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Asset Acquisition Criteria: A Process Tracing Investigation into Real Estate Investment Decision Making

Vivek Sah

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Asset Acquisition Criteria: A Process Tracing Investigation into Real Estate Investment Decision Making

By

VIVEK SAH

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree
of
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ACCEPTANCE

This dissertation was prepared under the direction of the candidate's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor in Philosophy in Business Administration in the Robinson College of Business of Georgia State University.

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ABSTRACT

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By

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Department : Real Estate

Abstract

Choosing the right investment option by a fund manager or analyst is the first step that contributes to the overall performance of any portfolio of assets. The decision making process is complicated. Markowitz portfolio theory (1952, 1959) laid the theoretical foundations for asset selection and management. However the decision maker is influenced by parameters outside the realm of financial theory and mathematical models (French and French 1997; French 2001). The actual behavior of decision makers can deviate from this normative model. This can be due to the problem solving behavior of the human brain.

Human problem solving theory began with the work of Newell and Simon (1972) and Simon (1978). They argue that the human memory is characterized by limitations in terms of processing capacities (Newell and Simon 1972). Given the amount of data the decision maker has to analyze, the process of asset selection is complicated and difficult. Besides the volume of data, the information items may provide information relating to the same aspect of the asset making

some of the data set redundant. Besides that, some of information contained in the data set might provide contradictory signals about the performance or characteristics of the asset. Thus the information set available to a decision maker is large, multi-channeled (different data providing different information) and multi-dimensional (for example real estate assets have information pertaining to legal aspects, financial aspects, physical aspects etc.). The limitations in the decision maker's processing capabilities and the characteristics of the information cues make the asset selection process exceedingly difficult.

French (2001) in a study of fund managers from U.K finds that asset allocation uses two sets of hard information during the process, namely historic data and current market perceptions. The study also finds differences between exposure levels of the funds dictated by theory (as per portfolio theory) and actual decisions made by companies (true asset allocations of funds). Gallimore, Gray and Hansz (2000) find medium-sized and small companies' investment decision making does not follow any normative model due to the diverse nature of property markets in the United Kingdom.

Past literature in the field of decision making finds that an expert's decision making behavior differs from that of a novice. (Bedard and Mock (1992), Bouwman (1984) and Jacoby et al. (1984, 1985, 1986, 1987)). The primary purpose of this study is to understand the impact of experience on the decision making behavior of investors and see if their behavior differs from that of inexperienced individuals. In a controlled experiment design, two groups of subjects are tested. One group is composed of experienced subjects (experts) represented by real estate professionals such as acquisition analysts, fund/portfolio managers or real estate investors

(experienced individuals investing either their own money or a client's money in real estate). The other group tested is composed of students, who are inexperienced subjects (novices). Both groups are asked to choose between two investment cases in two different cities. The two options offered are both class A office properties, institutional grade. Fifteen sets of data are given for each investment option. Data for the cases is sourced from investment management companies, involved in managing funds on behalf of institutional clients. Using a process tracing technique, each subject's behavior is observed and recorded while making the investment choice. These observations will give us insight into the actual (descriptive) behavior of experienced real estate professionals and inexperienced novices. It will help in isolating the impact of experience on the decision making behavior of real estate investors.

This study finds mixed evidence relating to the difference in the behavior of novices and experts. On the five aspects that the two groups are tested, evidence that their behavior differs in three has been uncovered. They are search pattern, number of steps and time on task. However, for the other two aspects, sequencing and cue utilization, no difference was found.

Chapter 1

Introduction

1. Purpose of the study

The overall performance of any portfolio of assets is dependent on the analyst's initial choice of investment options. However, the decision making process is complicated. Besides the financial aspects of the asset and the overall return expectations for the portfolio, the decision maker is influenced by parameters outside the realm of financial theory and mathematical models (French and French 1997; French 2001). In addition to the constraints on the analysis of data, there are constraints on the cognitive abilities of the decision maker. Because of the processing limitations of human memory (Newell and Simon 1972), the more information there is to analyze, the more severe the constraints. In real estate, given the multitude of data the decision maker has to analyze, the process of asset selection becomes even more complicated and difficult. Besides the volume of data, there are characteristics of the data that further complicate the process.

Some of the information items may provide information relating to the same aspect of the asset making some of the data set redundant. Besides that, some of information contained in the data set might provide contradictory signals about the performance or characteristics of the asset. Thus the information set available to a decision maker is large, multi-channeled (different data providing different information) and multi-dimensional (for example real estate assets have information pertaining to legal aspects, financial aspects, physical aspects etc.). Also, due to the availability of large amounts of data and the inherent biases of the decision makers stemming from their work environment (Hardin 1997), the reliability of some of the information may be

questionable. Thus we see that the information set available to a decision maker is large, multi-channeled (different data providing different information) and multi-dimensional (for example real estate assets have information pertaining to legal aspect, financial aspect, physical aspect etc.). The combination of limitations in the decision maker's processing capabilities and the information cue characteristics make the asset selection process exceedingly difficult and opaque. This forces individuals to use cognitive shortcuts known as heuristics. These heuristics are quite efficient and very often accurate. They develop over a period of time as individuals gain experience. Thus experience may play a crucial role in shaping the decision making behavior of individuals.

Many studies have focused on the pre-decision behavior of decision makers, the majority of which are in the field of accounting (Biggs and Mock 1981, 1983; Biggs 1984; Bouwman 1980, 1984). Real estate related decisions often involve large amounts of data analysis in a complex environment. The nature of real estate (poor information availability and transfer, (Baum et al., 1996; Hutchinson and Nanthakumaran, 2000)) adds to the complexity as compared to other conventional assets such as stocks and bonds. Proprietary information related to the sale of real estate coupled with the lack of reliable information is a characteristic of real estate as an asset class. Thus, considerable effort has to be spent to search for relevant cues and to evaluate their impact on the overall asset selection. In real estate no study has focused on the interplay of experience and the decision making behavior of real estate investors. This study tries to fill this gap. The purpose of this study is to examine the impact of experience on the decision making behavior of experts by studying the actual (descriptive) behavior of experienced real estate investors.

2. Justification of the study and Contribution to the Discipline of Real Estate

Decision making behavior has been an area of study for behavioral researchers for a long time. In the business management disciplines, these studies have been primarily in the field of accounting. Studies by Bouwman (1984), Biggs (1984) and Jacoby et al. (2001) in accounting have focused on the information search behavior of analysts in the context of stock selection. The focus of these studies was the behavior of novices as compared to experts.

In real estate, behavioral studies are scarce. There are even fewer real estate studies focusing on investment decision making. French (2001) did a series of surveys from 1994 to 1996 of individuals representing a broad cross-section of institutions in the United Kingdom property markets. He finds that there is difference between what decision-makers say when they are surveyed would do (on how much funds they will allocate to real estate, ex-ante) and the final observed outcome (what is actually allocated by them to real estate, ex-post). The study finds that the two critical drivers of real estate decisions are historic data and current market attitudes toward real estate. Roberts and Henneberry (2007) in a study of institutional investors in France, Germany and the United Kingdom find that decision makers take short cuts to achieve investment outcomes. Gallimore and Gray (2002) find that investor sentiment plays a key role in property decision making. However, the studies by French (2001), Gallimore and Gray (2002) and Roberts and Henneberry (2007), do not observe the actual decision making process and the type of information search as well as the type of information analyzed by decision makers in real estate.

Literature in accounting and psychology has focused on the difference in the behavior of experts and novices in decision making. In a detailed study by Chi, Feltovich and Glaser (1981) of the knowledge bases of experts and novices in the discipline of physics finds that lack of experience prevents novices at times from making key inferences necessary for solving problems.

In real estate, investment selection is generally determined by a person's knowledge about potential attributes that describe real estate quality and interrelationships among those attributes, knowledge about methods or strategies of real estate market analysis, and skills used in acquiring decision-relevant information. This study hypothesizes that experts information-acquisition task and the decision process is different from that of novices. This is due to the impact of experience which is lacking in novices.

This research will involve two groups of subjects: one group represented by real estate professionals who have industry experience and the other group represented by students, who are trained in real estate investment analysis but are without industry experience. It is assumed that the real estate professionals, through real-world experience make decisions much faster and more efficiently than those without any experience. This study is set up in such a way to observe the decision making process of experienced professionals (real estate professionals interchangeably called experts) and compare their behavior with the decision making process of inexperienced subjects, represented by students (interchangeably called novices). Their task will be to evaluate two different real estate choices based on the attributes of the properties and to then recommend one of those options for acquisition. Not only should the information-acquisition behavior of experts reflect the type of information the decision maker requires but their behavior may also

reflect the sequence of the search. Experience in this study is defined as working in the real estate industry for at least three years in the investment function. At present this study does not look at the level of experience (less or more), but looks to see if experience impacts decision making behavior.

3. The Information List

The real estate decision making process differs from one company to another, from one country to another (Roberts and Henneberry, 2007). Every company involved in real estate investing tends to be guided by an internal model. Whether the model benefits the company or not cannot be determined due to the proprietary nature of the models. Because the investments in real estate by funds are on behalf of private clients or shareholders, there is no information available to the public with respect to the framework in which the decision was made. The list of attributes that investors evaluate during their decision making process is not known. To form such a list for the purpose of this study, agencies rating commercial real estate related securities are considered.

Between 2005 and 2007, approximately $600 billion worth of CMBS were originated, which is more than one and half times the dollar volume originated from 2000 to 2004 (Various sources such as American Council of Life Insurers, Mortgage Bankers Association, Wells Fargo, Eastdil Secured, Green Street Advisors). Because these instruments are sold in the secondary market, they are rated by agencies such as Standard and Poors, Fitch and Moodys. The ratings provide a quantitative measure to investors interested in such securities. Because the underlying asset of these securities is the commercial real estate on which the mortgage is taken, the rating agencies analyze the strength of the real estate backing the mortgage. The information list for this study is

based on a list provided by Standard and Poors. For any real estate asset or derivative (Commercial or residential Mortgage Backed Security), the asset is analyzed on the attributes contained in the list. The list with a brief description of attributes is given in Appendix I. This information list is provided to the subjects to choose cues from during the investment decision making process as operationalized in this study.

4. Organization of the Dissertation

The first chapter has provided the research question explored, has laid down the theoretical background for the study, developed the normative/information list for asset selection and justified the relevance of this study for both real estate practice and theory. The rest of the dissertation is organized as follows: Chapter two elaborates the existing literature in various disciplines on human information processing, impact of experience on decision making and real estate investment decision making. Chapter three presents the research hypotheses for this study and the methods used to test them. Chapter four will present results of the study. The final chapter will present conclusions of this study and the direction of future research in this area.

Chapter Two

Literature review

This chapter will elaborate on the work done in the disciplines of psychology and real estate, both of which are the foundations for our study. More specifically this chapter will cover literature in the areas of human problem solving, information processing mechanisms, novice and expert decision making behavior in various disciplines and real estate investment decision making.

1a. Human Problem Solving

The foundation stone in human problem solving had been laid almost forty years ago by Simon and Newell (1971) and Newell and Simon (1972). Their theory on problem solving has found success particularly the processes for solving well structured problems studied in psychological laboratory settings. They suggest the human behavior as the interaction between information processing system, the problem solver and a task environment. The problem solver is the person involved in the task and the task environment is the task as described by the person presenting the task. The task environment is interpreted into a problem space which is the problem solvers way of viewing the task environment. Thus the framework of the problem solving behavior constitutes of the information processing system, task environment and the problem space.

From knowledge of the task environment, predictions can be made about the characteristics of the problem space, and from the knowledge of problem space, predictions although incomplete can be made about the problem solving strategy.

Problem solving behavior is shaped by the human information processing system has a few basic characteristics that shape its. The system operates serially rather than in parallel fashion. This means the processes are executed one at a time. The human brain is characterized by a short-term memory and a long-term memory. It is in the short-term memory that the input and output of the processes are stored. The short-term memory has a limited capacity. The long-term memory on the other hand has much higher storage capacity. The human processing system although has constraints on the capacity of short-term memory; however there are no constraints on what type of processing can be done.

The human memory can be represented as an organization of list structures or node-link structures. The list structure memory consists of specific and distinguishable relations between pairs of nodes. The structure of the problem space behaves in a certain way. First it defines legal moves. Second, it defines the goal and its direction toward or away from the goal. Third, it interacts with the limits of the short-term memory to find solution paths easier. The way it works is as follows: If an information processing system follows steps that does not lead to the next step in problem solving, it must back up to the previous steps and start in a new direction. To do this, it requires some memory of previous positions. This becomes extremely difficult for ill structured problems and complex tasks (cognitively demanding). Hence, the brain searches for alternate methods. If the problem can be broken down into smaller parts and each part dealt separately, the processing becomes easier (Difference between trained scientists and novice scientists). (Newell and Simon, 1972, Simon, 1972 and Simon, 1976).

To solve a problem, the problem solver must represent the task environment in memory in some way. This representation or interpretation of the task environment by the problem solver is his problem space. The ease of solving the problem depends on how successful the problem solver is in representing the task environment in his problem space. The problem space consists of set of nodes generated by the all legal moves during the information processing stage. Each node in a problem space is the possible state of knowledge that the problem solver attains as he progresses through the process of problem solving. After working on a problem for some time, the problem solver begins to store information about the previous states of knowledge/nodes in his long-term memory. The search for a solution continues from one node to another in the problem space, until the current knowledge stage contains the problem solution.

1b. Alternate Model of Problem Solving

Major work in human problem solving has been done since the pioneering work of (Newell and Simon, 1972, Simon, 1972 and Simon, 1976). One of the recent models that provide the framework of problem solving is the layered reference model of the brain (LRMB, Wang et al., 2006). The focus of this study is not human problem solving but its manifestations in the decisions made by real estate investors. We will therefore briefly discuss LRMB to provide a comparison with the work of (Newell and Simon, 1972, Simon, 1972 and Simon, 1976).

The LRMB model is a hierarchical model, which includes 39 cognitive processes at seven different layers known as the sensation, memory, perception, action, meta-cognitive, meta-inference, and higher cognitive layers from the bottom up (Wang et al., 2006). Problem solving is one of them. The life functions of the brain can be divided into two categories: the

subconscious (containing the layers sensation, memory, perception, and action) and conscious life functions (containing meta-cognitive, meta-inference, and higher cognitive functions.

The subconscious layers of the brain are inherited, fixed, and relatively mature when a person was born while the conscious layers of the brain are acquired, highly plastic, and can be controlled intentionally based on willingness, goals, and motivations (Wang and Chiew, 2008, in press). The problem solving process which starts at the top layer interacts with lower layer processes' such as object identification, search, memorization, and drawing inferences processes, comprehension, learning, and decision making. Although an alternate model of human problem solving is presented here, both the models face similar issue of cognitive constraints of the human brain. It is these cognitive constraints that lead to development of heuristics employed by decision makers. These heuristics are what may cause the difference between problem solving behavior of different set of individuals.

2. Experience and Decision Behavior

Decision making behavior of individuals differs systematically according to number of factors. One of the important factors impacting decision making behavior is experience as explained by Chi et al. (1982). Newell and Simon (1972), Simon (1972) and Simon (1976) attribute some of this difference between novices and experts to their memory structure of. Recent work by Simon and Schaeffer (1992) and Gobet and Simon (2000) estimate experts have a room of at least 50,000 chunks and can take up to ten years to reach that level (Anderson 1993). In terms of problem solving novices and experts tend to approach problems differently. Experts explore problems much more deeply than novices do. There have been a number of studies that show the

decision making behavior of experts differs from that of novices. Bouwman (1984) studied the decision making abilities of experts and novices in accounting. The subjects were asked to evaluate the position of a firm. The data given them was a case containing a general description of a firm and three years worth of financial statements, consisting of balance sheet, income statement, and pages with financial ratios, sales figures, and production data. The study used two groups of subjects: a novice group and an expert group. The novice group consisted of five graduate students majoring in accounting, while the expert group consisted of three Certified Public Accountants. The results of the study can be summarized as follows:

- Novices followed a passive, inductive strategy of collecting data and seeing what happens. Experts, on the other hand, frequently follow up on specific observations.
- Experts regularly summarized the results and formulated hypotheses.
- Both experts and novices appear to translate the financial information into qualitative terms using both use similar processes to do so.
- Experts relied heavily on rules of thumb; however they examined more information than the novices
- Experts developed a feeling to provide a framework against which individual observations were compared.
- In case of novices, during their evaluation of the problem, findings that did not explain each other simply were not linked together. Consequently, potential contradictions in the findings were ignored. Experts, on the other hand, consistently focus on potential contradictions, as an efficient means to zero in on underlying problems

Bedard and Mock (1992) in another study of behavior of experts and novices in the field of accounting, traced auditors' problem-solving behavior. Three dimensions of information search behavior were examined in the study namely: information search strategy, information acquisition, and information search duration. Twenty-four computer audit experts and twenty eight novice auditors were used as subjects. The case includes 201 information items on the background of the client, the general computer controls, the application controls, and the audit decisions. The findings of the study corroborate findings of similar studies on differential behavior of novices and experts. The results indicated that experts and novices utilized different information search behaviors. More experts than novices seem to use a global search strategy. However, both experts' and novices' detailed search was mostly sequential. Expert auditors were more efficient and acquired significantly fewer information items than the novices in their specific area of expertise, general computer controls. Experts also acquired significantly fewer redundant controls than novices. Although they acquired fewer general computer controls, experts attached significantly more importance to those controls. Finally, experts required significantly less time to perform the task. This difference was in part related to their lower acquisition rate but also to what might be faster internal information retrieval or processing.

Studies in the field of stock analysis show similar results for novices and experts. In a series of studies by Jacoby et al., (1984, 1985, 1986, 1987) using real-world security focused on identifying the information accessing strategies differentiating better-performing from poorer-performing analysts. The subjects in these studies were practicing security analysts. The real-world security analysts were asked to select, for each of four consecutive ninety-day periods, the one stock out of eight they judged would most appreciate in value over the next ninety days.

They were allowed to access up to twenty-six types of fundamental factor information related to a firm's financial statements for each of the eight stocks which were not named. The subjects were classified as better or poorer performers based on the cumulative net growth or decline in price of the stocks they selected.

Systematic differences are found between better and poorer performers in three criterion used in these studies to differential between better and poor performers. The criterions used in these studies are the type of information accessed i.e. the content of the search, the order in which different items of information are accessed i.e. the sequence of the search and the amount of information accessed i.e. the depth of the search. Results suggested that the proportion of accessing devoted to each factor was significantly different between the two groups for nineteen of the twenty-six fundamental factors (Jacoby et al., 1985). Both better- and poorer-performing analysts devoted nearly 50% of their total search to four types of information, but only one type of information namely price/earnings ratio for the last twelve months was common to both groups. The three other types were: latest earnings trend, price last month and annual earnings per common share adjusted for all stock dividends and splits in the past four years.

In context of sequence of information search also better performers differed from poorer performers. Better performers engaged in significantly greater amounts of "within-factor" (intra-option) search. Better performers generally selected one factor, such as earnings per share, and checked its value for all stocks of interest before moving on to the factor they next found of interest, such as long-term debt. Poorer performers engaged in more "within-stock" (inter-option) search. They selected one stock and checked its value on all factors of interest, such as

earnings per share, long-term debt, etc., forming an overall, holistic judgment of that particular stock before moving on to do the same for other stocks of interest. Finally on the last parameter of measurement, amount of information search, the better-performing analysts in these studies accessed more information overall than the poorer-performing analysts. Further, the better performers maintained the same relatively high level of information search across all four periods of the task, while the poorer performers typically reduced their search efforts considerably after the first period.

Table 2.1 displays a list of some other studies on some expert and novice behavior from various disciplines and their key findings.

Table 2.1

Study	Findings
Anderson (1988) (Accounting)	• Order of cue presentation affect cue assessing behavior of novices
Selnes and Troye (1989) (Marketing)	• Experts searched for more information than novices • Experts spent more effort to identification and definition of the problem and less effort on evaluation
Shanteau (1992a) (Psychology)	• Domains characterized by static stimuli and decisions about static targets (e.g. livestock assessment), experts tend to perform well • Domains characterized with changeable stimuli and decisions about human behavior (e.g. stock market

	prices), experts tend to perform poorly
Shanteau (1992b) (Psychology)	• Decision-processes of experts are superior to those of non-experts • Experts seem to acquire less but more relevant information cues
Maines (1995) (Accounting)	• Expert lenders fail to accurately predict corporate failure
Davis (1996) (Accounting)	• Experienced auditors acquired lesser cues but managed to better identify the relevant cues than less experienced auditors
Andersson (2004) (Economics)	• Experts searched for significantly more cues than novices • Experience may not result in consistent decisions

The studies on novices and experts behavior suggest that there is no consensus in the findings of all these studies. It may well depend upon experimental set up or the type of asset/problem being analyzed. The nature of real estate and characteristics of its data makes it an interesting setting to analyze the behavior of novice and expert real estate investors.

3. Investment Decision Making in Real Estate

Portfolio theory (Markowitz, 1952, 1959) provides the normative base to investors for investment decision making under uncertainty. It assumes that investors are risk averse and

rational. This means that for any given level of portfolio return variance, they prefer higher returns to lower returns and for any given level of portfolio returns, they prefer lower to higher return variance. Portfolio theory also assumes that security returns are multivariate normally distributed, which means that mean and variance parameters are sufficient to describe portfolio return characteristics. Portfolio theory suggests that investors hold only efficient portfolios, which offer highest return for any given of risk or those offering lowest risk for a given level of return.

Although portfolio theory is the backbone of investment decision making in financial literature, there is as such no normative theory associated with real estate investments. Some of the reasons for a lack of a normative model in real estate investment are the lack of reliable data sources due to the nature of real estate as an asset, proprietary information associated with real estate and lack of liquidity (as an example, A class "A" property may trade just once in ten years of its history). Some of the earlier studies in real estate (Wiley, 1976, Farragher, 1982, Page, 1983, Webb, 1984, Webb and McIntosh, 1986, Louargand, 1992) have suggested that some of the evaluation measures used in real estate investments are using first-year returns, discounted cash flow and return on equity. These studies suggest that little use is made of quantitative risk assessment tools and quantitative risk adjustment by real estate professionals. These studies reflect the nature of the real estate industry and the type of information used for decision making.

Farragher and Kleiman (1996) further expanded on the studies mentioned above to study the decision making process within real estate investors such as institutions and REITs. In a questionnaire based study of one hundred and twenty chief real estate investment officers of

institutions and REITs (equity investors only), the study found that real estate decision making is a complex process that includes:

- Setting strategy
- Establishing risk/return objectives
- Forecasting expected costs and returns
- Assessing investment risk
- Making risk-adjusted evaluations of forecasted costs and returns
- Implementing accepted proposals
- Post-auditing the performance of operating investments

The study revealed that private real estate investment companies tend to do less strategic planning than others indicating their entrepreneurial nature which places a good deal of faith in instinct and experience at the expense of formal quantitative analysis.

French (2001) studied the investor's perceptions and attitudes towards real estate in the decision making process. In a series of surveys from 1994 to 1996, undertaken at the end of each year, professional and academic expectations regarding the performance of real estate as asset class within a multi-asset portfolio was analyzed. The survey was sent to individuals representing a broad cross section of institutions, and their advisors, who were in the United Kingdom property markets. The questions in the survey asked the respondent's opinions and expectations regarding real estate returns and risks, and correlations with other asset classes. Other questions in the survey asked respondents to identify and comment upon what they consider to be the important factors affecting real estate returns.

The results for forecasted returns in real estate showed a large divergence from actual returns realized (IPD annual index used for actual return). The average deviation for a one year return was -2% in the downside and 4% on the upside. The results of study show that market sentiment which is used in decision making is not a good proxy for forecasting.

The literature on the type of information used in the modeling process and the process followed has been scarce in the discipline of real estate. Only a handful of studies have done so, all of them using surveys. Most of them are quite old and may not have a lot of validity in today's world. However, it still gives us insights on the type of information used historically and helps us compare the results with ours. French (1996) suggest that the process of modeling follows a requisite development. Historic information determines the initial inputs and hence, the initial output. This is then modified and developed by introducing market sentiment into the model via sensitivity analysis. Yet, this does not necessarily capture all the parameters within the decision process. French (1996) categorizes the information used in the decision process as "hard" and "soft". The hard inputs are definitive in nature such as historically justified numbers or predictive forecasts. The 'soft' information is the tendency to mirror competitors, a desire to meet weight of money objectives, a desire to retain the status quo, and many other non-financial considerations (relationship driven). Thus the study suggests the influence of hard and soft information on the decision making process.

In a more recent work, Jackson and Orr (2007), in a questionnaire based survey of 25 real estate investment fund managers and 2 fund acquisition analysts in the United Kingdom, explored the attributes most important to investors in stock selection in real estate. From a sample of eight

attributes, they find that two attributes namely location and specification and flexibility of the building stand out amongst the rest of the attributes. The eight attributes in their sample were credit worthiness, single or multi-tenant, rent review clause, period to expiry, user clause, location, BREEAM[2] rating and economic and functional obsolescence. The study further identifies the factors that cause volatility in property returns. They are leasing/releasing, tenant default, estimated resale value change and yield shift. The study suggests that these factors are forward looking in nature. They all are measurable and can be managed going forward. The study recommends using these tools rather than those that measure past volatility but cannot provide a sense of future volatility.

All studies discussed so far have not suggested a normative model for real estate decision making. The first study to suggest one is by Roberts and Henneberry (2007), where the authors explore the decision making processes of investors. The study covered a broader sample of countries across three European markets namely France, Germany and U.K. Interviewees in this study constituted those most likely to engage directly in property investment decision-making. The study proposes a ten stage normative model. The study finds that the actual decision-making process is much simpler than the normative model suggested. Both the UK and the French and German models are found to follow a broadly similar path, with investors setting a strategy, searching for properties, undertaking an analysis of market conditions and purchasing properties that fulfill that strategy. The decision-making process effectively shrinks the normative model, suggesting a five stage process in actuality as opposed to the ten stage process described in the

[2] BRE Environmental Assessment Method (BREEAM) is a voluntary measurement rating for green buildings that was established in the UK by the Building Research Establishment. BREEAM was established in 1990 as a tool to measure the sustainability of new non-domestic buildings in the UK. Its equivalents in other regions include LEED North America and Green Star in Australia.

literature. The simplification of the process suggests the use of heuristics in decision-making. The application of heuristics is not uncommon and has been extensively studied in real estate appraisal by Diaz (1997), Diaz and Hansz (1997), Gallimore (1994, 1996), Gallimore and Wolverton (1997, 2000).

All the studies discussed in this section analyze decision making in real estate investments. However they do not look at two things. First the impact of experience on decision making. Secondly the focus of these studies has been the processes of decision making. They do not shed any light on the information and its characteristics utilized by the decision maker during the decision process. This study will try to fill these gaps by analyzing the descriptive behavior of novice and expert real estate investors.

4. Summary

This chapter discussed relevant literature in the field of human problem solving, decision making and real estate investment decision making. In the next chapter we will present the research hypotheses and the methods used to test them.

Chapter Three

Research Hypotheses and Methodology

In the previous chapter, pertinent literature to the areas of human information processing, decision-making, asset selection and investment analysis was covered. In this chapter, we formalize the research questions as hypotheses and present an appropriate experimental design to examine these research hypotheses. This chapter will also describe the statistical tools used to analyze results.

1. Research Hypothesis

1A. Compensated vs. Non-compensated Expert Behavior

Critics of behavioral studies have often raised questions regarding the validity of the responses of the subjects. They argue that the absence of any motivation in the experimental tasks may not reflect true decision making behavior. There are two responses to this criticism. First, as these professionals are involved in real estate investments on a daily basis, their actions or behavior is deep rooted and hence will not change due to the hypothetical nature of the task at hand. Second, studies relating to compensation in the disciplines of psychology by Festinger and Carlsmith (1959) and Deci (1972) provide evidence that monetary compensation does not affect decision making behavior. In real estate Diaz, Zhao and Black (1999) could not find a non-monetary compensation impact in a series of experiments with students.

This study will extend knowledge on compensation impacts on experiments by offering market monetary compensation ($100 for approximately 30 minute of work) to a group of real estate industry professionals (experts). Their behavior will be compared to the behavior of a control

group of their peers who will not be offered any compensation. Task involvement and motivation will be enhanced by informing all subjects at the beginning that there is a correct answer which will be revealed at the end of the task. The subjects at the end of the exercise are informed that their decision is the right choice independent of what they have chosen. This is done to keep the subjects motivated and make them feel comfortable at the end of the exercise.

Research Hypothesis 1: The measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

The two groups of subjects will be compared on five aspects. A series of tests are developed to search for differences between the two groups. The five aspects, their hypotheses and the statistical tests used to examine them are:

Research Hypothesis 1a: With respect to sequencing the measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

Sequencing measures the sequencing of steps followed during performance of experimental tasks, in other words the order of steps employed. Sequencing is captured by constructing distributions of transition values. A transition value is defined as a jump from one information cue to another. To test this aspect, a Kolmogorov-Smirnov procedure is used to discover whether the two distributions have been drawn from the same population of transactions. A Kolmogorov-Smirnov procedure is a non-parametric test and is quite useful for addressing the similarity of two distributions. In this study, we list all transition values that are possible for a subject undertaking the experiment. The first property option has

information items numbered one through fifteen, while the second property option has information items numbered thirty-one to forty-five. Therefore the range of the transition values for any subject is from fourteen to forty-four. For each transition value in the range, the frequency of the transition value is calculated for all the subjects in a group. For any two groups, function S(x) and S(y) are calculated where:

$S(x) = (\text{number of observed } X\text{'s} \leq x)/m$

$S(y) = (\text{number of observed } Y\text{'s} \leq y)/n$

X: observations for one group and m: number of observations in that group

Y: observations for second group and n: number of observations in that group

Since we are interested in a difference in any direction, we use a two-sided test.

The test statistic for the two groups being identical is:

$D = \text{maximum } \left| S(x) - S(y) \right|$

If the two samples have been drawn from the same population, S(x) and S(y) should be close for all values of x and y. We reject the hypothesis that the two groups are from the same population at the α level of significance if the test statistic D exceeds the critical value. For large samples, the critical value to compare the test statistic D is given by $1.63\sqrt{((m+n)/mn)}$ at the 1% level, by $1.36\sqrt{((m+n)/mn)}$ at the 5% level and by $1.22\sqrt{((m+n)/mn)}$ at the 10% level. (Daniel, 1990)

Thus our hypotheses for testing this aspect can be stated as:

H_o: $D_c = D_n$

H_a: $D_c \neq D_n$

Where D_c is the distribution of the compensated expert group and D_n is the distribution of the non-compensated expert group.

Our research hypothesis is supported by failing to reject the null hypothesis for this aspect.

Research Hypothesis 1b: With respect to cue utilization, the measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

Cue utilization measures the frequency of usage of the information cues. For each cue the number of times it was accessed is calculated for each group. Because the type of cues are same after cues one through fifteen (information content is different), the frequency of similar type cues is combined (for eg. 1 and 31, 2 and 32 and so on), Therefore for any cue, the maximum frequency is twice the number of the subjects, while the minimum frequency is zero (assuming a cue is not assessed more than once by any subject). To test the difference in the cue utilization frequency a Kolmogorov-Smirnov procedure is employed.

Thus our hypotheses for testing this aspect can be stated as:

H_o: $Cu_c = Cu_n$

$H_{a:}$ $Cu_c \neq Cu_n$

Where Cu_c is the distribution of cue utilization for the compensated expert group and D_n is the distribution for the non-compensated expert group.

Our research hypothesis is supported by failing to reject the null hypothesis for this aspect.

Research Hypothesis 1c: With respect to search pattern, the measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

As describe earlier, a transition is labeled as a move from one cue to another by a subject while analyzing the information items. A transition can happen in two ways. One, the subject may choose another information set within the same property option. This is an intra-option transition. The other transition can be to choose an information set from the other property option. This is an inter-option transition. The information sets are so labeled that for an intra-option transition, the absolute value of the difference in the two labels of information sets will be less than 15, while for an inter-option transition the absolute value of the difference in the two labels of information sets will be greater than 15. For example, a transition with a value of 1, 2, 3 up to 14 is an intra-option transition. Note that inter-option search behavior is a distinct search and decision-making strategy from intra-option search. The Kolmogorov-Smirnov test treats all these transitions as unique while transitions will be categorized as inter-optional or intra-optional to detect overall search pattern strategies. Thus to measure the search pattern behavior (intra vs. inter option), a t-test of proportions is used because we are interested in the difference between the proportions of intra versus inter option search behavior for the two groups.

Thus our hypotheses for testing this aspect can be stated as:

H_o: $P_c = P_n$

$H_{a:}$ $P_c \neq P_n$

Where P_c is the proportion of intra-option transitions for the compensated expert group and P_n is the proportion of intra-option transitions for the non-compensated expert group.

Also for the inter-option transitions the test hypotheses can be equally stated as:

H_o: $P'_c = P'_n$

$H_{a:}$ $P'_c \neq P'_n$

Where P'_c is the proportion of inter-option transitions for the compensated expert group and P'_n is the proportion of inter-option transitions for the non-compensated expert group.

Our research hypothesis is supported by failing to reject the null hypothesis for this aspect for both the cases stated above (intra and inter transition proportions).

Research Hypothesis 1d: With respect to number of steps, the measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

Number of steps measures the number of steps utilized to reach an investment decision. This will suggest if a group of subjects uses less or more information than another group. Because of the constraint in the sample size, a Mann-Whitney test which is a non-parametric test is conducted to test the difference in the mean number of steps employed by the two groups of expert subjects.

Thus our hypotheses for testing this aspect can be stated as:

H_o: $N_c = N_n$

H_a: $N_c \neq N_n$

Where N_c is the mean number of steps utilized to complete the task by the compensated expert group and N_n is the mean number of steps utilized to complete the task by the non-compensated expert group.

Our research hypothesis is supported by failing to reject the null hypothesis for this aspect.

Research Hypothesis 1e: With respect to time on task, the measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

Time on task measures the amount of time utilized to reach an investment decision. A Mann-Whitney test, is conducted to test the difference in the mean amount of time taken to complete the task by the two groups of expert subjects

Thus our hypotheses for testing this aspect can be stated as:

H_o: $T_c = T_n$

H_a: $T_c \neq T_n$

Where T_c is the mean amount of time taken to complete the task by the compensated expert group and T_n is the mean amount of time taken to complete the task by the non-compensated expert group.

Our research hypothesis is supported by failing to reject the null hypothesis for this aspect.

1B. Novice vs. Expert Behavior

Jacoby et al. (1984, 1985, 1986, 1987) investigated how the information processing behavior of novices (inexperienced) differs from those of experts in the accounting profession. Diaz (1990), Diaz and Hansz (1997) and Hardin (1997) show us how training impacts real estate business decisions. Diaz (1990) and Diaz and Hansz (1997) analyzed decision making behavior of appraisers. Diaz (1990) finds that over a period of time as appraisers gain experience, they deviate from the normative process taught to them and apply a shorter process while appraising properties. Due to the experience gained over the years, they become more confident and skip some of the routine steps in appraisal (such as market analysis). Hardin (1997) finds differences

in the way training impacts lending decisions. Lenders trained in the real estate discipline analyze the underlying real estate while evaluating a lending proposal. On the other hand lenders trained in finance analyze the borrower's financial strength (credibility). This study analyzes the behavior of experts and novices in real estate investment decision making and evaluates the impact of experience on their behavior. This will help us validate, in the context of real estate investment decision making, how experience changes the information processing behavior of decision makers over time. Thus we can present our next research hypothesis as:

Research Hypothesis 2: The decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

The two groups of subjects will be compared on the same five aspects described earlier in the chapter to investigate Research Hypothesis 1.

Research Hypothesis 2a: With respect to sequencing, the decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

A Kolmogorov-Smirnov procedure is used to test whether the two transition distributions have been drawn from the same population. Thus our hypotheses for testing this aspect can be stated as:

H_o: $D_{no} = D_e$

H_a: $D_{no} \neq D_e$

Where D_{no} is the distribution of the novice group of subjects and D_e is the distribution of the expert group of subjects.

Our research hypothesis is supported by rejecting the null hypothesis for this aspect.

Research Hypothesis 2b: With respect to cue utilization, the decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

To test the difference in the cue utilization frequency a Kolmogorov-Smirnov procedure is employed.

Thus our hypotheses for testing this aspect can be stated as:

H_o: $Cu_{no} = Cu_e$

$H_{a:}$ $Cu_{no} \neq Cu_e$

Where Cu_{no} is the distribution of cue utilization for the novice group of subjects and Cu_e is the distribution for the expert group of subjects.

Our research hypothesis is supported by rejecting the null hypothesis for this aspect.

Research Hypothesis 2c: With respect to search pattern, the decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

To measure the search pattern behavior (intra vs. inter option), a t-test of proportions is used. Thus our hypotheses for testing this aspect can be stated as:

H_o: $P_{no} = P_e$

$H_{a:}$ $P_{no} \neq P_e$

Where P_{no} is the proportion of intra-option transitions for the novice group of subjects and P_e is the proportion of intra-option transitions for the expert group.

Equivalently for the inter-option transitions the hypothesis can be stated as:

H_o: $P'_{no} = P'_e$

$H_{a:}$ $P'_{no} \neq P'_e$

Where P'_{no} is the proportion of inter-option transitions for the novice group of subjects and P'_e is the proportion of inter-option transitions for the expert group.

Our research hypothesis is supported by rejecting the null hypothesis for this aspect for this aspect for both the cases stated above (intra and inter transition proportions).

Research Hypothesis 2d: With respect to number of steps, the decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

A Mann-Whitney test which is a non-parametric test is conducted to test the difference in the mean number of steps analyzed by the two groups of subjects.

Thus our hypotheses for testing this aspect can be stated as:

H_o: $N_{no} = N_e$

$H_{a:}$ $N_{no} \neq N_e$

Where N_{no} is the mean number of steps utilized to complete the task by the novice group of subjects and N_e is the mean number of steps utilized to complete the task by the expert group.

Our research hypothesis is supported by rejecting the null hypothesis for this aspect.

Research Hypothesis 2e: With respect to time on task number of steps, the decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

A Mann-Whitney test is conducted to test the difference in the mean amount of time taken to complete the task by the two groups of subjects.

Thus our hypotheses for testing this aspect can be stated as:

H_o: $T_{no} = T_e$

$H_{a:}$ $T_{no} \neq T_e$

Where T_{no} is the mean amount of time taken to complete the task by the novice group of subjects and T_e is the mean amount of time taken to complete the task by expert group.

Our research hypothesis is supported by rejecting the null hypothesis for this aspect.

2. Exploratory Research

The impact of experience on decision making will be analyzed by the research hypotheses presented. Also of interest is the decision making process, (the cue utilization and sequencing) of expert real estate decision makers participating in the study. This will help in developing a model of real estate investment decision making. Further refinement of a descriptive model can be an area of future research. Little has been done in this field except in studies by French (1996) and Roberts and Henneberry (2007), which focused on the process but not the type of information analyzed. Therefore what is of interest to us is the order in which the information cues are assessed by the experts. Alternatively order of cue utilization may be impacted by the order in which the cues have been presented to the subjects. To explore this possibility a regression is run with the average sequence number of a cue being the dependent variable, and the explanatory variable being the sequence of presentation of the cues and the group to which the subjects belong (student/novice vs. professional/expert), modeled as a dummy variable.

Each subject participating in the experimental session has the list of information items available to select cues one at a time. The sequence of the list of this set of information items is randomized. Subjects can choose any information item in any sequence depending on their decision making process. Items not playing any role in the individual's decision making process will not be accessed at all. For each subject, a cue is awarded a score corresponding to the order (sequence) in which it was accessed by the subject (i.e. First accessed cue = 1, second accessed cue = 2, etc.). If an item is not assessed at all, a score of sixteen was assigned to it. This indicates that the information item was not of any importance to the decision maker. An alternate way could have been by ignoring it in the calculation, but that way information is lost regarding the importance of the information item. Since there are two properties to choose from, information items thirty through forty-five are the same attributes as items one through fifteen. Therefore for the purpose of our calculation, items thirty through forty-five are ignored and only items one through fifteen are ranked in order of their sequence of use. For each group average order number is calculated for each cue accessed across all subjects within a group. The ordinal rank of each cue average indicates when the cue was generally accessed in the decision making process. Although not perfectly correlated, cue access rank is certainly correlated with cue importance. The regression is set up as follows:

$$S = \beta_0 + \beta_1 O + \beta_2 D + \varepsilon \qquad (1)$$

Where S = average sequence number of a cue

O = order of presentation of the cues

D = Dummy variable for type of subject (expert or student)

ε = error term

This is an exploratory question which will give us an insight into the cognitive process of decision making. Thus, there is no hypothesis with this regression model.

3. Data Generation

3. A. Experimental Task

To investigate the research question and examine the hypothesized answers, a high fidelity process tracing controlled experiment is employed. A controlled experiment is used in this study because of its advantages in a study like this. Firstly, experiments help in studying processes. This study is investigating the decision making behavior of experts and novices during the investment process, hence an experiment is appropriate. Secondly, experiments give the researcher the freedom to manipulate the independent variables and control the intervening variables (Jenkins, 1985) providing more direct evidence for research questions. Lastly, experiments help in isolating the effect of variables important to the researcher by constructing an appropriate research design. Because all the above mentioned factors are important to us, a controlled experiment is used in this study.

The task design utilizes the information set (alternatively referred to a cues) typically used by investment companies to analyze real estate investment options. The information set for this study comes from LaSalle Investment Management, a national company that manages and acquires properties for third party investors through their commingled funds. We use properties from two different cities for our subjects: San Francisco, California and Chicago, Illinois. Both cities are large in terms of population and commercial real estate market activity. Subject participating in the experiment will not be familiar with these markets and therefore are less likely to inject information outside of that provided in the case. This will minimize variation

(noise) due to extraneous factors. The two properties are class A office space. One is valued at approximately $95 million and the other $148 million at the time of acquisition by LaSalle Investment Management. The difference in the values is attributed to factors such as occupancy, lease structures of the current tenant etc. reflecting the risk profile of the two properties. The properties in this experiment are representative of actual investment options available to decision makers.

Fifteen sets of information are provided for each investment option. Each set provides a piece of information about an attribute of the property. For example the information set labeled "Appraisal" gives the appraised value of the property. All information presented as part of the normative list given in Chapter 1 is detailed in content. There are six information sets that are just statements of disclosure. The appraisal report is very detailed in content thus it may make the task more complex in nature, could confound our results and threaten internal validity. Given these concerns, the appraisal report has been replaced by a one-page statement, validating the value of the property. The statement is signed by an MAI (Member of Appraisal Institute) designated appraiser to strengthen the authenticity and standing of the appraisal statement. The second data item containing just a brief statement is the environmental report. Because environmental concerns on a property may tend to strongly diminish the acquisition prospects of the property, all our investment options are free of any environmental hazards. Therefore, this information piece is presented just as a statement of disclosure of the environmental status of the property. Another data item presented in a brief format is the statement of LEED certification. Because LEED certification is a relatively new initiative, at present the focus is on getting a building LEED certified. The level of the certification is not as important as being LEED

certified. This information set is presented simply as a statement that the property is not LEED certified. The other three information cues that are statements of information or disclosure are the (1) seismic zone in which the property is located, (2) insurance certificates and management agreements, and (3) franchise agreements and ground leases (if any). The rest of the cues are more detailed in nature. A brief description of the cues can be found in Appendix I.

3. B. Subjects and Research Design

Past studies in accounting and psychology dealing with stock selection behavior have all used professionals in their experiments. Bowman (1984) used Certified Public Accountants as experts in his study of decision making in accounting; Biggs (1984) used experienced financial analysts employed by financial institutions to trace the information search behavior of eleven financial analysts involved in assessing the earning power of companies; and within real estate studies, Roberts and Henneberry (2007) used fund managers in property companies in Europe to trace their decision making process.

The subjects we use for this study can be grouped into two categories. The first category is comprised of experienced real estate professionals (experts) involved in the decision making process of real estate investments either for their respective firms or for their own personal portfolio. Subjects in this category are solicited using the strong industry connections of the Real Estate Department of Georgia State University. This category can further be broken down into two groups. One group is composed of experts who will be informed that they will be compensated for their participation, but members of the other group will not be so informed. There are ten experts in each of these sub groups.

All the experts have considerable experience in the field of real estate investments. Figure 3.1 displays the range of experience of the real estate expert participants in this study. The average amount of experience the experts have is approximately 19 years. The minimum experience a subject has is four years and the maximum is thirty-two years. The twenty real estate professionals represented 17 different organizations across Atlanta. Except for three experts who had less number of years of experience (4, 7 and 9 years), the rest of the experts are at the position of vice-president and above in the firms they represent.

Figure 3.1

All but one of the experts is directly involved in real estate investment property in their present jobs. The one expert who is not involved directly in real estate investment property is on the investment committee of the company he works for, which is a prominent equity REIT.

The other group is comprised of inexperienced subjects (novices) who are undergraduate students majoring in real estate at Georgia State University. There are twenty subjects in this group. All these student subjects have taken the core courses required for real estate majors

including real estate investment analysis, real estate finance and development. All the student participants in this study are seniors planning to graduate in either Summer or Fall of 2009.

Experimental data for this study was generated during the period April, 2009 to June, 2009. Half of the expert participants were told before starting the experiment that they would be compensated for their participation. The other half were not told anything about compensation. The experimental sessions for the students were conducted at the research lab of the Real Estate Department of Georgia State University. The students were briefed about the experiment for about five to ten minutes and also given an opportunity to ask any questions regarding the exercise. Another objective of this briefing is to make the subjects comfortable before starting the experiment. The student subjects were also debriefed after the experiment to gauge the level of motivation in taking the task seriously. For the experts, the setting of the experiments varied. Out of the twenty expert subjects, five subjects undertook the experiment at a pre-agreed meeting place. Two expert subjects came to department of real estate to participate in the experiment. The remaining experiments were conducted at the respective offices of the expert subjects. Before the experiments, a general understanding of the nature of work of the subjects was gathered. The subjects were also quizzed on topical issues in the real estate industry. This once again was done to make the subject comfortable with the experiment as well as the investigator. The interaction was continued after the session was over to gauge the level of motivation among the expert subjects.

A one factor (compensation), two level (compensated vs. non-compensated) experimental design used is used for Research Hypothesis 1. A one factor (expertise), two level (novice vs. experts)

experimental design was also used for Research Hypothesis 2. There are five aspects on which each research hypothesis is being examined. They are sequencing, cue utilization, search pattern, time on task and number of steps used.

4. Data Gathering Technique

Process tracing techniques, although widely applied in the decision sciences, have been used seldom in real estate studies. Most of the behavioral studies in real estate are survey based. Process tracing techniques are intensive and obtaining subjects willing to dedicate the time and effort is difficult. However, Diaz (1990) started behavioral work in the field of real estate appraisal using process tracing techniques. The study involved the descriptive behavior of real estate appraisers. The study analyzed the actual behavior of appraisers appraising residential property in Atlanta, Georgia and Austin, Texas.

We use the same process tracing technique which can be called "information cue processing" developed by Diaz (1990) to observe the decision making process of the subjects. The subjects are provided a list of information sets related to the two investment options. The information sets are labeled one through fifteen for one option and thirty through forty-five for the other property option although the order of the information set is random. The subject starts by choosing one information cue at a time. The information cue can be any one of the overall thirty available to the subject. After the first selection, the subject moves to another information cue. During the whole process, the investigator will record which cue is selected and time of usage of the cue. This process will continue until the subject comes to a decision on which property to select. The

overall time taken to make a decision is also recorded. Appendix II shows the normative list as given to the subjects participating in this study.

5. Summary

In this chapter we have put forth our expectations concerning expert real estate behavior by means of specifying research hypotheses and the methods used to test them. We have also described the subjects who will participate and the task they will perform. In the chapter that follows, results are reported that shed light on our understanding of expert and novice investor behavior in the real estate domain.

Chapter Four

Results

In this chapter we will present the results of the hypotheses proposed in Chapter 3. The first step employed was an examination of the raw data. This exposed one extreme observation, a subject in the compensated expert group. Closer inspection revealed that this subject was a commercial real estate broker whose routine responsibilities did not include real estate investment choice. He therefore was not an expert in real estate investment decision making as defined for this study, and his observation was removed from the data base. A search for other brokers among subject participants was conducted, and one, an expert in the non-compensated group, was discovered. For consistency his observation was also removed from the data base. To recap, two observations, one from the compensated expert group and one from the compensated expert group, were removed from the database because they were judged not to possess the type of experience requisite of the study's definition of expert.

1. Results of Hypothesis

Research Hypothesis 1: The measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

There are five aspects on which the two groups are being compared. The results of each are presented below.

Research Hypothesis 1a: With respect to sequencing the measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

Our test hypotheses for this aspect are:

H_o: $D_c = D_n$

$H_{a:}$ $D_c \neq D_n$

$n_{Dc} = 110$, $n_{Dn} = 145$, where n_{Dc} is the sample size of the compensated group and n_{Dn} is the sample size for the non-compensated group.

A Kolmogorov-Smirnov test resulted in a test statistic of 0.045 with a p value > 0.20. (The critical value is 0.206 at the 1% level, 0.171 at the 5% level and 0.135 at the 20% level). We fail to reject the null hypothesis.

Thus our research hypothesis is supported for this aspect.

Research Hypothesis 1b: With respect to cue utilization, the measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

Our test hypotheses for this aspect are:

H_o: $Cu_c = Cu_n$

$H_{a:}$ $Cu_c \neq Cu_n$

$n_{Cuc} = 106$, $n_{Cun} = 146$, where n_{Cuc} is the sample size of the compensated group and n_{Cun} is the sample size for the non-compensated group.

A Kolmogorov-Smirnov test resulted in a test statistic of 0.091 with a p value > 0.20. (The critical value is 1.326 at the 1% level, 1.106 at the 5% level and 0.870 at the 20% level). We fail to reject the null hypothesis.

Thus our research hypothesis is supported for this aspect.

Research Hypothesis 1c: With respect to search pattern, the measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

Our hypotheses for testing this aspect are:

H_o: $P_c = P_n$

$H_{a:}$ $P_c \neq P_n$

$n_{Pc} = 110$, $n_{Pn} = 145$, where n_{Pc} is the sample size of the compensated group and n_{Pn} is the sample size for the non-compensated group.

A t-test of proportion resulted in a test statistic of 0.759 with a p value of 0.448. We fail to reject the null hypothesis.

Thus our research hypothesis is supported for this aspect.

Research Hypothesis 1d: With respect to number of steps, the measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

Our hypotheses for testing this aspect are:

H_o: $N_c = N_n$

$H_{a:}$ $N_c \neq N_n$

$n_{Nc} = 9$, $n_{Nn} = 9$, where n_{Nc} is the sample size of the compensated group and n_{Nn} is the sample size for the non-compensated group.

A Mann-Whitney test resulted in a test statistic of 1.15 with a p value of 0.250. We fail to reject the null hypothesis.

Thus our research hypothesis is supported for this aspect.

Research Hypothesis 1e: With respect to time on task, the measured behavior of experienced subjects (experts) participating in this study will not vary with respect to those offered market, monetary compensation.

Our test hypotheses for this aspect are:

H_o: $T_c = T_n$

H_a: $T_c \neq T_n$

$n_{Tc} = 9$, $n_{Tn} = 9$, where n_{Tc} is the sample size of the compensated group and n_{Tn} is the sample size for the non-compensated group.

A Mann-Whitney test resulted in a test statistic of -0.04 with a p value of 0.968. We fail to reject the null hypothesis.

Thus our research hypothesis is supported for this aspect as well.

Table 4.1 summarizes the results for the compensated expert and the non-compensated expert groups for the five aspects compared. As seen, the research hypothesis that compensation will not affect decision making behavior among participating experts is supported for all the aspects. Since the results are not significant, a question of power of the tests may arise. Four of the test statistics are non-parametric tests. Non-parametric tests have found to have an asymptotic

relative efficiency in the range of 0.864 to 0.955 (Gibbons and Chakraborti, 2003). Besides this the mean values of the time on task and numbers of steps for the two groups are quite close to each other. Finally, evidence from studies by Festinger and Carlsmith (1959), Deci (1972) and Diaz, Zhao and Black (1999) provide us with sufficient evidence to combine the data for the two groups into one to test our second research hypothesis.

Table 4.1

Compensated and Non-compensated experts					
Aspect	**Test**	**Test Statistic**	**Sample Size**	**p value**	**Research Hypothesis 1 (C=NC) Supported or Not supported**
Sequencing	Kolmogorov-Smirnov	0.045	$n_{Dc} = 110$ $n_{Dn} = 145$	> 0.2	**Supported**
Cue utilization	Kolmogorov-Smirnov	0.091	$n_{Cuc} = 106$ $n_{Cun} = 146$	> 0.2	**Supported**
Search pattern	t-test of proportions	0.759	$n_{Pc} = 110$ $n_{Pn} = 145$	0.448	**Supported**
Number of steps	Mann-Whitney	1.15	$n_{Nc} = 9$ $n_{Nn} = 9$	0.2501	**Supported**
Time on task	Mann-Whitney	-0.04	$n_{Tc} = 9$ $n_{Tn} = 9$	0.9681	**Supported**

Research Hypothesis 2: The decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

The results of the five aspects are presented below.

Research Hypothesis 2a: With respect to sequencing, the decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

Our test hypotheses for this aspect are:

H_o: $D_{no} = D_e$

$H_{a:}$ $D_{no} \neq D_e$

$n_{Dno} = 190$, $n_{De} = 255$, where n_{Dno} is the sample size of the novice group and n_{De} is the sample size for the expert group.

A Kolmogorov-Smirnov test resulted in a test statistic of 0.0983 with a p value > 0.20. (The critical value is 0.156 at the 1% level, 0.130 at the 5% level and 0.102 at the 20% level). We fail to reject the null hypothesis.

Our research hypothesis is not supported for this aspect for the two groups.

Research Hypothesis 2b: With respect to cue utilization, the decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

Our test hypotheses for this aspect are:

H_o: $Cu_{no} = Cu_e$

$H_{a:}$ $Cu_{no} \neq Cu_e$

$n_{Cuno} = 203$, $n_{Cue} = 252$, where n_{Cuno} is the sample size of the novice group and n_{Cue} is the sample size for the expert group.

A Kolmogorov-Smirnov test resulted in a test statistic of 0.1005 with a p value > 0.20. (The critical value is 0.153 at the 1% level, 0.128 at the 5% level and 0.1009 at the 20% level). We fail to reject the null hypothesis.

Our research hypothesis is not supported for this aspect for the two groups.

Research Hypothesis 2c: With respect to search pattern, the decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

Our hypotheses for testing this aspect are:

H_o: $P_{no} = P_e$

$H_{a:}$ $P_{no} \neq P_e$

$n_{Pno} = 190$, $n_{Pe} = 255$, where n_{Pno} is the sample size of the novice group and n_{Pe} is the sample size for the expert group.

A t-test of proportions test resulted in a test statistic of 3.59 with a p value of 0.0001. We reject the null hypothesis in this case.

Thus our research hypothesis is supported for this aspect.

Research Hypothesis 2d: With respect to number of steps, the decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

Our hypotheses for testing this aspect are:

H_o: $N_{no} = N_e$

$H_{a:}$ $N_{no} \neq N_e$

$n_{Nno} = 20$, $n_{Ne} = 18$, where n_{Nno} is the sample size of the novice group and n_{Ne} is the sample size for the expert group.

A Mann-Whitney test resulted in a test statistic of 2.41 with a p value of 0.016. We reject the null hypothesis in this case at 1.6% significance level.

Thus our research hypothesis is supported for this aspect.

Research Hypothesis 2e: With respect to time on task number of steps, the decision making behavior of inexperienced subjects (novices) differs from that of the experienced subjects (experts).

Our test hypotheses for this aspect are:

H_o: $T_{no} = T_e$

$H_{a:}$ $T_{no} \neq T_e$

$n_{Tno} = 20$, $n_{Te} = 18$, where n_{Tno} is the sample size of the novice group and n_{Te} is the sample size for the expert group.

A Mann-Whitney test resulted in a test statistic of 1.71 with a p value of 0.0873. In this case we reject the null hypothesis at 8.73% significance level.

Thus our research hypothesis is supported at 10% significant levels.

Table 4.2 summarizes the results for the inexperienced (novice) and the expert groups for the five aspects compared. The results are mixed. As seen, results on three aspects namely search pattern, number of steps and time on task support our research hypothesis. While, results on two aspects namely sequencing and cue utilization do not support our research hypothesis. Participating students behaved like participating experts in some aspects. At the same time on some aspects, participating experts behaved differently than participating students suggesting the impact of experience on these aspects.

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Table 4.2

Novices and Experts					
Aspect	**Test**	**Test statistic**	**Sample Size**	**p value**	**Research Hypothesis 2 (Nov=Exp) Supported or Not supported**
Sequencing	Kolmogorov-Smirnov	0.0983	$n_{Dno} = 190$ $n_{De} = 255$	> 0.2	Not Supported
Cue utilization	Kolmogorov-Smirnov	0.1005	$n_{Cuno} = 203$ $n_{Cue} = 252$	> 0.2	Not Supported
Search pattern	t-test of proportions	3.59	$n_{Pno} = 190$ $n_{Pe} = 255$	0.000	**Supported**
Number of steps	Mann-Whitney	2.41	$n_{Nno} = 20$ $n_{Ne} = 18$	0.016	**Supported**
Time on task	Mann-Whitney	1.71	$n_{Tno} = 20$ $n_{Te} = 18$	0.0873	**Supported**

2. Exploratory Research

One of the reasons for exploratory research is to get an insight on qualitative aspects of decision making and to suggest future research questions. Information such as which cues are most accessed by different groups (novices vs. experts) and which are least accessed is critical. This will help in future research by developing a candidate normative list of critical cues for asset selection. It also gives insight on the descriptive behavior of experts. Figure 4.1 and Figure 4.2 show the frequency of cue usage for novices and experts respectively. The calculations have been standardized as the number of expert subjects is two less than novice subjects.

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Figure 4.1

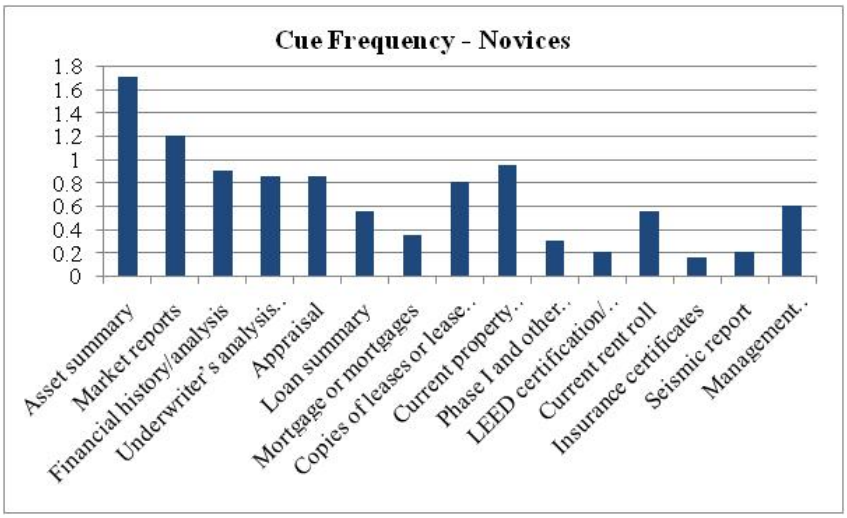
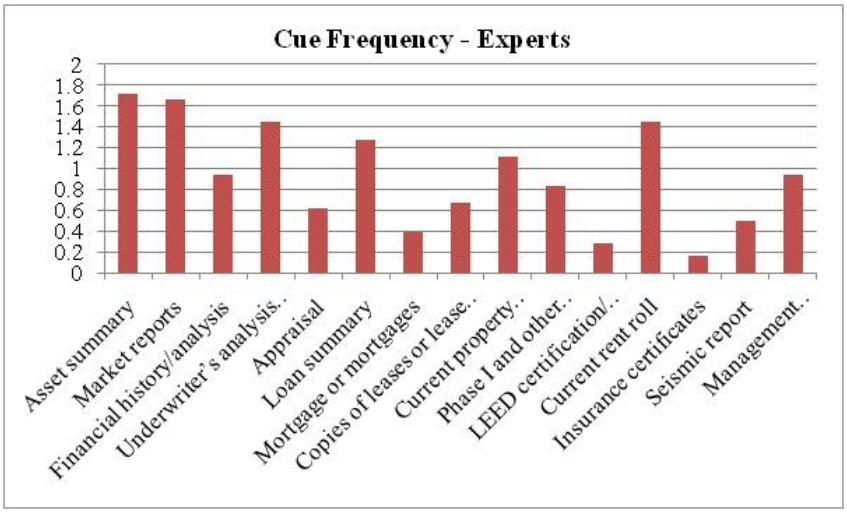


Figure 4.2

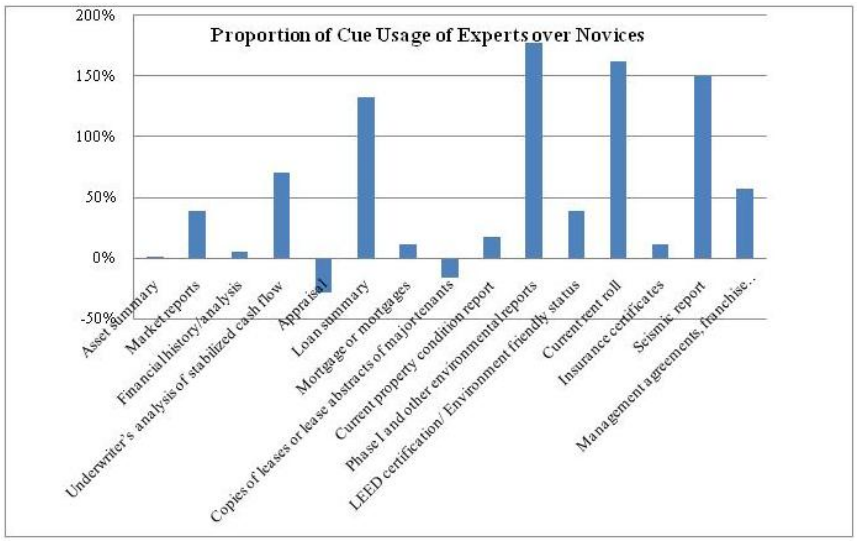


As seen from the graphs, experts use asset summary, market reports, current rent roll and underwriter's analysis and loan summary the most. While, novices use asset summary, market reports, current property condition and financial history/analysis the most. Figure 4.1 and Figure 4.2 also reveal the low preference of subjects towards qualitative aspects of real estate. Attributes

such as management agreements, ground leases, insurance certificates, seismic report and LEED certification are some of the attributes with the lowest frequency of usage across both the groups of subjects. For novices, cues with a frequency of less than 0.7 (the mean of the frequency of the cues) can be said to be less critical in decision making than others. While for experts, cues with a frequency of less than 0.9 (the mean of the frequency of the cues) can be said to be less critical in decision making than others.

Figure 4.3 shows the cues used more by experts than by novices (and vice versa). Cues Phase I and environmental reports, current rent roll, seismic report and loan summary are all used at least twice as much by experts than novices. This shows how experience teaches experts to look for certain attributes which are critical to the investment decision. Novices lack this magnifying lens due to lack of experience.

Figure 4.3



As a quality control, the impact of order of cue presentation on order of cue utilization was examined. The order of presentation was randomized by design. Figure 4.4 and Figure 4.5 show

the average order of access of each cue. The calculation of the average order is explained in Chapter 3. The smaller the average order of a cue, the earlier it was accessed at an average by subjects. It can be suggested that for novices, cues with an average order number of greater than 11.5 (the mean of the average order numbers) can be said to be less critical in decision making than others. While for experts, cues with an average order number of greater than 10 (the mean of the average order numbers) can be said to be less critical in decision making than others. We also run a correlation between the average order number and cue frequency for the two groups of subjects. The results gave a Pearson correlation of -0.983 (p value of 0.000) for the novices and a correlation of -0.911 (p value of 0.000) for experts. What it means is that cues that are most accessed are the ones that are accessed earlier in the process. This result although not conclusive but may suggest that cues accessed earlier in the decision making task seem to be more important than those accessed later on in the process. However, this result needs further investigation to give a definitive answer to this question.

Figure 4.4

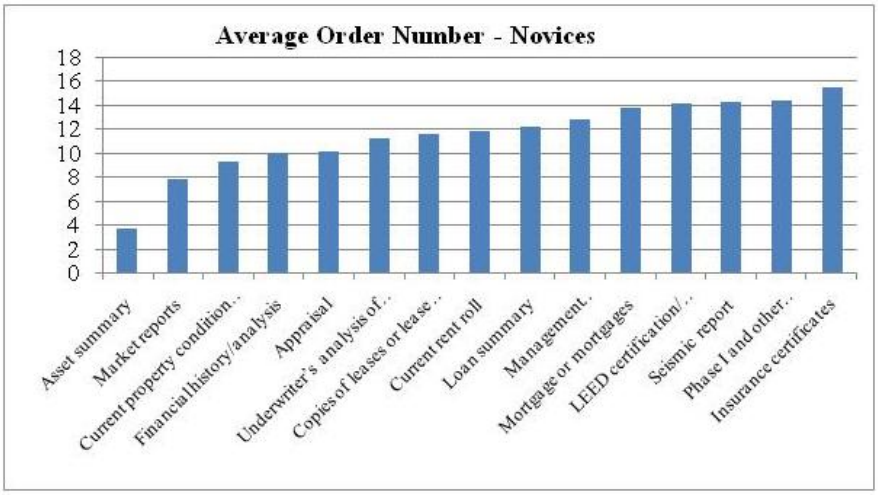


Figure 4.5

The average order is then regressed on the order of presentation and type of subject. The results of the regression are presented in Table 4.3

Table 4.3

	Coefficients	**P value**
Constant	4.249	0.000
Order of Cue Presentation	0.771	0.000
Group	-0.026	0.939

As the table shows only the order of cue is signifcicant. This tells us that the order in which information is presented is highly correlated and may impact order in which cues are accessed. The first half of the information items have been accessed more and sooner by both subject groups. Perhaps this is merely coincidence or perhaps it is causality. Further analysis is required to resolve the issue. This exploratory exercise has helped us develop preliminary ideas about the

descriptive nature of real estate investment decision makers suggesting future research in this area.

3. Summary

In this chapter we have presented the results of our research hypotheses. Further we have tried to gain insights in the descriptive behavior of real estate investors (novices and experts). In the next and final chapter we will put forth the conclusions from this study and areas of future research.

Chapter Five

Conclusion

1. Contributions

Decision making is a complex task due to the nature of the human brain. While the decision making process takes place in the short term memory, the information involved is accessed from the problem environment and long term memory. The short term memory is characterized by a limited capacity. Thus in complex decision making task such as real estate, cognitive shortcuts are taken for efficient processing of information. These cognitive short cuts called heuristics are developed over a period of time. These are heuristics that individuals develop, over time, to guide the flow of information from the environment to and within the cognitive system. Experience plays a critical role in development of these heuristics.

This study explored the actual behavior of real estate investment decision makers. There are two objectives for doing so. First to evaluate the impact of experience on the decision making behavior of real estate investors. This is done by comparing the difference in the decision making behavior of inexperienced subjects (novices represented by students) and experienced subjects (experts represented by real estate professionals). Secondly this study also explores whether compensation affects the way in which people behave. This is operationalized by compensating a randomly selected half of participating experienced subjects and not compensating the other half. To test our hypotheses (impact of compensation and impact of experience on decision making), five aspects were employed. They are sequencing, cue utilization, search pattern, number of steps and time on task.

The first finding of this study on the decision making behavior of compensated experts (experienced subjects) and non-compensated experts corroborates conclusions from other studies such as Festinger and Carlsmith (1959), Deci (1972) and Diaz, Zhao and Black (1999). All these studies find no evidence of a compensation impact on decision making behavior in experiments. Also, anecdotal evidence from this study confirms our empirical findings. When offered compensation, no subject was willing to accept any monetary reward for participating in the experiment. The findings of this study relating to compensation ha**ve** implications for the design of future experiments in real estate.

For interpreting the findings of this study analyzing the impact of experience on decision making behavior, some caution has to be exercised. There is mixed evidence relating to the difference in the behavior of novices and experts. On the five aspects that the two groups are tested, evidence that their behavior differs in three has been uncovered. They are search pattern, number of steps and time on task. However, for the other two aspects, sequencing and cue utilization, no difference was found.

The possible explanation for these results is the type of training given to student subjects (novices). This training prepares the students to behave like experts in terms of actual cues and their frequency of use. However the impact of experience becomes evident when it comes to search pattern, number of cues and time on task. As novices gain experience, their behavior becomes ever more dominated by an inter-option search strategy when engaged in relatively straightforward; two option (investment property) tasks. Besides this, experience seems to compel subjects to utilize more steps and take more time while performing these investment

decision laboratory tasks. Table 5.1 and Table 5.2 compare novices and experts on some of the aspects discussed. Perhaps experience teaches novices the gravity of the decision making role getting them more deeply involved, motivated, and engaged in the asset selection process. Standard cautions about extending laboratory results apply and increasing the task complexity by adding more investment property options may evoke different behavior, nevertheless the findings of this study on search pattern, number of steps and time on task are consistent with other studies outside the real estate domain like Jacoby et al, (1984, 1985, 1986 and 1987).

Table 5.1

	Novices	**Experts**
Number of steps	10.5	15.16
Time on task (minutes)	24.6	31

Table 5.2

Search Pattern (Proportion)	**Novices**	**Experts**
Intra	35%	19%
Inter	65%	81%

With regards to the exploratory research, the findings give us an insight on the type of data utilized by the two groups. Expert's frequency of cue utilization was greater in all cues except two. In four cues in particular, underwriter's analysis of stabilized cash flow, loan summary, Phase I and environmental reports and current rent roll the expert's frequency was twice that of novices. This suggests that experience may sensitize experts to the importance of some attributes of real estate overlooked by novices. This study also finds evidence of order of presentation of cues influencing the sequence of cue access by the subjects suggesting the possibility of recency

behavior and its impact on real estate investment decision making (see Gallimore, 1994 for a study of recency behavior among valuers in the UK). However, the findings are not conclusive and have to be tested further in future research. This study opens the door to a rich body of questions in the area of real estate investment decision making. Potential future research of interest is discussed in the next section.

2. Areas of Future Research

Some of the questions that arise from this study pose interesting themes questions for future real estate investigation. One interesting question is the impact of type of training on expert decision making. This study did not include lenders in the subject group. The descriptive behavior of experts trained as underwriters versus expert equity investors can be explored in future studies. Given the high correlation found in this study between order of cue utilization and order of cue presentation, a search for recency behavior and bias seems worthwhile.

The results of this study are silent on whether the observed correlation between cure presentation and cue utilization orders are causal or simply coincidental. Perhaps varying the cue presentation order will vary the cure utilization order. Or perhaps the observed order of cure utilization is stable over varying orders of cue presentation. More study is required to resolve this question. Studies of the impact of task complexity due to increased property options will help to establish the limits of the external validity of these findings. For example how stable is inter-option search as task complexity increases? Do expert subjects tend to employ intra-option screening heuristics in the face of task complexity?

Continuing the study of the descriptive behavior of investors and lenders will help in developing a normative model of decision making in real estate. Students in the classroom are trained to use specific analytic tools. Development of a normative model will help in melding these tools into an overall process that can be taught to students and thereby abbreviate the lag in the progression of moving from novice to expert. A promulgated normative model is also a worthwhile goal for industry. It will facilitate movement toward investment decision making standards that will improve performance and guard against exposure to bias and suboptimal behavior.

IRB Approval

INSTITUTIONAL REVIEW BOARD

Mail: P.O. Box 3999
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In Person: Alumni Hall
30 Courtland St, Suite 217

April 17, 2009

Principal Investigator: Gallimore, Paul

Student Principal Investigator: Sah, Vivek

Protocol Department: Real Estate

Protocol Title: Asset Acquisition Criteria: A Process Tracing Investigation into Investment Decision Making Amongst Real Estate Investors

Funding Agency:

Submission Type: Protocol H09454

Review Type: Expedited Review

Approval Date: April 17, 2009

Expiration Date: April 16, 2010

The Georgia State University Institutional Review Board (IRB) reviewed and approved the above referenced study and enclosed Informed Consent Document(s) in accordance with the Department of Health and Human Services. The approval period is listed above.

Federal regulations require researchers to follow specific procedures in a timely manner. For the protection of all concerned, the IRB calls your attention to the following obligations that you have as Principal Investigator of this study.

1. When the study is completed, a Study Closure Report must be submitted to the IRB.

2. For any research that is conducted beyond the one-year approval period, you must submit a Renewal Application 30 days prior to the approval period expiration. As a courtesy, an email reminder is sent to the Principal Investigator approximately two months prior to the expiration of the study. However, failure to receive an email reminder does not negate your responsibility to submit a Renewal Application. In addition, failure to return the Renewal Application by its due date must result in an automatic termination of this study. Reinstatement can only be granted following resubmission of the study to the IRB.

3. Any adverse event or problem occurring as a result of participation in this study must be reported immediately to the IRB using the Adverse Event Form.

4. Principal investigators are responsible for ensuring that informed consent is obtained and that no human subject will be involved in the research prior to obtaining informed consent. Ensure that each person giving consent is provided with a copy of the Informed Consent Form (ICF). The ICF used must be the one reviewed and approved by the IRB; the approval dates of the IRB review are stamped on each page of the ICF. Copy and use the stamped ICF for the coming year. Maintain a single copy of the approved ICF in your files for this study. However, a waiver to obtain informed consent may be granted by the IRB as outlined in 45CFR46.116(d).

All of the above referenced forms are available online at https://irbwise.gsu.edu. Please do not hesitate to contact Susan Vogtner in the Office of Research Integrity (404-413-3500) if you have any questions or concerns.

Sincerely,

Susan K. Laury

Susan K. Laury, IRB Chair

Federal Wide Assurance Number: 00000129

Appendix I

Information cues and their description

I. **Asset summary:** It typically consists of a narrative of the asset detailing the property's location, operating history, strengths and weaknesses, a summary of the loan terms for the new borrower, a competitive market analysis, and summaries of the environmental and property condition reports.

II. **Market reports:** A current report on the economic and real estate conditions prevailing in the city and submarket in which the property is located. The reports are third party reports to give an unbiased outlook of the economic and real estate environment. These reports consist of employment trends, demographics, leasing activity, information on rent charged and rent changes, occupancy trends and development activities in the city and submarket.

III. **Financial history**: Three years of financial statements, if available, the current operating statement, the trailing 12-months income statement.

IV. **Underwriter's analysis of stabilized cash flow:** It includes assumptions used for all adjustments to revenue, expenses, capital expenditures, tenant improvements, and leasing costs, if applicable.

V. **Appraisal:** A complete appraisal by a third party (less than 12 months old).

VI. **Loan summary:** A questionnaire that addresses and summarizes the material terms of the loan documents pertaining to the financing of the property purchase.

VII. **Mortgage or mortgages:** Information on any existing mortgage, senior or subordinate, on the property.

VIII. **Copies of leases or lease abstracts of major tenants:** A brief summary of existing lease with expiration dates.

IX. **Current property condition report:** This document provides an assessment of the property's condition, building quality, immediately needed repairs and future capital needs over the life of the loan prepared by a licensed engineer (less than 12 months old).

X. **Phase I and other environmental reports:** A current (less than 12 months old) phase I report prepared in accordance with ASTM (American Society for Testing and Materials) protocol by a licensed environmental engineer detailing the scope and results of the analysis and recommendations. Any follow up reports, phase II reports, and environmental insurance should also be included

XI. **LEED certification/ Environment friendly status:** With increasing concern towards the environment, investors are increasingly showing interest in cost efficient properties. This set of data gives information on the environment friendliness of the property. This information set is not part of documentation required by Standard and Poors for rating purposes. However, it has been added due to the increasing popularity of eco-friendly buildings amongst investors.

XII. **Current rent roll:** It should show the as-of date, tenant's name, space occupied, rent paid, beginning and ending lease dates, and other pertinent lease data.

XIII. **Insurance certificates:** A detail coverage levels and names of carriers

XIV. **Seismic report:** This document is required for properties located in seismic zones 3 and 4.

XV. **Management agreements, franchise agreements, and ground leases**

Appendix II

Information List Available to Subjects to Choose From

Cue No.	Property F	Cue No.	Property C
1	Asset summary	31	Asset summary
2	Market reports	32	Market reports
3	Financial history/analysis	33	Financial history/analysis
4	Underwriter's analysis of stabilized cash flow	34	Underwriter's analysis of stabilized cash flow
5	Appraisal	35	Appraisal
6	Loan summary	36	Loan summary
7	Mortgage or mortgages	37	Mortgage or mortgages
8	Copies of leases or lease abstracts of major tenants	38	Copies of leases or lease abstracts of major tenants
9	Current property condition report	39	Current property condition report
10	Phase I and other environmental reports	40	Phase I and other environmental reports
11	LEED certification/ Environment friendly status	41	LEED certification/ Environment friendly status
12	Current rent roll	42	Current rent roll
13	Insurance certificates	43	Insurance certificates
14	Seismic report	44	Seismic report
15	Management agreements, franchise agreements, and ground leases	45	Management agreements, franchise agreements, and ground leases

References

Anderson, J. R., 1993. Problem solving and learning. American Psychologist 48, 1, 35-44.

Anderson, M., 1988. A Comparative Analysis of Information Search And Evaluation Behavior of Professional and Non-Professional Financial Analysts. Accounting, Organizations, and Society, 13, 431–446.

Andersson, P., 2004. Does experience matter in lending? A Process-tracing Study on Experienced Loan Officers and Novices Decision Behavior. Journal of Economic Psychology, 25: 4, 471–492.

Baum, A., Crosby, N. and MacGregor, B.D., 1996. Price Formation, Mispricing and Investment Analysis in the Property Market, A Response to 'A note on the 'The Initial Yield Revealed: Explicit Valuations and the Future of Property Investment', Journal of Property Valuation & Investment, 14, 36-49.

Bedard, J and Mock T.J., 1992. Expert and Novice Problems-Solving Behavior in Audit Planning. Auditing: A Journal of Practice and Theory, 11, 1-32.

Biggs S.F., 1984. Financial Analysts' Information Search in the Assessment of Corporate Earning Power. Accounting Organizations and Society, 9, 3/4, 313-323.

Biggs S.F., and Mock T.J., 1981. A Detailed Investigation of Auditor Decision Processes. Working paper no, 10, Center for Accounting Research, University of Southern California.

Biggs, S. F., and Mock, T. J., 1983. An Investigation of Auditor Decision Processes in the Evaluation of Internal Controls and Audit Scope Decisions. Journal of Accounting Research, 234-255.

Bouwman, M, 1980. The Use of Accounting Information Expert versus Novice Behavior, Unpublished manuscript, University of Oregon.

Bouwman M, 1984. Expert vs. Novice Decision Making In Accounting: A Summary. Accounting, Organizations and Society, 9: 3-4, 325-327.

Chi, M. T. H., Feltovich, P., and Glaser, R., 1981. Categorization and Representation of Physics Problems by Experts and Novices. Cognitive Science, 5, 121–152.

Chi, M. T., Glaser, R., and Rees, E., 1982. Expertise in Problem Solving. In R. J. Stemberg (Ed.), Advances in the Psychology of Human Intelligence (pp. 7-77). Hillsdale, NJ: Erlbaum.

Daniel W. W., 1990. Applied Nonparametric Statistics, Duxbury Press.

Davis, J. T. (1996). Experience and Auditors Selection of Relevant Information for Preliminary Control Risk Assessment. Auditing: A Journal of Practice and Theory, 15, 1, 16–37.

Deci, E. L., 1972. The Effects of Contingent and Non-contingent Rewards and Controls on Intrinsic Motivation. Organizational Behavior and Human Performances, 8, 217-229.

Diaz III, J., 1990. How Appraisers Do Their Work: A Test of The Appraisal Process and The Development of A Descriptive Model. The Journal of Real Estate Research, 5, 1, 1-15.

Diaz III, J., 1997. An Investigation into the Impact of Previous Expert Value Estimates on Appraisal Judgment, Journal of Real Estate Research. 1997, 13, 1, 57–66.

Diaz III, J., and Hansz, A J., 1997. How Valuers Use the Value Opinions of Others. Journal of Property Valuation and Investment, 15, 3.

Diaz III, J., Zhao R. and Black R., 1999. Does Contingent Reward Reduce Negotiation Anchoring? Journal of Property Investment and Finance, 17, 4, 374 - 379.

Farragher, E. J., 1982. Investment Decision-Making Practices of Equity Investors in Real Estate, The Real Estate Appraiser and Analyst, 48, 2, 36–42.

Farragher, E. J. and Kleiman R., 1996. A Re-Examination of Real Estate Investment Decision-Making Practices, Journal of Real Estate Portfolio Management, 2, 1, 31–9.

Festinger, L., and Carlsmith J. M., 1959. Cognitive Consequences of Forced Compliance. Journal of Abnormal and Social Psychology, 58, 203-210.

French N. 1996. The Behavior of Investors; Perceptions and Decisions in Real Estate Investment. Paper presented ARES 1996, Lake Tahoe.

French N, French S., 1997. Decision Theory and Real estate. Journal of Property Valuation and Investment, 15, 3, 226–232.

French N, 2001. Decision Theory and Real Estate Investment: An Analysis of the Decision-Making Processes of Real Estate Investment Fund Managers. Managerial and Decision Economics, 22, 7, 399–410.

Gallimore, P., 1994. Aspects of Information-Processing in Valuation Judgment and Choice, Journal of Property Research, 11, 2, 97-110.

Gallimore, P., 1996. Confirmation Bias in the Valuation Process: A Test for Corroborating Evidence, Journal of Property Research, 13, 4, 261-273.

Gallimore P and Gray A, 2002. The Role of Investor Sentiment in Property Investment Decisions, Journal of Property Research, 19, 2, 111-120.

Gallimore P, Gray, A. and Hansz, J. A, 2000. Decision Making in Small Property Companies. Journal of Property Investment and Finance, 18, 6, 602-612.

Gallimore, P. and Wolverton, M., 1997. Price-Knowledge Induced Valuation Bias: A Cross-Cultural Comparison. Journal of Property Valuation and Investment, 15, 3, 261-273.

Gallimore, P. and Wolverton, M., 2000. The objective in Valuation: A study of the Influence of Client Feedback. Journal of Property Research, 17, 1, 47-57.

Gibbons J. D. and Chakraborti S., 2003. Nonparametric Statistical Inference, Marcel Dekker.

Gobet, F. and Simon H. A., 2000. Five seconds or sixty? Presentation time in expert memory. Cognitive Science, 24, 4, 651–682.

Hardin, W., 1997. Heuristic Use, Credit Constraints and Real Estate Lending", Journal of Property Investment and Finance, 15, 3, 245-55.

Hutchison, N.E., and Nanthakumaran, N., 2000. The Calculation of Investment Worth. Journal of Property Investment & Finance, 18, 1, 33-51.

Jackson, C. and Orr, A., 2007. Investor Decision-Making and Real Estate Attributes. Paper presented at annual ARES meeting, San Francisco 2007.

Jacoby, J., Jaccard, J., Kuss, A., Troutman, T. and Mazursky, D., 1987. New Directions in Behavioral Process Research: Implications for Social Psychology. Journal of Experimental Social Psychology, 23, 2, 146-175.

Jacoby, J., Mazursky, D., Troutman, T., and Kuss, A., 1984. When Feedback Is Ignored: Disutility of Outcome Feedback. Journal of Applied Psychology, 69, 531-545.

Jacoby, J., Kuss A., Mazursky D. and Troutman T., 1985. Effectiveness of Security Analyst Information Accessing Strategies: A Computer Interactive Assessment. Computers in Human Behavior, 1, 95–113. (See Erratum in Volume 1, Issue 2.).

Jacoby, J., Kuss A., Mazursky D. and Troutman T, 1986. Experience and Expertise in Complex Decision Making. In R. Lutz, ed., Advances in Consumer Research, 13, 469-472.

Jacoby, J., Morrin M., Johar G., Gürhan Z., Küss A., and Mazursky D., 2001. Training Novice Investors to Become More Expert: The Role of Information Accessing Strategy., The Journal of Psychology and Financial Markets, 2001, 2, 2, 69–79.

Jenkins, A.M., 1985. Research Methodologies and MIS Research, Research Methods in Information Systems. Amsterdam, Holland: Elsevier Science Publishers BV

Louargand, M. A., 1992. A Survey of Pension Fund Real Estate Portfolio Risk Management Practices, Journal of Real Estate Research, 7, 4, 361–74.

Maines, L. A. (1995). Judgment and Decision-making Research in Financial Accounting: A review and analysis. In R. H. Ashton, & A. H. Ashton (Eds.), Judgment and decision-making in accounting and auditing (pp. 76–101). New York: Cambridge University Press.

Markowitz H, 1952. Portfolio Selection. Journal of Finance 7:1, 77–91.

Markowitz H, 1959. Portfolio selection: efficient diversification of investments, Yale University Press.

Newell, A., Simon, H. A. 1972. Human Problem Solving. Englewood Cliffs, NJ: Prentice-Hall.

Page, D. E., 1983. Criteria for Investment Decision Making: An Empirical Study, Appraisal Journal, 51:4, 498–508.

Roberts C and Henneberry J, 2007. Exploring office investment decision-making in different European contexts, Journal of Property Investment and Finance, 25, 3, 289-305.

Selnes, F and Troye S.V., 1989. Buying Expertise, Information Search and Problem Solving. Journal of Economic Psychology, 10:3, 411-428.

Shanteau, J. 1992a. Competence in experts: The role of task characteristics. Organizational Behavior and Human Decision Processes, 53, 252–266.

Shanteau, J. 1992b. How much information does an expert use? Is it relevant? Acta Psychologica, 81, 75–86.

Simon, H A, 1972. The Theory of Problem Solving. North Holland Publishing Company.

Simon, H A, 1976. The Information Storage System Called “Human Memory”. Neural Mechanisms of Learning and Memory. Cambridge, Mass.: M.I.T. Press.

Simon, H., 1978. Rationality as Process and Product of Thought, American Economic Review, 68:2, 1-16.

Simon, H A. and Newell, A. Human problem solving, 1971. The State of the Theory in 1970. American Psychologist, 26, 2, 145-159.

Simon, H. A. and Schaeffer J., 1992. The Game of Chess. Handbook of Game Theory with Economic Applications, 1, 1-17.

Wang, Y., Wang, Y., Patel, S., & Patel, D., 2006. A Layered Reference Model of the Brain (LRMB). IEEE Transactions on Systems, Man, and Cybernetics (C), 36(2), 124–133.

Wang Y. and Chiew V., 2008. On the Cognitive Process of Human Problem Solving, Cognitive Systems and Research (In Press)

Webb, J. R., 1984. Real Estate Investment Acquisition Rules for Life Insurance Companies and Pension Funds, Journal of the American Real Estate and Urban Economics Association, 12, 4, 495–520.

Webb, J. R. and McIntosh, W., 1986. Real Estate Acquisition Rules for REITs: A Survey, Journal of Real Estate Research, 1, 1, 77–98.

Wiley, R. J., 1976. Real Estate Investment Analysis: An Empirical Study, Appraisal Journal, 44, 4, 586–92.

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