

Non Economic Factors And Asset Valuation

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Abstract

Focuses on the concept of perceived value in a multi-dimensional space (MDS) in which utilitarian and psychic factors of influence contribute to the value of an asset. Depicts valuation and purchase decisions relative to decision "thresholds." Offers a model that incorporates economic and non-economic factors in the valuation process. Includes conceptual background and:

- ?? Examines perceived value of an asset separately from the price of an asset.
- ?? Models the valuation process as a function of: utility-economic factors and non-economic or psychic based factors. Allows interactive effects between utility and psychic factors. The multi-domain space allows for -- but does not insist on -- the influence of "non-economic variables" in behavior and in the pricing of assets.
- ?? Provides a vector depiction of the perceived value of an asset in terms of utility and psychic contributions.
- ?? Advances the concept of the action threshold barrier.
- ?? Relates multi-domain space, the action threshold, and interaction with market opportunities.
- ?? Portrays human decision making and resultant perceived value of an asset in terms of joint effect space.
- ?? Depicts a multivariate model that captures economic and psychic variables.
- ?? Provides several hypotheses related to perceived values, thresholds, and the determination of the value of an asset in multi-domain space.
- ?? Offers specific suggestions for possible research. Relates these avenues of research to practical implications.
- ?? Introduces the notion of continuous scale dummy variables and suggests their potential use in determining the presence of interactive effects.

Non Economic Factors And Asset Valuation

"A man knows the price of everything, and the value of nothing."
Oscar Wilde (Oscar Fingal O'Flahertie Wills)

I. Introduction

This paper focuses on the concept of perceived value, "thresholds," and their relationships with a market(s) for an asset. It incorporates economic and non-economic factors in the valuation process. In particular, the author characterizes:

- ?? The perceived value of an asset by an individual(s) separately from the price of an asset.
- ?? The valuation process as a function of: utility or economic factors associated with asset ownership (utility space); non-economic or psychic based factors (psychic space); and interactive effects between utility-economic and non-economic psychic factors (interactive space). The combined effects of these multivariate spaces yield a multi-domain space. Multi-domain space allows for -- but does not insist on -- the influence of "non-economic variables" in behavior and in turn, in the pricing of assets.

The paper offers a conceptual background and then:

- ?? Provides a vector depiction of the perceived value of an asset in terms of utility and psychic contributions.
- ?? Advances the concept of the action threshold barrier and its importance relative to perceived values and market opportunities.
- ?? Characterizes a multi-domain space, which includes the utility and psychic space and perceived value.
- ?? Describes joint effect space consisting of multi-domain space, the action threshold, and interaction with market opportunities.
- ?? Ultimately portrays human decision making and resultant perceived value of an asset in terms of joint effect space. This joint effect space allows for the influence of economic and non-economic variables and the action threshold on price discovery.

- ?? Depicts a multivariate model that captures economic and psychic variables. This model will serve as a basis for empirical efforts aimed at improving understanding the behavior of people and the implications for the valuation and separately, the pricing of assets.
- ?? Provides several hypotheses related to perceived values, thresholds, and the determination of the value of an asset in multi-domain space.
- ?? Offers specific suggestions for possible research. Relates these avenues of research to practical implications.
- ?? Stimulates thought and welcomes the benefit of additional insights as well as ideas at variance with those of the author.

II. Background

Perceived Value

The perceived value (PV) of an asset by a person is conceptually and distinctly different from the market price of that asset. Perceived values may diverge considerably from the existing market price. Perceived value and the interaction of perceived value with markets results in the behavior and actions of people and may -- but not necessarily -- influence price discovery. Determination of perceived value for an asset occurs in the individual's mind. Interactive effects of the individual with the market(s) for an asset can influence the perceived value of the asset. Depending on circumstance, an individual's perceived value may influence the price of the asset. On an aggregate basis, only a subset of those who have established a perceived value of an asset acts in markets and influence price discovery.

Overview

Economic and psychic (defined as all non-economic) factors influence the perceived value of real and financial assets. Perceived values by individuals of an asset provide importance because of the role of perceived values in behavior and the pricing of assets. Perceived values of an asset by individuals, human thresholds for decision making, and the interaction of factors such as offered price, supply, demand, and the actions of a subset of people result in the observed market price. Understanding and modeling the joint effects of economic and psychic factors in the value assigned to assets are important. Such efforts will allow one to better understand the valuation process, the pricing process, and a host of behavioral issues related to how people value assets and implications

in turns of behavior.

Psychic need fulfillment increases perceived value above economic or utility value. The psychic contributions to perceived value of an asset vary and are important in delivering need fulfillment and satisfaction. For a subset of individuals, ownership of that "special pen" with the white design on the top of its cap (and for some individuals, the importance of displaying the pen in a pocket or using it in public) represents a significant proportion of total perceived value of the asset. Even in the case of financial assets, some people will pay more for the asset because of psychic influence. For example, in some instances the name of the company in an IPO does affect the price at which shares can be sold.

Psychic factors influence valuation of assets -- including risk free assets -- in other fashions. For example, psychic factors influence the price of risk, allocation of resources to risky vs. risk free assets, and hence to some degree, even interest rates. The magnitude of influence and the relative importance of economic factors versus psychic factors and effect on perceived value and possible price discovery do vary with market "mood," or "sentiment."

Previous Research

Price discovery occurs in markets. Researchers have explored and provided great insight on price discovery, "pricing mechanisms," and the "efficiency" of markets. Still others have provided models and insights depicting how rational people making economic decisions ought to behave and the resulting implications for the pricing of assets.

In contrast, researchers have focused less attention on the perceived value of an asset -- distinct from the observed price of an asset -- by an individual. Relatively few attempts characterize the influence of "non-economic" and "irrational" economic decisions on the perceived value of an asset. Non utility, non-economic factors do influence the perceived value of an asset and sometimes ultimately influence the resultant price of that asset. People will pay \$1,000 US for a fountain pen even though an alternative and attractive pen with the same utility sells for \$8.00 US -- and one that is not attractive but may in fact write better sells for as little as \$0.10 US.

Interestingly and counter to most prescriptions of rational economic behavior, the fact that the offered price of the pen is sufficiently high and will remain "protected" at a high price may result in greater perceived value. For some, the high price of the pen actually adds to need fulfillment and satisfaction. Such phenomena in terms of human behavior may be irrational in terms of economics, but very rational in terms of psychic need fulfillment adding to non-monetary utility.

Non-economic, "Non-monetary" Utility

Undoubtedly, you have noted even famous economists with a handsome pen with the imprimatur of a white star on its cap. Their purchase behavior is not irrational. They understand that the "value of things" to them may differ considerably from a price determined purely from monetary-utility factors. They recognize non-monetary factors can contribute to a person's utility realization. Rather than just knowing about the pricing of assets, they have decided on the "personal" value of certain assets. These economists and other people simply realize and accept that rational -- as well as irrational -- behavior can exist and also can prevail outside the realm of pure utility-economics.

Implications Of Perceived Value

The notion of non-monetary contributions to perceived value has profound implications, both conceptually and practically. For example, theoretically we posit that current price discovery "exchange mechanisms in competitive markets" will not necessarily lead to the optimum allocation of resources in an economy or by a firm.¹ An example of practical implications of perceived value theory: knowledge of how a potential segment of customers perceives the value of a product or service can guide a pricing strategy -- sometimes including pricing segmentation -- yielding increased contribution margin to a company selling product or services. Only incidentally will this contribution margin equal the margin realized through discovery in markets of a single price for an asset.

Decomposing Perceived Value

The perceived value of an asset by an individual at a point in time derives from a host of factors. We initially categorize contributions to the perceived value of an asset in two categories.

- ?? Utility-economic resulting from monetary-utility relationships.
- ?? Psychic contributions, capturing all other non-monetary contributions to perceived value.

Multi-domain & Joint Effect Space

After introducing other concepts, we will provide details. An overview for now: utility and psychic space provide a multi-domain space (MDS) in which a person arrives at a perceived value for an asset at a point in time. Figure 1 depicts the relationships. Joint effect space (JES) consists of the multi-domain space, what we will describe below as an action threshold, the market(s) for and asset and interactive effects.

Figure 2 portrays JES. Behavior and associated trading (or non trading) of an asset hinges

on relationships in joint effect space. Price discovery occurs in the market(s) under the influence of a subset of individual agents potentially active in the market. Only individuals whose perceived value exceeds the threshold for the asset potentially participate in price discovery. Of these, a smaller subset actually find market opportunities conducive to their participation in the market with resultant price discovery precipitates at the margin and reflects the influence of participation contributing to price discovery for the asset.

(Insert Figure 1 and Figure 2 about here.)

Joint Effect Space

The market price of an asset distills from an interplay of perceived values, action thresholds, and market opportunities, and the subset of possible market participants who actually participate in the market. A joint effect space model reflects that the observed price of an asset for most market agents usually differs from the value of an asset as perceived by an individual. Furthermore, it is the behavior of just a subset of individual agents who interact and trade at the margin to reveal current price that results in the observed price of an asset.

Market Interaction

Knowledge of how people arrive at the perceived value of an asset at a point in time, the relationship between perceived values by individuals constituting the "relevant" population at a point in time are important in terms of understanding resultant market prices and returns. Offered price also can affect the composition and size of the potential "purchasing population," perceived values, the resultant supply, demand and attendant price for an asset, and the aggregate contribution margin realized by the selling agent.

Vector Representation

An individual may deliberate in both the utility or psychic multi-domain space. However, at any moment in time when the individual has arrived at a perceived value, the perceived value reflects the net influence of utility and psychic space. Perceived value thus stems from joint domain space. Individual valuation of an asset in joint domain space yields a perceived value summarized in a vector in economic-psychic space.

Figure 3 offers a vector portrayal of perceived value (PV) by an individual (i) of an asset (A_j) at time (T_k). The representation relates the resultant perceived value vector to the relative contributions of utility and psychic space as well as interactive effects. Sub-vectors (hypothesized

to total 19 for this person at this point in time for this asset) representing different variables of varying levels of influence in multi-domain space yielded the PV_i . Remember, we are referring to an individual, an asset, and always at a point in time. Some additional comments about the vector PV_i :

- ?? The length affects the potential price a person will pay for an asset.
- ?? Since individuals vary in risk aversion for risky assets, an equal length vector does imply each would be willing to pay the same price for a risky asset.
- ?? The orientation of the vector with respect to internal-external provides indication of, for example: the likelihood advertising or comments of a salesperson will influence value perception person; whether the person is an innovator or an imitator; whether the person will be influenced by crowd behavior or the report by an analyst about a security; and many other issues left to another paper.
- ?? Weighting with respect to the utility-economic axis provides other insights. For example, the extent to which a person will evaluate product features in arriving at perceived value. A high utility person would assess whether the designer or classic pen does write several hundred dollars better than an alternative pen.
- ?? Vector orientation in the three planes reflects numerous other possibilities. One person might purchase shares of a particular share of stock based on expected economic benefits of ownership. Another might purchase the same stock because a friend purchased the stock (high external psychic influence) and he does not even understand how to evaluate the expected benefits of ownership. Others may purchase stock because "everyone else is buying" and it seems the only thing to do. For example, there are a number of people who have and are purchasing mutual funds without the knowledge of even knowing how to find out the price of a fund share. Still others are in an "equity fund," and do not know what equity or common stock represents.

(Insert Figure 3 about here.)

Action Threshold

An action threshold (TH) exists for an individual (i) with respect to an asset (THiAj). A host of variables determine the threshold's position in utility-psychic space. The resultant behavior of an individual derives from interaction of the perceived value of a specific asset at a point in time given the action threshold and given opportunities in the market for the asset (Maj), written as $(PV_i|TH_i|Maj)$.

If the perceived value vector penetrates the threshold or alternatively withdraws from the threshold, the individual seeks to act. He or she: does not buy, buys, sells, or holds the asset depending on the interplay of his/her perceived value, action threshold, and opportunities in the market(s). The ability to effect the desired trade and the terms of the trade depend on the market(s) for the asset.

Figure 4 depicts an action threshold for a person (AT_i) at a point in time with respect to an asset. Currently PV_i does not pierce the AT_i . Perceived value vector penetration of or withdrawal from the threshold may result from a change in threshold location, a change in perceived value, or a combination of both.

(Insert Figure 4 about here.)

Figure 5 reflects a change in the threshold, a change in the PV_i , and a change in the number of sub-vectors contributing to the PV_i . These changes may have resulted from the influence of advertising. We defer discussion of specifics of the threshold to another occasion and offer just an example. A parent watching a news report sees a house in flames and the reporter indicates a child is trapped inside. The parent changes his perceived value of smoke and fire detectors (PV increases) and at the same time, the action threshold moves in. The person goes to the store and buys a smoke detector for his child's bedroom and for his own -- the decision to purchase made independently of the existing price.

(Insert Figure 5 about here.)

Individual Influence On Price

The relationship of perceived value to an action threshold for an asset and price existing or discovered in the market determine whether an individual buys, sells, or holds the asset. In this interaction, an individual's action may or may not influence observed price for an asset depending on whether or not the perceived value and action threshold interact with the market mechanism at the margin. Exchange of assets occurs between those most willing to sell and those most willing to buy. The resultant "discovered price" does not reflect the perceived values of the asset by those who did not participate.

Multi-Domain Space: Decomposition

Classification yielding the domains of influence and behavior in the mind rests on the nature of the variables, the decision process associated with these variables, and the resultant behavioral influence. Such classification provides a basis for initial models of valuation that capture economic

and psychic behavior, both rational and "irrational" in both utility and psychic space. The space classification for multi-domain space are:

- ?? Utility-Economic space (US). Customary economic models of valuation such as the discounted cash flow model for assets fall in this space.
- ?? Psychic space (PS). Composed of all variables not in utility-economic space. The origin of influences on behavior prompts decomposing psychic space into internal (IPS) and external psychic space (EPS).
- ?? Interactive spaces (IS). Joint domain space is an interactive space, as are:
 - ?? Utility and psychic-internal (UPI)
 - ?? Utility and psychic-external (UPE)
 - ?? Psychic-internal and psychic-external (PIE)

Exhibit 1 offers some additional comments on aspects of utility and psychic space.

Figure 1, offered earlier, characterizes the regions of multi-domain space. The addition of the action threshold and market opportunities provides the joint effect space previously shown in Figure 2. Joint effect space (JES) potentially results in an action space since individuals may take action depending on perceived value, their threshold, and the opportunity to act provided by market(s).

Utility-economic space (US) represents factors of influence and behavior viewed as rational and logical in an economic sense. Variables of influence and behavioral influences not germane to US fall in psychic space (PS). Many "dimensions" define the psychic space. "Emotions" represent some elements of psychic space, as well as possible instinctive or intuitive influences that arise (consciously or unconsciously) for other than utility-economic reasons.

Psychic Dimension Example

Although we defer a detailed discussion of psychic space to another occasion, limited discussion illustrates the range and potential power of influence of the psychic domain of the mind.

Figure 6 depicts a dimension with a single descriptor. Proceeding in either "direction" on this dimension offers other "states" and associated descriptors. Possible descriptors for alternative states of mind -- and at the extremes, beyond states of mind to physiological response -- appear in Figure 7. The order, choice, and spacing of descriptors reflect assessment by one individual. Individuals would not necessarily agree on all aspects reflected in Figure 7. This lack of agreement is precisely one reason why perceived values for the same asset vary across individuals. The

perceived value of certain assets would vary considerably depending on psychic state. The value of an escape ladder would increase as sounds of bursting glass reach you, you hear air being sucked out under the hotel room door, and you witness the fire burning through the door.

(Insert Figure 6 and Figure 7 about here.)

Multiple dimensions exist in psychic space. Not all are "emotional." By definition, none are "economic" since our depiction places economic factors in utility space. For example, physiological dimensions also exist. The reaction of a human to changes in temperature influences many dimensions. Segments of one physiological dimension along with a different "emotion" dimension appear in Figure 8. Different stimuli can result in the same physiological response but for different reasons. Example: You may have "goose bumps" because of a change in temperature. You may also have "goose bumps" in response to someone relating a story or reporting an incident. This is an example of the same physiological response to different stimuli "operating on or within" different dimensions of the mind.

(Insert Figure 8 about here.)

In addition, in multi-dimensional space "proceeding along" different dimensions sometimes results in the same outcome. Emotional response can result in paralysis, perhaps even a coma or death. In a similar fashion, extreme cold can result in a coma and death. For some dimensions, extending the dimension in the "other direction" may lead to the same ultimate outcome: extreme heat brings death.

Some behavior in the psychic realm may appear irrational from the economic perspective but quite rational in the contest of psychic space. Psychic space can exert powerful influence on behavior. Consequently, psychic space effects do have an impact on the perceived value of an asset.

Multivariate Model

We admit the model presented enjoys no generally accepted theoretical basis. We provide the model without extended explanation of the assumptions about human behavior and without defense of the inclusion of certain variables in the model.² Instead, we welcome the criticism that the model is speculative. We do not seek consensus. Divergence of thoughts affords the chance for discovery. We welcome the prospect of provoking thoughts and welcome fresh ideas from others. These initial rudimentary explorations seek to understand how to best characterize and model aspects of human behavior related to the perceived value of assets. Ultimately the goal is to continue explorations with the aim of unearthing interrelationships between perceived value and markets as well as practical implications related to the pricing of assets and the allocation of resources by markets.

In particular, the authors seek ideas concerning additional variables to employ in analysis. Second, since perceived values are not observable, the empirical challenges are great. Survey input from individuals regarding the perceived values of an asset may offer promise. For example, one might be able to obtain the assessed value (as opposed to the current market price) of a company's stock from a number of analysts as a proxy for his/her perceived value for a company. The selection of a scale for use in survey input is a great challenge if one desires to have variables measured on a scale consistent with the underlying assumptions of various methods of analysis.

Figure 9 expands the notion depicted earlier in Figure 1. It provides a schematic showing characterizing a model. Later the paper provides a more detailed representation of the model.

(Insert Figure 9 about here.)

III. Model: Overview

The behavior of an individual gives rise to individual perception of the value of an asset. The model recognizes the perceived value of an asset stems from individual behavior reflecting both economic and psychic considerations. It also allows for conscious, unconscious, dominant, influence, and internal and external effects of variables on an individual. Notes on these issues appear in Figure 9. Decisions resulting in the PV_i may result from:

- ?? "Rational" decisions in the economic context.
- ?? "Irrational" decisions given the prescriptions of economics.
- ?? From rational and/or irrational behavior and decisions made in the context of "psychic" regions of the mind important to the individual independent of the economics.
- ?? Interaction of economic and psychic space factors, e.g., moods and sentiment affecting the "price of bearing risk."

The model characterizes the perceived value vector of an individual for an asset at a point in time with a summary vector. The perceived value vector PV_i results from two sub-vectors:

- ?? An economic or utility vector representing the contribution to value of economic and/or utility of an asset as perceived by an individual given individual circumstance and

expectations.

?? A psychic vector contributing to perceived value reflecting additions to perceived value resulting from behavior unrelated to economic factors.

In addition to identifying the proportional contributions of the economic and psychic vectors to perceived value of an asset, the model desegregates the psychic (non-economic, behavioral) vector into "external" and "internal" psychic components.

The external component captures the contribution to perceived value stemming from an interaction effect of the individual with other behavioral agents. The influence of crowd behavior on an individual's perception of value is an example of an external psychic effect.

The internal component represents the augmentation to perceived value independent of interaction effects of other people. An individual liking an expensive pen solely because of how it works, feels and how it looks without regard to the social message or aspects of having such a pen represents an internal psychic effect that influences the perceived value of the pen.

Psychic factors can play a role in the perceived values of real and financial assets. Some individuals wanted shares in the IPO of Netscape because they thought it would represent a good economic investment. Perhaps one factor these individuals considered in their economic analysis was the behavior of others that would lead to share price behavior at least initially yielding attractive returns, "the fast buck." For example, some rational economic agents may have purchased shares in anticipation of irrational economic behavior by others.

On the other hand, some that purchased Netscape shares wanted the shares for psychic reasons. This subset of investors also contributed to resultant price behavior even though some had not even a remote notion of the nature of a share of stock and the economic consequences of owning stock. Although such behavior may not pass the test of rational economic behavior, it may derive from rational behavior in the context of need fulfillment not measurable by the "economics." Still, the behavior of such individuals influenced share price.

Expanded Model

The utility-economic vector captures the effect of economic variables on perceived values. Example: the economic benefits of owning a bond in terms of expected cash flows, risk, and attractiveness compared to alternative investment opportunities. For a bond, one expects rational economic behavior will result in a perceived value summary vector having all or substantially all of the vector attributable to the economic component. However, for certain assets (including financial assets during periods of "excess") the psychic vector reflects additions to perceived value traceable to non-economic factors. Example: the value to some owners, independent of functional utility, of a

particular pen having a unique white trademark design on the top of its cap.

The model:

- ?? Leaves the classic economic variables and their effect on perceived value in tact.
- ?? Allows for "psychic contributions" to the perceived value of an asset. The model decomposes the psychic value vector into secondary components or sub-vectors representing internal as well as external psychic based factors. The dichotomy into external and internal influences is important in many applications such as advertising and point of sale influence.
- ?? Classifies sub-vectors contributing to the psychic and utility components as core and overlay, dominate and influence, external and internal. For terms previously not used
- ?? Core factors are common to all people (e.g., fear in the face of certain circumstances). The influence of core factors varies among people and across time.
- ?? Non-core overlay contributors to the psychic vector are transitory in presence and weight. Rather than always present to some degree (core), these influences are transient. Under certain circumstances these factors are present with some weighting.
- ?? Dominant variables usually always have a high weight. Influence variables have greater variance in weight depending on circumstance and/or the asset.
- ?? Unique factors are individual specific and contribute their influence either "all the time" or only under certain conditions. Certain "personality traits" whether innate or developed might result in unique factor influence. These are not given separate variable status in the model and they will exert their influence on the error terms. We may later add separate variables for unique factors.
- ?? Recognizes influence in utility and psychic space may derive from both the conscious and unconscious.
- ?? Allows for different economic and psychic components and weighting across individuals and with respect to each individual, across time and circumstance. For example, only under certain circumstances does crowd psychology seem to influence a large number of people. In addition, crowd psychology influences individuals to a different degree, and may not affect some individuals at all.
- ?? For economic and psychic factors, the model characterizes the weighting of each factor for each individual at point in time t as an element of a distribution of weights. The

characteristics of the resultant distribution of weights of individuals give weighting for the factor. For example, concentrated consensus (low variance) on expected growth in earnings for the "market" may result in a heavy weighting of expected growth in earnings of the market resulting in a greater influence of this expectation on market valuation.

- ?? Takes account of interaction between perceived economic value and psychic factors. For example, at a point in time psychological factors may cause one to assign greater value to the utility of ownership.
- ?? Offers a sample array of psychic based variables useful in the examination of perceived value and the observed price and return behavior of assets.
- ?? Incorporates the concept of the action threshold for decision making and the influence of the action threshold on the purchase decision as well as price of an asset.

Variable Identification

Identifying an array of variables that may directly or as a proxy measure psychic factors contributing to the perceived value of an asset represents a formidable challenge. In addition, some psychic variables are specific and have weighting only to subgroups of the population. For example, membership in an affinity group such as retired military might serve as a proxy for certain psychic factors including "patriotism." To the extent such affinity does influence perceived values, "made in the (person's home country)" may cause members of this subgroup to add some increment to perceived asset value.

Other variables likely influence a large majority of the population without regard to particular demographics or affinity. Separately examining different affinity groups may result in identifying factors present across all groups and separately, factors having important weight only to a particular affinity group. For example, one may find certain psychic factors present and with relatively high weights for affinity groups concerned with nature and with the environment.

Some existing variables employed by analysts offer promise. Measures of consumer sentiment and indicators of consumer confidence are possible candidates for variables.

A variable may operate in both utility and psychic space. Factors such as interest rates may affect both economic and psychic components of valuation differently for different people. Low mortgage rates may prompt some people to decide to buy a larger house based on rational economic analysis of the relative attractiveness of interest rates given expectation about future interest rates. The price such individuals are willing to pay for the asset is independent of the availability of the low rates. These rational economic agents detect the over-pricing by the seller of

the house because the seller seeks to take advantage of buyers having a high psychic influence.

For other potential buyers, psychic factors contribute more to the perceived value of the house. The low rates and the chance to buy a larger house and "finally get the house we want" affect mood, perceived value, and or the action threshold. The importance of psychic buyers may result in a willingness to pay more for the house because of the significant influence of "psychic drivers" in the purchase decision. The net economic effect (low rates offset by higher purchase price) may result in these individuals actually paying more (net) for the dream house than they would have paid when mortgage rates were higher. Despite this, they may be happier about the outcome.

A Model Form

Exhibit 3 provides the basis for a model. The form of the final model selected for empirical work will depend on the selection of the method of analysis. We must admit that we have no preconceived notion that argues for a linear, additive-interactive model. Notes related to the model appear as part of the exhibit.

Error & Miss-specification

Efforts to decompose error and miss-specification, and interactive effects pose a special challenge. Opportunities to unearth interactive psychic-utility require a sufficient sample size of individual perceived values for the same asset. Preliminary efforts suggest a possible new technique: creating and including newly defined variables that are some combination of hypothesize separate utility and psychic variables. We term these "continuous scale dummy variables (CSDV)" since they may take on values other than the normal binary 0,1. The approach using the CSDV is in some sense convoluted, but we think it offers great promise. To our knowledge, others have not described the proposed method.³ Details on original efforts to formulate this method appear as Appendix A.

Possible Empirical Techniques

Several empirical techniques may prove useful in exploring the relationships related to perceived values, economic utility, psychic factors, and the market(s)-pricing mechanisms. Empirical experience may suggest alternative methods. The choice of a multivariate analysis technique hinges on the specific factors of interest. For example, attempts to identify common psychic factors that seem to influence equity investors might suggest orthogonal factor analysis. Regardless of the choice of method, likely empirical samples will not conform to the underlying assumptions for most techniques. Consequently, we must exert caution in relying on any "statistical significance." Nevertheless, careful use may proceed along several avenues.

- ?? Employing canonical correlation to unearth latent variables which influence other variates or to investigate the dependence structure among variables.
- ?? The use of principle components, perhaps to summarize a utility, external psychic, and internal psychic vector.
- ?? Using discriminate analysis to distinguish and create groups that vary in terms of the importance of psychic influence on behavior. One might also discriminate according to the importance of external versus internal psychic behavior on the effectiveness of advertising, purchase decisions or whether or not a brokerage house might solicit business from subgroup of potential clients (those who respond to external influence) compared to another group (those not influenced by external interaction.)
- ?? Application of factor analysis to discern what utility or psychic based variables customers associate with a particular product or service.

IV. Hypotheses For Future Research

Some hypotheses that may prompt additional thoughts and research ideas by readers include: We postulate the psychic domain has influence in several ways including:

- ?? the psychic influence on the price of risk.
- ?? effects on the total perceived value (utility + psychic value) of an asset.
- ?? altering the portion of the "action threshold" for decision making.
- ?? through interaction with the utility domain, affects the perceived utility value of an asset.
- ?? the response to change in circumstance (for example, continuing to hold a stock following a loss in value with hopes the price will go up "to what I paid for it" even though rational analysis does not yield a conclusion suggesting improved price and recover of analysis)
- ?? "influence risk" associated with a decision that results from external psychic contributions, e.g., the influence of "the crowd" on the behavior of an individual investor.

We postulate with respect to psychic value:

- ?? perceived psychic values of an asset affect the market price(s) for assets.
- ?? the perceived value of an asset varies across individuals due to psychic and utility reasons.
- ?? for an individual the perceived value of an asset varies
 - ?? according to circumstance.
 - ?? mood.
 - ?? interactive effect of individual's utility-psychic space.
 - ?? interactive influence of individual with another person'(s) psychic and or utility space.
 - ?? interactive influence of individual with the environment, the environment including the market(s) for an asset.
- ?? the proportion of total perceived value traceable to the psychic domain varies considerably across time and circumstance. For example, high external psychic influence characterizes periods of "market excess" and investor "speculation" and developing "investor frenzy."

Research Opportunities

Numerous research possibilities exist that focus on perceived values of assets, thresholds, interaction of people with market opportunities, and the resultant behavior of people and in turn, prices and returns for real and financial assets. Other avenues of research address implications for a firm pursuing the creation of value. For example, for some products or services, understanding factors that result in the perceived value of an asset is also important in terms of pricing and production. A partial list of potential research opportunities appears in Exhibit 2. For the first research topic, we sketch an approach that may prove fruitful.

Determining The Effect Of Psychic Factors On The Price Of Risk

For example, examination of the change in Price/Earnings ratio for a major stock index controlling from economic variables such as changes in analysts forecasts of earnings for the index, expected growth in earnings, and other economic variables thought to influence the P/E ratio. The unexplained "residual change" in the P/E may be partially explained by variables reflecting the influence of psychic space on the price of risk and the resultant P/E. For example, "consumer confidence index" and variables purported to measure the mood of investors may explain a portion

of the change in P/E not accounted for by variables in utility-economic space.

This approach provides only indirect measures since the change in P/E ratios derives from only the subset of potential investors who actually participate in the market. On the other hand, the absence of participation by the other set may also affect the P/E ratio for the index. Examination of periods of "market excess" and periods preceding "market corrections" may unearth psychic space effects on the P/E and other measures.

For certain assets on some occasions, the perceived value of an asset by many of its owners equals or approximates the observed market price. In other instances, considerable divergence may exist between perceived values and market price. The perceived value of an asset stems from a host of factors an individual somehow integrates with result of perceived value.

V. Summary

This paper distinguishes between perceived values and the price of an asset. It traces perceived values of real and financial assets to multi-domain space that allows for utility-economic effects and psychic effects; introduces the concept of individual action threshold for each asset; relates perceived values and the action threshold to market opportunities and resultant price discovery in joint effect space; depicts the circumstances under which individuals act and buy or sell an asset given PV thresholds and PV; offers a multi-factor model for asset valuation that allows for economic and psychic variables and interactive effects; suggests psychic variables potentially useful in conjunction with economic variables to support research; and suggests several topics for research.

Notes

1. Perceived value of an asset by an individual at a point in time influences the acceptable price to that individual of the asset. The author is exploring the implications of the "acceptable price principle" in terms of effects on price discovery, the allocation of resources in an economy, as well as practical implications for individuals and companies.
2. Current research in progress focuses on a variety of issues such as core, dominate, overlay, influence variables as well as "conscious and unconscious variable influence" and issues related to "instinct." We intentionally limit the discussion of these factors in this paper. The author welcomes the opportunity to work with others in this area.

3. We would appreciate readers advising us if they have seen this technique used previously.

Please Note

Because of a formatting problem, a couple of extra blank pages appear between some exhibits. Please scroll past any blank pages.

Utility Space: Realm of mental influence in which consciously or unconsciously sense, evaluate, and make decisions about the match of an asset in meeting utility needs.

Utility Value: Portion of perceived value attributable to rational "economic analysis" associated with ownership of the asset.

Mind Domain: Rational, in the sense of "classical" economic decision making. Logical. Conscious, unconscious, preconscious influences.

Examples: "The cash flows and risk of this investment seem attractive and ..."
"We need a place to live and this house will meet our needs."

Psychic Space: Realm of mental influence in which humans consciously or unconsciously sense or experience, assess and make decisions related to non utility need. Example. "I know she does not really need a new fountain pen but I really want her to have this one."

Psychic space reflects "internal" and "external" psychic influence. The internal and external proportion of psychic influence varies across people. For an individual, internal-external influence varies by circumstance, time, mood, and the nature of the decision (e.g., buying a long sought after stamp for his collection vs. purchasing a new washing machine).

Psychic Value: That portion of perceived value that exceeds the utility value of an asset.

Mind Domain: Emotional realm or "psychic domain." Perhaps -- at least with respect to certain circumstances, e.g., "survival" -- influenced by primal brain and or the unconscious and preconscious. For example, instinct may affect the emotional realm of the Mind.

Examples: Purchasing a stamp "I have long sought" may result in a perceived value and threshold price that exceeds what an informed person (including the purchaser) would normally pay in current markets.

"I would like to own shares in this company. I think it is important ..."
"This house seems comfortable and I think we would be happy here."

Psychic Domain and "Influence Risk"

Influence Risk: The "net effect" in terms of hesitancy to own assets resulting from the influence of variables of the utility or psychic domain.

Example: Investors expect earnings for the market to increase above current market's expectations but do not purchase securities or even sell because of "feelings of uneasiness" not traceable to "economics." Increased risk aversion and an increased price of risk affects security prices.

- ?? Determining the effect of psychic factors on the price of risk.
- ?? Estimating the "speculative component" of market behavior.
- ?? Psychic influence (e.g., name of stock) on the pricing of IPOs.
- ?? The use of psychic variables to attract/maintain a stable clientele for a company's stock.
- ?? Perceived value and the concept of acceptable price.
- ?? Price discovery vs. acceptable price: implications for allocation of resources.
- ?? Differential pricing in market segments.
- ?? Mood effects and the purchase decision.
- ?? Influencing psychic variables to alter perceived values.
- ?? Manipulation of action thresholds to stimulate sales.
- ?? Identifying action psychic factors.
- ?? Unconscious variable(s) effect (e.g., innate fear) on perceived value.
- ?? External psychic influence on perceived value, threshold, and purchase decision.
- ?? Altering action thresholds to stimulate sales.

Appendix A

Continuous Scale Dummy Variables (CSDV)

Continuous scale dummy variables (CSDV) may be useful in various forms of multivariate analysis. To illustrate the potential technique, we proceed assuming we desire to detect utility-psychoic interactive effects important in individual determination of the perceived value of the same asset.

Separate from interactive variables, the model contains variables hypothesized as important in utility space, e.g., interest rates, mortgage rates, inflation rate, home purchase index, the price-earnings multiple for a broad equity market index, new car sales

The model contains separate variables thought to capture aspects of psychoic space, e.g., consumer confidence index, fine jewelry purchase index, sentiment index, ratio of bright-color new car purchases to staid color new car purchases, ratio of dollar value of certain options (hypothesized as non-economic utility) on new cars to base price of new cars,

The CSDVs are newly defined variables representing some combination of hypothesized separate utility and psychoic variables. These serve as what we term "continuous scale dummy variables (CSDV)" since they may take on values other than the normal binary 0,1. Examples of CSDV variables: the product of the consumer confidence index with the inverse of interest rates; product of bright-color-car ratio and the price-earnings for the market. For example, the "logic" for defining the color car ratio and P/E for the market hinges on the notion that, as people are more confident and less risk averse, they purchase brighter, more "aggressive" colors. Less risk averse would also change the price of risk and the P/E ratio. It might also result in greater confidence in growth expectations ... also a variable affecting the P/E ratio for the market index.

In the current scenario, use of this approach assumes psychoic-utility interactive effects in terms of interactive variables of importance and/or weighting of variables are equal only randomly for individuals.

Initial efforts to unearth true interactive variables require sample data on the perceived value for the same asset by a number of individuals. We randomly select a holdout sample and then randomly divide the remaining sample into a number of subgroups. No reported interaction effects by individuals are included in the raw data..

The technique allows for capturing the "potential error and miss-specification" in an initial group of the "newly defined composite utility-psychoic" variables. Let's hypothetically assume nine CSDVs. Ex ante, we do not know which of these nine variables collectively will reflect error and miss-specification. We do not want to "force" discovery of interactive psychoic-utility effects. Consequently, econometric efforts must allow classification of all nine CSDVs as error and miss-specification terms.

Ex post, classification as an interactive or error variables depends on the behavior of the

coefficients for each of the nine CSDVs compared across the subgroups. Recall, ex post, coefficient behavior may prompt classifying all CSDVs as variables capturing error and model miss-specification implying no detection of interactive effects.

Analysis of the data for each subgroup yields estimates of the coefficients for each CSDV. We preserve these estimates for use in a moment. Next, we randomly create fewer subgroups but of larger size and again estimate the coefficients. Last, we estimate the coefficients for the full sample less the hold-out group.

Comparison of the coefficients of the CSDVs estimated for different subgroups may allow one to discern if the CSDVs reflect errors and miss-specification effects as opposed to interactive effects. For example, coefficients of similar magnitude on the same variable across subgroups -- particularly if the stability of these coefficients increases as the number of observations in subgroups increases -- suggest these variables in fact reflect model miss-specification and error. This conclusion rests on the assumption that individuals only randomly have the same interactive effect. If this assumption is wrong, we have erred on the conservative side in that we end up classifying the variable as error rather than risk erroneous classification as interactive.

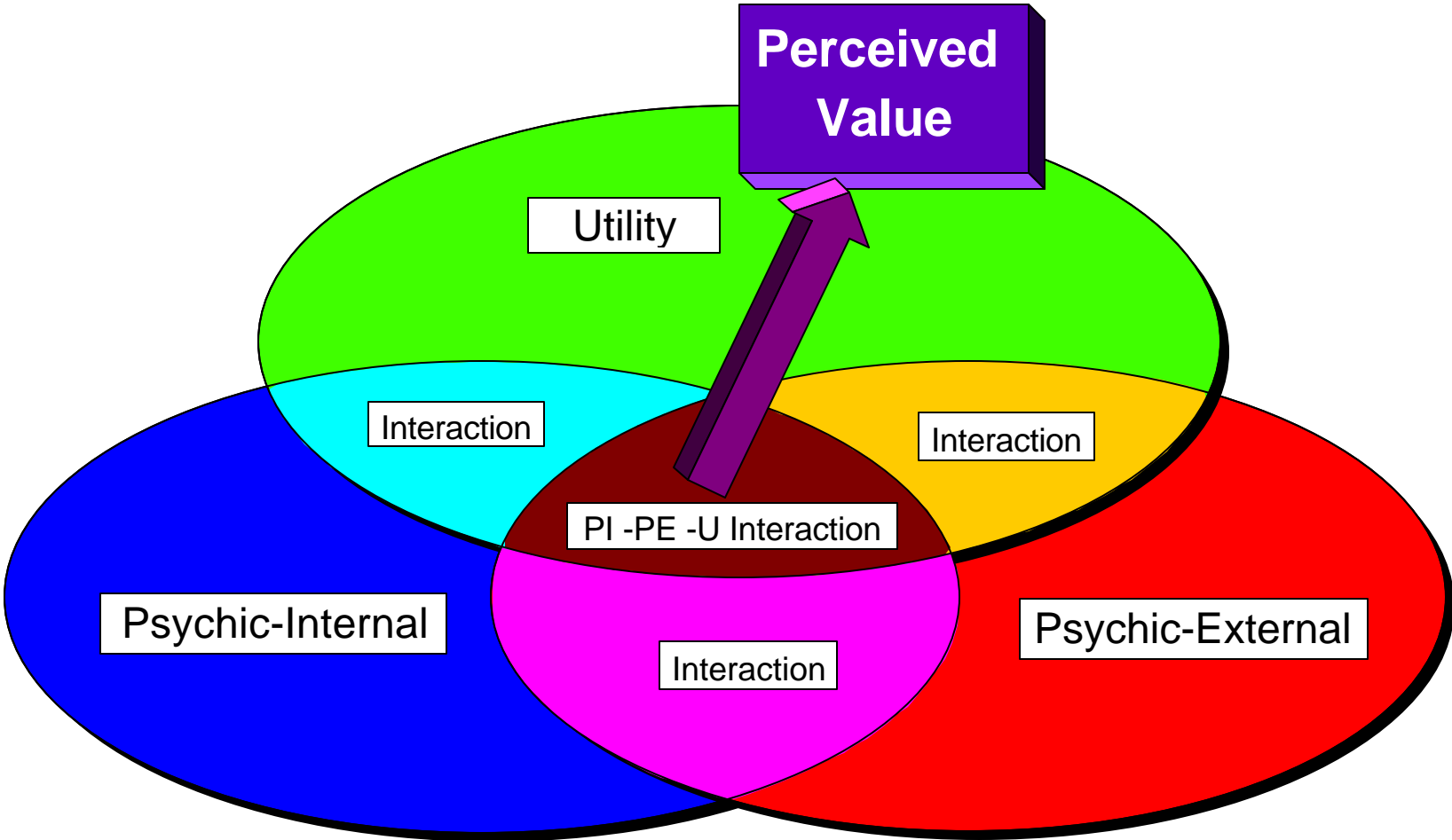
Let's assume we classify seven of the nine variables as non-interactive. The two remaining are interactive variables. We replace the seven variables with an error term and keep the two interactive variables. Next, we define additional CSDVs and repeat the procedure. Repeating this algorithm until we run out of ideas for potential interactive variables hopefully yields a final set of interactive variables and the customary error term. We use this derived model on the hold out sample to determine the proportions of PVi explained by utility, psychic, and interactive utility-psychic effects.

There may be a priori reasons to suspect different affinity groups would have different utility, psychic, and interactive variables (and/or different weightings of the same variables) explaining the perceived value of an asset. For example, people under 35 who drive BMWs may "view" and value a six-disc compact disk player somewhat differently than people over fifty whom own recreational vehicles.

To investigate these possibilities one purposely forms samples hypothesized as biased. Coefficient weights that differ across subgroups for the same "variable" may indicate interactive effect since we hypothesize interactive effects likely vary across people. Success at unearthing possible interactive effect variables now allows additional investigation. For example, one might hypothesize the interaction between bright-color-car ratio and the price-earnings for the stock market varies by age grouping or profession. Non random sub grouping according to age group and analysis might then find discernible differences in the coefficient for this variable across such sub groups.

Comparison of affinity groups with non affinity groups represents another potential application aimed at discerning which psychic variables are important to those in an affinity group.

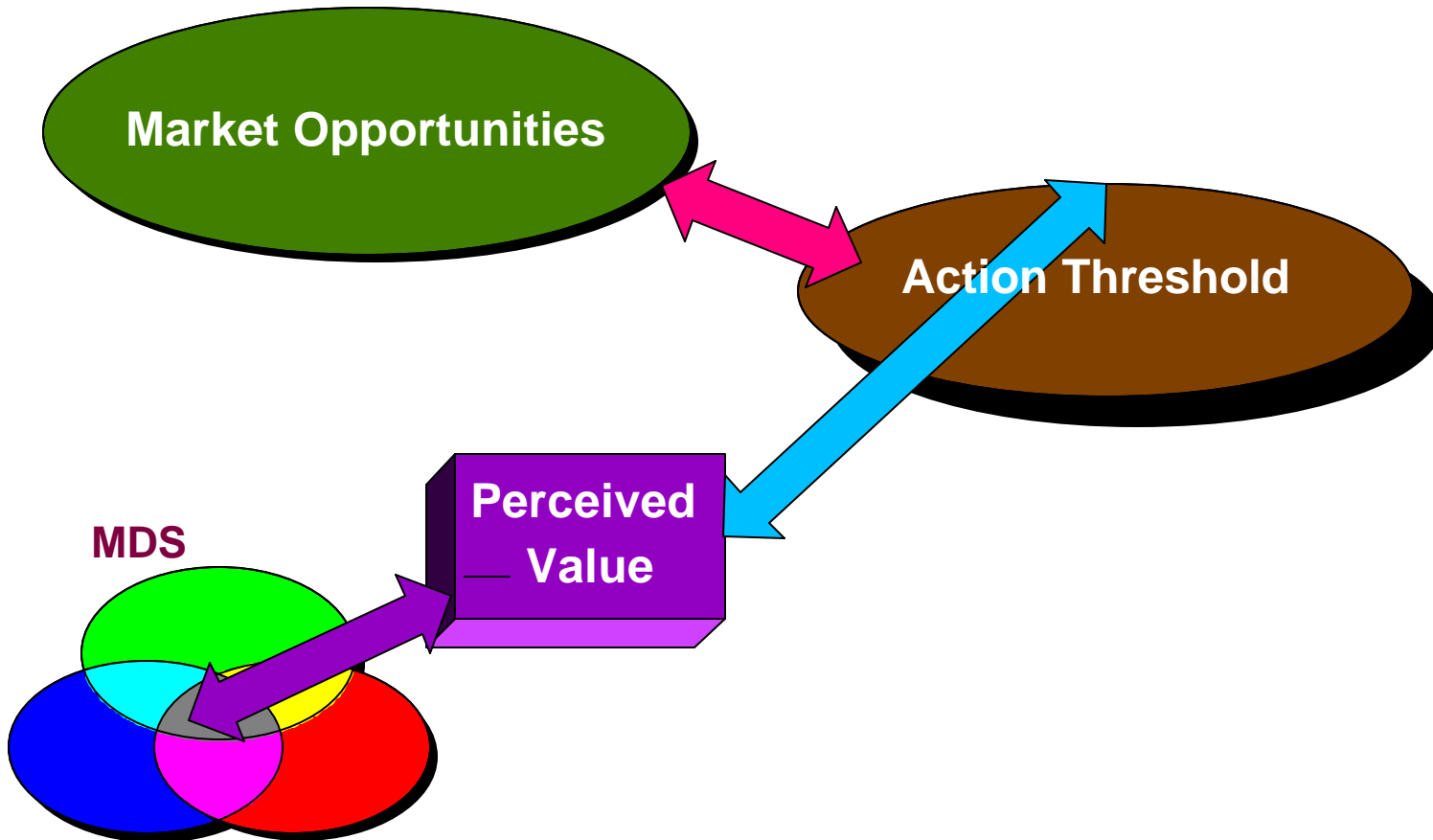
Multidomain Space: Perceived Value Vector



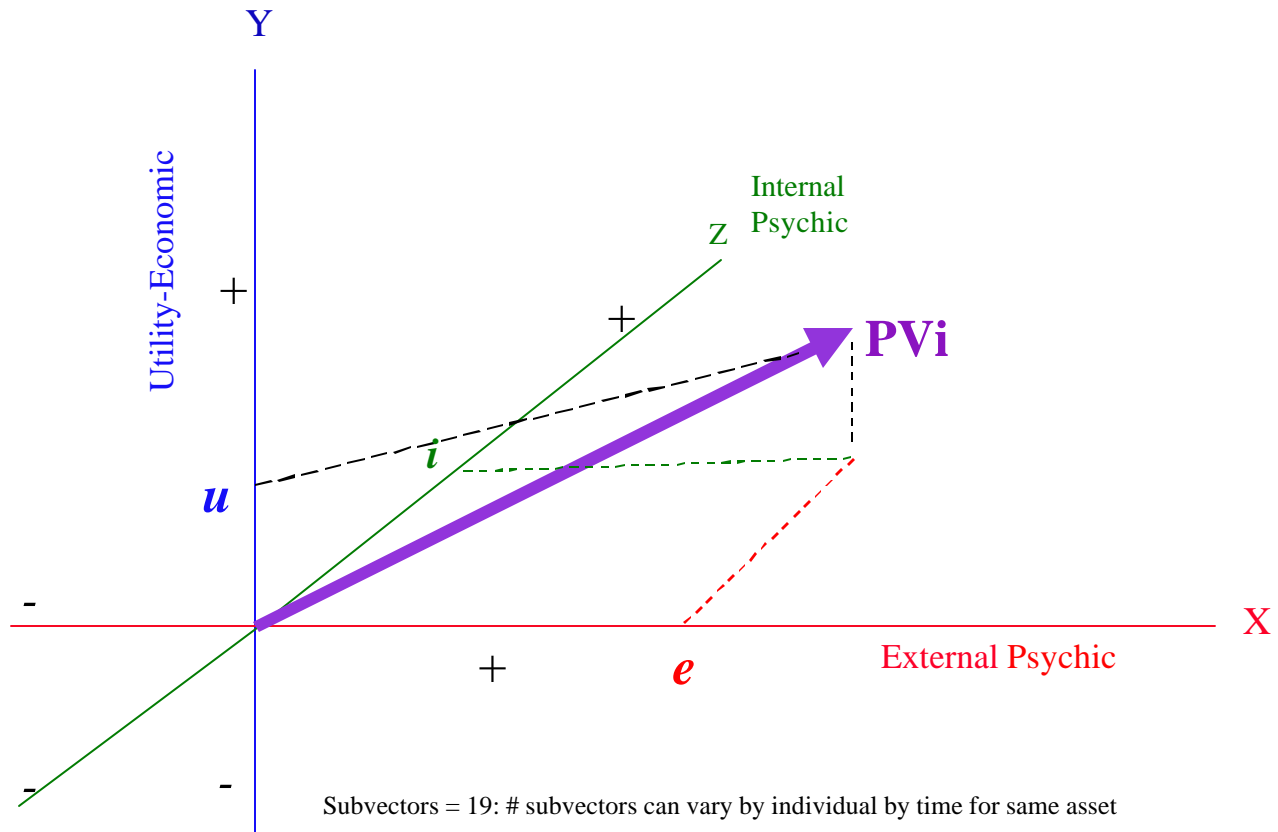
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Figure 2

Perceived Value, Action Threshold & Market Opportunities

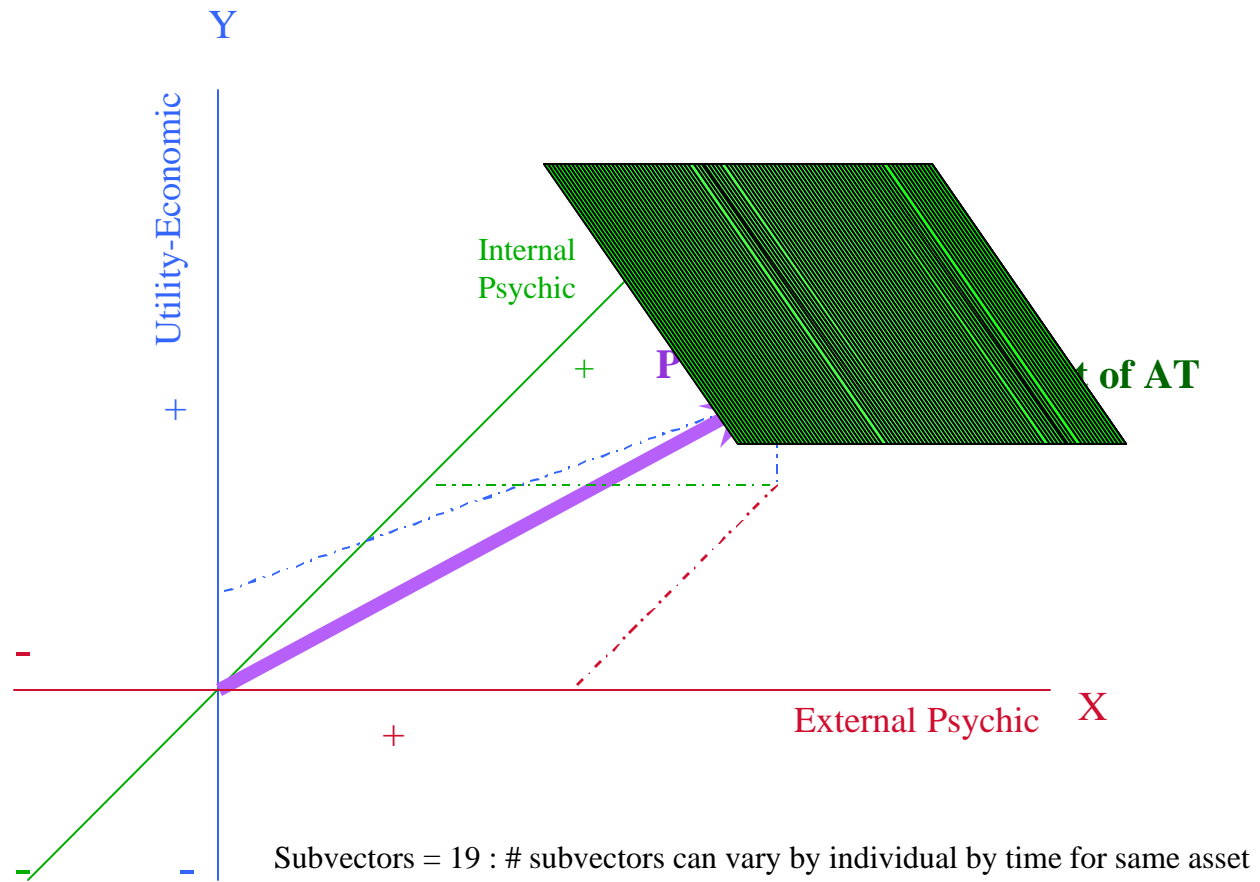


Perceived Value In Utility & Psychic Space



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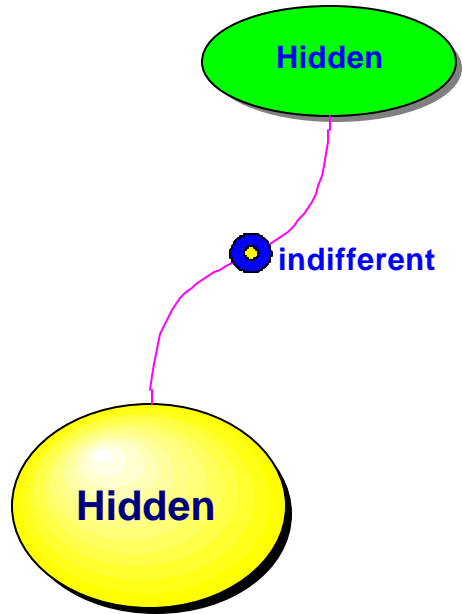
Figure 4
Perceived Value Vector & Action Threshold



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Figure 6

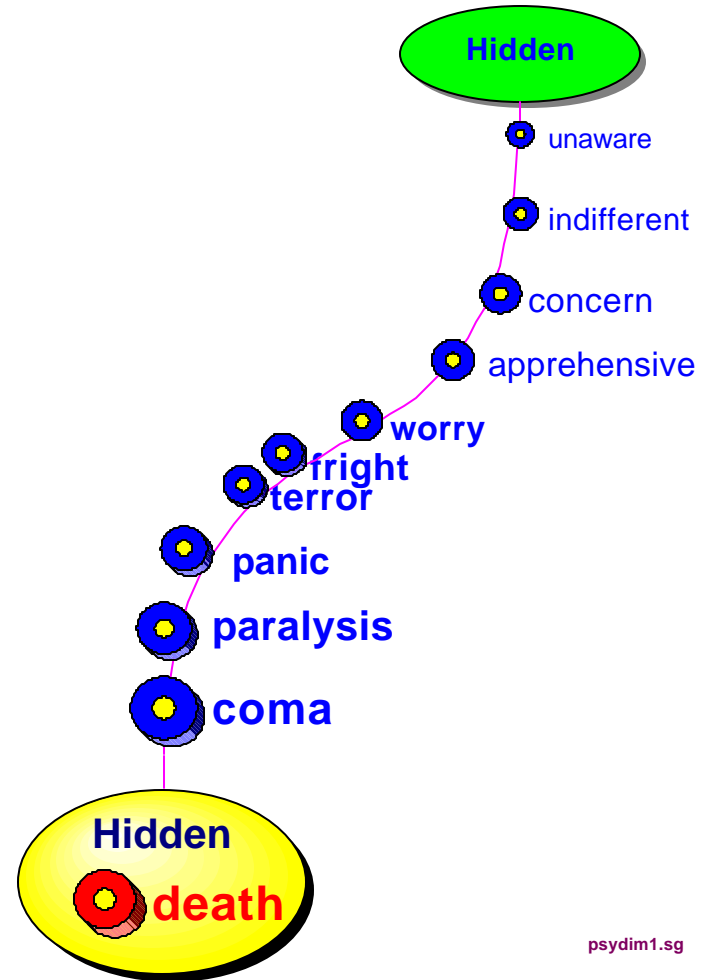
Sample Psychic Dimension



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Figure 7

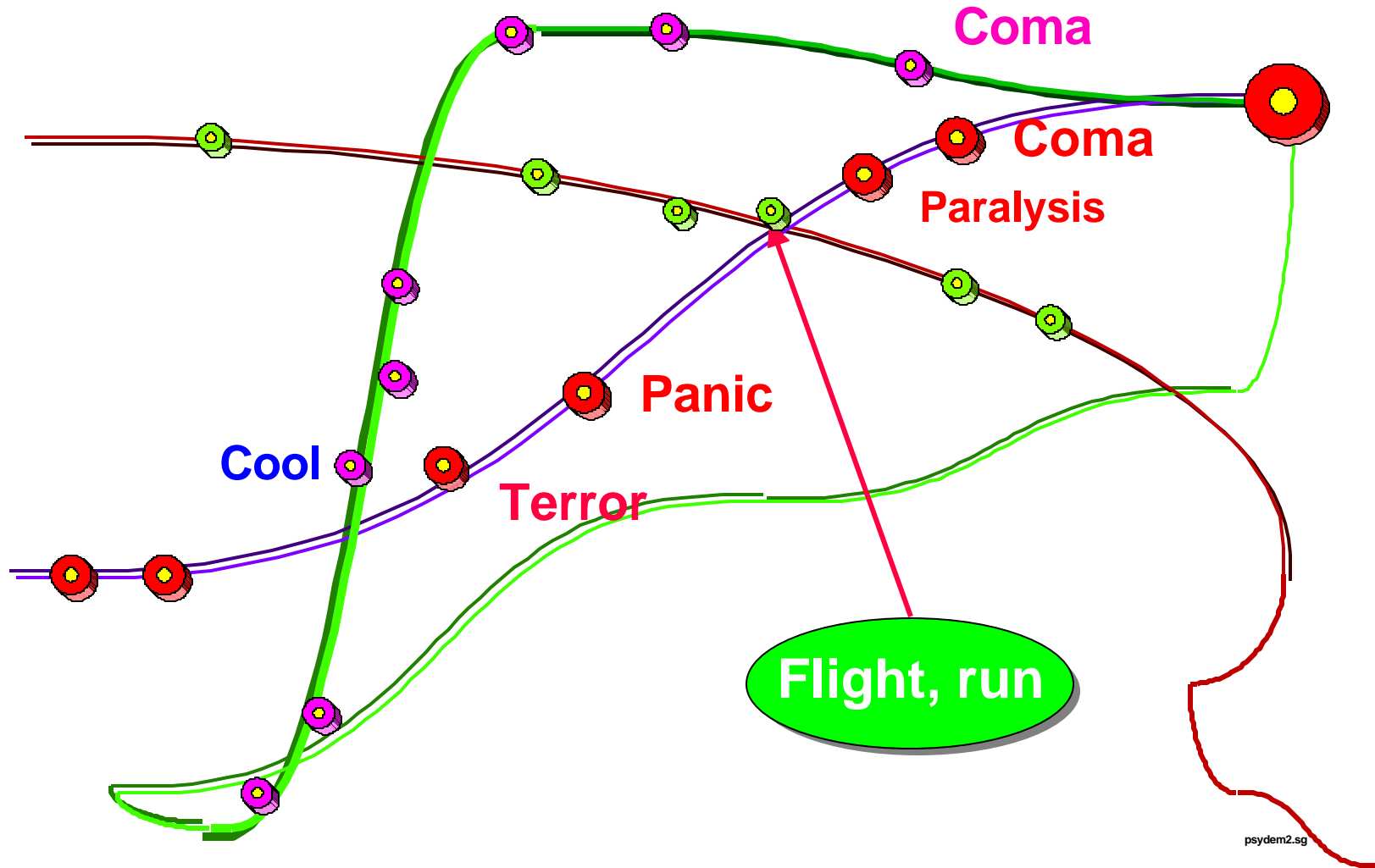
Sample Psychic Dimension



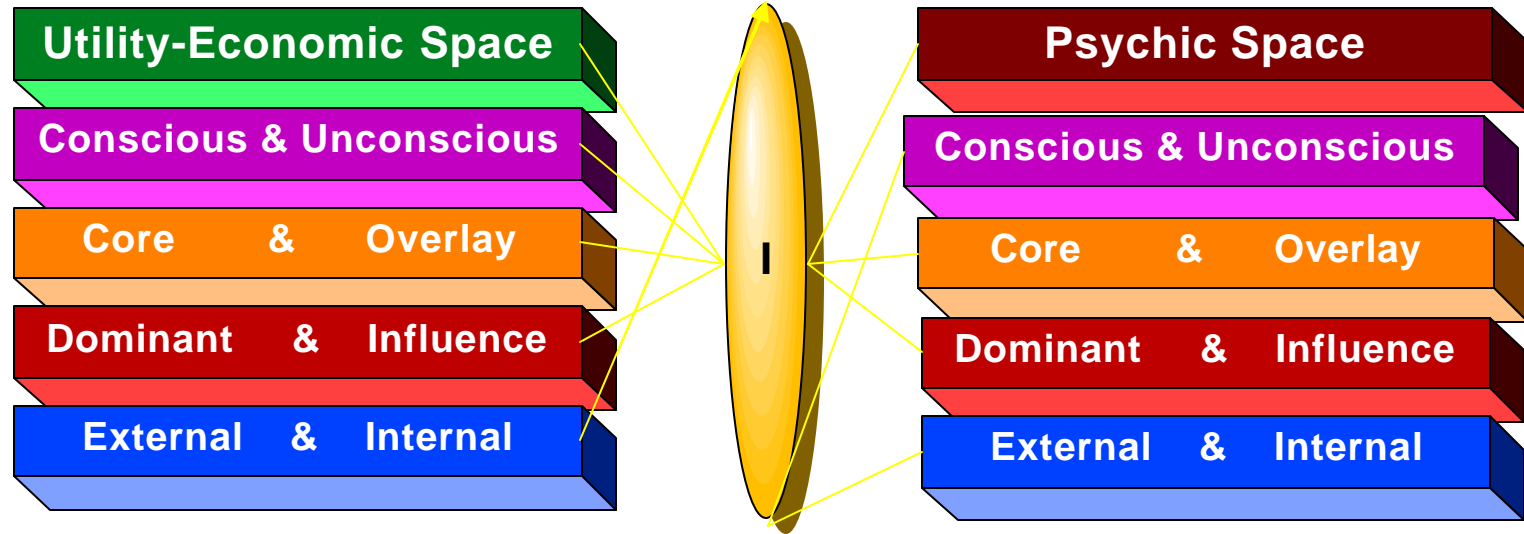
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Figure 8

Multiple Psychic Dimensions



Perveived Value: Multi-Domain Space Model

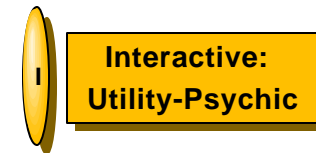


Conscious: Aware considers variable.
Unconscious: At time of decision, unaware considering variable.

Core: Variables usually or always present to some degree.
Overlay: variables that vary with circumstance.

Dominant: Usually or always of high proportional weight.
Influence: Weighting varies depending on circumstance.

External: Variables and/or weighting result from external influence.
Internal: Variables and/or weighting independent of external influence.



psymult.sg

Notes

ceived value of an asset by an individual at a point in time influences the acceptable price to that individual of the asset. The author is exploring the implications of the "acceptable price principle" in terms of effects on price discovery, the allocation of resources in an economy, as well as practical implications for individuals and companies.

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