Multilevel Determinants of Forecasting Effectiveness: Individual, Dyadic, and System Level Predictors and Outcomes

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ABSTRACT

This dissertation offers a conceptual framework capturing forecasting related activities in a formal organizational context, and it empirically assesses how and how well an organization utilizes forecasting tools and results. Specifically, a multilevel model is formulated that suggests that forecasting capabilities and forecasting processes predict forecasting effectiveness. The model is tested through a field study utilizing a qualitative and quantitative research design. The findings suggest that there are great differences in how forecasting is done among mangers within the same organization, and that in the absence of process congruency (i.e., similar procedures for similar forecasters), the use of a bottom-up approach to forecasting contributes to inconsistent forecasting results. Further, the findings suggest that when it is difficult to establish solid market information, managers often look to competitors in order to establish pseudo-estimates of supply and demand.

With respect to content congruency (i.e., the imposition of higher level forecasts onto lower level entities), the dissertation examines the consequences of making decisions based on data from different levels of analyses (and with different geographic scopes).The results highlight the consequences of relying on higher level forecasts when a mismatch exists between organizational and national "footprints". Using various economic variables to predict housing starts across levels, the analyses found disparate results for the lower level of analysis. The results also reveal great differences in the strength of the forecasting models between different levels of analysis and between different entities at the same level. Different combinations of variables contribute toward predicting the key dependent variable, housing starts, at different levels, and even between geographic markets at the same level of analysis.

The findings suggest that traditional organizational forecasting performed at the national level presents decision makers with a "hit or miss" scenario when trying to predict housing demand in the local markets. The inability to generate strong forecasts utilizing the same variables in different markets appears to be problematic. Thus, a "bottoms-up" approach to the technical generation of forecasts is desirable Recommendations for both future research and practice are suggested.

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CHAPTER 1: THE RESEARCH PROBLEM

1.1. Motivation for the Study

Forecasting techniques, coupled with complementing organizational processes, can be considered an organizational capability critical to firm performance (Barney, 1986; Makadok & Walker, 2000). Eisenhardt and Martin (2000) suggest that an organization's ability to predict and respond appropriately to environmental changes will, to a great extent, predict its performance because it allows the firm to better meet market demands by avoiding both inventory shortages and costly excess inventory. This is consistent with the strategic management literature's concept of *dynamic capabilities*, which is defined as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece, Pisano, & Shuen, 1997; Amit & Schoemaker, 1993). Change is costly, so firms must develop processes to minimize those changes associated with low payoffs. A part of these capabilities involves being able to scan the environment (i.e., monitor), to evaluate markets (i.e. forecast), and to quickly reconfigure and transform (i.e. utilize) strategic assets (Teece, Pisano, & Shuen, 1997).

The dynamic capabilities framework further suggests that firms need to respond quickly and be innovative when faced with volatile market conditions. It proposes that firms are in need of strategic assets, such as knowledge and technology, and that these must be integrated within the company in order to be useful. These assets have to be transformed or reconfigured by the organization. Such transformations require common codes of communication and coordinated search procedures to secure effective and efficient use of these assets, as these are believed to impact organizational performance. In short, within fast changing markets, performance is dependent upon the firm's internal ability to anticipate and then quickly reconfigure these strategic assets (Teece, Pisano, & Shuen, 1997; Eisenhardt & Martin, 2000).

As suggested by Barney (1986) accurate forecasts are associated with organizational success, and they are possibly a source of competitive advantage as noted by Makadok and Walker (2000). Coff, Durand and Gerasymenko (2009) also suggest that accurate forecasts are strategic assets to firms operating in volatile markers, and that forecasting should therefore be viewed as a dynamic capability of the firm as forecasts provide information valuable to the organization's decision makers. This is also consistent with the more recent conceptualization of

sales forecasting management by Davis and Mentzer (2007). Sales, or demand, forecasting is the predominant variable of interest in industry in general.

Forecasting, however, may be one of the least understood among the business decision making tools by managers at all organizational levels. In fact, many companies do not distinguish clearly between forecasting, planning, and decision making (Lawless, 2008). Oftentimes managers do not treat forecasting as an integral part of their organization's dynamic capabilities. It also suggests that managers do not view the knowledge derived from forecasts as strategic assets, and that their view is limited to a more traditional view of what forecasting is and should be.

1.2. Problem Statement

Statistical, or quantitatively-based, forecasting has been viewed as a critical organizational capability utilized for both strategic and tactical business planning (Sanders & Manrodt, 2003). This statistical approach has not only been viewed as a helpful tool for organizational decision makers, but also as an efficient means of predicting the future. This view of forecasting has, however, been fairly narrow. In its simplest form, forecasting has been defined as a statistical-based process which includes utilizing historical data of interest to generate demand patterns and forecasts which are more or less accurate depending on the randomness of the data included in the models (Gilliland, 2008). In other words, forecasting has been conceptualized by both researchers and managers as an activity limited to the econometric aspects of utilizing historic longitudinal data to predict the future.

A recent survey by Raspin and Terjesen (2007) examining organizational forecasting methods revealed that managers across organizations exercise a great deal of discretion regarding their methods of forecasting. They identified three forecasting modes. First, *formal forecasting* utilizes external secondary information, and it is embedded within an organizational routine. Further, it appears to be driven by strategy formulations arising from the budget process of the organization. Second, *focused forecasting* is similar to formal forecasting in terms of formality, but has smaller breadth in that it tends to emerge due to specific issues or is executed on a project basis. Third, *intuitive forecasting* relies on conversational, subjective, judgmental, and anecdotal evidence, and it utilizes personal sources (both internal and external) as opposed to secondary information.

Raspin and Terjesen's third mode of forecasting (intuitive, as noted above) resembles a qualitative or judgmental approach. Research suggests that despite improvements in quantitative techniques, managers often rely

on qualitative methods such as executive opinion and customer expectations rather than what appears to be superior quantitative forecasting techniques (Kahn & Mentzer, 1994; McCarthy, Davis, Golicic, & Mentzer, 2006). It has been argued that most business forecasting today is performed judgmentally despite its limitations (Sanders & Manrodt, 2003). Simply put, these findings suggest that there is gap between forecast theory and actual business practice (Davis & Mentzer, 2007; Sanders & Manrodt, 2003). The first research objective of this dissertation is, therefore, to examine what forecasters and managers do with respect to forecasting and what these forecasting processes look like. The second overall objective is to better understand how individual capabilities, dyadic influences, and system characteristics impact these processes.

Researchers have found that (1) a lack of access to quantifiable information, (2) having operations in markets with high uncertainty, (3) and low amount of software integration with other organizational systems (i.e., poor match between current forecasting software and other internal systems utilized to respond to environmental changes) are all associated with the use of subjective and less accurate forecasting methods across firms and industries (Sanders & Manrodt, 2003). These three conditions alone, however, may not explain why firms are reluctant to utilize quantifiable data in an effort to predict the future with more accuracy.

Findings by Reynolds and Lancaster (2007) suggest that many small firms use no formal sales forecasting (i.e., demand forecasting) framework. In fact, the majority of small business owners and managers in their sample rate sales forecasting skills as very low on their list of day-to-day work priorities. The authors found that managers and business owners do not even consider forecasting an integral part of their organizational routines, which further highlights differences between research and practice. Reynolds and Lancaster's (2007) findings further indicate that forecasting skills are not considered critical competencies in many businesses.

Interestingly, until recently, generating accurate forecasts has been work reserved for professional forecasters. Attempts at bridging the gap between developing forecasts and utilizing them in an effective manner is a relatively recent issue in the management field (Wacker & Lummus, 2002). Wacker and Lummus suggest that managers can improve organizational processes by understanding the nature and role of forecasts. Usually, the most important managerial decisions a company can make are based on the least accurate forecasts. If the future could be predicted with high certainty, then the potential rewards would be less beneficial to the firm. Finally, the organizations that need the most accurate forecast usually have the largest forecast error, i.e., firms operating with relative internal and external stability do not necessarily need to predict the future because their environment is so

stable, but would, on the flipside, be fairly accurate at doing so for the same reason. This suggests that managers should devote their attention to improving the use and implementation of forecasts for better resource utilization, and that future research should focus on broadening the understanding of the role of forecasts in strategic decision making. It therefore appears to be a managerial problem with respect to the ability to understand the relationships between the information forecasts provide and the usefulness of this information to managers and organizations.

Forecasts may also appear less useful as managers often rely on aggregated data when predicting the future. Relying on aggregated data to predict changes at lower levels of analyses is commonly done by managers , but may distort the interpretation of the environment in which the organization operates by increasing positive forecast biases and error magnitudes (Gilliland, 2008). Managers may find a poor match between forecasts utilizing data from a higher level (e.g., national) to predict changes at a lower level (e.g., state, city, etc.; (Das & Bing-Sheng, 1999)). A third area of concern with respect to managerial forecasting is the econometric tradition of attempting to detect market changes through aggregation, e.g., using higher level data to predict changes in local markets.

Organizational forecasting is a complex process. This dissertation seeks to understand how managers approach forecasting, what influences these processes, and how they account for differences between markets and levels of analyses. In summary, the main research questions of this dissertation are as follows:

1. What do forecasters and managers actually do with respect to forecasting and what do these forecasting processes look like?
2. How do individual capabilities, dyadic influences, and system characteristics impact forecasting processes?
3. What are the implications of relying on aggregated data for forecasting purposes for an organization with organizational footprints that do not match national footprints from an organizational forecasting effectiveness standpoint?

1.3. Context of the Study

This study utilizes upper level managers from an organization referred to as *Home Builder A*. This organization currently operates in 83 Metropolitan Statistical Areas (MSA) across the U.S. Each MSA falls under the leadership of one of 30 Division Presidents and six Area Presidents, who are charged with the responsibility of running the operations in their respective markets. Additionally, each area is assigned a Vice President of Finance

and a Vice President of Strategic Marketing. Each of the Divisional, Vice, and Area Presidents are responsible for growth and revenues, and a significant portion of their work relates to forecasting. These managers have been selected for two reasons. First, they generate independent forecasts for their divisions and geographic areas of operations. Second, they also contribute to the development of the organizational level forecasts. The organization itself was selected because multilevel issues could be evaluated both on the process side and the technical forecasting side.

1.4. Data Sources and Methodology

A questionnaire was designed to elicit responses from the Division Presidents pertaining to their personal background and experiences as related to forecasting, the budget process, and market monitoring. A similar, but more in-depth questionnaire was designed to elicit responses from the Area and Vice Presidents. In addition to the items included in the questionnaire for the Division Presidents, this questionnaire also solicited work specific information, training information, and questions specific to the organization's forecasting systems and processes. The questionnaires were sent to the respondents via e-mail along with a consent form which they returned via mail to the investigator. Approval by the Institutional Review Board at Virginia Tech was obtained before the questionnaires were sent out (Appendix 1). Following the completion of the surveys, a twenty-five minute phone interview was conducted with the Area and Vice Presidents to more fully understand what they do with respect to forecasting. These interviews were semi-structured in format, and the findings were summarized with descriptive statistics and a mix of quantitative and qualitative approaches was used for analysis purposes.

To address the second, technical phase of this dissertation having to do with the multilevel aggregation problems, the study utilized historic time-series data collected from *Moody's Economy.com* to test a series of hypotheses relating to technical forecasting issues. This quarterly data started with Quarter 1 1987 and went through Quarter 3 2009 as the last quarter of observations. The variables included are all related to the housing industry. Regression analyses and *Within And Between Analyses* (WABA) were used to test the hypotheses.

1.5. Dissertation Contributions

This dissertation sheds light on three critical issues related to forecasting from a managerial standpoint. First, it examines what forecasters and managers do with respect to forecasting while simultaneously investigating

individual capabilities, dyadic influences, and system characteristics that impact these processes. Second, it examines how these processes impact individual forecasting effectiveness. A model suggesting that forecasting capabilities and forecasting processes impact forecasting effectiveness at the individual, team, and organizational level is formulated. Although the literature has established that there are numerous factors that can negatively impact forecast accuracies and forecast utilization such as lack of environmental monitoring, reduced attention span (Das & Bing-Sheng, 1999), and a general lack of comfort with quantitative applications and statistics (Greve, 1999), we have yet to determine how individual forecasting capabilities impact individual forecast processes and how these eventually influence forecasting effectiveness. Third, this dissertation addresses an apparent gap in the literature when it comes to assessing the management of forecasting with respect to organizational versus national footprints (i.e., differences between areas where an organization operates versus the nation as a whole.) Most empirical research appears to utilize a single-level of analysis approach as statistical models are built at an intermediate or high level of aggregation for organizational forecasting purposes. This may incorrectly force managers to assume that higher level findings hold true at the individual level or in geographically diverse markets of operations. This dissertation therefore investigates how well forecasts based on aggregate national data really represent what is happening in an organization which operations are not evenly distributed across all states or regions.

1.6. Organization of the Dissertation

The dissertation is organized into six chapters. Chapter 1, the introduction, lays the foundation for the study and introduces the main research questions in general terms. Chapter 2 starts by situating this study in existing literature. It then examines relevant theories that offer insight into why there is a need for a multilevel approach to forecasting research. In particular, it considers dyadic and system level influences upon individual forecasting effectiveness. Chapter 3 develops a set of propositions and hypotheses based on various theories encompassing multiple levels of analysis. In this chapter, a conceptual framework is generated for forecasting related activities that address how forecasting capabilities and forecasting processes relate to forecasting effectiveness at the individual level, while simultaneously considering dyadic, systems, and organizational influences. To further investigate the multilevel nature of operating in more than one location, this chapter discusses the consequences of relying on higher level forecasts when a mismatch exists between organizational and national “footprints”. Chapter 4 explains in detail the research design and methodology that consists of two different approaches to research. In order to test

the propositions a qualitative approach consisting of questionnaires and semi-structured interviews is utilized. The hypotheses are tested with the use of time-series data collected from Moody's Economy.com from 1987 to 2009. Chapter 5 describes the results from the analyses of managerial practices. It also presents the empirical results from SPSS and DETECT analyses. In this chapter, the descriptive statistics, a qualitative summary of the interviews, and results of various data analyses in light of the propositions and hypotheses are presented. Chapter 6 discusses the contribution of the study in light of the findings, first with respect to managerial practices and forecasting effectiveness, and then the aggregation and footprint issues. It also discusses the limitations of the study and makes recommendations for future research. The chapter concludes with a discussion of the implications of the study.

CHAPTER 2: LITERATURE REVIEW

2.1. Overview

This chapter provides a background for the study of forecasting in the organizational context. It begins by identifying a gap in the existing literature, and then examines some multilevel paradoxes that exist with respect to organizational forecasting. To illustrate some of these issues, the chapter utilizes examples of forecasting related problems across industries. Finally, it defines the key constructs utilized in the theory development.

2.2. Existing Research

The strategic management literature has introduced the construct of *organizational forecasting capability* (OFC), which, from a very general standpoint, appears to include all aspects of an organization's ability to predict the future, not just the technical accuracy of its forecasts (Durand, 2003). Durand's research suggests that properly directed organizational attention will improve forecasting accuracy. Improved organizational attention will enable the firm to better assess its own strengths and weaknesses, which will make it less likely to overrate its own strengths and its ability to control its environment. In other words, the OFC construct attempts to cover areas that are of interest to managers and researchers from both a scholarly and practical standpoint.

Durand (2003) recognizes that there are several individual level factors that can negatively affect judgment which leads, in turn, to errors in forecasting. First, he specifically identifies cognitive biases which impair a decision maker's ability to select optimal choices. Second, he recognizes that preprogrammed sequences of behaviors (i.e., individual routines) impair autonomous judgments. Third, he suggests, in accordance with theories on cognitive blind spots and escalation of commitment, that dominant logic guides an individual's vision which leads to forecasting errors. Durand (2003) is, however, strictly focused on a higher level analysis.

Durand (2003) defines organizational forecasting capability as the ability to (1) monitor environmental changes, (2) accurately predict the future, and (3) act upon these predictions in a coordinated manner. This is a fairly broad definition, and may not adequately address the complexity of the forecasting process. His analyses also focus exclusively on organizational characteristics and their consequences upon its forecasting abilities as a whole. Considering that large, Fortune 1000 companies have multiple product lines, multiple territories, and multiple types

of customers for which forecasting is usually done above and beyond an entire corporate forecast, a multilevel analysis of these processes at different levels or for different sub-entities within the corporate umbrella may be warranted. Moreover, a multilevel analysis could shed light upon how individual forecasting skills and practices may influence the organizational forecasting performance and other outcomes of interest or vice versa. Such an analysis also addresses group, team, systems, and organizational influences upon the individual. Multilevel analyses do not appear to have been used with respect to forecasting in the management literature.

The study by Durand (2003) was important for the management literature as it addressed forecasting as an organizational capability critical to firm performance. There are, however, research findings that trigger a need for a multilevel approach, rather than relying on analyses at the organizational level alone. First, it has been suggested that judgmental forecasting is limited by biases inherent in human decision making and people's inability to process information in large quantities, but it is preferred by managers with (1) limited access to quantifiable information, (2) environments containing high uncertainty, and (3) limited access to software (Sanders & Manrodt, 2003). The extensive use of qualitative forecasting methods introduces problems related to lack of attention that may lead to poor decision making when decision makers ignore or even reject suitable options. Managers may focus on limited targets, few alternatives, and ignore various outcomes relevant to the situation in the absence of objective, quantifiable information (Das & Bing-Sheng, 1999). Attention problems are also associated with reduced forecasting accuracy (Durand, 2003), and could stem from either internal (e.g., related to employees, managers, organizational systems etc.) or external (e.g., lack of verifiable data) sources. Internal attention problems could arise from an organization's inability to stimulate employee motivation and capabilities in absence of clear articulation and distribution of information, while external attention problems stem from an inability to incorporate external information in the interpretation of the environment (Durand, 2003). After controlling for reciprocal effects, Durand (2003) found that two principal firm-level factors (i.e., organizational illusion of control and organizational attention) influence both bias and magnitude of errors in estimates. He found that high organizational illusion of control, such as an organization's perception of being able to control variables that in reality are out of its control, increases positive forecast biases, which, in practical terms, suggests that firms generate overly optimistic forecasts when they think they can control the environment.

Second, we know that less than optimal forecasting choices are often made due to decision-makers' cognitive biases (Durand, 2003). Individual decision makers' autonomous judgments are impaired by routines that

are pre-programmed sequences of behavior. Such routines impair decision makers' vision, leading to "blind spots" and escalation of commitment. Consistent with Schwenk (1986), Durand (2003) suggests that inaccurate risk assessments are associated with illusions of control which make managers more likely to overestimate the likelihood of successful outcomes. According to Langer and Roth (1975), the construct of illusion of control is a human tendency to believe that one can influence, or even control, outcomes that one has no influence over whatsoever. It is closely associated with overconfidence, which leads managers to be certain about their own accuracy, when, in fact, they are not.

Durand's (2003) findings suggest that increased attention to environmental changes, such as higher relative investments in market information, appear to reduce positive forecast bias and magnitude of errors. Additionally, he found that the ability to acquire external information about the environment in which a firm operates, reduces both positive forecast biases and the magnitude of errors. Acquiring such external, market-based information also has a moderating effect on forecast biases associated with illusion of control. Different decision processes therefore tend to accentuate particular types of cognitive bias, which suggest that cognitive biases are systematically associated with strategic decision processes (Das & Bing-Sheng 1999).

The issues associated with forecasting being performed judgmentally despite all its limitations (Kahn & Mentzer, 1995), may also be due to poor fit between the job requirements and the person performing the tasks. As mentioned earlier, managers who favor judgmental forecasting methods over quantitative methods often do so because of familiarity with such methods, or they rely on simple quantitative methods such as moving averages and exponential smoothing. Therefore, the problems we experience during volatile economic conditions such as those during the last four or five years, may be associated with an inability to generate and use forecasts due to unfamiliarity with quantitative applications and a lack of training in statistics. Specifically, managers often ignore the fact that variables tend to regress toward the mean; this, in turn, leads them to overestimate the likelihood that past performances will be repeated in the future (Greve, 1999). If an organization experiences higher than expected growth, its managers are likely to make upwardly biased forecasts. When the organization performs above forecasted targets, it is crucial that decision makers understand that there is an element of randomness in the higher performance. Unless that randomness is accounted for, the predictive ability of the forecasts will be impaired. Durand (2003) found that there is, in fact, a positive association between change in past performance indicators and

forecast biases. He found support for the idea that managers typically ignore the "regression toward the mean" effect associated with upward biased forecasts following periods of extensive growth.

It is important to recognize that organizational processes, such as forecasting, are not solely influenced by individual characteristics, but also by the organization's systems, or its internal ability to quickly reconfigure strategic assets (Teece, Pisano, & Shuen, 1997; Eisenhardt & Martin, 2000). Without well developed processes, such as knowledge and information sharing, data transfer, and automation, individual forecasters will struggle to get the job done. Additionally, support from subordinates and superiors will also most likely influence how and how well managers perform forecasting related work. It would therefore be natural to addresses dyadic influences. The importance of the dyadic level of analysis for understanding organizational leadership problems has a well-documented 25 year track record (Dansereau, Alutto, Nachman et al., 1995) and since individuals in charge of forecasting related activities have to assess and utilize both internal and external information (Durand, 2003) from both subordinates and immediate supervisors, dyadic issues may impact the forecasting processes.

Finally, being in a position to understand and improve forecasting results and processes is critical to managers in any organization because this work is no longer reserved just for dedicated, professional forecasters (Wacker & Lummus, 2002). Managers at all levels make decisions daily about the future that determines the direction of the organization. In formal organizations forecasting is an inherently multilevel process. On one hand, middle level managers often have to make targeted forecasts for their particular domain (e.g., a product line, a geographic territory, etc.); on the other hand, the corporation as a whole needs to be able to generate a single forecast for the entire organization.

This inherently multilevel nature presents possible paradoxes. For example, it is possible to have accurate and useful individual forecasts for lower level domains or organizational units, but when they are assembled and managed at the organizational level, the forecasts are poor. On the other hand, it is possible for the corporate forecast to be stellar, but the various individual component forecasts to be mediocre. In other words, excellence in forecasting at one level does not guarantee excellence at all levels. It is also possible that the corporate forecast is assembled completely independently from any lower level forecasts. Thus, the key issue might be how the lower level efforts are subsumed into a single forecast and then utilized. As an example of this possible transfer process across levels, if one envisions an organization with ten subsidiaries operating in geographically distinct areas and each manager overseeing operations in these areas submits their individual forecasts to the corporate office to

generate an organizational wide forecast, one would expect that the corporate forecast would be as accurate and useful as the sum of the individual forecasts. That is, however, not always the case because of statistical artifacts related to aggregation or to other corporate level processes that may have introduced new variables or manipulated the lower level results.

A multilevel analysis may therefore be warranted in order to fully understand how organizations utilize forecasts and how individual forecasting capabilities impact the organization. This would include an analysis of the processes used to generate and share the results of the forecasting processes, which includes both the informal sharing of results and the formal deployment of resources based on these results (Diamantopoulos & Winklhofer, 2003). If organizational processes prevent forecasting findings from being shared within the organization, it is unlikely that the findings will be acted upon. Additionally, even accurate forecasts are useless if resources are not redeployed based on these results. The bottom line is that both forecasting results and their concomitant processes must be mapped for at least two nested hierarchical levels in order to evaluate their efficacy and the transfer between them. One would ideally study a dozen or more organizations along with the all of the embedded forecasters within each one for a true "within and between" multilevel analysis of organizational forecasting capabilities and results.

Further, multilevel analyses do not appear to have been used in the management literature with respect to forecasting as they relate to the technical side of forecasting either. Traditionally, statistical models are often built at an intermediate or high level of aggregation for forecasting purposes. This is done because these levels are considered "stable" or not subject to organizational realignments or changes over the forecasting horizon. The underlying assumption behind such an approach is that errors will cancel each other out during aggregation, and forecast accuracy is not of great importance. Forecasters attempt to detect patterns through aggregation as it can be difficult to draw meaningful information from lower levels of analyses where data may appear random (Gilliland, 2008).

In addition to the economic "tradition" of performing statistical forecasts at higher levels of analysis, managers often pay attention to this type of data (such as leading national economic indicators) as it is relatively easy to obtain and frequently discussed in the press, whereas accurate data for lower levels of analysis are harder to obtain. Thus, the organizational forecaster and the decision makers are forced to assume that the results from national data will equally apply to lower level units.

Relying on aggregated data may distort the interpretation of the environment in which the organization operates by increasing positive forecast biases and error magnitudes. Managers may find a poor match between forecasts utilizing data from a higher level (e.g., national) to predict changes at a lower level (e.g., state, city, etc) (Das & Bing-Sheng, 1999). An inability to pay attention to environmental conditions at the actual level of operations may cause an organization to ignore or even reject suitable options. Organizations that only pay attention to forecasted results of aggregated data (such as national unemployment numbers, national GDP, etc.) may focus on limited targets, few alternatives, and ignore various outcomes relevant to the decisions being made (Das & Bing-Sheng, 1999). Despite the limitations associated with the utilization of single, higher-level forecasting, it is common practice in many industries to make decisions at the managerial level based on aggregated data (Gilliland, 2008). In summary, an additional forecasting managerial problem exists when a mismatch exists between organizational and national data footprints. This footprint problem refers to a situation in which the actual presence of a corporation, as defined by its sales and market locations, is equally and fully distributed across the US. Thus, forecasters often make the assumption the national level data which represents the entire country, will work for the corporate forecasting effort despite the fact that the corporation may be in only 40%, 60%, or 80% of the nation.

2.3. A Practical Example of Poor Forecasting Practices: The Real Estate Crisis

The current financial crisis and the global recession were preceded by an almost complete collapse in the United States (U.S.) real estate market. With approximately 25% of the U.S. economy tied up in the housing market and its associated industries, the effects upon the overall economy have been devastating. Homebuilders and investors have witnessed the sharpest decline in real estate prices and housing activity (e.g., construction and sales) in recent memory. This crisis did not suddenly appear in January 2007, although it appears as if both forecasters and managers were caught off guard.

It appears as if the housing industry in particular ignored leading indicators that should have warned of trouble ahead. Real estate predictor variables such as building permits, a necessary prerequisite before starting to construct a new residential home, peaked in September of 2005, and then started a steep decline. Mortgage originations, another leading indicator, also peaked in August of 2005 and then started a freefall. This suggests that there was about a 4 to 6 month period during which the housing industry had advanced warning, and another year

and a half before the Dow Jones Indicator collapsed. Home builders should have been able to scale back on building activity during this period.

The median existing home price in the U.S. hovered around $230,000 during the summer months of 2007. Roughly fifteen months later the median price was approximately $160,000. Not surprisingly, sales volume of existing homes dropped similarly during this time period. Reflecting on these sharp declines in prices and sales volumes, it is even more interesting to note that sales of existing homes had already been declining sharply since the fall of 2005. In other words, market prices for existing homes did not reflect the troubling trend which had been developing for nearly two years. Table 2.3a below illustrates the dramatic drop in Single-Family Building Permits following this key variable's peak in September 2005.

Figure 2.3a. Single-Family Housing Permits (Thousands) – Seasonally Adjusted Annualized Rate

Table 2.3.b illustrates the subsequent drop in Single-Family Housing Starts. Interestingly, the sharp decline took place six to nine months following the drop in permits, which should have given the homebuilders adequate time to adjust and halt the building activity.

Figure 2.3b. Single-Family Housing Starts (Thousands) – Seasonally Adjusted Annualized Rate

As sales numbers cooled off in the U.S. market, the supply of homes started to accumulate which, in turn, triggered the eventual drop in prices. Until fall of 2005, the amount of housing inventory, measured as months' supply of existing home inventory, fluctuated between three and a half and five months at current sales rate (seasonally adjusted). The inventory level had been constant for the last seven or eight years. This is a common indicator of how long the average home sits on the market as it is reflects housing demand versus housing supply at any given time. This number rose sharply throughout 2006 and 2007 until it peaked at nearly a twelve months supply in mid 2008.

The sharp decline in activity in the existing housing market was mirrored by similar trends in the new housing market. During the summer of 2005 this market peaked when the annualized, seasonally adjusted, sales numbers for new homes reached 1.8 million homes. Prices on new construction, however, did not peak until early 2007 when the median sales price in the U.S. topped $260,000. Prices later dropped to approximately $200,000. Sales of new homes dropped even more dramatically. By late 2008 the annualized sales rate was barely above 300,000 homes or approximately twenty percent of what it had been three years earlier. The developments in this market are illustrated in Figure 2.3c below:

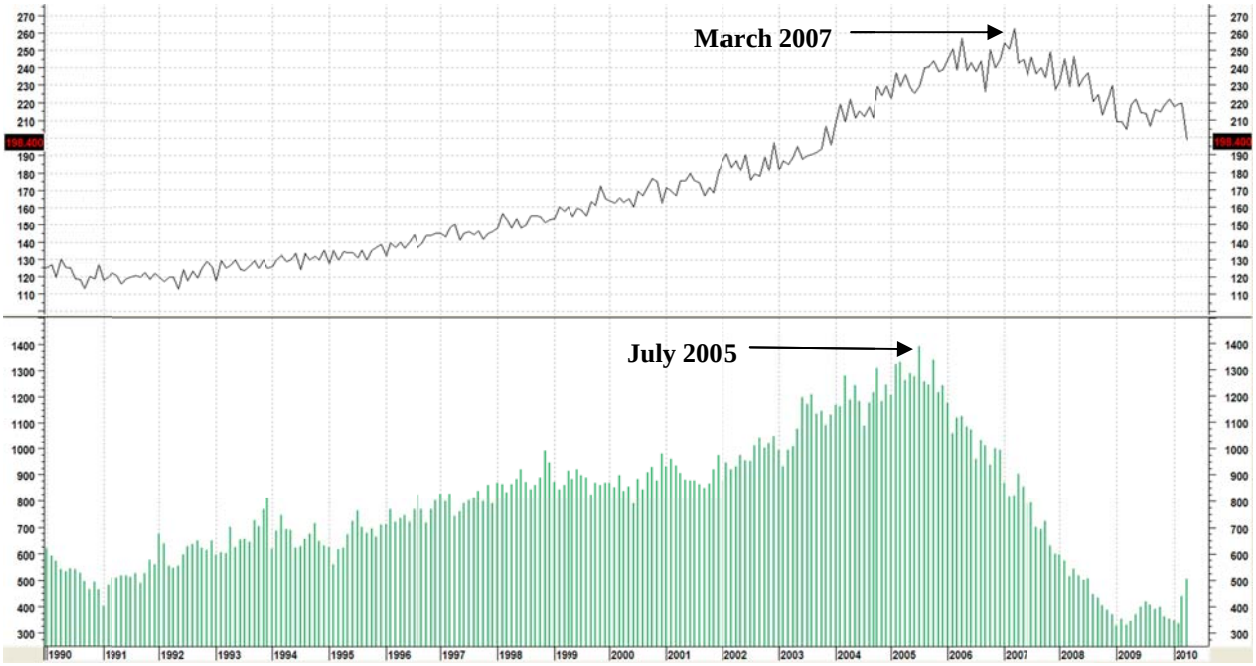

Figure 2.3c. New Single-Family Housing Sales (Thousands) – Seasonally Adjusted Annualized Rate & Median New Single-Family Housing Sales Price (Thousands)

As the bottom portion of Figure 2.3c reveals, sales of new single-family homes peaked during the summer of 2005, approximately two months before the peak in building permits. The decrease in sales of existing inventory and permits should have warned of trouble ahead, but starts did not decrease until the following winter. Prices for new construction, however, did not peak until the winter of 2007. At that time sales had slowed so much that prices took a very steep decline with the inventory of new homes piling up.

The over-supply of new homes was even more excessive than in the existing home market. Supply was so great that by late 2008 the typical new home would sit on the market for over a year at the current sales rate, which represented an historic high in the U.S. On the demand side, building activity eventually dropped to an historic low. Based on the over-supply of both new and existing homes, it is clear that U.S. homebuilders were caught off guard with respect to the downturn that took place. The result of the record downturn that took place has been financial struggles for most of the nation's homebuilders.

2.4. Forecasting Failures: Evidence from Other Industries

Overconfidence in forecast results is not unique to the housing industry. Research suggests that forecasters and financial planners in the securities industry have fallen victim to their own overconfidence following years of

continued growth. Venter and Michayluk (2008) found, in a sample of financial planners, a general overconfidence in respondents' ability to make judgments under uncertainty as shown by a narrow range of forecasts and a substantial number of inaccurate predictions. The overconfidence was present both when comparing estimates to the ex-post outcome of a predicted quantity and to an interval based on historical return volatility.

The auto industry has also had its share of forecasting related problems in recent years. Toyota Motor Company, the world's largest auto maker, expected its first operating loss in 70 years in 2009, due to an inability to predict demand in a volatile market (Takahashi & Linebaugh, 2008). European auto makers have also had problems predicting the future. Most manufacturers have had to severely adjust their forecasts over the last couple of years. These forecasts have traditionally been based on growth, a strategy which worked well during the upswing portion of the business cycles. The Chief Executive Officer (CEO) of Renault and Nissan recently stated that their struggles were closely linked to an inability to forecast not only the next year, but even the next month (Reed & Simon, 2008).

The struggles of the airline industry have also been documented extensively by the media in recent years. Operating with mostly fixed costs, accurate demand forecasting is essential to the large air carriers (Ratliff et al, 2008). Despite option-based fuel contracts that should reduce some uncertainty, most U.S. airlines continue to report losses through 2009. Most of these losses are attributed to lower-than-expected sales as consumers and corporations cut back on travel as a response to the struggles of the economy. Even Southwest Airlines, commonly referred to as the U.S. airline industry's success story, attributed their losses for the third quarter of 2009 to failed forecasts of passenger demand (Esterl, 2009).

The developments of the last four years in the housing, finance, auto, and airline industries suggest that there is an apparent need to understand the processes necessary to generate and utilize forecasts. The developments in the housing industry are particularly interesting as there appears to have been intra-organizational breakdowns with respect to forecasting either due to managerial ignorance or possibly even oversight. One may also speculate whether innumeracy or organizational inertia contributed to the inability to adjust to changing market conditions. Lack of statistical skills or an inability to understand quantifiable information, combined with more than a decade of growth, could have made managers and decision makers incapable of understanding the long-term nature of the market's cyclicality. It is important to remember that these tasks are no longer reserved for just professional forecasters who can devote one hundred percent of their time to this kind of work (Wacker & Lummus, 2002), but also a much larger population of senior managers who have significant forecasting responsibilities without being

exclusively devoted to these tasks studying forecasting from A broader view of forecasting above and beyond technical aspects of statistical techniques does, therefore, appear to be warranted.

2.5. Individual Forecasting Capability, Processes, and Effectiveness

This dissertation proposes that it is the effectiveness of forecasting activities that is of most interest to practitioners and management scholars alike when examining forecasting related activities. While, the strategic management literature defines organizational forecasting capability as the ability to monitor environmental changes, accurately predict the future, and act upon these predictions in a coordinated manner (Durand, 2003; Coff, Durand & Gerasymenko, 2009), this dissertation seeks to understand the multilevel issues underlying effective forecasting. The OFC definition may be valuable from a very high level of analyses, but may be considered a too general and brief for someone attempting to examine forecasting practices and effectiveness from multiple levels of analysis. For the purpose of this dissertation, an individual's *forecasting capability* is the target individual's relevant training, psychological orientation, and energy and enthusiasm for the forecasting processes. It also encompasses an individual's ability to gather relevant information and to be in a position to objectively utilize and monitor environmental changes through carefully planned and organized activities directly related to forecasting processes. *Individual forecasting processes* reflect the forecaster's efforts spent on forecasting related activities, the duration of time spent on these activities, the implementation of routines, and the quality of deliverables. In other words, this construct, which to some extent is determined by individual capabilities and specific system capabilities, is designed to capture what and how the individual performs the forecasting related activities.

Individual forecasting capabilities together with forecasting processes are proposed to influence *forecasting effectiveness*, or the ability to predict, or estimate, future events, which is the outcome of interest. Forecasting effectiveness is high when there is little difference between actual and predicted values for any outcome of interest (i.e. accuracy), and when the forecast is timely and is being utilized by the organization. The relationship between these three components is illustrated in Figure 2.5 below.

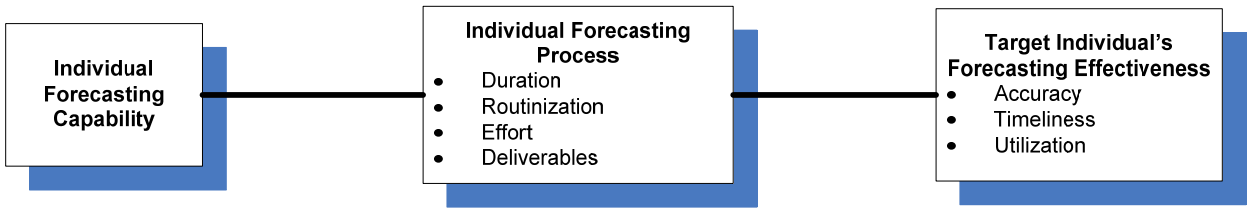

Figure 2.5. Primary Individual Level Constructs

As illustrated in Figure 2.5, an individual's forecasting capabilities (i.e., being in possession of relevant training and experience, exhibiting an appropriate psychological orientation toward such tasks, and exerting high levels of energy and enthusiasm) will impact an individual's forecasting processes, i.e., how forecasting is carried out by the individual. These processes, in turn, reflect the individual's efforts spent on forecasting related activities, duration of time spent on these activities, implementation of routines, and quality of deliverables. Finally, individual forecasting processes are associated with the extent to which accurate, timely, and useful forecasts are generated (i.e. individual forecasting effectiveness).

2.6. Summary and Conclusions

This chapter has provided the background for this study of forecasting within a formal organizational context. It started by identifying a gap in existing literature. Despite interesting studies on forecasting and organizational characteristics, no multilevel studies appear to have addressed this issue which appears to be multilevel by nature. The intention of this study is to disentangle some of these issues as a multilevel approach could shed light on how individual forecasting skills and practices may come together in an organizational forecast. This chapter suggested that a multilevel framework should accommodate dyadic, systems, and organizational influences upon the individual forecaster.

Next, this chapter examined multilevel paradoxes that exist with respect to organizational forecasting. It is possible to have accurate and useful individual forecasts for lower level domains or organizational units, but when they are assembled and managed at the organizational level, the forecasts could be poor. Additionally, it is possible for the corporate forecast to be accurate, but the various individual component forecasts to be mediocre. Thus, the key issue is how the lower level efforts are subsumed into a single forecast and then utilized.

This chapter also addressed issues relating to the economic tradition of building statistical models at an intermediate or high level of aggregation for forecasting purposes. Forecasters attempt to detect patterns after aggregation as it can be difficult to draw meaningful information from lower levels of analyses where data may appear random. Managers often pay attention to this type of data (such as leading national economic indicators) because it is relatively easy to obtain and frequently discussed in the press, whereas accurate data for lower levels of analysis are harder to obtain. Relying on aggregated data may distort the interpretation of the environment in which the organization operates by increasing positive forecast biases and error magnitudes. Managers may find a poor match between forecasts utilizing data from a higher level (e.g., national) to predict changes at a lower level.

To illustrate practical problems associated with the traditional view of forecasting the housing industry was selected as an example of "overconfidence" in forecast results and the industry's own ability to turn housing starts into closings (i.e., revenue). Research findings from other industries were also included in this discussion to illustrate how forecasters and managers outside of the housing industry have also fallen victim to their own overconfidence following years of continued growth. Further, examples from various industries were provided to highlight some of the struggles they have faced in recent years when trying to anticipate both market changes and product demand.

The latter part of this chapter introduced the key concepts that will be included in the proposed model. First, *forecasting capability* was defined as an individual's relevant training, psychological orientation, and energy and enthusiasm for the forecasting processes. It was also suggested that this construct encompasses an individual's ability to gather relevant information and to be in a position to utilize it to objectively monitor environmental changes through carefully planned and organized activities directly related to forecasting. Second, *forecasting process* was defined as the forecaster's efforts spent on forecasting related activities, the duration of time spent on these activities, the implementation of routines, and the quality of deliverables. Third, *forecasting effectiveness* was defined as the ability to predict, or estimate, future events, which is the outcome of interest. High forecasting effectiveness was associated with high accuracy, timeliness, and organizational utilization.

CHAPTER 3: PROPOSITIONS AND HYPOTHESES SECTION

3.1. Overview

This chapter describes in detail a conceptual framework regarding forecasting related activities within a formal organizational context. This is done in order to assess how and how well an organization utilizes forecasting tools and results. Specifically, in this chapter a multilevel model is formulated with proposed relationships between individual forecasting capabilities, forecasting processes, and forecasting effectiveness, while simultaneously considering dyadic, systems, and organizational influences. Accordingly, a series of propositions are developed in order to test the nature of these relationships.

Additionally, this chapter discusses the consequences of relying on higher level forecasts for organizations without national "footprints" (i.e., when an organization's sales territories are only partially spread throughout the continental US). A series of hypotheses are introduced in order to empirically test whether there will be a significant difference in which key indicator variables predict housing starts across levels of analyses, and whether there will be significant differences in the optimum forecasting model of housing starts across levels.

This chapter, therefore, presents the two highly interrelated portions of this dissertation. First, it proposes a framework that serves as a guide to investigate what managers do with respect to forecasting. Second, it proposes testable hypotheses that can be used to examine whether organizations can use the same processes when operating in different markets.

3.2. Formulating a Multilevel Model of Forecasting Effectiveness

Reflecting on the extensive work that has been generated with respect to econometric forecast models and the apparent gap between research and practice, it can be argued that the focus on improving the technical accuracy of forecasts has been too narrow. As mentioned, the motivation of this dissertation is to examine whether there has been a failure in American management with respect to both its ability to forecast and anticipate the future in light of the recent major meltdown in the U.S. and world economies.

The problems associated with forecasting can be illustrated with results by Kahn and Mentzer (1995). They found that managers often favor judgmental forecasting methods over quantitative methods due to lack of familiarity with such methods, or they rely on simple quantitative methods such as moving averages and exponential smoothing

rather than more sophisticated and potentially more accurate forecasting methods. Through surveys of nearly five hundred forecasting executives in both consumer and industrial sales, the authors found that consumer firms typically employ regression, straight line projections, and executive opinions to generate forecasts. The findings further suggest that when lacking direct customer information, firms tend to identify extrinsic factors that correspond to sales, extrapolate sales history to predict future sales, and depend on company executives for qualitative forecasts.

The findings by Kahn and Mentzer (1995) appear to be typical in many industries despite other research findings which suggest that such methods are associated with poor forecasts and corresponding lower organizational performance (Kahn & Mentzer, 1994; Sanders & Manrodt, 2003). It has been suggested that judgmental forecasting is limited by biases inherent in human decision making and people's inability to process information in large quantities, but is preferred by managers with limited access to quantifiable information, operating in environments with high uncertainty, and with limited access to statistical forecasting software (Sanders & Manrodt, 2003).

Managers who rely on qualitative forecasting methods are more likely to focus on fewer targets and ignore suitable alternatives in the absence of objective, quantifiable information. The consequences of such forecasting practices are poor decision making and potentially lower organizational performance (Das & Bing-Sheng, 1999). Internal (such as managerial or organizational systems limitations) and external (such as the lack of useable data) attention problems further reduce the forecasting accuracy when employing qualitative methods (Durand, 2003). Internal attention problems are often associated with an organization's inability to stimulate employee motivation and capabilities in absence of clear articulation and distribution of information, while external attention problems stem from an inability to incorporate external information in the assessment of the environment (Durand, 2003).

Durand (2003) found that organizational illusion of control, or assuming that the organization can control external factors, increases positive forecast biases. Langer and Roth (1975) defined illusion of control as a human tendency to believe that one can influence, or even control, outcomes that one has no influence over whatsoever. It is closely associated with overconfidence, which leads managers to be certain about their own accuracy due to inaccurate risk assessments. The net result is that managers overestimate the likelihood of successful outcomes.

Organizational illusion of control is a greater problem when an organization utilizes qualitative forecasting methods due to presence of the decision-makers' cognitive biases (Durand, 2003). As suggested by Schwenk (1986), individual decision makers' autonomous judgments are impaired in the presence of routines and pre-

programmed sequences of behavior. Such routines make managers unaware of their own "blind spots" can lead to escalation of commitment. Durand's (2003) findings suggest that increased attention to environmental changes, such as higher relative investments in market information, appear to reduce positive forecast bias and magnitude of errors. Additionally, he found that the ability to acquire external information about the environment in which a firm operates, reduces positive forecast biases and the magnitude of errors. Acquiring such information, such as through investments in marketing information, also has a moderating effect on forecast biases associated with illusion of control. Different decision processes therefore tend to accentuate particular types of cognitive bias, which suggest that cognitive biases are systematically associated with strategic decision processes (Das & Bing-Sheng 1999).

The issues associated with forecasting being performed judgmentally despite all its limitations, as described by Kahn and Mentzer (1995), may also be due to poor fit between the job requirements and the person performing the tasks. As mentioned earlier, managers who favor judgmental forecasting methods over quantitative methods often do so because of familiarity with such methods, or they rely on simple quantitative methods such as linear trends. Therefore, the problems we experience in volatile conditions such as those during the last four or five years may be associated with an inability to generate and use forecasts due to unfamiliarity with quantitative applications and a lack of training in statistics. Specifically, managers often ignore the fact that variables tend to regress toward the mean, this, in turn, leads them to overestimate the likelihood that past performances will be repeated in the future (Greve, 1999). If an organization experiences higher than expected growth, its managers are likely to make upwardly biased forecasts. When performing beyond expectations, it is crucial that decision makers understand that there is an element of randomness in the performance. Unless that randomness is accounted for, the predictive ability of the forecasts will be impaired. Durand (2003) found that there is, in fact, a positive association between change in past performance indicators and forecast biases. He found support for the idea that managers typically ignore the "regression toward the mean" effect associated with upward biased forecasts following periods of extensive growth.

The importance of understanding forecasting is not limited to professional forecasters but also senior managers in formal organizational settings as noted by Wacker and Lummus (2002). Managers make decisions about the future that determine the direction of the organization and it is therefore critical that they understand the nature of forecasts. Senior managers often have to make targeted forecasts for their particular domain (e.g., finance, sales, etc.) and these forecasts will affect not only these individual areas, but also the forecasts and operations for the

larger organization. This is because forecasts at the organizational or corporate level often consist of multiple component forecasts.

3.3. Antecedents of Forecasting Capabilities

The predictors of forecasting capabilities are divided into two categories: personal background and personal proclivity. Personal background encompasses past experiences and education, while personal proclivity represents the personal attraction and enthusiasm for forecasting, which may be dependent upon the fit between the individual's mental style and the kind of work that is being performed and his or her level of comfort working with numbers. The proposed relationships between personal background, personal proclivity, and forecasting capabilities are discussed in the following two sections.

3.3.1. Personal Background

As stated earlier, the inability to generate and effectively use forecasts may be due to a lack of comfort with quantitative applications and a lack of training in statistics. Forecast-related work requires, at a minimum, that managers have an understanding of some key statistical concepts. As an example, if managers ignore or do not understand the concept of regression toward the mean they are more likely to make upwardly biased forecasts than those that recognize that there is an element of randomness in the performance (Greve, 1999).

Durand's (2003) findings confirmed Greve's arguments as he found that there is a positive association between change in past performance indicators and forecast biases. This supports the idea that managers typically ignore the "regression toward the mean" effect associated with upward biased forecasts following periods of continuous growth. Managers with formal training in quantitative areas and knowledge of the inner working of statistics will therefore be in a position to better understand the nature of regression toward the mean and elements of randomness in organizational performance.

Further, an important underlying conceptual skill for forecasting is the ability to envision the future as if it has already occurred, and then plan accordingly. Thus, an individual assigned to forecasting related activities must be able to think in the future perfect tense (Gioia, Corley, & Fabbri, 2002), which is used to describe an event that has yet to occur, but is expected to happen prior to another stated event. A practical implication for a forecaster would be expressed through statements or thoughts such as "We shall have reduced our inventory by the time

demand picks up." In other words, forecasters are expected to have the cognitive abilities to think as if future events have indeed already happened. This may present less experienced individuals with some challenges because they may not have lived through the true nature of long-term business cycles. As noted by Navarro (2005), a focus on business cycles is imperative in distinction to linear predictions generated by most regression models. Although increased experience may be associated with organizational inertia, or the inability to change patterns of behavior, it will also increase an individual's awareness of cyclicality which is essential to understand the true nature of long-term time-series models. Based on this it would be natural to predict that:

Proposition 1: Individuals with higher education and formal training in statistics are likely to be more comfortable with forecasting tasks than those with less education and formal training in statistics.

3.3.2. Personal Proclivity – Attraction and Enthusiasm for Forecasting

At the individual level of analysis, basic forecasting capabilities may depend upon thinking (cognitive) styles, cognitive abilities, and an ability of an individual to comprehend problems and tasks associated with numbers. The concept of thinking styles (also referred to as cognitive) originates in the cognitive psychology literature and describes the way individuals think, perceive and remember information, and their preferred approach when utilizing information to solve problems. Although multiple definitions exist with respect to the exact meaning of the term, it is a key concept in both education and management literature as it refers to multiple dimensions of human personality (Allinson & Hayes, 1996).

From an organizational behavior perspective, research on personality and thinking style differences has for the most part focused on the relationship between such human characteristics and individual job performance, team performance, and leadership (Funder, 2001). Interestingly, no studies appear to have examined the specific relationship between personality and forecasting related tasks.

A poor fit between personality and performing forecasting tasks can be a problem at the individual level of analysis because some personalities, as defined by the Myers Briggs Type Indicator (MBTI), may not be very compatible with forecasting disciplines. The MBTI is a commonly used multi-dimensional instrument for the measure of cognitive styles (Capraro & Capraro, 2002). Specifically, those who rely on Intuition prefer to work with theoretical and abstract information and are by nature described as being more interested in future possibilities (and

particularly detecting patterns in data), whereas those relying in Sensing tend to trust information that is in the present, is concrete, and understood by the five senses (Myers & McCaulley, 1985). Traditionally, strong Sensors, those managers with a preference for perceiving concrete details (as opposed to Intuitives, who are more comfortable perceiving patterns and gestalts), which may make them frustrated with the ambiguities of forecasting and developing strategic visions (Keirsey & Bates, 1984) . Combined with a Thinking preference for decision making, those with a Promethean temperament, or intuitive thinkers (NT's) in the MBTI framework, would be more likely to enjoy and succeed with forecasting tasks. Such individuals pursue power of nature, rather than power over people, through their quest to understand, control, predict, and explain realities, which are the four aims of science (Keirsey & Bates, 1984). Based on this it would be natural to predict that:

> *Proposition 2: Individuals with a preference for intuitive thinking styles will be more likely to express an interest and passion for forecasting related activities.*

Aside from pre-existing differences with respect to thinking styles, an individual's preference for forecasting may be linked to his or her cognitive abilities. Forecasting challenges the numeric abilities of the individual, and numeric abilities are considered a dimension of an individual's cognitive abilities (Banks & Oldfield, 2007). Thus,

> *Proposition 3: Individuals who are comfortable working with numbers will be more likely to be comfortable with forecasting related activities relative to those expressing being less comfortable working with numbers.*

3.4. Predictors of the Individual Forecasting Process ("How Forecasting is Done")

In addition to possessing certain forecasting capabilities, being able to generate accurate and appropriate forecasts is a function of what kind of forecasts are being generated (e.g., judgmental, quantitative, etc) and the level of preparation that goes into the forecasting activities. Without a clearly defined forecasting process that includes systematic monitoring of the environment and collection of available data, an individual can hardly be expected to be ready to generate or execute accurate and appropriate forecasts that will be utilized by an organization. Since an individual's forecasting capability is assumed to reflect the extent to which they are prepared

for forecasting related tasks based on educational and experience, it is expect that these capabilities will be associated with their individually developed forecasting routines and processes. In other words, having both required skills and enthusiasm is likely to be associated with the amount of effort they spend on forecasting related activities, the duration of time spent on these activities, implementation of routines, and the quality of their deliverables (e.g., formal reports, use of databases, charting tools as opposed to informal briefs generated with simple graphing techniques).Thus,

Proposition 4: Individuals with higher education and formal training in statistics will describe more advanced forecasting processes than those with less developed forecasting capabilities.

3.4.1. System Level Influences upon the Individual Forecasting Processes

Reflecting on the dynamic capabilities framework proposed by Teece and colleagues (Teece, Pisano, & Shuen, 1997), who define a *dynamic capability* as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments", it is important to recognize that processes are not solely influenced by individual characteristics, but also by the organization's systems, or its internal ability to quickly reconfigure strategic assets (Teece, Pisano, & Shuen, 1997; Eisenhardt & Martin, 2000). From a forecasting perspective, data availability, information sharing, internal knowledge transfer, and automation would classify as system capabilities that could be considered strategic assets. Thus,

Proposition 5: Individuals who perceive their organization's system capabilities to be strong will be more likely to have well developed individual forecasting processes than those that view their system capabilities as poor or inadequate.

Poorly developed forecasting processes could also be the result of an individual forecaster being overwhelmed by other pressing tasks due to staffing problems (e.g., understaffed) or lacking support from immediate supervisors for forecasting related tasks. Such problems could be due to dyadic problem at the top management level of analysis (either with the forecaster's direct supervisor or the top management team), where there may be a problem of influence in which one or two individuals have dominated an organization's forecasting effort thereby limiting both

the number of individuals and the requisite skills that could have been contributed. Because individuals in charge of forecasting related activities have to assess and utilize both internal and external information (Durand, 2003), and also responding and reporting to executive decision makers, dyadic issues will certainly impact their forecasting processes. In other words, forecasters need dyadic support from both their supervisors and subordinates.

Additionally, motives other than "predicting" often politicize the forecasting and modeling process to the detriment of managerial decision quality. Many firms routinely manipulate elements of the forecasting process through mandates (e.g., orders from superiors to subordinates). Requests by senior management to purposely alter forecasts, change them according to previously established cost and revenue positions, or mis-specify models occur frequently (Galbraith & Merrill, 1996). Hence:

> *Proposition 6: Individuals, who perceive high levels of attention and support for forecasting related activities from their supervisor, and with low amounts of supervisor interventions, will have more extensively developed forecasting processes than those who perceive the support to be less and/or are subject to supervisor pressures and mandates.*

3.4.2. Competitor Influences upon the Individual Forecasting Processes

Another element that may influence an individual's forecasting process is the extent to which the target manager mimics competitors' actions. Institutional theory could be applied to the forecasting process to understand why forecasters and organizations apparently look to competitors for guidance. Institutional theory does not assume that organizational action and behavior is motivated by reason and efficiency as suggested by most organizational theories, but that organizations try to conform to social expectations in order to obtain legitimacy and resources needed to survive (Scott, 1987; Scott, 2001; Dacin, 1997). This suggests that organizational actions are driven more by a desire to appear legitimate rather than being rational. The theory suggests that organizations try to obtain legitimacy through conforming to prevailing institutional norms and that institutions have a dual nature of processes and properties. If that is the case, individuals assigned with forecasting tasks may let competitors' practices influence the forecasting process rather than developing their own processes. Therefore:

Proposition 7: Individuals who only track and/or imitate competitor' actions when deciding upon a course of action are less likely to have well developed forecasting processes than those who are less influenced by competitor actions.

Forecasting processes may also be influenced by competing incentives, which may alter the motivation of the forecasters. Chaman (2005) found that salaries for professional forecasters have moved upward with the increased practice of employing internal forecasters. Through a five year period (2001-2005) the median salary for Vice Presidents of Forecasting increased from $143,000 to $161,000 based on a large scale survey. Additionally, the number of potential career paths for forecasters have increased through this period. Traditionally, forecasters were limited to being forecasts analysts and forecast managers. With the increased emphasis on organizational forecasting, positions like Director of Forecasting and Vice President of Forecasting have made it more lucrative to enter this sphere of organizational life (Chaman, 2005). Opportunities for professional growth (such as memberships in professional associations, forecasting groups, statistics groups, etc.) and compensation packages that are not tied to simple growth models would likely contribute to improved individual forecasting processes. Such opportunities would motivate forecasters to improve their own performance. Thus:

Proposition 8: Individuals who view forecasting related tasks as professionally beneficial will have more extensively developed forecasting processes than those that view them as necessary chores.

Additionally, research suggests that organizations are influenced by their past experiences (e.g., Ahuja & Lampert, 2001; Barnes, 1984; Bukszar & Connolly, 1988), when it comes to both monitoring the environment and developing their forecasts. Relying on past experiences, especially successes, generates illusions of control (Coff et al., 2009), which will impact the strategic decisions made by managers and forecasters (Duhaime & Schwenk, 1985; Durand, 2003). Past positive performances tend to increase biases as individuals assume that they played an important part in bringing about the success (Coff et al., 2009). This may generate similar attributions regarding future projects which will impair their ability to remain objective when assessing information and generating forecasts. Thus:

Proposition 9: Illusions of control associated with past investments, past successes, and "side bets" will negatively impact an individual's forecasts.

3.5. Determinants of Individual Forecasting Effectiveness

As earlier stated, the outcome of interest for this research effort is *forecasting effectiveness*, defined as an entity's ability to accurately predict future events, while simultaneously being timely and relevant to the extent that the forecasts are utilized by the organization. The likelihood of the forecasts being utilized by the organization will be associated with the forecasting processes. Thus:

Proposition 10: Individuals with well articulated forecasting processes will be more likely to exhibit high individual forecasting effectiveness, as identified by the accuracy, timeliness, and utilization of their forecasts, compared to those with less developed processes

3.6. System Level Forecasting Effectiveness

It is possible to have accurate and useful individual forecasts for lower level domains or organizational units, but when they are assembled and managed at the organizational level the forecasts are poor. It is not always the case that the corporate forecast is as accurate and useful as the sum of the individual forecasts. This could be due to statistical artifacts related to aggregation or to other corporate level processes that introduces new variables. It could also be that organizational processes manipulate the lower level results when consolidating the lower level forecasts.

Further, it is possible for the corporate forecast to be accurate and useful, but the various individual component forecasts to be mediocre. This suggests that corporate level forecasts could be accurate, while the forecasts at the lower levels of analyses are less useful due to inaccuracies or lack of timeliness. This dissertation is interested in assessing the organizational and systems processes that are used to generate and share the results of the forecasting processes. This includes both the informal sharing of results and the formal deployment of resources as described by Diamantopoulos and Winklhofer (2003). If organizational processes prevent forecasting findings to be shared within the organization it is unlikely that the findings will be acted upon. Additionally, this dissertation also seeks to understand the extent to which process congruity, or possibly the lack thereof, impacts system level

forecasting effectiveness. Process congruity assumes that there are standardized processes in place that facilitate consistent market monitoring and forecasting, so comparisons between markets could be made.

The extent to which an organization is able to generate high forecasting effectiveness will not be solely dependent upon the individual forecasting efforts. Forecasting effectiveness at the organizational level may also be affected by an organization's decision to utilize data from a higher level (e.g., national) to predict changes at a lower level (e.g., state, city, etc.). As an example, relying on forecasts generated with national data for operations at the state or city level may distort the interpretation of the environment in which one operates. This may be a common problem because higher levels of analysis data (such as national economic measures) are relatively easy to obtain and frequently discussed in the press, whereas accurate data for lower levels of analysis are harder to come by. Thus, the forecaster working at the organizational level is forced into an assumption that the results from national data will apply equally to lower level units. In other words, there needs to be congruency with respect to the content, or the variables that are being used to predict and the outcomes that are being predicted. The next section of this dissertation will propose three testable hypotheses to examine these technical forecast issues.

3.7. The Importance of the Technical Forecast Results: Aggregation & "Footprint" Issues

Statistical models are often built at an intermediate or high level of aggregation for organizational forecasting purposes. This is often done as these levels are considered "stable" or not subject to organizational realignments or changes over the forecasting horizon. The underlying assumption behind such an approach is that errors will cancel each other out during aggregation, and forecast accuracy is not of great importance. Forecasters attempt to detect patterns through aggregation as it can be difficult to draw meaningful information from lower levels of analyses where data may appear more random (Gilliand, 2008).

In order to interpret data dealing with multiple levels, it is crucial to understand the difference between analytical, structural, and global properties of collectives and their members. Unless forecasters and decision makers recognize the inherently nested nature of members and collectives, they are likely to inappropriately assume that relationships at one level are likely to be observed at other levels. One may incorrectly assume that higher level findings hold true at the individual level (*ecological fallacy;* Robinson, 1950; Freedman, 2001) or make incorrect inferences at a higher level based on individual-level information (*atomistic fallacy*; Luke, 2004; Hox, 2002).

Members can be individuals, work groups, metropolitan areas, or any other unit of interest that can be aggregated to a higher level. Collectives, or collections of individual members, can be measured and analyzed at the same time. Analytical properties represent information which has been aggregated from the individual members of the collective (e.g., proportion of homeowners in a city). Structural properties represent relational characteristics of collective members (e.g., income distribution among metropolitan areas in a state). Finally, global properties represent characteristics of the collective itself, which are not based on properties of the individual members, such as tax policies which affect all members within the collective (Luke, 2004).

An example of how global properties are used in forecasting one may examine how economists have attempted to generate models for predicting *housing starts* using time-series regression models with nationally aggregated data dating back to the early 1980s (see Falk, 1983; Puri & Vanlierop, 1988). A *housing start* is a key component for housing industry firms as it signals not only how many homes are being built in a particular area or nationwide, but ultimately the earning potential of their endeavors. A housing start, which is defined by the Census Bureau (2009) as the start of excavation for the footings or foundation of a building, is therefore a variable of special interest for the housing industry. Housing starts are estimated for all areas of the United States by the Census Bureau on a monthly basis, regardless of whether permits are required. This national data is published through press releases and made available to both industry insiders and the general population. Although it is a widely accepted indicator of the nation's economic health, these numbers do little to inform managers about local conditions when faced with decisions at lower levels of analysis.

Falk's (1983) model was formulated to generate short-run, unconditional forecasts of new, single-family housing starts and sales. The model also generated forecasts of seven other economic variables thought to be important determinants of starts and sales. After estimating the model over a sample period, ex post forecasts were produced and compared with realized values. The main conclusion drawn was that the model performed reasonable well for the first six months beyond the sample, but its performance deteriorated badly beyond that.

More recent attempts at improving housing start forecasts included more advanced techniques (e.g., structural models of housing supply, inventory and innovation accounting methods; Falk & Bong-Soo, 2004; Guirguis, Giannikos, & Anderson, 2005) and different types of variables and techniques (Hendershott & Weicher, 2002). All of these models, however, have relied exclusively upon single level of analysis models (SLA) using national data. None of them accounted for data from multiple levels of interest to the housing industry such as the

four Census regions (Northeast, Midwest, South, & West), states, geographic markets, or Metropolitan Statistical Areas (MSAs). [MSAs are geographic entities defined by the U.S. Office of Management and Budget (OMB) for use by federal statistical agencies in collecting, tabulating, and publishing federal statistics. They are also commonly referred to as CBSAs (Census Bureau Statistical Areas)]. This reliance upon national data may have contributed to both decreased accuracy and relevance for companies operating in distinctly different geographic areas. From an operational perspective, an important question to ask is whether organizational forecasters can safely ignore the multilevel nature of their data when their operations are clearly not national in scope?

Given the advancements in forecasting techniques that have been made possible over the last decades due to improvements in information technology and quantitative method capability (Sanders & Manrodt, 2003), it is remarkable that the housing bubble burst while industry insiders were busy building homes in what appears to have been fully saturated markets. In addition to the troubling sales trends in the existing home markets, a variety of indicators commonly used to predict trends within the housing industry should have warned of trouble as early as 2005.

New home building (i.e. housing starts) and its predictors, such as mortgage originations and building permits, had already started to decrease dramatically in numbers during the summer months of 2005. Despite these trends, the housing starts did not peak until mid 2007, and at that time the volume was at historic high (with an annualized rate exceeded 1.8 million single-family homes.)

In addition to questionable forecasting effectiveness at the individual and levels of analyses, some of the issues facing forecasters in the housing industry could be related to their neglect of the existence of what may be referred to as embedded levels of analysis. Given the appropriate data, it is possible to conduct parallel analyses at the national level (two “flavors”), the regional level, the state level, the MSA level, and even the zip-code level. As an example of the two possible “flavors” of analysis at the national level, forecasts could be generated based on the entire population (i.e., a true “national” forecast), or one could also analyze all 366 Metropolitan Statistical Areas (excluding Puerto Rico) in the U.S., which is also a national flavor as these MSAs represent all urban areas in the US and constitute about 85% of the entire national market. As an example, the total number of housing starts in the United States in 2008 was 919,895, while the aggregated total for all MSAs totaled 777,958, or 84.6% of total. In other words, approximately fifteen percent of all starts take place in non-MSA areas. As the all-MSA approach

accounts for such a large portion of the entire nation, it is therefore reasonable to assume that forecasts based on true national data and the aggregate totals for all MSAs are not all that different from each other.

A common method of breaking data down from the national level to more "useful" levels, and one that receives its share of attention in media, is to divide the U.S. into Census regions, which geographically breaks the fifty states into four geographic regions. Although regions are a lower, embedded level of analysis, these are somewhat large areas which may or may not be more suited for analysis than the raw national data. A first set of hypotheses tests assumptions about the usefulness of utilizing the Census Regions for forecast related work;

Hypothesis 1: A different set of indicator variables will predict housing starts within each of the four Census regions.

Housing starts can also be analyzed at the state level, but from an organizational perspective, large home builders tend to divide their operations into "markets" which divide areas of operation into clusters, rather than defining their markets by states. Such markets could exist of geographically defined areas such as *Great Lakes, Central, Atlantic Coast,* etc., and consist of a collection of MSAs in which a particular builder operates. As these markets represent a lower level of analyses and are more geographically similar than larger regions, it would be unreasonable to expect that they mirror national or regional changes. The second set of hypotheses therefore predicts:

Hypothesis 2: A different set of indicator variables will predict housing starts across organizationally specific markets.

Moving beyond aggregated models, an analyses of differences within and between each of the 366 individual MSAs would allow decision makers to assess whether there are significant differences between MSAs within a particular market or if these markets operate fairly similarly. Specifically, are MSAs that are geographically close to one another and that belong to the same market similar in terms of what key indicators predict housing starts? Further can the same forecasting models be used for different MSAs in the same market? As an example,

could the same predictor variables and models be used in geographically close areas such as Dallas and Houston? Or are MSA specific models needed? The next hypotheses to be tested are therefore:

Hypothesis 3: A different set of indicator variables will predict housing starts across MSAs.

The proposed hypotheses addressing aggregation and "footprint" issues are believed to be of importance to managers faced with forecasting related tasks. In order to generate appropriate and useful forecasts, one needs to be able to understand the differences that exist between various levels of data. These hypotheses will hopefully shed light upon relevant forecasting issues that have not been addressed previously by the management literature. The entire model is summarized in Figure 3.7 below.

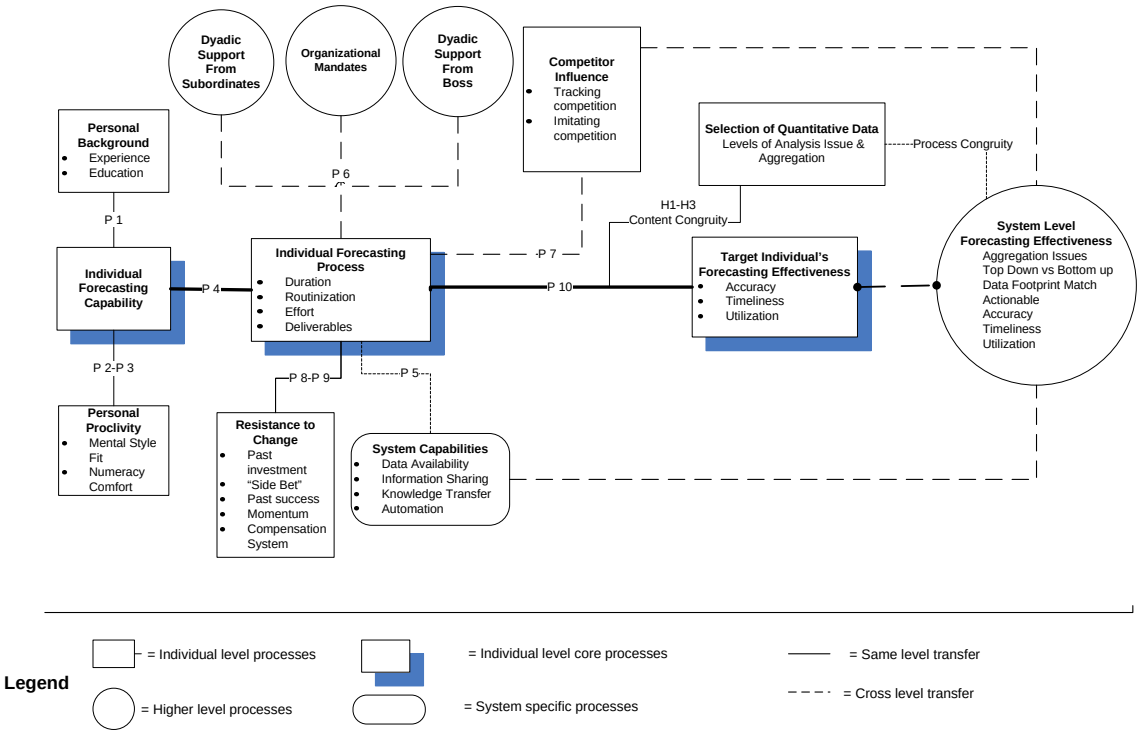

Figure 3.7. Full Model with Propositions and Hypotheses

As the model illustrates, a manager's personal background and personal proclivity are expected to be important elements in shaping individual forecasting capabilities (propositions 1-3). Such capabilities are again

expected to influence the individual's forecasting processes (proposition 4). There are, however, several other proposed factors that will influence these processes. It is proposed that system capabilities (proposition 5), dyadic support (from both subordinates and superiors) will influence these processes along with corporate mandates (proposition 6). Further, the model suggests that competitors will influence these processes as managers track and potentially imitate their rivals (proposition 7) and that various elements of resistance to change will impact how forecasting is done (propositions 8-9). It is also proposed that well developed forecasting processes will be associated with high forecasting effectiveness (proposition 10).

The model also suggests that well-developed system capabilities will impact organizational forecasting effectiveness. Such capabilities, coupled with high individual forecasting effectiveness, are expected to lead to solid forecasting at the organizational level, hence the sigma sign between the target individual's forecasting effectiveness and higher level forecasting effectiveness. Additionally, the relationship between an individual's processes and their forecasting effectiveness may also be affected by the extent to which there is content congruity (i.e., levels of analysis issues and aggregation) as reflected by Hypotheses 1-3. If national and organizational footprints do not overlap, it is likely that even well developed individual processes will be futile. Similarly, there needs to be process congruity or a consistent process across regions and different markets, in order to ensure meaningful comparisons and forecasting effectiveness at the systems level.

3.8. Summary and Conclusions

This chapter detailed a conceptual framework of forecasting related activities within a formal organizational context in order to assess how and how well an organization utilizes forecasting tools and results. Specifically, a multilevel model has been formulated that suggests that forecasting capabilities and forecasting processes predict forecasting effectiveness at the individual level, while simultaneously considering dyadic, systems, and organizational influences. Additionally, this chapter discussed the consequences of relying on higher level forecasts when a mismatch exists between organizational and national "footprints" (i.e., when an organization's sales territories are only partially spread throughout the continental US). A series of hypotheses were proposed in order to empirically test whether there will be a significant difference in which key indicator variables predict housing starts across levels of analyses, and whether there will be significant differences in the optimum forecasting model of housing starts across levels.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

4.1. Overview

In this chapter, the methods of the study are explained. More specifically, a design consisting of both qualitative and quantitative approaches to research is described. It further details the variables used in the study with respect to surveys, interview scripts, and historic time-series. Additionally, the chapter includes a description of the sample utilized for this research project and a detailed description of the methods of data collection.

4.2. Research Design

The study consisted of two fairly different approaches to research. The propositions that deal with managerial approaches to forecasting were tested with a qualitative approach consisting of questionnaires and semi-structured interviews, while the hypotheses were tested with a quantitative approach through the use of time-series data. The two distinctively different approaches to research were chosen to better address the key research questions.

First, the qualitative approach was chosen in an attempt to more accurately describe what managers actually do with respect to forecasting. No work has previously been done in this area, and it would seem premature to hypothesize about the proposed relationships and to administer formally developed scales until it is more clearly understood what forecasting related work consists of in the presence of bounded rationality and conflicting goals. Specifically, by choosing a qualitative approach it would be possible to have managers charged with forecasting explain their processes and thereby further our understanding of what this type of work entails within an organizational context. Additionally, it would allow for a more complete understanding of how forecasting relates to other managerial practices, such as budgeting, goal setting, and decision making. Although the academic work on forecasting, has assumed that these are distinctively different tasks, recent developments may indicate that the lines are being blurred between these managerial responsibilities as suggested by Lawless (2008).

The second aspect of this study (quantitatively based) tested the hypotheses with the use of time-series data collected from Moody's Economy.com. This database publishes both Census-collected data and data from other sources. This was done in order to examine the consequences of relying on aggregated and high-level data for forecasting purposes. By using data from different levels to analyze the predictive abilities of various models, the underlying assumptions of aggregated models could be tested. Accordingly, quarterly data relevant to the prediction

of housing starts was included starting with Quarter 1of 1987 and ending with Quarter 3 of 2009. Although national data from the Census Bureau are collected and published monthly, the native frequency for data at the MSA level is quarterly. These data are only available through Moody's. Due to the reliance on data from Moody's for the lower levels of analyses, and in order to maintain consistency, both the national and MSA level data were collected from Moody's. The Census region data was generated by aggregating the 366 MSAs to the regions to which they belong. As these are primarily Seasonally Adjusted Annualized Rates (SAARs), there will always be some small monthly discrepancies between the two data sources (Census and Moody's), but the overall correlation between the two data sources was close to 1.0.

4.3. Sample Organization

Home Builder A is a national home builder with operations in numerous states located across the entire U.S. Following years of continuous growth, Home Builder A's financial performance began to deteriorate during the winter months of 2006, as reflected by the firm's market value. The market's response was partially based on the firm's organizational performance which was linked to sharply declining home sales. The firm's poor performance was arguably a consequence of the sharp increase in months' supply of houses for sale (seasonally adjusted) at current sales rate (i.e., ratio of houses for sale to houses sold) that took place in the U.S. during 2005. As Home Builder A (and other national, regional, and local home builders) kept building homes, the demand for homes had already cooled down to such an extent that the current housing inventory began to sit longer and longer on the market. By the time firms stopped building homes, the supply of new homes far exceeded the demand.

Despite extensive contemporary research on forecasting techniques, including a steady stream of work focused on improving forecasting performance (Davis & Mentzer, 2007), managers within the housing industry have often relied on qualitative methods such as executive opinion and customer expectations rather than superior quantitative forecasting techniques, which is consistent with research findings on managerial approaches to forecasting in both consumer and industrial sectors of the economy (Kahn & Mentzer, 1994; McCarthy, Davis, Golicic, & Mentzer, 2006). Home Builder A is no exception, as a majority of business forecasting today is performed judgmentally despite all of its limitations (Sanders & Manrodt, 2003). Based on the over-supply of both new and existing homes, it is clear that Home Builder A and all other U.S. homebuilders were caught completely off

guard with respect to the downturn that took place. This record downturn has resulted in financial struggles for most of the nation's homebuilders as the market values of these firms have plummeted over the last two years.

Home Builder A currently operates in approximately 83 MSAs across the U.S. Each MSA falls under the leadership of one of thirty Division Presidents who are charged with the responsibility of running the operations in their respective markets. As each of these Division Presidents is responsible for growth and revenues, a significant portion of their work relates to forecasting. The Division Presidents report to one of six Area Presidents who, in turn, report to the corporate office. Each of the Area Presidents also employs a Vice President of Finance and a Vice President of Strategic Marketing. Although the Division Presidents are charged with local market data-collection and analysis, the Area Presidents and his or her Vice Presidents are also actively involved in market monitoring, budget developments, and the direct execution of forecasts. With the Area Presidents being the direct link between Divisions/Areas and the corporate office, they are also charged with providing the organization with the lower level forecasts needed for strategic decision making at the corporate office.

4.4. The Pilot Study

Prior to the main study, questionnaires and phone interview scripts were tested on a diverse sample of managers and executives in four different corporations operating in distinctively different industries and the public sector. The first pilot interview was conducted with a senior manager in a multi-domestic conglomerate charged with sales and demand forecasting for his plant. The second pilot interview was with a manager charged with inventory control and sales accounts with the same firm. Both these individuals spend about fifteen percent of their time on forecasting related activities. The third pilot was with the city manager of a municipality. The fourth interview was with the vice president of operations of a large bottling firm. The fifth interview was with one of the vice presidents of Home Builder A.

The subjects interviewed during the pilot study spent a fairly similar amount of time on forecasting related activities, despite working in very different industries. All respondents spent between fifteen and twenty percent of their work time on such tasks. All of them also described forecasting as a set of activities that included the following elements: 1) monitoring market/environment changes, 2) making projections for budget processes, and 3) attempting to predict the demand for the products or services they are in charge of providing.

Based on the pilot interviews, it was clear that it was essential to ask questions that clearly identified three major categories of forecasting related activities. All managers identified forecasting as activities relating to "the forecast", the budget process, and monitoring market changes external to the firm/municipality. It was also clear that forecasting related activities overlap extensively with other functions that they perform within the firm. The questionnaires and the interview script were therefore revised to reflect these findings.

The final pilot interview with the vice president of Home Builder A also enabled me to identify industry specific terminology to be included in the questionnaires and interview scripts. This was done to ensure that the subjects responded based on the same interpretation of the questions and to allow me to remain true to the focus of the study. As an example, "the forecast process" was defined as the "projection of sign-ups" for a given time period, since this is the particular variable of interest when forecasting housing demand. Additionally, it became clear through the pilot interview that housing industry executives refer to any environmental scanning as "market monitoring" so the questionnaires were changed to reflect the industry terminology.

The pilot interviews also revealed the need to make changes to how the forecasting processes were to be analyzed. The original plan involved having the interview subjects forward a *process map* of their forecasting with their returned questionnaires. After having gone through the samples provided by the pilot subjects and having reflected on multiple conversations with representatives for Home Builder A, it was clear that the respondents would only provide standardized tables generated by firm as part of their strategic plan. It was instead decided to proceed with questions that would allow the respondents to describe, in their own words, the major steps associated with developing forecasts, budgets, and market monitoring. The phone interviews would allow for follow up questions and clarification of responses.

4.5. The Full Study - Data Collection

Following the revisions to the questionnaires and interview script, Home Builder A's Chief Operating Officer (COO) sent an e-mail to all Division Presidents, Area Presidents, Vice Presidents of Finance, and Vice Presidents of Strategic Marketing to let them know that they would be receiving emails with attached questionnaires. They made it clear that participation was strictly voluntary. Following the notice from the COO, the questionnaires and attached consent forms were e-mailed to thirty Division Presidents, six Area Presidents, six Vice Presidents of Finance, and six Vice Presidents of Strategic Marketing. Of the potential respondents, 47 (98%) were male and 1

(2%) was female. For the Division Presidents, twenty completed surveys were returned and all were usable. Thus, the survey resulted in a 67% response rate. For the Area and Vice Presidents, nine completed surveys were returned for a response rate of 50%.

As a condition of getting approval to utilize the staff of Home Builder A and to secure a higher response rate I was asked to keep the questionnaires to a maximum of fifteen minutes for the Division Presidents and twenty-five minutes for the Area/Vice Presidents, so I was unable to include questions that would have allowed me to assess Proposition 2 which suggested that individuals with Intuitive thinking styles will be more likely to express an interest and passion for forecasting related activities, and Proposition 3 which suggested that individuals who are comfortable working with numbers will be more likely to be comfortable with forecast related activities relative to those expressing being less comfortable working with numbers.

The Division Presidents were asked to respond to a brief questionnaire, while the Area and Vice Presidents were asked to respond to a slightly longer questionnaire and also participate in a 25 minute phone interview. The questionnaire collected their background information, such as educational and professional experience, and information regarding their forecasting related work and specifically their forecasting processes. The phone interview consisted of follow-up questions to the questionnaire and allowed for a more complete understanding of what they actually do in their jobs.

4.6. Measures: Propositions

The propositions were tested through the use of both questionnaires and phone interviews. The breakdown and discussion of the questions and interview scripts are discussed in the next two sections.

4.6.1. Questionnaires

Propositions 1 through 3 deal with antecedents of individual forecasting capabilities. As discussed in the theory section, this construct has previously been defined by Durand (2003) at the organizational level as (1) the ability to monitor environmental changes, (2) accurately predict the future, and (3) act upon these predictions in a coordinated manner. This dissertation has introduced the construct at the individual level with a much narrower definition in order to better differentiate it from other forecasting related constructs. Accordingly, the individual

forecasting capability construct has been defined as an individual's ability to understand the processes and mechanics associated with organizational forecasting,

In order to assess the relationships between individual forecasting capabilities and the respondents' background and personal proclivity the questionnaires started by collecting essential personal information, i.e. bio-data. First, the respondents were asked about their highest completed level of education (e.g., high school, college, graduate, etc), and the type(s) of degrees they hold. Second, the questionnaires inquired about their organizational experience (e.g., years with Home Builder A, and years in current job). Third, the respondents were asked about how their education and work experiences had prepared them for forecasting related work (Area and Vice Presidents only).

In order to get a sense of how personality preferences might impact the manner in which managers enact their forecasting related work information about MBTI types were solicited from the area and vice presidents. Similarly, based on existing literature on forecasting and the perceived importance of understanding "regression towards the mean" for managers charged with forecasting (see Greve, 1999) the respondents were asked the following question: "When planning for the future, it is common to look to the past. Assuming that you observe an unusually high or low observation in the past, which of the following do you think is most likely to happen in the future?" with answer choices ranging from "continue" to "move in the direction of the less extreme".

To clarify the extent to which individual forecasting processes impact the individual forecasting effectiveness (proposition 4 through 9) the respondents were asked about their organization's strengths and weaknesses as they relate to developing forecasts, the budget process, and market monitoring. They were also asked about the variables they consider important in terms of predicting the future. Further, they were asked to answer questions based on their own experiences with respect to the forecast process (e.g., deciding on a projected number of sign-ups in an upcoming period), the budget process (e.g., developing plans for both revenue streams and costs for the upcoming period), and market monitoring (e.g., examining the external marketplace). Specifically, they were asked them to quantify how many hours they spend on a monthly basis on the above listed activities. Consistent with Proposition 10, they were also asked to rate their forecast accuracy, timeliness, and utilization relative to other managers in their organization.

To more fully understand what their forecasting processes look like, the Area and Vice Presidents were asked to think about the future of their market, and how important they consider a set of variables to the

development of forecasts, the budget process, and market monitoring. The variables, single- and multi-family housing starts, permits, completions, and new and existing home sales volumes and median prices, are all typical variables included in the monitoring of home building activity. They were further asked to think about the future of their division's (or area's) market, and list any industry, demographic, or economic measures that are especially helpful to their efforts.

At the end of the questionnaire the respondents were asked to describe the major steps involved in accomplishing the three related activities of generating a forecast, the budget process, and monitoring the market. In short, they were asked to describe the major steps involved in determining sign-ups for their market, the major steps involved in assembling their budget plan, and the major activities related to monitoring the market and predicting changes external to the firm.

4.6.2. Phone Interviews

During the phone interviews with the Area and Vice Presidents the respondents were allowed to explain and assess all aspects of their forecasting related tasks. Follow up questions specifically addressed specific concerns such as the duration and efforts relative to other tasks, number of variables included in monitoring efforts, use of objective measures, use of reliable sources, and types of forecasts capable of being prepared (e.g., judgmental, simple linear regression, or more advanced forecasts). The interviews were designed to allow for a clarification of strengths and weaknesses of current forecasting practices, and for assessments of dyadic and system specific influences. The structure of the phone interview is depicted in Figure 4.6 below.

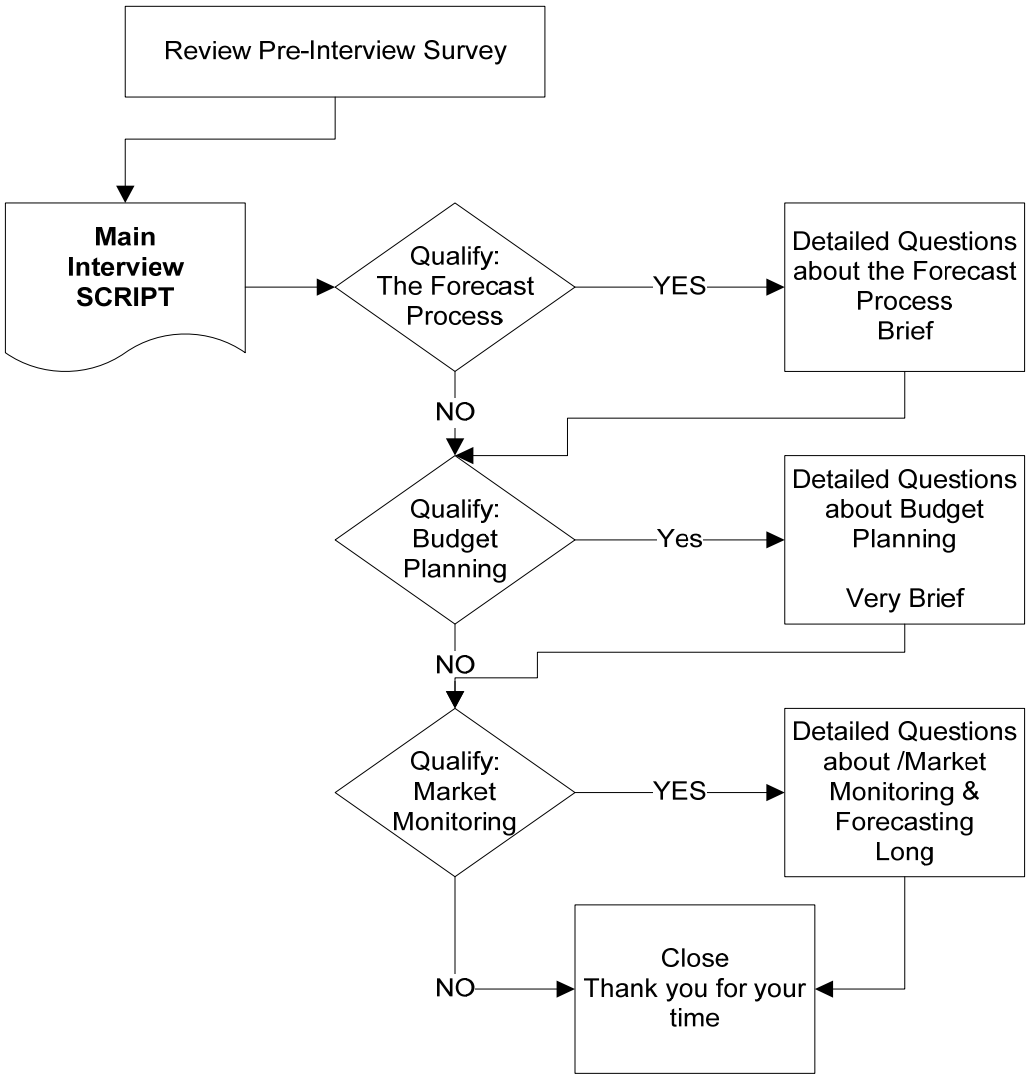

Figure 4.6. Overview of Adaptive Logic of Phone Interview

The phone interviews started with a review of the results of the Pre-Survey, and by way of review, to what extent the respondents are involved in the forecast process (i.e. deciding on a projected number of sign-ups for their market for an upcoming year or quarter). Next, the questions inquired about what percent of their job they perceive to be spent determining sign-ups. The respondents were also asked to rate their own accuracy with respect to projecting sign-ups, and whether their projections for sign-ups are timely enough to allow them to act upon these projections.

Following the questions regarding the development of forecasts, the managers were asked about the extent to which they are directly involved in planning the budget for an upcoming year or quarter, the percent of time spent

on budgets, and whether budget planning is a more central aspect of their job than the forecast process. They were also asked to what extent they are involved with either monitoring the market for important changes and/or using external data to make formal predictions or forecasts. Next, they were asked whether monitoring the market is a more central aspect of their job than the forecast process and budget planning and what percent of their job is devoted to market monitoring.

In order to clarify how the managers track changes in the external environment, the respondents were asked whether they have a formal process developed with respect to market monitoring. Further, the respondents were asked what economic, industry, or demographic changes they consider important enough to be included when trying to more accurately understand and predict the future. In the case they identified any variables, they were asked which national or local economic, industry, or demographic changes they do in fact monitor.

In order to understand the multilevel use of forecasts the interviewees were asked whether they generate different types of forecasts for different purposes (e.g., one set of forecasts for the corporate office and another for their local market(s), and separate forecasts in order to develop budgets). If that was the case, they were asked if their forecasting process is directly linked to their budgeting process.

Proposition 5 deals with forecasting processes and system capabilities. The respondent's perceptions of the organization's system capabilities were therefore assessed through initial questions seeking to understand what specific resources the organization provides with respect to the forecasting process. The phone interviews allowed for follow-up questions regarding key elements such as data availability, information sharing, knowledge transfer, and elements of automation within the organization. All these are elements that should positively impact the forecasting process, if present. In order to assess system capabilities and resources the respondents were asked whether Home Builder A provides adequate data to work with from a forecasting perspective. They were also asked to rank this data in terms of usefulness and to give examples of such data. Further, the respondents were asked how this data is stored (i.e. in Excel, a database, a website, etc.) and how it is accessed in order to clarify whether there are elements of knowledge and information sharing within the organization.

Recall from the above discussions that the quality of dyadic support given and received about forecasting from the manager's boss and subordinates can either impede or augment the forecasting process, a series of questions related to this topic were posed. These included: "Do you receive adequate support from your immediate boss for the various forecasting tasks we just discussed; particularly with respect to resources you may need to

perform such tasks?" and "Do your immediate, direct reports understand, and support these efforts?". Additionally, the respondents were asked to which extent mandates trickle down from the supervisors. This was done in order to capture whether supervisors manipulate elements of the forecasting process to match previously established cost and revenue positions, which is common top-management practices according to Galbraith and Merrill (1996). Consistent with the proposition that mandates tend to influence forecasts and forecasting processes, the respondents were asked whether corporate policies or mandates influence the way they currently perform their tasks.

Next, in order to clarify the issue revolving around the extent to which forecasts are developed independently of competitor knowledge, the managers were asked whether they look to their competitors to see what they do before they predict sign-ups, develop budgets, or monitor the markets. To clarify the role of competitors in the individual forecasting processes, the respondents were asked if they track or imitate competitors as a part of the forecasting processes. Specifically, this was operationalized by asking whether they look to their competitors to see what they do before they execute their forecasts and how often they try to copy successful practices used by the competition before they make predictions on their own.

With respect to Proposition 11, the phone interviews were also used to clarify how the forecasts generated by both Division Presidents and Area/Vice Presidents are used at the corporate level. The respondents were specifically asked whether their immediate boss or the corporate office utilize their forecasts or predictions for any purpose other than including it in their budgets. In order to assess whether the market changes over the last decade had altered forecasting processes, the respondents were also asked to reflect on the time period 2003-2008, and then asked whether they do anything differently with respect to forecasting today than you did during that time period.

Finally, the managers were asked if there are there any difficulties, in their opinion, with respect to forecasting between them and the corporate office. If so, they were asked what types of difficulties exist. To expand on this and to solicit their thoughts about organizational forecasting within their organization, a follow-up question asked what suggestions for improvements that they have for either the forecast process, budget planning, or market monitoring at Home Builder A. The full questionnaires and interview scripts are included in appendices 3, 4, and 5.

4.7. Measures: Hypotheses

The interviews with the managers charged with forecasting related responsibilities allowed this study to examine the challenges that exist with respect to predicting changes in multiple markets and how organizations

consolidate forecasts from geographically distinct areas and levels of analyses. Further, the interviews also assessed how organizations aggregate forecasts in order to develop "master forecasts" used to develop organizational strategies, plans, and budgets. The purpose of hypotheses 1 through 3 was to consider differences in forecasting outcomes when using multiple levels of analyses. This would be critical if data is collected in the field (a bottom-up approach to forecasting) and corporate strategies are developed with a top-down approach (decisions are made based on macro findings, e.g., national level changes). Examining footprint and aggregation issues would clarify whether a mismatch in findings could be the result of such different approaches to forecasting.

Data for both dependent and independent variables were collected from Moody's Economy.com which publishes both Census-collected data and data from other sources. Quarterly data was included starting with Quarter 1 of 1987 and with Quarter 3 of 2009 as the last quarter of observations. Although national data from the Census Bureau is collected and published monthly, the native frequency for data at the MSA level is quarterly and is only available through Moody's. Due to the reliance on data from Moody's for the lower levels of analyses, and in order to maintain consistency, both the national and MSA level data were collected from Moody's. The Census region data was generated by aggregating the 366 MSAs to the regions to which they belong. As these are Seasonally Adjusted Annualized Rates (SAAR), there will always be some small monthly discrepancies between the two data sources (Census and Moody's), but the overall correlation between the two data sources was close to 1.0. To accomplish the research objective time-series data with housing starts and nine independent variables were analyzed using multiple regressions from the national level (an aggregation of all MSAs), the four Census regions, six discrete markets (clusters), and for two MSAs in each of the six markets.

4.7.1. Dependent Variable for Quantitative Hypotheses

As previously discussed, the dependent variable of interest is single-family housing starts. The start of construction is when excavation begins for the footings or foundation of a building. Beginning with statistics for September 1992, estimates of housing starts include units in residential structures being totally rebuilt on an existing foundation. Housing starts are estimated for all areas of the United States, regardless of whether permits are required (Census, 2009). Being able to accurately forecast housing starts is of particular interest to firms in the housing industry as it is not only an indication of demand, but also the basic source of revenue for home builders.

4.7.2. Independent Variables for Quantitative Hypotheses

In order to be consistent with the most recent work on forecasting starts, the independent variables chosen to be included in the analyses closely mirror those of Falk (1983) and Falk and Bong-Soo (2004). As each analysis were to be performed identically, but at different levels, nine independent variables were chosen based on those studies and a series of exploratory factor analyses. As stated earlier, the purpose of this study is not to analyze predictors for the purpose of generating a best possible forecasting model for housing starts, but to examine the managerial implications of limiting the forecasting of organizationally critical variables to one particular level. The nine variables chosen should, however, be relevant predictors of housing starts based on availability at the lowest level of analysis (MSA). Variables that are only available at the national level are therefore excluded from this analysis.

Based on the review of existing literature, a series of exploratory analyses, and availability of data at the lowest level of analysis, the following independent variables are chosen for inclusion;

1) Number of building permits for single-family homes (SAAR),

2) Median existing home prices,

3) Housing Affordability Index (HAI),

4) Consumer Price Index (CPI),

5) Median household income,

6) Single-family home sales (SAAR), and

7) Total population.

8) Population change (Net of birth rate, death rate, and net immigration)

9) Mortgage originations

Single-family home sales and median home prices were both included in Falk's (1983) study. That study also included Boeckh's residential construction cost index, but without access to that particular index for the MSAs included in the study, the HAI (Housing Affordability Index) was included instead. In order to replace commonly used interest rates, which are not only unavailable at the MSA level, but also of little interest as borrowers may obtain loans from areas outside of their immediate area of residence, two variables reflecting income and costs of

living are included; median household income and the CPI. Finally, mortgage originations have been added to the analyses as home builder insiders commonly track this variable as an indicator of activity in the housing market.

4.8. Summary and Conclusions

This chapter described the methodologies of the study. Two questionnaires were developed: a short version for the Division Presidents and a longer version for the Area presidents and Vice Presidents of finance and strategic marketing. Additionally, an interview script was developed for follow-up phone calls with just the Area Presidents and Vice Presidents. Questions were constructed consistent with the proposed framework. Following a series of pilot interviews in different industries and with a Home Builder A insider, the format and questions were adjusted to ensure consistent interpretation. Questionnaires were distributed via email to the respondents, while the interviews were conducted via phone. The next chapter describes the results of the study.

CHAPTER 5: ANALYSES OF DATA AND RESULTS

5.1. Overview

This chapter starts by giving a general description of the respondents, such as their organizational tenure, time spent in current position, and educational preparation. It then presents relevant descriptive statistics followed by a qualitative summary of the findings. This summary focuses on all aspects of the proposed model, and attempts to describe what organizational forecasting looks like in an organization with operations in nearly one hundred metropolitan areas. To answer the questions raised through the proposed hypotheses, the chapter concludes with the results of a series of multiple regression and within and between analyses (WABA) of historic time-series data.

5.2. Characteristics of the Respondents

All respondents were male (100%, n=29). The median organizational tenure for Division Presidents was 12 years (the average was 12.6 years) and ranged from 3 to 26 years. The median time with the company for Area and Vice Presidents was 8.5 years (the average was 12.4 years) and ranged from 6.5 to 25 years. The median time in current position for Division Presidents was 3 years (the average was 5.1 years), while the median for Area and Vice Presidents was 5.3 years (the average was 5.1 years). In terms of their educational backgrounds, the average level of completed education was slightly higher than four-year college. Two respondents held high-school degrees as their highest completed education (both serving as Division Presidents), one respondent had a Juris Doctorate and two master degrees, and one was “all but dissertation”. The remaining respondents had bachelors or masters degrees. The most common college majors were accounting, finance, and marketing. Those were also the most common areas of study for those with master’s degrees.

5.3. Descriptive Statistics

Table 5.3a summarizes the respondents answers to questions regarding the number of hours they spend per month on the forecast process (i.e., deciding on a projected number of sign-ups in an upcoming period), the budget process (e.g., developing plans for both revenue streams and costs for the upcoming period), and market monitoring (e.g., examining the external marketplace).

	Area/Vice Presidents (n = 9)					Division Presidents (n = 20)				
	Mean	**Min**	**Max**	**Median**	**Mode**	**Mean**	**Min**	**Max**	**Median**	**Mode**
Forecast Hours	8.9	0	24	5	4	9.8	1	32	8	8
Budget Hours	8.0	1	30	4	4	8.6	1	20	8	8
Monitoring Hours	17.9	3	80	5	5	28.9	3	80	21	16

Forecast Hours, Budget Hours, and Monitoring Hours represent the total number of hours spent on those tasks during a month.

Table 5.3a. Descriptive Statistics for Forecast Activities

As the table reveals, the amount of hours spent on forecast, budget, and market monitoring tasks varied greatly among both groups of managers. One Vice President reported spending no time on forecasting during a regular month, while the average colleague reported spending nearly nine hours on these tasks. One Division President reported spending only one hour a month on forecasting, one hour on budgets, and three hours on market monitoring, compared with the average of 9.8, 8.6, and 28.9 hours per month on the same tasks. Among the Area and Vice Presidents the same discrepancy existed for both budgets (ranging from one to thirty hours) and market monitoring (ranging from three to eighty hours).

With respect to forecasting effectiveness this dissertation asked the respondents to rate themselves relative to their colleagues. Table 5.3b includes the respondents' assessments of where they stand compared to other managers in their organization on forecast accuracy, forecast timeliness, and forecast utilization.

	Area/Vice Presidents					Division Presidents				
	Mean	**Min**	**Max**	**Median**	**Mode**	**Mean**	**Min**	**Max**	**Median**	**Mode**
Perceived Forecast Accuracy	4.8	4	6	5	5	5.4	4	7	5	5
Perceived Forecast Timeliness	6.5	4	7	7	7	6.1	4	7	7	7
Perceived Forecast Use	6.0	5	7	6	7	5.6	4	7	5.5	7

Accuracy: 1= "much less accurate", 7= "much more accurate", Timeliness: 1= "almost never on time", 7 = "almost always on time"
Forecast use: 1= "very little reliance", 7 = "very heavy reliance"

Table 5.3b. Descriptive Statistics for Forecast Outcomes

As Table 5.3b shows, managers from both groups rated themselves very similarly in terms of forecast effectiveness. On forecast accuracy the Area and Vice Presidents rated themselves a 4.8 (on a seven point scale where "7" is "much more accurate") on average when they compared themselves to other managers in their organization. The Division Presidents rated themselves slightly higher at 5.4. On forecast timeliness the averages were 6.5 (Area and Vice Presidents) and 6.1 (Division Presidents). When asked to what extent they rely on their forecasts for decision making purposes the average responses were 6.0 (Area and Vice Presidents) and 5.6 (Division Presidents), where "7" would represent "very heavy reliance".

5.4. Results: Antecedents of Individual Forecasting Capabilities

Proposition 1 suggested that individuals with higher education and formal training in statistics are likely to be more comfortable with forecasting related tasks than those with less education and formal training in statistics. Although the respondents came from a variety of different education backgrounds, and ranged from high school degrees to "all but dissertation", most managers indicated that work experience was more important than formal education in terms of preparing them for forecasting related tasks. High school graduates ranked their forecasting accuracy almost identical to those with bachelors or masters degrees. It is important to note that the high school graduates had been with the company for 20.5 years on average, while those with post-graduate degrees had been with the company for 11.3 years on average, suggesting that the company has hired individuals with higher education in recent years. Table 5.4 summarizes how the Area and Vice Presidents (the Division Presidents were not asked these questions) rated the extent to which their education and work experience have prepared them for forecasting related work.

	Education			**Work Experience**		
	Mean	**Min**	**Max**	**Mean**	**Min**	**Max**
BA/BS (n=5)	4.4	3	6	6.4	6	7
MS/MBA+ (n=4)	4.5	2	6	5.9	3.5	7

Responses are on a 7 point Likert scale where "0" represents "not at all" and "7" represents "extremely well"

Table 5.4. Impact of Education and Work Experience on Forecasting Preparation

As Table 5.4 indicates, the Area and Vice Presidents appear to rate work experience much higher than education when assessing how these two components have prepared them for forecast related work. No particular differences existed between those with different levels of degrees.

5.5. Results: Description of Individual Forecasting Processes

There was a great variety of responses, particularly among the Division Presidents when asked to describe their individual forecasting processes. When asked whether they have used any external data (i.e., non-organizationally generated data) to help think about or predict changes in their local market the respondents gave widely different responses. Ten out of the twenty responding Division Presidents described the use of at least eight external data sources in their forecasting efforts. Of those, two mentioned fifteen commonly used sources. Three of the Division Presidents reported using no external data. Only one of the Area and Vice Presidents reported using no external data. Two Area and Vice Presidents mentioned fifteen commonly used external data sources.

While local "job growth information", *Metro Study* data on housing starts, permits, closings, prices, and macro-economic indicators from Economy.com were among the most common answers, some Division Presidents reported that in addition to macroeconomic data they also use investigative strategies such as discussions with local officials, competitors, and land developers, in order to better understand their local markets. Typically, those who reported using a variety of external data sources also specifically mentioned the sources used. Among the managers with bachelor degrees, the most common combination was *Metro Study, RL Brown, John Burn's Real Estate Consulting, Moody's*, local land brokers and various other third party sources. These reports, containing information on House Inventory Supply, Land Inventory Supply, permits, pricing, population growth, job growth, household growth, etc., were described by the respondents as "tools to understand business trends".

Those who reported spending more than ten hours a month on marketing monitoring also described the most comprehensive forecasting processes. Tables 5.5a and 5.5b below summarize the forecasting processes by the two Area/Vice Presidents and the two Division Presidents spending the most time on market monitoring and the two individual respondents from each group spending the least amount of time on market monitoring.

	Hours Spent on Market Monitoring	Variables and Data Sources Included in Individual Forecasting Processes
Area/Vice President #1	80	Macro housing industry data: macro starts, macro permits, macro closings, existing home inventory, days on market, trended list pricing, trended transaction pricing, foreclosure inventory/activity, foreclosure pricing. Micro housing industry data: competitive project information (sales rate per month, pricing activity) Data sources: Hanley Wood housing data, Real Estate Economics data and market reports , Monitoring MLS listing trends, Trendgraphix listing trends, New Home Trends housing data (State *A* / State *B*), Economy.com (both data buffet forecast data and their MSA Precis reports), John Burns Real Estate Consulting, Demographics Now
Area/Vice President #2	20	Macro and micro housing industry data: New and resale closing records at the market level. New and resale sales volume and median price. Bank owned/foreclosure activity. Data Sources: Local MLS (Listings and Sold), R.L. Brown (Closings); Hanley Wood (new home sales), Metro-Study (Finished Vacant Lot supply)
Area/Vice President #3	5	No use of resources. Depends entirely on information provided by Division Presidents.
Area/Vice President #4	4	Frequent use of Metro-Study to identify sales and traffic trends for competitors

Table 5.5a. Sample Summary of Area/Vice Presidents' Forecasting Processes

As Table 5.5a indicates, the Area/Vice President who reported spending eighty hours a month on market monitoring alone, also described a wide variety of macro and micro level indicators utilized in his forecasting processes. Additionally, this respondent also reported using data from a variety of sources. This stands in stark contrast to the two Area/Vice Presidents who spend five hours or less a month on market monitoring.

Table 5.5b reveals great differences in forecasting processes among the Division Presidents spending the most and fewest hours on market monitoring. The findings are very consistent with those among the Area/Vice Presidents. The respondent who spends eighty hours a month on market monitoring utilizes a mixture of macro and micro indicators and utilizes a variety of data sources. The two respondents with the fewest number of hours both reported that they have no formal processes in place and did not identify any external data sources or indicators. One Division President does not utilize anything but organizational data in his forecasting efforts. In other words, he relies entirely on just past sales and production data.

	Hours Spent on Market Monitoring	Variables and Data Sources Included in Individual Forecasting Processes
Division President #1	80	Macro and micro housing industry data: Reports on House Inventory Supply, Land Inventory Supply, Permits, Pricing, Population growth, job growth, household growth, and any other data that aids in detecting trends in the market. Data Sources: Metro Study, RL Brown, John Burn's Real Estate Consulting, Moody's, local land brokers and various other third party sources to help predict future supply and demand.
Division President #2	60	Macro and micro housing industry data: housing starts, permits, closings, prices. Discussions with local officials, competitors, land developers, etc. Data Sources: Job growth information from Area Chamber of Commerce, Metro-Study data, and Economy.com for macro-economic information.
Division President #3	6	No use of external data sources. Reported that they do not have a prescribed process for monitoring the trends in the market.
Division President #4	3	No formal processes in place. Utilizes job info and commercial real estate rental information.

Table 5.5b. Sample Summary of Division Presidents' Forecasting Processes

To further illustrate the link between efforts spent on forecasting and the extent to which formal processes have been developed it is noteworthy that none of the Division Presidents who spend less than ten hours on monitoring activities use a combination of quantitative (databases, historic time series, etc.) and qualitative resources (expert opinions, interviews with other builders, government officials, etc). Those who reported spending more than twenty hours on the same activities listed twice as many commonly utilized resources than those who spend less than 10 hours.

The responses were diverse among the Division Presidents when asked if they have found any good resources (experts, reports, analyses, etc.) that they feel have been helpful to them or their group when examining potential changes in their market's economic or demographic composition. *Metro Study* was a common answer while other respondents suggested that they have found local real estate centers, their state employment commission, *Economy.com, Claritas,* and the *Case – Schiller Index* particularly helpful. Again, some Division Presidents said that they were not aware of any particular resources that are helpful. Those unable to identify such resources were the same respondents who described forecasting as a "futile task". Comments like "It [forecasting] is done too often" and "It [what they are trying to predict] changes immediately due to the fluid market" were made by

respondents that spend less than twenty hours cumulatively on forecasting, budget activities, and market monitoring on a monthly basis.

This dissertation proposed during the theory development that the extent to which formal forecasting processes are in place could also be due to factors external to the individual manager. With respect to compensation systems, most of the respondents did not address that as a major influence on their forecasting processes. There were, however, some "hints" to the importance of bonuses and other monetary rewards when describing their forecasting processes. One respondent stated that "bonuses are often tied to achievement of forecast numbers." Some of the Vice Presidents also mentioned that they wished there would be more conformity between areas and divisions as they are held accountable for meeting the numbers, thereby suggesting that they find today's performance evaluation and reward systems unfair. One Vice President stated that although the organization uses a bottom-up approach where data is collected by the Division Presidents, the analysis and decision making should be done at the area level, as there are "incentives today that clearly influence and distort the decisions made by the Division Presidents".

With respect to "resistance to change" some of the Area and Vice Presidents expressed during the interviews that an unwillingness to predict market decline is prevalent, while others said that "you are rewarded for hitting targets while living in fear of not stretching far enough". Some of the Vice Presidents communicated a general concern that the lack of consistency between divisions and areas when it comes to determine "success" leads to frustration. Whereas some Division Presidents are "aggressive" others play it safe in order to hit targets. One respondent suggested that he is conflicted on whether to aim for a less aggressive target and look good in terms of forecast and budget accuracy, or take a risk and try to "stretch the market." This may indicate that some managers at least "satisfice" as a part of the forecasting processes. Instead of optimizing, they may be tactical with respect to goal setting and forecasting with their own compensation in mind. In other words, they let the desire to maintain momentum influence how they conduct their jobs.

One area in which there was consensus was the extent to which the respondents look to competitors as part of the forecasting, budget, and market monitoring activities they perform. All but one of the Vice Presidents included some kind of competitor "assessment" or "analysis" as a part of the monitoring and forecasting processes. For some managers this is limited to market monitoring, in combination with tracking macro-economic indicators, but for others this is also a part of the prediction of own sign-ups and the budget processes. From a forecasting

perspective, assessing the competitive landscape was listed with historical trends and adjustments for seasonality as one of top three activities for Vice Presidents in both finance and strategic marketing. Several of them also included "changes in the competitive environment" as one of the top budget considerations. The interviews revealed that this is done in order to establish what appear to be pseudo-measures of supply and demand so they can better predict future prices. An Area President said talking with competitors is something he does weekly, if not daily. Looking to the competition appeared to be a little less common as part of the budget process, but as one Vice President stated: "As Vice President I am involved in the forecast and budget process from an overview perspective and knowing what the competition does is critical. Although it is difficult to know what they do when it comes down to budgets you cannot see these activities as separate, so what you discover through market monitoring and forecasting will at least indirectly impact the budgets."

It appears that managers who spend a lot of time on forecasting related activities and have well developed processes track competition extensively, including, but not limited to, other home builders, the resale market, and the foreclosure inventory in their respective divisions and areas. Although the use of *Metro-Study* appears to be critically important in that such reports identify sales and traffic trends for their competitors, speaking with the competition is seen as even more valuable. Several of the Division Presidents and Vice Presidents listed "talking with competitors" as one of the most valuable resources in terms of monitoring the market. To understand what the competition does is apparently considered critical. In fact, one Vice President suggested that the importance of forecasting itself is directly linked to "developing an understanding of the overall competitive landscape facing each location."

Only one Vice President did not include "looking at competitors" as an activity in the forecast, budget, or monitoring aspects of his job. Interestingly, this individual was the respondent in the entire company that mentioned the most resources utilized in his forecast efforts and the only one that reported taking post graduate courses in Practical Marketing Research and Multivariate Techniques. He also reported monitoring efforts that included data for multiple levels of analysis, automation, and unlike many of his peers he reported utilizing general market conditions as predictors of sign-ups and closings, such as consumer confidence and employment trends that he said could dramatically alter the forecast. When asked about the extent to which he looks to the competition he stated that other home-builders are no longer considered competitors. The real competition is the resale market and the foreclosures, and being able to predict that is much more valuable, according to this Vice President.

Interviews with the Vice Presidents also revealed that the role of competitors as a part of the Individual Forecasting Processes has changed somewhat since 2006. Several of the Vice Presidents stated that the competitor they monitor most closely today is the resale market of existing homes. Each respondent ranked key indicators where "0" is "not important" and "3" is "critically important. Table 5.5c below illustrates how the resale market for existing homes is considered most important to these manages for forecasting, budgets, and market monitoring.

Forecasts (n = 9)			**Budgets (n = 9)**			**Market Monitoring (n = 9)**		
Name of Variable	**Mean**	**SD**	**Name of Variable**	**Mean**	**SD**	**Name of Variable**	**Mean**	**SD**
New Single-Family Sales	2.4	.8	New Single-Family Sales	2.1	.9	New Single-Family Sales	3.0	.0
New Single-Family Median Prices	2.4	.8	New Single-Family Median Prices	2.1	.9	New Single-Family Median Prices	3.0	.0
Existing Single-Family Sale	2.1	.7	Existing Single-Family Sale	1.9	.7	Existing Single-Family Sale	3.0	.0
Existing SF Median Prices	2.0	.8	Existing SF Median Prices	1.6	.8	Single-Family Starts	2.7	.5
Single-Family Starts	1.9	.7	Single-Family Starts	1.4	1.0	Single-Family Permits	2.7	.8
Single-Family Permits	1.7	.8	Single-Family Permits	1.3	.8	Existing SF Median Prices	2.7	.8
Single-Family Completions	1.6	.8	Single-Family Completions	1.3	.5	Multi-Family Permits	2.6	1.1
Multi-Family Starts	1.4	.8	Multi-Family Starts	1.3	.8	Multi-Family Starts	2.4	1.1
Multi-Family Permits	1.4	.8	Multi-Family Permits	1.3	.8	Single-Family Completions	2.0	1.0
Multi-Family Completions	1.1	.7	Multi-Family Completions	1.0	.6	Multi-Family Completions	1.7	1.1

Responses are on a four point scale where "0" represents "not important" and "3" represents "critically important"

Table 5.5c. Rank Ordered Perceived Importance of Key Indicators by Task

When asked to consider the future of their respective market and how important a number of key variables are in their opinion, the Area and Vice Presidents consistently ranked changes in the existing market as more important than new home construction indicators such as starts, permits, and completions. The Area and Vice Presidents, however, ranked almost all the key variables as "critical" from a market monitoring standpoint. All nine managers also rated "new single-family sales" and "new single-family median prices" as "critically important".

Interestingly, from a forecasting perspective only the two resale variables and "existing single-family sales" and "existing single-family median prices" had average ratings above 2, suggesting that when trying to predict "sign-ups" in new developments these managers depend on existing sales volume and median prices. From a budget perspective, only sales volume and prices of new construction are considered moderately important. Additionally, several of the Vice Presidents and Area Presidents suggested that in some divisions foreclosure sales are of more concern in terms of predicting demand than other home builders' sales numbers.

To summarize the findings in Table 5.5c, new single-family sales and median prices are considered more important indicators than any other variables by the managers for forecasting, budgeting, and market monitoring. Similarly, existing single-family sales was rated third for all three activities. Multi-family starts, permits, and completions, on the other hand, were rated the least important indicators.

After having considered the influences of competitors and the apparently important role the resale market plays in developing forecast processes, it was time to consider dyadic influences and how subordinates and immediate supervisors support these processes. All the respondents concurred that they receive not only adequate, but very helpful support from subordinates. With respect to support from their superiors, the responses were much more divided. A respondent said "I receive support *to do forecasting* from my superior, but no support in terms of tools and resources to get the job done". After hesitating and having said "yes" another Vice President suggested that resources are provided in a timely manner, but that they do not attempt to assess market appreciation and that they do not try to make predictions. With an approach to forecasting where data is collected in the field and where each division and area is responsible for their own predictions of future events, there is a limited amount of support needed from superiors, according to the particular Vice President, thereby justifying what he perceives to be a lack of resource support from the corporate office. One of the respondents voiced frustration over the lack of information sharing, noting that more efficient information sharing would make the job not only easier but also the forecasts more accurate. He also stated that "this is typical for the organization and leaves [the forecaster] on his own on a regular basis". According to this respondent and some of those that shared his viewpoint, the perceived lack of support from their immediate boss leads to two choices; they can accept that forecasts will not be particularly accurate or develop their own processes.

Five of the Vice Presidents did not specifically articulate a lack of support from their superiors, but it was clear that many of them were, to some extent, frustrated with the corporate office's lack of information sharing (such

as sharing of area level data). It was made clear by almost all the respondents that one of the organization's strengths is tied to how it has a clear direction on accounting practices and adheres to them. Home Builder A has also developed centralized accounting functions that support consistency in that area. All of the Area/Vice Presidents also expressed what appeared to be a sincere belief that the review process for forecasting is conducted diligently and in good faith to ensure accuracy to the fullest extent possible. They did, however, note that sales forecasting is, and will continue to be, a challenge and that is clearly the organization's Achilles heel. Having the organization provide better data and facilitate information sharing was mentioned frequently as a solution to this issue.

The extent to which mandates and corporate policies influence the forecasting, budget, and monitoring efforts was another issue on which the Area/Vice Presidents disagreed with the Division Presidents. The answers ranged from "this is a decentralized organization, so there are no mandates at all" to "yes, mandates and policies that dictate these processes are common and occur frequently". The responses from the Vice Presidents of Finance suggested that mandates are virtually non-existent. On the other hand, all the Vice Presidents of Strategic Marketing mentioned that although there are no formal mandates per se, there is pressure to provide forecasts that are "optimistic" or "stretch" the activity in the division or area. This was confirmed by Division Presidents through statements like "we are sometimes asked to change the numbers despite what we think" and "differing doctrines of forecasting from one division to the next make comparisons less useful… in the past, we would build forecasts based upon targets instead of reality." Others said that based on the "pressure" from corporate, it is a common practice to "force" numbers that they at times know the market will not be able to support. Specifically, a Vice President stated that "there is a certain psyche, a culture, and it definitely influences what we do".

In summary, based on the respondents' assessments of both dyadic support and corporate mandates, both positive and negative elements appear to exist within this organization that impact the individual forecasting processes as suggested by Proposition 6. The majority of the respondents (sixteen out of twenty Division Presidents and seven out of nine Area/Vice Presidents) said that they received support for monitoring the market and getting the forecasts and budgets done in a timely manner. In fact, a detailed process is in place across divisions and areas with respect to the review of forecasts and budgets, and, from an accounting and finance standpoint, the numbers are for the most part accurate and analyzed in good faith. There appears to be, however, some frustration over the lack of consistency between divisions and areas with the general lack of information sharing. With the organization relying on a bottom-up approach to forecasting and the divisions collecting their own data, there is no collective

automation of processes which makes the monitoring process both time-consuming and inconsistent. Some divisions and areas have responded to this by developing their own systems, while others have taken much less active roles in resolving the challenges.

5.6. Results: Determinants of Individual Forecasting Effectiveness

Interestingly, when asked to compare themselves to other managers in their organization on forecast effectiveness for projected sign-ups, most managers ranked themselves lower on accuracy than on timeliness or utilization as illustrated in Table 5.3b. With respect to accuracy, there was no apparent relationship between the cumulative time the respondents spend on forecasting related tasks and their self-assessed accuracy relative to their peers. As an example, the person who spends five cumulative hours a month on market monitoring, developing budgets, and executing forecasts ranked himself "much more accurate" ("7 out of 7") than his fellow Division Presidents. He did, however, only rank the extent to which he uses the forecasts a "3 out of 7", suggesting that he has high confidence in his own accuracy with almost no effort put into these tasks, but is not very likely to utilize the forecasts for decision making purposes. At the same time, the Division President who spends in excess of one hundred hours on the same tasks, rated his accuracy a "5 out of 7", but ranked his utilization a "7 out of 7".

The respondents that described the most sophisticated forecasting processes (with respect to formally developed processes, a variety of indicators, and multiple data sources) rated utilization a "6" or "7" (i.e., high degree of utilization), while those with the least developed forecasting processes rated utilization the lowest. That was not the case with perceived accuracy, as those who did not describe comprehensive forecasting processes consistently ranked their accuracy as high relative to their peers.

All the respondents rated themselves a 6 or 7 on timeliness. This could possibly be attributed to the stringent deadlines provided by the corporate office for generating forecasts and well developed budget and accounting practices. These deadlines are clearly articulated and the organization holds them to accountable for getting their numbers in on time. Specifically, the organization requires them to generate monthly, quarterly, and annual figures.

5.7. Results: Determinants of System Level Forecasting Effectiveness

When asked to assess system level capabilities, the respondents (both Division Presidents and Area/Vice Presidents) used very different words and phrases to describe the strengths and weaknesses of their organization. While some respondents suggested that forecasting is a managerial activity that "receives a significant amount of attention from senior leaders" and is rooted in "regular processes" and hence an organizational strength, others suggested that the forecasting process is the company's biggest weakness.

Many of the respondents described forecasting activities as system level processes with high accountability through statements like "This is your forecast….You are not forced into numbers that you do not believe" while one of his colleagues said "we sometimes force the results to what we want them to be as opposed to what the market will give us". The extent to which the respondents described a system with high degrees of accountability appeared to be area specific. Division Presidents from the same areas appeared to have very similar comments, but not necessarily compared with Division Presidents from other areas.

One Division President suggested that the organizational forecasting process is the single biggest weakness within the organization. Other Divisions Presidents and Vice Presidents from the same area claimed that the rest of the organization laughed at them when, prior to 2006, they predicted that home prices would take a "dive" in the near future. The Division Presidents from his area also noted that there is little knowledge sharing within the organization and that there is "very little visibility of housing market monitors and forecasts for other areas of the country." Interestingly, these particular individuals' processes stand out from their peers and could best be described as "sophisticated" forecasting methods that include multivariate forecasting techniques coupled with monthly monitoring of an array of key indicators. They also take advantage of professional development workshops and courses in quantitative methods to enhance their skills and abilities.

The respondents were also divided in their assessments of the resources that the organization provides for forecasting related works. While some suggested that "We are barraged with external data" other suggested that no such data is being provided. Some suggested that "the company does not seem to subscribe to one over another [data sources], which probably leads to varying opinions and lack of continuity of thinking." Particularly among the Vice Presidents, the lack of consensus was noticeable. Whereas it appears that all respondents confirmed that the organization has a "bottom-up" approach to forecasting (i.e., data are collected in the field and then consolidated), no decisive answer could be derived from their responses in terms of whether the corporate office provides adequate

resources for analysis. One Vice President suggested that while "data is generated in the field, analyses are done by corporate and made available on a website, while raw data is stored in a database." A colleague from a different area responded to the same question about information/data sharing with "there is no data sharing". This was confirmed by other Vice Presidents who suggested that information sharing only takes place at the area level. Frustrations over system capabilities were also frequently voiced during interviews when respondents were asked directly about organizational weaknesses. The apparent lack of system capabilities from a forecasting perspective was voiced through comments like "the tool used to forecast is very cumbersome and forces certain assumptions that may not be entirely accurate" and "we are dealing with poor tools and therefore generate poor results."

With respect to questions of automation of processes, the respondents were equally divided. Some of the respondents viewed the organization as having well developed systems and processes in place. A respondent noted "We are very disciplined in our approach. We have processes around all aspects of the forecast from determining signups and closings, to land development cash flows, to margin and overhead analysis." Some used words like "disciplined", "organized", and "automated" to describe the processes. In contrast, some suggested that the organization lacks in automation. "We don't have a prescribed process for monitoring the trends in the market. This is really left up the individual Division President to use resources available at the market level to assist in monitoring the market. As such, I feel that some Division Presidents and Divisions are very in-tune and do a very good job forecasting. Others are out of touch and actual results to forecasts are indicative" was a comment made by one of the Division Presidents. Several Division Presidents also noted that the lack of automation makes the forecasting process both time-consuming and less accurate. Again, the differences appeared to be area specific.

Some of the Vice Presidents also voiced concern over poorly organized data. Moving from the monitoring to the forecast stage is apparently cumbersome and extremely time consuming with today's lack of data processing systems. One of the respondents answered the question about organizational support with "if there is one thing I would like to see, it would be that the organization generates a system that enables us to organize the data more efficiently." He described the current "system" as multiple Excel downloads that have to be consolidated with no particular approach to level-specific issues.

As the model suggests, system capabilities are assumed to be associated with both individual forecasting processes (Proposition 5) and system level forecasting effectiveness. The interviews suggest, at least to some extent, that managers who view their system capabilities as strong have more advanced individual forecasting processes. As

an example, those who described system capabilities to be beneficial are the same managers who utilize a variety of tools in combination with automated forecasting processes. On the other hand, it is also clear that those who perceive resources from corporate as inadequate fall into two categories; they either take an "it does not matter what we do, so why waste our time" approach or they generate automated processes and data analysis processes within their own area.

The bottom-up, approach that the organization apparently uses presents some challenges in terms of how to meaningfully make decisions at the various levels of operations (corporate, area, divisions, MSAs, sub-MSA). The Vice Presidents described the ways of consolidating the lower-level forecasts in very different ways. All of them utilize forecasts that they received from their respective Division Presidents and all described their jobs as reviewing and kicking back any forecasts or budgets that are incorrect or incomplete before they forward the forecasts to a superior at corporate. The Vice Presidents of finance and strategic marketing also report to the Area Presidents. Most of them described the process as one of "consolidation" and not necessarily aggregation. In other words, they do not appear to create a master forecast based on lower level forecasts. Instead, they combine the individual forecasts by divisions and submarkets. Whereas some of them suggested that corporate utilizes these forecasts for "Wall Street and investors" others said "I have no idea what they do with them". One Vice President said that the forecasts were not shared with other areas, but that the corporate office uses them for "corporate forecasting, estimating net results, inventory, and cash flow" without being able to specify how this was done.

None of the respondents could provide an answer to the question about how their forecasts are utilized at higher levels within the organization. One forecaster stated that "often the numbers that are rolled up are not "acceptable" and DPs [Division Presidents] are asked to reflect more to satisfy political pressure from the Region or Corporate level." Adjustments are being made to forecasts that are generated in the field at higher levels in the organization and what is ultimately the consolidated forecast is a mixture of corporate goals and a Division's expectations for their market in an upcoming period. One Vice President made the following statement: "We often try to use the tool not only to forecast our business results but as a motivational tool to drive and push for higher performance and better results." In other words, the organization blends forecasting with goal setting and as a source of motivation for the staff. As the forecasts are manipulated through the process it would be unrealistic to assume that high forecasting effectiveness at the individual level would lead to effectiveness at the systems level.

Since the organization relies on data-collection and market monitoring at the Division level, the Vice Presidents of finance in each area review them before budgets and forecasts are finalized and reported to Area Presidents and the corporate office. Market monitoring from a Vice President of finance's perspective is therefore limited to the macro level and their involvement in forecasting is limited to overview. The organization eventually makes decisions at the systems level based on local market data from the Divisions, audited by the Vice Presidents. The Vice Presidents kick back forecasts if the predictions are inconsistent with corporate goals. This leads to what some Division Presidents describe as high accountability as they make updates often, which forces them to stay focused on the budgets and the market. As one respondent stated: "We are very disciplined in our approach. We have processes around all aspects of the forecast from determining signups and closings, to land development cash flows, to margin and overhead analysis." Others, however, suggested that this disciplined approach does not necessarily work as intended because "[the] forecast process is very defined and rigid by dates but not necessarily by content," and that the forecast process "can be very time consuming because of the strict process around it." In other words, the organization appears to be concerned with timeliness and accounting accuracy, but not necessarily with consistency of content.

In summary, few standardized processes are in place within the organization. In some Areas the Division Presidents and the Vice Presidents have developed fairly rigid processes on their own, while other Areas lack both automation and sophistication when it comes to market monitoring and forecasting. As a result, there is a variety of forecasting methods utilized among the managers of Home Builder A. With few corporate guidelines and lack of consistency in forecasting techniques, i.e., low process congruity, the process of generating higher level forecasts based on sub-market and market specific forecasts presents several challenges for Home Builder A.

5.8. Results: Aggregation and Footprint Issues

It was not clear to the Vice Presidents how strategic plans were formulated based on national data are consolidated with the lower level findings. A mismatch between these plans and what is taking place at the local level was a concern to many of the managers. The proposed hypotheses were designed to examine the consequences of utilizing different levels of analyses when organizations, like Home Builder A, operate with footprints that don't represent the nation as a whole. In order to test the hypotheses, two different data analyses methods were utilized:

Ordinary least squares regression and Within and Between Analysis (WABA). The results from these analyses are described in the following sections.

5.8.1. Ordinary Least Squares Regression

A series of multiple regression analyses were run to determine both the overall R^2 and to examine which independent variables contributed the most to the overall equation. Ordinary Least Squares (OLS) regression is a technique used for estimating the unknown parameters in a linear regression model. OLS can be used as a maximum likelihood estimator assuming a normal distribution, but has also been shown to have good statistical properties for other distributions (Rao, 1973). It is commonly used for time series data and we considered would be a good fit for the purpose of this study.

The first analysis included "total US" national data. Next, analyses were run for each of the four Census regions, followed by the six markets in which Home Builder A operates. The last set of analyses included the two largest MSAs (determined by the average number of single family housing starts for years 1987-2009) in each of the six markets (total of 12 MSAs).

As expected when dealing with time-series, the initial analysis of the national data revealed severe autocorrelation problems. In order to deal with these issues, the Cochrane-Orcutt method (Cochrane & Orcutt, 1949; Ostrom, 1990) was used to adjust the linear model for serial correlation in the error term. This method was applied to all levels of analyses, due to the need for consistency and out of necessity as the autocorrelation problem existed at all levels Most of the autocorrelation problems were dealt with by generating one autoregressive lag and then partialling it out. Thus, more complex two, three or four stage models were not required. For the initial analyses, the Durbin-Watson, a statistic used to detect autocorrelation in the residuals from a regression analysis, was well below 1 at all levels of analyses reflecting the potential of positive autocorrelation. However, as expected, it substantially improved following the Cochrane-Orcutt procedure. Means, standard deviations, and zero-order correlations for all variables are shown in Table 5.8.1a.

		Means	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	SF Starts_AR1 † (thousands, SAAR)	40.41	922.74									
(2)	SF Permits (thousands, SAAR)	2595.24	5201.08	.171*								
(3)	Median Existing Home Price (thousands)	116.25	73.20	-.041*	.196*							
(4)	HAI (index)	165.03	45.04	.001	-.199*	-.547*						
(5)	CPI (index)	158.92	29.11	-.074*	.022*	.683*	-.035*					
(6)	Median House. Income ($)	37158.28	9716.67	-.034*	.252*	.725*	-.100*	.777*				
(7)	SF Existing Home Sales (thousands, SAAR)	9.59	18.00	.089*	.864*	.284*	-.189*	.129*	.333*			
(8)	Total Population (thousands)	622.10	1448.77	.056*	.670*	.289*	-.215*	.093*	.263*	.893*		
(9)	Population change (change per 1000)	25.92	16.31	.075*	.443*	-.049*	-.066*	-.077*	-.001	.219*	.04*	
(10)	Mortgage Originations (Mil $)	4008.92	14283.54	.022*	.552*	.454*	-.235*	.219*	.353*	.724*	.75*	-.025*

* p< .05 N = 33,305

† The Dependent Variable (SF Starts) is the result of a two-stage Cochrane-Orcutt model used to eliminate model inflation due to auto regression problems.

Table 5.8.1a. Descriptive Statistics for National Data (Across All MSAs) – Means, Standard Deviations, and Zero-Order Correlations

A second area of concern was the potential of multicollinearity among the predictors. The collinearity statistics for the national data did reveal that this was a large problem for the full model as shown in Table 5.8.1b. The variance inflation factor (VIF) is a method of detecting the severity of multicollinearity amongst independent variables. It is an index which measures how much the variance of a coefficient is increased because of multicollinearity. VIF values greater than 10 indicate severe problems.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.226[a]	.051	.051	898.93789	.051	199.617	9	33,295	.000	2.088

a. Predictors: (Constant), Mortgage Originations, Population_Change, Consumer Price Index, HAI, SF Permits, Median Household Income, Total Population, Median Existing Home Price, SF Existing Home Sales

b. Dependent Variable: SF_Starts_AR1

N = 33,305

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	163.956	36.314		4.515	.000		
	SF Permits	.079	.002	.445	32.900	.000	.155	6.431
	Median Existing Home Price	.442	.164	.035	2.700	.007	.169	5.909
	HAI	.977	.169	.048	5.793	.000	.420	2.378
	Consumer Price Index	-1.095	.315	-.035	-3.477	.001	.289	3.461
	Median Household Income	-.004	.001	-.043	-4.125	.000	.260	3.851
	SF Existing Home Sales	-15.542	1.063	-.303	-14.615	.000	.066	15.108
	Total Population	.054	.009	.084	5.833	.000	.137	7.290
	Population_Change	-3.306	.372	-.058	-8.895	.000	.661	1.514
	Mortgage Originations	-.003	.001	-.051	-5.581	.000	.340	2.941

N = 33,305

Table 5.8.1b. Full Regression Model for National Model Based on All MSA Data: Nine Independent Variables Regressed on Single Family Housing Starts

As Table 5.8.1b reveals, the full model had several VIFs that were excessively large. In order to reduce these problems, the predictors with the highest VIFs were removed one by one until a model existed with no VIFs in excess of 2. The reduced model (Table 3) consisted of five predictors: Single-family Permits, Housing Affordability Index (HAI), Consumer Price Index (CPI), Population Change, and Mortgage Originations. All proposed analyses were run with a reduced number of predictors.

Analysis 1, which utilized data for all MSAs in the United States, revealed an R square of .042 and an Adjusted R square of .042. Only the partial correlation coefficients for HAI (.114) and Population Change (.363) were statistically significant but not particularly large. The statistics are summarized in Table 5.8.1c.

Model Summary[b]

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.205	.042	.042	903.20317	.042	292.381	5	33,3299	.000	2.082

a. Predictors: (Constant), Mortgage Originations, Population_Change, Consumer Price Index, HAI, SF Permits

b. Dependent Variable: SF_Starts_AR1

N = 33,305

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	239.395	35.328		6.776	.000		
	SF Permits	.044	.001	.250	32.336	.000	.481	2.079
	HAI	.457	.114	.022	4.027	.000	.937	1.067
	Consumer Price Index	-1.907	.176	-.060	-10.860	.000	.938	1.066
	Population Change	-2.349	.363	-.042	-6.471	.000	.699	1.430
	Mortgage Originations	-.006	.000	-.099	-13.795	.000	.560	1.785

a. Dependent Variable: SF_Starts_AR1

Table 5.8.1c. Reduced Regression Model for National Model Based on All MSA Data: Five Independent Variables Regressed on Single Family Housing Starts

Analysis 2, as summarized in Table 5.8.1d, utilized data aggregated for the four Census regions. This analysis did not reveal particularly stronger results than the "all MSA" national model with R squares ranging from .041 to .054. The partial correlation coefficients for Permits (ranging from .154 to .210) were statistically significant in all regions, which was also the case for Population Change. The partial correlation coefficients for HAI, CPI, and Mortgage Originations were each statistically significant in three regions, but not particularly large.

					Partial Correlation Coefficients				
	R	**R Square**	**Adjusted R Square**	**DW**	**SF Permits**	**HAI**	**CPI**	**Pop change**	**M.O**
Midwest (N= 7,553)	.211	.044	.044	2.251	.179*	.025*	-.066*	-.071*	-.096*
Northeast (N=4,004)	.202	.041	.040	2.110	.170*	.014	-.050*	-.061*	-.078*
South (N=13,376)	.233	.054	.054	1.924	.210*	.038*	-.063*	-.025*	-.112
West (N=8,372)	.214	.046	.045	2.010	.154*	.035*	-.036*	-.048*	-.090*

*indicates significant at <.05
Regions have different sizes due to the number of MSAs which compose them.

Table 5.8.1d. Reduced Regression Models for Census Regions: Five Independent Variables Regressed on Single Family Housing Starts

Analysis 3, which utilized aggregated data for the six markets (Areas) identified by Home Builder A, is summarized in Table 5.8.1e. This analysis showed slightly stronger results than the higher levels of analyses with R square values ranging between .050 and .152.

					Partial Correlation Coefficients				
	R	**R Square**	**Adjusted R Square**	**DW**	**SF Permits**	**HAI**	**CPI**	**Pop change**	**M.O**
Market 1 (N=1,547)	.238	.057	.051	1.565	.238*	.014	-.099*	-.109*	-.149*
Market 2 (N=1,001)	.224	.050	.045	2.336	.142*	-.002	-.151*	.017	.028
Market 3 (N=1,365)	.223	.050	.046	2.129	.180*	-.009	.016	.024	-.083*
Market 4 (N=819)	.341	.116	.111	1.469	.286*	.051	-.086*	-.168*	-.194*
Market 5 (N=455)	.390	.152	.142	2.113	.321*	.122*	.048	-.215*	-.266*
Market 6 (N=2.366)	.223	.050	.048	2.054	.159*	.056*	-.036	-.036	-.075*

*indicates significant at <.05
Markets have different sizes due to the number of MSAs which compose them.

Table 5.8.1e. Reduced Regression Models for Home Builder A's Markets Data: Five Independent Variables Regressed on Single Family Housing Starts

Interestingly, the market specific models did not have particularly high R Squares. In fact, for markets 2, 3, and 6, the R Square (.500) is almost the same as for the national model (.042) and the much larger Census Region models (all between .041 and .054). The partial correlation coefficients for Permits (ranging from .142 to .321) were statistically significant in all six markets. The partial correlation coefficients for HAI, CPI, and Population Change were statistically significant, but not particularly large, in two, three, and three markets respectively. The partial correlation coefficients for Mortgage Originations were statistically significant in five out of six markets, ranging from -.075 to -.266.

Analysis 4, which utilized individual MSA data from the two largest MSAs (as measured by single-family housing starts) in each of the six markets, with statistics summarized in Table 5.8.1f below, revealed much stronger results with R squares ranging from of .293 and Adjusted R square of .286.

					Partial Correlation Coefficients				
	R	**R Square**	**Adjusted R Square**	**DW**	**SF Permits**	**HAI**	**CPI**	**Pop change**	**M.O**
Houston (1)	.402	.162	.112	1.979	.274*	.108	-.365*	-.055	.038
Dallas (1)	.366	.134	.083	1.963	.225*	.071	-.272*	-.004	.060
Chicago (2)	.354	.125	.074	1.772	.159	.191	-.137	-.031	.043
Minneapolis (2)	.323	.104	.051	1.383	.201	.144	-.164	-.129	-.029
New York (3)	.359	.129	.078	1.328	.315*	-.045	.070	.063	-.001
Wash DC (3)	.355	.126	.074	2.196	.167	-.016	.029	.089	-.045
Atlanta (4)	.445	.198	.151	2.054	.225*	.235*	-.303*	.008	.054
Charlotte (4)	.456	.208	.161	1.644	.220*	.152	-.230*	-.049	.008
Phoenix (5)	.463	.214	.168	1.693	.264*	.316*	-.250*	-.083	.044
Las Vegas (5)	.575	.330	.291	1.780	.462*	.086	-.211*	-.403*	-.188
Riverside (6)	.541	.293	.251	1.730	.457*	.315*	.033	-.340*	-.215*
Los Angeles (6)	.379	.144	.093	2.106	.267*	.197	.082	-.004	-.008

*indicates significant at <.05
Each MSA has the same N of 91.
( ) indicates to which market the MSA belongs

Table 5.8.1f. Reduced Regression Models for Individual MSA Data: Five Independent Variables Regressed on Single Family Housing Starts

The partial correlation coefficients for Permits (ranging from .220 to .462) were significant in nine of the 12 MSAs and generally fairly large. The partial correlation coefficients for HAI were only statistically significant in

three of the twelve markets, while for CPI the coefficients were significant in six of the markets and typically fairly large. For the Washington DC, Chicago, and Minneapolis none of the coefficients were statistically significant, while in New York only the coefficient for single-family permits was statistically significant. Only in Riverside and Las Vegas were the partial correlation coefficients for Population Change significant and large. The partial correlation coefficient for Mortgage Originations was only statistically significant in Riverside and large.

The models were particularly strong for Riverside, California and Las Vegas, Nevada (R Squares of .293 and .330), but all of them were stronger than any of the higher level (national, Census Regions, markets) models. In fact, the lowest R squares were associated with Minneapolis (.104), Chicago (.125), and Washington DC (.126), the same MSAs where none of the variables had statistically significant partial correlations. This indicates that variables do not perform similarly between MSAs and at different levels of analysis.

5.8.2. Within and Between Analyses

To further clarify the consequences of relying on data from different levels when conducting forecasts and making decisions, a series of single-level *Within And Between Analyses* (WABA) were run using DETECT software to examine similarities and differences among the different levels of analyses (e.g., Census regions, markets, MSAs). WABA is a multilevel analytical procedure and has been used in a variety of contexts when studying multilevel phenomenon, such as absenteeism and group effects (Markham & McKee, 1991), and group effects related to pay-for-performance programs (Markham,1988).

The results from the first WABA I analysis, which examined differences and similarities between the 366 MSAs in the United States are summarized in Table 5.8.2a. The results revealed significant differences between the MSAs with respect to Starts, Permits, and Housing Affordability but no other variables. The between eta-correlations (.915) were significantly larger than the within eta-correlations (.406) for starts. Between eta-correlations for permits (.909) were also significantly larger than the within eta-correlations (.418). Similarly, between eta-correlations for Housing Affordability (.845) were significantly larger than within eta-correlations (.534).

Within and Between Analysis I

	Eta Correlations				F Ratios		
	Between	Within	E Ratio	Induction	Between	Within	Prob
Starts	0.91452	0.40454	2.260603	WHOLES-30	461.20184		0.0000
Permits	0.90866	0.41753	2.17625	WHOLES-30	427.41461		0.0000
HAI	0.84523	1.58166	1.58166	WHOLES-15	225.76590		0.0000
CPI	0.32425	0.34277	0.34277	PARTS-30		0.09431	1.0000
Pop Change	0.60613	0.79537	0.76207	PARTS-15		0.01908	
Mortgage	0.77287	0.63456	1.21795		133.87292		0.0000
Averages	0.72861	0.62206	1.39022		312.06382	0.05670	

PRACTICAL SIGNIFICANCE CRITERIA
WHOLES - 15 E > OR = 1.30323
WHOLES - 30 E > OR = 1.73205
PARTS - 15 E < OR = 0.76733
PARTS - 30 E < OR = 0.57735

DEGREES OF FREEDOM FOR (BETWEEN) F-RATIO = 365, 32940
DEGREES OF FREEDOM FOR (WITHIN) F-RATIO = 32940, 365

Table 5.8.2a. Single-level Within and Between Analysis I: All MSAs (n=366)

The results further revealed that there were in fact greater differences within MSAs than between with respect to the Consumer Price Index and population change. As for mortgage originations, there were only negligible greater differences within MSAs as opposed to between them. This indicates that mortgage originations may be positively correlated with housing starts at the national level, but that it may be an artifact of aggregation and not very useful at lower levels of analyses.

The second WABA I analysis utilized aggregated MSA data representing the four Census regions. As shown in Table 5.8.2b., only the eta correlations for Housing Affordability and Population Change was larger between Census regions than the eta correlations within regions, suggesting that there are more within region differences than between them. None of the eta correlations were statistically significant. Consistent with the results of the regression models that were generated with the Census level data, there was no support for Hypothesis 1, which suggested that there will be a significant difference in which key indicator variables predict housing starts across all four Census regions, and that there will be significant differences in the optimum forecasting model of housing starts across all four Census regions. The results from both the regression analyses and the WABA analysis instead suggest that there are too many differences between the MSA making up the large Census regions to generate strong models.

Within and Between Analysis I

	Eta Correlations				F Ratios		
	Between	Within	E Ratio	Induction	Between	Within	Prob
Starts	0.51611	0.85652	0.60256	PARTS-15		0.02295	1.0000
Permits	0.50791	0.86141	0.58963	PARTS-15		0.02397	1.0000
HAI	0.80123	0.59836	1.33904	WHOLES-15	215.16183		0.0000
CPI	0.19772	0.98026	0.20170	PARTS-30		0.20484	0.9976
Pop Change	0.93558	0.35310	2.64960	WHOLES-30	842.44390		0.0000
Mortgage	0.43209	0.90183	0.47913	PARTS-30		0.03630	1.0000
Averages	0.56511	0.75858	0.97694		528.80286	0.07202	

PRACTICAL SIGNIFICANCE CRITERIA
WHOLES - 15 E > OR = 1.30323
WHOLES - 30 E > OR = 1.73205
PARTS - 15 E < OR = 0.76733
PARTS - 30 E < OR = 0.57735

DEGREES OF FREEDOM FOR (BETWEEN) F-RATIO = 3, 360
DEGREES OF FREEDOM FOR (WITHIN) F-RATIO = 360, 3

Table 5.8.2b. Single-level Within and Between Analysis I: 4 Census Regions

The third WABA I analysis utilized aggregated MSA data representing the six organizational markets (or Areas) for Home Builder A. Similarly to the Census level data, only the between market eta correlations for Population Change were larger than the eta correlations within markets, suggesting that there are more within market differences than between them. None of the other eta correlations were statistically significant. Consistent with the results of the regression models that were generated with the market level data, there was no support for Hypothesis 2, which suggested that there will be a significant difference in which key indicator variables predict housing starts across all six organizational markets, and that there will be significant differences in the optimum forecasting model of housing starts across these markets. The results from both the regression analyses and the WABA analysis instead suggest that there are too many differences between the MSA making up the organizational markets to generate strong models. The results from the organizational markets WABA are summarized in Table 5.8.2c. below:

Within and Between Analysis I

	Eta Correlations				F Ratios		
	Between	Within	E Ratio	Induction	Between	Within	Prob
Starts	0.56555	0.82471	0.68576	PARTS-15		0.01969	1.0000
Permits	0.54958	0.83544	0.65782	PARTS-15		0.02140	1.0000
HAI	0.74463	0.66748	1.11559		134.41095		0.0000
CPI	0.23480	0.97204	0.24155	PARTS-30		0.15869	1.0000
Pop Change	0.84090	0.54119	1.55380	WHOLES-15	260.74401		0.0000
Mortgage	0.42095	0.90708	0.46407	PARTS-30		0.04299	1.0000
Averages	0.55940	0.79132	0.78643		197.57748	0.06069	

PRACTICAL SIGNIFICANCE CRITERIA
WHOLES - 15 E > OR = 1.30323
WHOLES - 30 E > OR = 1.73205
PARTS - 15 E < OR = 0.76733
PARTS - 30 E < OR = 0.57735

DEGREES OF FREEDOM FOR (BETWEEN) F-RATIO = 5, 540
DEGREES OF FREEDOM FOR (WITHIN) F-RATIO = 540, 5

Table 5.8.2c. Single-level Within and Between Analysis I: Six Individual Home Builder A Markets

The fourth WABA I analysis utilized data for the 83 individual MSA in which Home Builder A operates. As shown in Table 5.8.2d., the eta correlations between MSAs were significantly larger than the eta correlations within MSAs for Starts (.881 between and .472 within), Permits (.873 between and .487 within), and for the Housing Affordability Index (.814 between and .581 within). For mortgage originations and population change, the differences were not statistically significant, thereby indicating that these predictors could be statistically significant at the national level as artifacts of aggregation. For Consumer Confidence Index, the within eta correlations were actually greater than between MSAs. Consistent with the results of the regression models that were generated with the individual MSA data, there is support for Hypothesis 3, which suggested that there will be a significant difference in which key indicator variables predict housing starts across individual MSAs, and that there will be significant differences in the optimum forecasting model of housing starts across these markets. These results suggest that there are many differences between MSAs and those different indicators are associated with housing starts differently across MSAs, necessitating the need for individual MSA forecast models.

Within and Between Analysis I

	Eta Correlations				F Ratios		
	Between	Within	E Ratio	Induction	Between	Within	Prob
Starts	0.88141	0.47235	1.86601	WHOLES-30	317.24803		0.0000
Permits	0.87317	0.48741	1.79143	WHOLES-30	292.39708		0.0000
HAI	0.81414	0.58067	1.40208	WHOLES-15	179.10941		0.0000
CPI	0.39612	0.91820	0.43141	PARTS-30		0.05897	1.0000
Pop Change	0.76509	0.64393	1.18816		128.62406		0.0000
Mortgage	0.73266	0.68060	1.07649		105.58168		0.0000
Averages	0.74376	0.63053	1.29260		204.59205	0.05897	

PRACTICAL SIGNIFICANCE CRITERIA
WHOLES - 15 E > OR = 1.30323
WHOLES - 30 E > OR = 1.73205
PARTS - 15 E < OR = 0.76733
PARTS - 30 E < OR = 0.57735

DEGREES OF FREEDOM FOR (BETWEEN) F-RATIO = 81, 7380
DEGREES OF FREEDOM FOR (WITHIN) F-RATIO = 7380, 81

Table 5.8.2d. Single-level Within and Between Analysis I: All Home Builder A MSAs (n=83)

Additionally, a series of multiple-level (MLA) WABA I were run using DETECT software to examine similarities and differences among the different levels of analyses. MLA is an extension of the single-level analysis to situations where there is more than one grouping entity to consider. The simplest case allowable for an MLA would be two nested grouping entities and a third component entity. This smallest entity has two continuous variables associated with it as attributes, and all three are hierarchically nested (Dansereau, Alutto, & Yammarino, 1984). In the example of housing starts, one can consider MSAs, organizationally specific markets, Census Regions, and national data fully nested. The first of these analyses included data from all MSAs belonging to Home Builder A (results are presented in Table 5.8.2e below).

Within and Between Analysis I

	Eta Correlations				F Ratios		
	Between	Within	E Ratio	Induction	Between	Within	Prob
Starts	0.92984	0.36797	2.52690	WHOLES-30	0.95208		0.7685
Permits	0.93633	0.35111	2.66675	WHOLES-30	1.06038		0.2040
HAI	0.99746	0.07128	13.99283	WHOLES-30	29.19497		0.0000
CPI	0.95106	0.30901	3.07778	WHOLES-30	1.41245		0.0000
Pop Change	0.95566	0.29447	3.24536	WHOLES-30	1.57045		0.0000
Mortgage	0.99724	0.07424	13.43283	WHOLES-30	26.90492		0.0000
Averages	0.96126	0.24468	6.49041		10.18254	0.0000	

DEGREES OF FREEDOM FOR (BETWEEN) F-RATIO = 3246, 484
DEGREES OF FREEDOM FOR (WITHIN) F-RATIO = 484, 3246

Table 5.8.2e. Multiple-level Within and Between Analysis I: MSAs

Not surprisingly, all variables had significantly higher between eta correlations than within MSAs. In other words, all variables at this variable suggest that there are great differences with respect to variables between these 83 metropolitan areas.

The second multiple-level WABA I included data from the six individual markets belonging to Home Builder A. This analysis revealed that only single-family housing starts, consumer price index, and population changed differed significantly more between markets, than within markets, as shown in Table 5.8.2f below.

Within and Between Analysis I

	Eta Correlations				F Ratios		
	Between	Within	E Ratio	Induction	Between	Within	Prob
Starts	0.91361	0.40660	2.24695	WHOLES-30	25.46966		0.0000
Permits	0.43160	0.90206	0.47846	PARTS-30		0.86591	0.9862
HAI	0.49206	0.87056	0.56523	PARTS-30		0.62047	1.0000
CPI	0.95625	0.29257	3.26847	WHOLES-30	53.89178		0.0000
Pop Change	0.88075	0.47358	1.85980	WHOLES-30	17.44881		0.0000
Mortgage	0.49246	0.87033	0.56583	PARTS-30		0.61915	1.0000
Averages	0.69446	0.63595	1.49746		32.27008	0.70184	

DEGREES OF FREEDOM FOR (BETWEEN) F-RATIO = 537, 2709
DEGREES OF FREEDOM FOR (WITHIN) F-RATIO = 2709, 537

Table 5.8.2f. Multiple-level Within and Between Analysis I: Markets

After having moved to the Census level, the third analysis was performed and revealed just two variables with higher eta correlations than within correlations. Specifically, only housing starts and population change had greater between eta correlations as shown in Table 5.8.2g below. This confirms the findings from the series of single-level analysis, in that there is too much within variability at the higher levels of analysis. The between differences among the Census and Market specific regions basically "wash out" against the within region differences. In other words, these results suggest that there are no more differences between the Census regions and the markets defined by the organization than there are between them, and that regional (Census or Operational Markets) would not be much more helpful than a national model.

Within and Between Analysis I

	Eta Correlations				F Ratios		
	Between	Within	E Ratio	Induction	Between	Within	Prob
Starts	0.97199	0.23503	4.13566	WHOLES-30	8.62372		0.0000
Permits	0.70888	0.70533	1.00503		0.50929		1.0000
HAI	0.72611	0.68758	1.05604		0.56229		1.0000
CPI	0.77736	0.62905	1.23576		0.76997		0.9803
Pop Change	0.93695	0.34947	2.68104	WHOLES-30	3.62419		0.0000
Mortgage	0.72870	0.68483	1.06405		0.57086		1.0000
Averages	0.80833	0.54855	1.86293		2.44339	0.0000	0.0000

DEGREES OF FREEDOM FOR (BETWEEN) F-RATIO = 357, 180
DEGREES OF FREEDOM FOR (WITHIN) F-RATIO = 180, 357

Table 5.8.2g. Multiple-level Within and Between Analysis I: Census Regions

5.9. Summary of Findings

This study has now utilized the findings from a series of interviews with managers and the analysis of more than twenty years of quarterly data for housing starts and related variables to assess the propositions and hypotheses proposed in the full mode. The next two sections will summarize the findings for both managerial practices and aggregation/footprint issues.

5.9.1. Managerial Practices and Forecasting Effectiveness

The results suggest that organizational forecasting is a complex and to some extent confusing aspect of organizational life. With respect to Individual Forecasting Capabilities, the results reveal that most managers and forecasters find that work experience far outweighs education in terms of preparing them for that kind of work. Those with higher degrees, such as MBAs in accounting and finance, did not rank their forecast capabilities particularly higher than those with four years of college or a high school education. There were some interesting findings in that those who actively took advantage of post-graduate training in forecast related areas described much more sophisticated processes than those who did not report continuous education. The study was unfortunately unable, due to time and organizational limitations, to assess the impact of personal proclivity upon forecast capabilities. Most of the respondents had never been assessed a personality inventory. Additionally, very few, were able to correctly answer the question asked to assess their understanding of "regression toward the mean", an important concept to understand from a forecasting perspective.

The interviews also uncovered differences in individual forecasting processes as predicted by Proposition 4. The duration and efforts that go into forecasting differed greatly from those who spend less than ten cumulative hours a month on forecasting, budget work, and market monitoring, to those who spend in excess of one hundred hours. Routinization appears to be driven by corporate policies and expectations, but the extent to which the respondents had automated these processes varied greatly. Similarly, outputs generated by the mangers were typically driven by organizational requirements, but the extent to which the respondents stored data in databases, used statistical processes, and more sophisticated tools varied from manager to manager.

The results also suggest that system capabilities, such as data availability, information sharing, knowledge transfer, and elements of automation are area and even division specific. This may be due to the "community-based", or bottom-up, approach to forecasting that is prevalent in the sample organization. Managers are therefore "forced" to create their own systems and forecasting methods due to a general lack of organizationally provided data and systems. Individual forecasting processes therefore appear to differ from area to area, and some areas have sophisticated processes while other areas struggle with lack of automation and extremely time-consuming methods of assessing and predicting environmental changes. As a result, some Division Presidents have almost entirely abandoned any attempts at doing advanced forecasting and they justify their decisions by how difficult it is to predict anything with accuracy in today's market and that their efforts are better spent on other tasks. They therefore

apply simple growth projections consistent with corporate expectations and await their area Vice Presidents' adjustments if their numbers do not match corporate goals.

Dyadic support appears to be strongest from subordinates and is, according to the respondents, critical to good forecasting processes. When there is a lack of perceived support from the corporate office, area and division level managers have to develop their own processes. They do, however, have to consider corporate policies. The respondents did not all describe these policies as mandates, but it is clear that the organization, despite its decentralized structure, has very clear expectations for what the numbers will look like by the time they are consolidated and reach the corporate office (and eventually Wall Street). There are also clearly defined operating plans in place. Accounting requirements and timeliness with respect to these plans appear to be strengths and they hold the managers accountable. On the other hand, they do not seem to have established consistent measures of performance or requirements for forecast tools, so most of the Division Presidents and Vice Presidents articulated a sense of frustration with the inability to make meaningful comparisons between markets.

With compensation in mind, it appears as if the lack of consistent performance measurements and expectations makes the forecasters uncomfortable. They are not certain whether to aim for "meeting the target" or "taking risks". It is apparent that the lack of consistency results in an almost "schizophrenic" approach to forecasting where the managers want to meet corporate goals, but at the same time knows that some of their compensation is tied to meeting their own estimates. The findings suggest that the forecasters therefore blur the lines between objective assessments of market changes and goal setting.

Compensation systems and side-bets also appear to influence individual forecasting processes to some extent. The managers are well aware that some of their bonuses will be determined by the extent to which they meet their, or possibly the organization's, goals. Momentum is also a key word, as the corporate office clearly communicates an "optimistic tone", and supports efforts at "stretching" the demand. A Vice President used the word "psyche" to describe this tone. Looking to the competition to assess what they will do is a common practice and is possibly one of the key predictors of the chosen strategy for many of the managers. Tracking, and to some extent imitating, competition was described as one of the most common practices, not only for the purpose of monitoring the market, but also for developing forecasts and budgets.

The extent to which the managers have sophisticated individual forecasting processes appears to influence their effectiveness from a utilization standpoint. Those with detailed and advanced forecasting processes rely on

their forecasts for decision making purposes to a greater extent than those who have less sophisticated processes in place. I did not find the same results with respect to self-assessed forecast accuracy. Those who have an "it does not matter what we do" attitude do not rank themselves lower on accuracy than those with more sophisticated methods. This suggests that they are under the impression that in today's volatile market they can do as good of a job as those who actively work to improve their forecasting. Without meaningful comparisons between markets, they may come to this conclusion without ever being convinced of the opposite. Those without highly developed individual forecasting processes do, however, suggest that they use their forecasts to a much lesser extent than their colleagues with respect to decision making. In other words, in terms of utilization, managers with robust forecast processes are more likely to use their forecasts.

Finally, most of the respondents were not sure how their forecasts are used at higher organizational levels. Area Vice Presidents utilize different methods of "consolidating" division level forecasts to the area level, and many of them did not know how their forecasts are used to generate an organization level forecast or for what purpose their forecasts are used. Explanations ranged from "providing it to investors" (e..g, Wall Street) to "determining the overall costs." Forecasts are apparently not generated for different purposes at the division and area levels, so each manager is only in charge of one forecast. Most of the respondents, did, however, state that forecasts are often pushed back from their subordinates to better fit the objectives of the organization, which confirms the apparent lack of distinction between forecasting and goal setting. The findings have been summarized in Table 5.9.1. below.

Propositions	Findings	Propositions	Findings
Proposition 1	No particular differences between respondents with bachelors or masters degrees.	Proposition 6	No respondents considered supervisor support as “high”. Mandates appear to impact forecasting processes, particularly among those with few hours developed to forecasting.
Proposition 2	Not investigated.	Proposition 7	Only one respondent did not track and/or imitate competitors as a part of the forecasting process.
Proposition 3	Not investigated	Proposition 8	Not supported. All respondents viewed forecasting as an integral part of their jobs, but only a third viewed it as a critically important part of the job.
Proposition 4	Respondents that reported taking advantage of post-college training in statistics, forecasting, or econometrics reported more advanced forecasting processes.	Proposition 9	Supported. Illusions of control appear to impact forecasting processes, particularly among those spending few hours on forecasting.
Proposition 5	Inconclusive findings. No respondents viewed system capabilities as strong. Some of the respondents developed their own systems and processes, while other respondents reported no such practices or processes.	Proposition 10	There were few differences between the respondents with respect to their self-assessed effectiveness and timeliness relative to peers. Those with more developed processes did report utilizing their forecasts to a greater degree than those with less developed processes.

Table 5.9.1. Summary of Findings for Managerial Forecasting Processes

5.9.2. Aggregation and Footprint Issues

The results from the series of regression and analyses and the WABA 1 analyses suggest that there are differences between levels of analyses. The five predictors impacted housing starts quite differently at the various levels of analyses, despite the fact that the results for the models for the four Census regions were not much stronger than the "all MSAs" national model. Although the Census Bureau divides the nation into four geographically distinct regions, these areas are probably too large to be useful for managerial forecasting purposes. Although some differences exist in support of the first hypothesis, there appears to be too much within region variability to accurately forecast housing starts based on Census region level models.

Second, when analyzing the six operational markets, there were large differences not only compared to the national and Census region data, but also when comparing the markets with one another. The R Squared ranged from .104 to .330. Additionally, the partial correlation coefficients were also quite different, with permits ranging from .142 to .321. Further, the WABA 1 results revealed that when dealing with these fairly large markets of operation, there are too many differences between the MSAs making up the organizational markets to generate strong models for forecasting purposes. Although some differences exist in support of the second hypothesis, there appears to be too much within market variability to accurately forecast housing starts based on organizational area level models.

When performing the same analyses at the individual MSA level, permits, CPI, Population Change, and Mortgage Originations had high partial correlation coefficients in several MSAs. But, the same predictors were not statistically significant in other MSAs. In three of the twelve MSAs none of the variables were statistically significant. Similarly, while population change was not even statistically significant in ten of the twelve MSAs, this variable's coefficients were both large and statistically significant in Riverside and Las Vegas. Additionally, while Mortgage Originations' coefficient was not statistically significant in eleven MSAs, it was both large and significant in Riverside. The WABA 1 that was run with the 83 individual MSAs in which Home Builder A operates revealed that the eta correlations between MSAs were significantly larger than the eta correlations within MSAs for Starts, Permits, and Housing Affordability.

5.10. Summary and Conclusions

The findings suggest that there can be great differences in how forecasting is done among mangers within the same organization. My findings reveal interesting differences in chosen approaches to forecasting between individuals performing the same job in different geographic markets. The results also suggest that bottom-up approaches to forecasting generate very different methods of forecasting in the absence of clearly defined forecast guidelines from the corporate office.

Further, my findings indicate that system capabilities within an organization are critical in order to develop effective forecasting processes. In the absence of such capabilities, individual forecasters will generate their own capabilities that may not be shared with other units of the organization. If not, they downplay the role of forecasting and employ simple growth models or expert opinions (typically their own or competitors' opinions).

Looking to the competition in order to establish a pseudo estimate of supply and demand is a common element in the forecast processes in local markets. To some forecasters this is the nuts and bolts of the entire process, while for others this supplements the information they derive from other local market predictors and macro-economic variables. Only one forecaster did not identify competitors as a source of information in market monitoring, forecast, or budget processes he had developed. In return, he utilizes a vast number of other data sources and methodologies that most of his colleagues does not utilize.

In this decentralized organization where a bottom-up approach to forecasting is used, it is not clear to the forecasters how their predictions are utilized at a higher level. It is evident, however, that they feel certain expectations are trickling down from the corporate office, and that their forecasts are not only objective predictions, but also goals and expectations in a bigger puzzle that culminates in reports to current and potential investors. Corporate policies and mandates appear to be influential in shaping the monitoring of markets, forecasts, and budget processes.

The expectations that the Division Presidents, Area Vice Presidents, and Area Presidents are working with from the corporate office are clearly linked to changes in national market conditions. The corporate office tracks environmental changes at the national level and expectations are therefore based on those developments. As my multiple regression and WABA analyses of historic time series reveal, it is difficult to match changes at the macro level with changes in MSAs and even sub-markets (communities within MSAs). Conflict appears to be inevitable

when bottom-up forecasts that are based on field data meet downward pressures that are based on macroeconomic changes.

These findings suggest that traditional organizational forecasting performed at the national level that utilizes national data presents decision makers with a “hit or miss” scenario when trying to predict housing demand in the local markets. Not only does the overall model perform quite differently from one level of analysis to another, but the predictive abilities of the independent variables varies between levels and in different local markets. The inability to generate strong forecasts utilizing the same variables in different markets appears to be problematic. The common practice of using aggregated data when attempting to predict variables of interest at the local level appears to be flawed as the variables perform very differently in different markets.

Future research should examine the predictive differences among variables at different levels of analyses. Traditional forecasting models have assumed that the same variables will impact models in consistent manners in vastly different geographic markets which the results from this study suggest. If organizational forecasting capabilities are sources of competitive advantage, as suggested by strategy literature, taking multilevel implications into consideration should greatly benefit our understanding of these advantages.

CHAPTER 6: DISCUSSION

6.1. Overview

This chapter discusses the contributions of the study in light of the findings, first with respect to managerial practices and forecasting effectiveness, and then the aggregation and footprint issues. Specifically, it highlights contributions to the management literature with respect to forecasting capabilities, processes, and effectiveness while accounting for dyadic and systems influences. Further, it addresses the contributions of the findings as they relate to utilizing higher level findings to develop strategies for operations in organizations operating in geographically distinct areas. The chapter also addresses the limitations of the study and makes recommendations for future research. Finally, the implications of the study are discussed.

6.2. Review of Research Findings

The study examined two areas of concern to managers and management scholars: the organizational practices of managing forecasting related activities and aggregation and footprint issues associated with organizational forecasting. In order to address the contributions of in detail, the following sections review the research findings for both areas.

6.2.1. Findings: Managerial Practices and Forecasting Effectiveness

The findings suggest that formal forecasting in organizations is a complex processes that appears to have been neglected in the management literature. Research on forecasting has been viewed, and limited to, the improvement of econometric models using aggregated, or high-level, data. Forecasting is, however, something that managers view as critical to organizational success, but also find to be a frustrating and difficult task.

The results of this study suggest that managers working in geographically distinct markets for an organization with operations in eighty-three MSAs monitor market changes and conduct forecasts in very different ways. System capabilities, dyadic support, and corporate mandates, or at least expectations, are particularly instrumental in determining the extent to which robust and comprehensive individual forecasting processes are developed.

The interviews revealed that in an organization where forecasting is done with local data and with the expectation that each market generates their own forecasts, the organization "pushes" expectations upon the managers to adjust their forecasts based on changes in market conditions at the national level. In some areas, forecasts and budgets are pushed back to Division Presidents, resulting in frustration over having to "forecast" numbers that they either do not believe in, or know with certainty are not realistic.

The findings also revealed that many managers are torn between satisfying an organizational policy of growth while simultaneously being held accountable for meeting their own goals. Facing what they perceive as lack of organizational support in the absence of well developed systems capabilities, some managers choose to just give the organization "what they want" as they perceive forecasts to be nothing more than educated guesses given the current state of affairs. Without automated processes and adequate data support, many managers choose to not "waste" their time on forecasting related activities which results in vast discrepancies with respect to efforts and duration spent on such tasks.

The interviews also revealed that with bottom-up approaches to forecasting, managers are often left to their own devices in terms of developing means of performing forecast related work. Although an organization provides deadlines and specifics from an accounting standpoint, little conformity between markets with respect to "how" and "what" makes inter-market comparisons both meaningless and unfair. Those with well developed processes may therefore generate more "realistic" forecasts that may be rejected by higher level executives. Managers with realistic approaches may even be "ridiculed" when predicting market downturns, as noted by one Vice President: "we were laughed at when we suggested that the red-hot prices would eventually start to drop." Having established solid monitoring efforts and forecast tools was not rewarded by the organization, and the Vice President was instead frowned upon by superiors and peers who to a certain extent base their decisions on loosely-defined goals and competitors' actions.

This study also revealed that managers do not necessarily know how their organization consolidates forecasts from different markets and levels. It is not even clear for what purpose they are used. Although they may know what they are interested in (sign-ups and closings in this particular industry), it is clear that forecasts that "move up" in the organization are still influenced by mandates that "move down". Those mandates are influenced by changes in national, or macro-level, variables, and not what is going on the markets.

The recession of the last few years and the dramatic decrease in home building activity has nevertheless changed how this particular industry conducts forecasting. Prior to 2006 forecasting efforts were focused on trying to predict production capabilities. In the aftermath of the decline, forecasting is now focused on trying to predict consumer demand. As one manager suggested; “Forecasting is easy when you focus on cost – that we are very good at – but to predict demand is a different animal. Now we are dealing with a new reality where our production capabilities far exceed customer demand, and to predict human behavior is one heck of a challenge.” All the respondents expressed a concern about the organization’s ability to predict demand in a volatile market. Even within an organization where there are guidelines for “when” and “what”, individual managers are left with one unanswered question, and that is how to account for the human element in the equation.

6.2.2. Findings: Aggregation and Footprint Issues

The findings also suggest that without a consistent approach to forecasting across areas and divisions, it is difficult to compare and aggregate the findings from each division. Further, collecting data at the local data and then trying to consolidate it with strategic goals that are generated at the national level presents the organization with many challenges. This study’s use of time-series data at various levels of analysis, suggests that five commonly used predictors impact housing starts quite differently at the various levels of analyses (see Tables 5.8.1d, 5.8.1e, and 5.8.1f). First, Census Bureau regions that divide the nation into four geographically distinct regions are too large to be useful for forecasting purposes. There is too much within-region variability to accurately forecast housing starts based on Census region level models.

Second, using operational markets similar to those identified by Home Builder A also appears to be of no use for forecasting efforts. The findings suggest that although there are large differences compared to the national and Census region data, there are also great differences between the different markets and even within each market. There were substantial differences in the R Squared values and the partial correlation coefficients were also quite different between the markets and between the MSAs, particularly with respect to building permits. Similarly, the Consumer Price Index, population change, and mortgage originations had high partial correlation coefficients in several MSAs, while not even statistically significant in other MSAs. Even more telling, in three of the twelve MSAs none of the variables were statistically significant.

These findings suggest that traditional organizational forecasting performed at the national level utilizing aggregated data presents decision makers with a “hit or miss” scenario when trying to predict housing demand in the local markets. Not only does the overall model perform quite differently from one level of analysis to another, but the predictive abilities of the independent variables varies between levels and in different local markets. The inability to generate strong forecasts utilizing the same variables in different markets appears to be problematic. The common practice of using aggregated data when attempting to predict variables of interest at the local level appears to be flawed as the variables perform very differently in different markets.

6.3. Contribution to Literature

Although there have been a number of academic articles addressing organizational forecasting in recent years, this study is the first to address how multilevel issues impact these important managerial tasks. The study contributes mainly to two areas of study: the organizational practices of managing forecasting related activities and aggregation and footprint issues associated with organizational forecasting. The contributions to each area of study are addressed in the following two sections.

6.3.1. Contributions: Managerial Practices and Forecasting Effectiveness

The findings in this study have shed light on some critical issues from a managerial standpoint. It has examined what forecasters and managers do with respect to forecasting from both a technical and behavioral standpoint. With a qualitative approach, it has identified the challenges that managers deal with when monitoring market changes, preparing forecasts, and including these efforts into organizational budgets. Previous studies have often treated forecasting as an organizational activity that is standardized across markets and business units, but this study has clearly revealed that there can be multiple “flavors” of forecasting being performed even within the same organization.

This dissertation has simultaneously investigated how individual capabilities, dyadic influences, and system characteristics impact the processes that we commonly refer to as forecasting. The findings can be summarized as follows:

- Education is not necessarily an indicator of individual forecasting capabilities. The managers typically rated experience as more important in preparing them for forecast related work.
- Individual forecasters that actively work to improve their forecasting capabilities through graduate coursework, workshops, and other professional development opportunities described more sophisticated forecasting processes than those who do not take advantage of such opportunities.
- Managers view dyadic support from subordinates as important to perform forecast related work. In the sample organization, all respondents rated support from their subordinates as more valuable than the support they receive from their supervisors.
- Organizational mandates, both formal and informal, appear to influence individual forecasting processes. Managers perceive a certain "tone" coming down from the top management team that dictates what kinds of numbers they should "produce" through the forecasting process.
- There are elements of being "tactical" among managers when they monitor the market, create budgets, and make predictions for the future. Several forecasters respond to the pressure from the corporate office by "giving them what they want" rather than making objective predictions. For some, this is done to make sure they can hit their targets. The prediction serves as a measuring stick for what they will do in an upcoming period, and almost serves as a "postdiction", or a measure of what will happen looking back at the period.
- Findings in this study suggest that looking to the past and relying on past performance is common among managers with less sophisticated forecasting processes. Previous research findings have suggested that organizations are influenced by their past experiences (e.g., Ahuja & Lampert, 2001; Barnes, 1984; Bukszar & Connolly, 1988) when monitoring the environment and developing forecasts. As noted by Coff and colleagues (2009), relying on past experiences, especially successes, generates illusions of control which are believed to impact strategic decisions made by managers and forecasters as individuals assume that they played an important part in bringing about the success. Findings from this study suggest that some of the managers that have not developed adequate forecasting processes attribute successes related to forecasting to themselves, but view failures as something out of their control.

- Forecasters let competitors' actions influence their processes to a great extent. It is common among managers to communicate and discuss strategies and opportunities with rivals. It apparently serves the purpose of establishing estimates of supply and demand in local markets. All but one of the respondents in this study articulated that this is a common practice as part of their forecasting processes.
- Well-developed system capabilities appear to be important for individual forecasting processes. In the absence of organizationally provided data, information sharing, knowledge transfer, or automation, some Areas and Division created their own system capabilities that resulted in fairly sophisticated processes. In other regions, the lack of system capabilities resulted in no formally developed forecasting processes, with limited or no use of external data.
- Having well-developed forecasting processes appears to be associated with high degrees of self-reported forecast utilization. Although the respondents with less sophisticated processes ranked their accuracy similarly to their colleagues with more developed processes, they relied much less on their forecasts for decision making purposes.

Lastly, it appears that in an organization with a bottom-up approach to forecasting there is no guarantee that the forecasters know how, or if, the forecasts are generated into a master forecast at the organizational level. There were also confusion, and to some extent frustration, about having to match the locally developed forecasts with the strategic plans that trickle down from forecasts. System level forecasting effectiveness therefore does not appear to be guaranteed by lower level forecast effectiveness.

6.3.2. Contributions: Aggregation and Footprint Issues

Some of the difficulties associated with consolidating and comparing forecasting efforts at the local and national levels may be related to the findings in this study that suggest that there are significant differences in how key indicator variables predict housing starts across levels of analyses. They also point out that there are significant differences in the optimum forecasting model of housing starts across levels and between units of analysis (e.g., MSAs) at the same level, which is critical to our understanding of what constitutes effective forecasting at the organizational level. The findings suggest that an organization's decision to utilize data from a higher level (e.g.,

national) to predict changes at a lower level (e.g., state, city, etc.) will distort the interpretation of the environment in which it operates, and possibly lead the organization to pursue a poor strategy. All the findings indicate that forecasters working at the organizational level are likely to erroneously assume that the results from national data will apply equally to lower level units if they rely on such data.

Contrary to the econometric tradition of attempting to detect patterns through aggregation (Gilliand, 2008), the findings suggest that managers utilizing national, Census region, or aggregated market data may incorrectly assume that relationships at one level are likely to be observed at other levels. Specifically, these managers may incorrectly assume that higher level findings hold true at the lower level at which they operate and therefore fall victims to the ecological fallacy *(*Robinson, 1950; Freedman, 2001).

This study does also add to a list of studies dating back to the early 1980s when economists began to generate models for predicting housing starts using time-series regression models (see Falk, 1983; Puri & Vanlierop, 1988). Using national data, Falk's (1983) model was formulated to generate short-run, unconditional forecasts of new, single-family housing starts and sales. This study examines how variables included in these earlier studies perform similarly at lower levels of analyses, and suggest that just because variables may be important predictors at the national level, there is no guarantee that they will be useful at other levels of analysis. Since most managers do not oversee operations at the national level, studies using national level data exclusively, research findings from such studies would be of little importance.

Although a series of more recent attempts at improving housing start forecasts have included more advanced techniques (e.g., structural models of housing supply, inventory and innovation accounting methods; Falk & Bong-Soo, 2004; Guirguis, Giannikos, & Anderson, 2005) and different types of variables and techniques (Hendershott & Weicher, 2002), all of these studies have relied exclusively upon single level of analysis models (SLA). None of them accounted for data from multiple levels of interest to the housing industry such as the four Census regions, states, geographic markets, or MSAs. The findings in this study suggest that from an operational perspective, organizational forecasters cannot ignore the multilevel nature of their data when their operations are clearly not national in scope. The findings also suggest that organizational reliance upon national data may have contributed to both decreased accuracy and relevance for companies operating in distinctly different geographic areas.

6.4. Limitations of the Study and Future Research Needs

With respect to measuring forecasting effectiveness at the organizational level, it would have been ideal to conduct a study with multiple organizations. This would have allowed for an analysis of differences and similarities between organizations and individuals, while also examining system specific differences. This study was unfortunately unable to utilize more than one organization, making an inter-organizational comparison impossible.

The study was also unable to examine individual forecasts and contrast these with what actually happened in retrospect. It relied on self-reports of individual forecasting efficiency. Considering the sensitive information that the organization would have had to reveal with respect to the development of forecasts and the budget process in particular (such as compensation packages and personal information), it was clear that it would be impossible to access such information.

From a measurement perspective it would also have been ideal to utilize pre-established measures, such as the MBTI, cognitive measures, and instruments used to assess dyadic relationships. It was decided, however, that since this portion of the dissertation was to be exploratory by nature, it would be premature to develop or utilize specific instruments before it was clear if these relationships existed, or what managerial forecasting processes look like, so a more qualitative approach was therefore chosen. Additionally, the study was limited in terms of the time that could be spent with the managers over the phone so it was not possible to explore some of the proposed relationships in as much detail as originally planned. Also, given the fact that the managers are working out of diverse geographic areas it was not possible to conduct in-person interviews and the opportunity to administer lengthy instruments.

In order to build on these initial findings, future research would benefit from being conducted in a multi-organizational context. This would allow the researchers to analyze differences and similarities between both organizations and individuals, while also examining system specific differences. When considering the pilot interviews in addition to the full study, there appear to be great differences between organizations with respect to both forecasting practices and philosophies.

Future studies would also benefit from utilizing organizationally developed forecasts in order to compare these with what actually happened. Such studies should probably focus on outcomes that are not influenced directly by the organization itself (e.g., forecasting housing starts involves trying to predict how many homes are built in an upcoming period, which also includes the organization’s own building activity). Predicting demand characteristics

would also reduce the sensitive nature of the forecasts, and may make the participating organizations more willing to share such information. Studies seeking to better understand individual level differences among forecasters should also use existing measures such as the MBTI and the *Wonderlic*. Further, in order to better understand dyadic influences, it would be beneficial to administer instruments that measure the quality of such relationships.

In order to begin to bridge the apparent gap between theory and practice as it relates to forecasting, future research should pay attention to how managers conceptualize organizational challenges and how they view forecasting as tools to overcome obstacles. We know little about why managers choose inferior forecasting methods over more sound quantitative models. Having shed some light upon the multi-level implications involved with forecasting, future research is needed to understand the full implications of this issue for forecasting.

Finally, future research should also examine the predictive differences among variables at different levels of analyses. Traditional forecasting models have assumed that the same variables will impact models in consistent manners in vastly different geographic markets which the results from this study suggest. If organizational forecasting capabilities are sources of competitive advantage, as suggested by strategy literature, taking multilevel implications into consideration should greatly benefit our understanding of these advantages.

6.5. Practical Implications

There are several practical implications associated with how key indicator variables predict housing starts across levels of analyses differently, and that there are significant differences in the optimum forecasting model of housing starts across levels and between units of analysis at the same level. Organizations operating in multiple markets that are geographically diverse will improve their ability to respond to industry and demand changes by matching their overarching strategies with local market conditions. In other words, the strategies that are formulated by a corporate office should not be solely formulated by macroeconomic indicators and analyses performed at the national level, but should be rooted in local market conditions.

Based on the findings, it also appears to be critical for organizations to invest in system capabilities to facilitate market specific forecasts. This would require investments in lower level data and tools needed to effectively monitor such changes. Rather than having individual units generate their own processes, organizations should develop system and organizational infrastructure that enhances the sharing of information so that required higher level forecasts can be generated and facilitate sound strategy formulation. This would allow for meaningful

comparisons between different markets, and enable top management to objectively evaluate investment opportunities in current and potential markets. With better tools to work with managers may also reduce the amount of time they spend on market monitoring activities. Without sufficient resources, many managers choose to abandon their forecasting efforts and instead rely on judgmental models of forecasting.

The findings suggest that forecasting effectiveness will be enhanced if lower level units monitor their own environments, and that forecasts are generated based on these changes. With sufficient information sharing, these forecasts should be utilized to create market (intermediate level) and national forecasts. It is interesting to note, however, that in my sample organization the forecasts are generated by the same managers who monitor the changes. It may be in the best interest of such organizations to separate the market monitoring from the actual forecast efforts. It would reduce the workload, but more importantly also reduce the forecast bias as the personal interests and agendas of the managers are being removed from those operating at the field level. Managers charged with forecasting in addition to running the operations appear to blur the lines between objectively predicting the future, goal setting, and meeting organizational mandates.

Next, a bottom-up approach to forecasting makes sense for organizations where location is a key component of creating demand. As an example, auto makers can utilize a top-bottom approach as a vehicle is perceived as “good” or “bad” from a demand perspective depending on the nature of the car itself. A home builder, however, can have a superior product but if it is not in the correct location it will be difficult to sell. Home builders will therefore have to consider the local market conditions and a bottom-up approach makes sense. The challenges are therefore associated with linking the overall organizational strategy with the forecasts that move up in the organization. Conflicts will arise when mandates trickle down based on top management teams’ assessments of the market from a national or high level. There needs to be process congruity where the organization develops a formal system, where there is consistency in tools utilized and reports generated. At the same time, there is need for content congruity, where the Divisions do market monitoring at the level of operations. In other words, there cannot be a mismatch between levels of analyses. A system where a forecasting unit regularly informs strategy makers about local market developments would keep the organization connected and mutually accountable. Keeping the market monitoring at the field level, aggregating it at the area level, have the area level teams integrate macroeconomic changes that impact all areas, and then have a forecast division analyze the data could bridge the

needs between the corporate office and the local markets. Figure 6.5 illustrates the need for content and process congruity:

	Content	**Process**
Top Management Team	No	Yes
Divisions/Areas	Yes	No

Figure 6.5. The Need for Content and Process Congruity

As Figure 6.5 suggest, content should not be dictated by the top management team, but rather by the divisions and areas where the data for analysis is collected. The process of data collection, data sharing, and techniques used for analyses should, however, be dictated by the top management team, rather than being left to the individual Divisions and Areas. If that is done, there is a greater chance for content congruency (the right data for level of operations), and process congruency (multiple areas of operations conducting similar analyses).

Home Builder A's problems are to some extent caused by incongruence in goals between Division Presidents, Vice Presidents, Area Presidents, and the corporate office. These difficulties may be explained by *agency theory*, a theory born out of the idea of risk sharing. Agency theory looks to solve the problems created by the incongruence of goals between the principals and the agents of firms (Eisenhardt, 1989; Fama & Jensen, 1983; Jensen & Meckling, 1976). Specifically, agency theory is concerned with creating contracts that maximize goal congruence between the two parties. The theory assumes that agents are more risk averse than the principals, as the majority of their personal livelihood is derived from the compensation they receive, and that contracts regarding the relationship are needed. Agency theory suggests that organizational decisions involve a consideration of the amount of risk agents are willing to accept and the benefits to principals of spreading the risk among themselves and the agents (Eisenhardt, 1989).

With compensation packages and performance evaluations designed around growth, Home Builder A appears to have distorted some of the incentives that were meant to entice he Division Presidents to align their goals

with the organization's goals. Having charged the managers with market monitoring, forecasting, and decision making, Home Builder A essentially adopted an outcome-oriented contract to resolve the agency problem in what is a highly decentralized organization. Outcome oriented contracts are meant to pass some of the risk of principals onto the agents (Eisenhardt, 1989), and thereby align the agents' goals with the principals' goals. Under conditions of uncertainty, business owners cannot be sure that employees are acting in their interests without incurring monitoring costs to do so. This situation gives rise to two problems, *adverse selection* and *moral hazard* (Jensen & Meckling, 1976). Moral hazard exists when an entrepreneur cannot know for certain if an employee is working hard or is shirking. Adverse selection exists when an employee misrepresents his or her true abilities (Eisenhardt, 1989). Agency theory proposes two solutions to these problems, *residual claimancy* and *monitoring*. The first solution is to replace wage contracts with compensation packages that provide residual claimancy to employees. Residual claimancy is meant to align the employees' goals with those of the organization and reduce the problems of moral hazard and adverse selection (Jensen & Meckling, 1976). Such arrangements apparently backfired, not only for Home Builder A, but also for the entire home building industry as managers kept building in saturated markets to meet corporate goals and to increase their overall compensation.

The second solution to agency problems is to increase the amount of information about the agent's behavior through monitoring. A decision to implement behaviorally oriented contracts usually means that principals have inexpensive means through which they can easily monitor agents' behavior rather than trying to spread the risk. Removing the decision making aspect from the Division Presidents may be the best way to resolve this apparent problem. In the case of Home Builder A, opportunities to do so clearly exist. With market monitoring at the field level taking place with the Division Presidents, the Vice Presidents of finance and strategic marketing are already utilizing this data to create forecasts. It would make sense if the analysis of the data and actual forecasting would be performed by the Vice Presidents, and then passed on to the Area Presidents. With such analyses in place, Area Presidents would be able to make decisions that could be consolidated with the strategic plans coming down from the corporate office. Additionally, by having the Vice Presidents conduct the forecasting aspects, the Area Presidents would be better equipped to make decisions about whether or not to build in a certain area. As it stands today, Division Presidents can make that call just to ensure building activity in their respective markets. Having the Vice Presidents generate standardized forecasts, it will also be easier to generate more accurate aggregated forecasts across Areas that can be meaningfully be consolidated with the strategic plans from corporate.

As of today, the outcome oriented contracts have created a messy process where each Division fights for their share of the compensation. Distorted incentives and a complete inability to make meaningful comparisons across different geographic markets are the net results. By separating the market monitoring, forecasting, and decision making aspects, a system of checks and balances would be implemented that would hold the entire organization accountable and resolve the agency problem that exists within this organization.

Separating the monitoring efforts from the forecast analyses will require an investment in system capabilities. The entire organization will need to be integrated through data and knowledge sharing. They will also have to keep forecasting conceptually separate from the goal setting and decision making processes. Forecasting is meant to be a tool to facilitate those related managerial tasks, but not be a part of them. If companies do not distinguish clearly between forecasting, goal setting, planning, and decision making, they are not treating forecasting as an integral part of their organization's dynamic capabilities. It also suggests that the knowledge derived from forecasts are not viewed as strategic assets, and that their view is limited to a more traditional view of what forecasting is and should be. Since accurate forecasts are associated with organizational success, as noted by Barney (1986), being able to monitor market specific changes is of utmost importance. The findings in this dissertation should therefore encourage investments in monitoring and forecasting related capabilities.

6.6. Summary and Conclusions

This chapter described the contributions of the study to two streams of literature: the organizational practices of managing forecasting related activities and aggregation and footprint issues associated with organizational forecasting. With respect to the management of forecasting related activities, the findings suggest that in the absence of clearly defined forecasting processes at the organizational level, managers operating at the field level will have to developed their own systems and processes, and that their effectiveness therefore depends to a great extent upon their abilities to successfully assess environmental changes and respond appropriately. The results also suggest that dyadic support is critical. Also, mandates appear to be important in terms of how forecasts are developed and the predictions that are being made. With regard to aggregation and footprint issues, the study revealed that the "ideal" forecasting models vary extensively across levels, and even between units at the same level. Predictor variables that were statistically significant in some models and geographic markets, were not contributing to predicting housing starts in other areas.

The chapter also pointed out directions for future research, such as using organizationally developed forecasts to compare with actual events, establishing measures to further understand the individual differences among forecasters, focusing on how managers conceptualize organizational challenges and how they view forecasting as tools to overcome obstacles. The chapter also suggested doing an inter-organizational study in order to more fully understand the similarities and differences between organizations and how forecasting is done.

Finally, the chapter pointed out the practical implications of the study. It suggested that organizations should generate market specific forecasts, and invest in system capabilities to effectively monitor environmental changes, and separate the monitoring process from the data analysis and forecast processes. It also suggested that there is a need to clearly distinguish between forecasting, planning, goal setting, and decision making in order to use the knowledge derived from forecasts as strategic assets, and move away from the traditional, and limited, view of what forecasting is and should be.

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APPENDICES

Appendix 1: Institutional Review Board Approval

VirginiaTech

Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24060
540/231-4606 Fax 540/231-0959
e-mail irb@vt.edu
Website: www.irb.vt.edu

MEMORANDUM

DATE: April 9, 2010

TO: Steven Markham, Kristian Braekkan

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires June 13, 2011)

PROTOCOL TITLE: Braekkan Dissertation

IRB NUMBER: 10-319

As of April 9, 2010, the Virginia Tech IRB Chair, Dr. David M. Moore, approved the new protocol for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at http://www.irb.vt.edu/pages/responsibilities.htm (please review before the commencement of your research).

PROTOCOL INFORMATION:
Approved as: **Expedited, under 45 CFR 46.110 category(ies) 6, 7**
Protocol Approval Date: **4/9/2010**
Protocol Expiration Date: **4/8/2011**
Continuing Review Due Date*: **3/25/2011**
*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federally regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Date*	OSP Number	Sponsor	Grant Comparison Conducted?

*Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

cc: File

Appendix 2: Cover Letter to Potential Participants

Dear Mr. /Mrs. Doe

Good morning. My name is Kristian Braekkan, and I am a doctoral candidate at Virginia Tech. I am currently working on my dissertation under the supervision of Professor Steve Markham (markhami@vt.edu). My dissertation seeks to clarify what managers and organizations do with respect to forecasting. Your organization has allowed me to speak with its divisional and area presidents, and I would very much like to learn more about you and your work. The participation will consist of two parts: a questionnaire which you can complete and return to me via email (it will take approximately 30 minutes to complete) and a 30 minute phone interview.

I would very much appreciate your willingness to participate in my research project. If you are interested, please let me know via email what a good time for us to talk briefly over the phone to set up the interview.

You can reach me via email (braekkan@vt.edu) or phone (540-598-3072).

Sincerely,

Kristian Braekkan
Doctoral Candidate
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Appendix 3: Questionnaire for Divisional Presidents

The Virginia Tech Forecasting Utilization Project

May 2010

Questionnaire for Divisional Presidents

In an effort to map how Home Builder A is looking at the future, this brief questionnaire seeks to understand what you do with respect to the forecast process, the budget process, and market monitoring. (Each of these terms is defined more clearly later.)

Please complete the following questionnaire as accurately as possible. Your answers will **not** be available to your supervisor or anyone else within your organization. Only the researcher will have access to your responses. Only aggregated responses will be used in any reports.

When completed, please e-mail your responses to braekkan@vt.edu.

Part 1: Background information

Your responses can be completed by typing directly into this Word file and e-mailing it back to me.

1. Your Job Title:

2. For which Division or Area do you work?

3. What is the highest academic degree you have earned? (e.g., HS, GED, BA, BS, MBA, ABD, PhD, JD, etc.)

Please indicate here:

From what type of academic department or unit was it awarded (i.e. Finance, History, Engineering, Management, etc.)?

4. a) How many years have you been with Home Builder A?

b) How many years have you been in your current job?

Part 2: Please answer the following questions based on your own experiences with respect to the forecast process (e.g., deciding on a projected number of sign-ups in an upcoming period), the budget process (e.g., developing plans for both revenue streams and costs for the upcoming period), and market monitoring (e.g., examining the external marketplace).

1. On average, approximately how many hours per month do you spend working *on the forecast process* for an upcoming period? (This refers to predicting the number of sign-ups in an upcoming quarter or year.) _____ Hours

2. On average, approximately how many hours per month do you spend working on the *budget planning process* for an upcoming period? (This refers to developing plans for both revenue streams and costs for a future month, quarter or year. It does not refer to any control or implementation activities that pertain to the current or past months.) _____ Hours

3. On average, approximately how many hours per month do you spend working on *market monitoring related activities* for an upcoming period? (This refers to observing external market changes for a future time span (i.e. a month, quarter or year) that might affect future demand for housing. It also refers to using any subjective or objective data in predicting what might happen in the future.) _____ Hours

4. Compared to other managers in your organization, how accurate is your forecast with respect to projected sign-ups for your area or division?

(Please place an "X" in the box BELOW the number that best represents your answer.)

Much less accurate	1	2	3	4	5	6	7	Much more accurate

5. Compared to other managers in your organization, is your forecast developed ahead of schedule or on-time?

(Please place an "X" in the box BELOW the number that best represents your answer.)

Almost never on time	1	2	3	4	5	6	7	Almost always on time

6. Compared to other managers in your organization, how often do you utilize, refer to, or rely on your forecast for sign-ups for decision making purposes?

(Please place an "X" in the box BELOW the number that best represents your answer.)

Very little reliance	1	2	3	4	5	6	7	Very heavy reliance

7. What would you consider Home Builder A's overall *strengths* to be in terms of the forecast process, developing budgets, and monitoring the market?

8. What would you consider Home Builder A's overall *weaknesses* to be in terms of the forecast process, developing budgets, and monitoring the market?

9. What are your specific recommendations for organizational improvements that might be implemented either at the corporate, area or division-level that might help when developing a forecast?

10. Have you used any external data (i.e., non-Home Builder A generated data) to help think about or predict changes in your local market? If so, what types of data have you used?

11. Have you found any good resources (experts, reports, analyses, etc.) that you feel have been helpful to you or your group when examining potential changes in your market's economic or demographic composition? What are these resources?

Many thanks for taking part in this! If you have any questions regarding this study please feel free to contact me. I will be in touch at a later date with an overall summary of responses.

Sincerely,

Kristian Braekkan,
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Appendix 4: Pre-Interview Questionnaires for Area/Vice Presidents

The Virginia Tech Forecasting Utilization Project

May 2010

Pre-Interview Questionnaire for Staff

In an effort to map how Home Builder A is looking at the future, this brief pre-interview questionnaire seeks to understand what you do with respect to the forecast process, the budget process, and market monitoring. (Each of these terms is defined more clearly later.) This pre-interview survey will allow us to move much more quickly through the phone interview that will be scheduled later.

Please complete the following questionnaire as accurately as possible. Your answers will **not** be available to your supervisor or anyone else within your organization. Only the researcher will have access to your responses. Only aggregated responses will be used in any reports.

When completed, please e-mail your responses and any supplementary files to braekkan@vt.edu.

Part 1: Background information

Your responses can be completed by typing directly into this Word file and e-mailing it back to me.

1. Your Job Title:

2. For which Division or Area do you work?

3. What is the highest academic degree you have earned? (e.g., HS, GED, BA, BS, MBA, ABD, PhD, JD, etc.)

   From what type of academic department or unit was it awarded (i.e. Finance, History, Engineering, Management, etc.)?

4. a) How many years have you been with Home Builder A?

   b) How many years have you been in your current job?

Part 2: Please answer the following questions based on your own experiences with respect to the forecast process (e.g., deciding on a projected number of sign-ups in an upcoming period), the budget process (e.g., developing plans for both revenue streams and costs for the upcoming period), and market monitoring (e.g., examining the external marketplace).

1. On average, approximately how many hours per month do you spend working *on the forecast process* for an upcoming period? (This refers to predicting the number of sign-ups in an upcoming quarter or year.) _____ Hours

2. On average, approximately how many hours per month do you spend working on the *budget planning process* for an upcoming period? (This refers to developing plans for both revenue streams and costs for a future month, quarter or year. It does not refer to any control or implementation activities that pertain to the current or past months.) _____ Hours

3. On average, approximately how many hours per month do you spend working on *market monitoring related activities* for an upcoming period? (This refers to observing external market changes for a future time span (i.e. a month, quarter or year) that might affect future demand for housing. It also refers to using any subjective or objective data in predicting what might happen in the future.) _____ Hours

4. Compared to other managers in your organization, how accurate is your forecast with respect to projected sign-ups for your area or division?

(Please place an "X" in the box BELOW the number that best represents your answer.)

Much less accurate	1	2	3	4	5	6	7	Much more accurate

5. Compared to other managers in your organization, is your forecast developed ahead of schedule or on-time?

(Please place an "X" in the box BELOW the number that best represents your answer.)

Almost never on time	1	2	3	4	5	6	7	Almost always on time

6. Compared to other managers in your organization, how often do you utilize, refer to, or rely on your forecast for sign-ups for decision making purposes?

(Please place an "X" in the box BELOW the number that best represents your answer.)

Very little reliance	1	2	3	4	5	6	7	Very heavy reliance

7. What would you consider Home Builder A's overall *strengths* to be in terms of the forecast process, developing budgets, and monitoring the market?

8. What would you consider Home Builder A's overall *weaknesses* to be in terms of the forecast process, developing budgets, and monitoring the market?

9. What are your specific recommendations for organizational improvements that might be implemented either at the corporate, area or division-level that might help when developing a forecast?

10. Have you used any external data (i.e., non-Home Builder A generated data) to help think about or predict changes in your local market? If so, what types of data have you used?

11. Have you found any good resources (experts, reports, analyses, etc.) that you feel have been helpful to you or your group when examining potential changes in your markets, economic or demographic composition? What are these resources?

BACKGROUND

1. How well has your formal <u>education</u> prepared you for work that involves (1) the forecast process, (2) the budgeting process, and (3) market monitoring?

(Please place an "X" in the box BELOW the number that best represents your answer.)

Not at all	1	2	3	4	5	6	7	Extremely well

Comments:

2. How well have your previous work experiences prepared you for work that involves (1) the forecast process, (2) the budget process, and (3) market monitoring?

3.

(Please place an "X" in the box BELOW the number that best represents your answer.)

Not at all	1	2	3	4	5	6	7	Extremely well

Comments:

Part 3: Work Specific Information

These questions seek to clarify what managers do with respect to the forecast process, the development of budgets, and market monitoring.

1. *When you think about the future of your market, how important is each of the following variables to the three activities shown below*:

(Put one number in each cell below.)

0= Not important 1=mildly important 2=moderately important 3=critically important

	…for the forecast process?	*…for the budget planning process?*	*…for marketing monitoring?*
SF Starts in your market			
SF Permits in your market			
SF Completions in your market			
MF Starts in your market			
MF Permits in your market			
MF Completions in your market			
New SF Sales			
New SF Median Prices			
Existing SF Sales			
Existing SF Median Prices			

2. When you think about the future of your division's (or area's) market, are they any special industry, demographic, or economic measures that are especially helpful to your efforts? Please list them.

The following questions have to do with training issues related to forecasting.

1. When planning for the future, it is common to look to the past. Assuming that you observe an unusually high or low observation in the past, which of the following do you think is most likely to happen in the future? (Please place an X in front of your choice)
    a) it will remain either unusually high or low
    b) it will move in the direction of the less extreme
    c) it is impossible to tell

2. Have you (or members of your group) used the MBTI (Myers Briggs Type Indicator)? If yes, what is your 4 letter type?

Part 4: Home Builder A Systems and Processes

Please take moment to describe the major steps involved in how you accomplish the three related activities shown below? (If any of them don't apply, just note that fact.) What we are especially keen to learn is how different pieces of information from other parts of the organization (or from the outside) come together. If writing it down here won't work, let us know and we can talk through this during the phone interview.

Major Steps Involved in Determining Sign-Ups for this Market:

1.

2.

3.

4.

Major Steps Involved in Assembling the Budget Plan:

1.

2.

3.

4.

Major Activities Related to Monitoring the Market and Predicting Changes

1.

2.

3.

4.

Many thanks for taking part in this! I will be in touch by phone to complete the interview, and will share the results of this in a formal report following the completion of this study.

Sincerely,

Kristian Braekkan,
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Pamplin Hall 2007 (0223)
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(540) 598-3072
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Appendix 5: Main Interview Script

Interview Script for Forecasters

(Customized for Home Builder A Area VPs of Marketing & Finance)

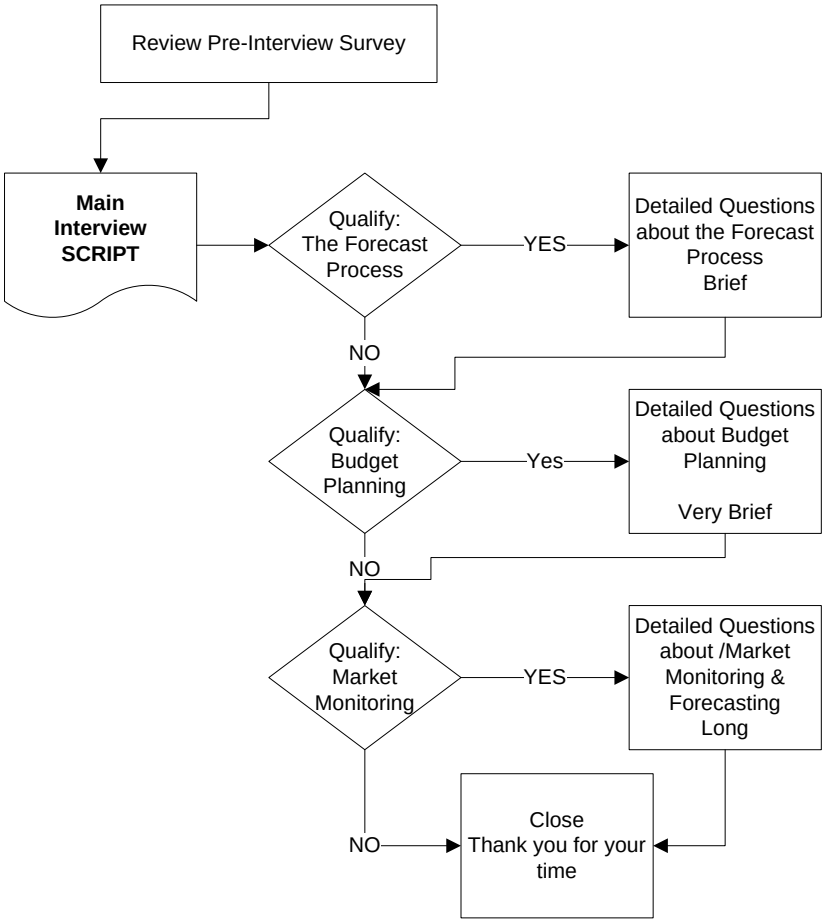
Estimated Administration Length: 25 minutes

Requires Matched Pre-Interview Survey

Kristian Braekkan

May, 2010

Adaptive Logic Overview:



Main interview:

K: Good morning/afternoon/evening. My name is Kristian Braekkan, and I am a doctoral candidate at Virginia Tech. As I mentioned in my introductory email/phone call, I am currently working on my dissertation which seeks to clarify what managers and organizations do with respect to forecasting.

K: I truly appreciate your willingness to participate in my research project, and I would also like to thank your assistant(s) for their help in getting the pre-interview materials to me.

K: As stated in the consent form you have signed your participation is strictly voluntary, and you may decline to answer any questions you do not feel comfortable answering. Also, feel free to ask me to clarify any questions that are unclear or confusing. I also want to assure you that your responses will be kept strictly confidential.

K: Before we start, do you approve of letting me tape our conversation in order to more accurately describe your responses? (if yes: "thank you", if no: "that is understandable").

K: Do you have any questions before we begin?

1. The Forecast Process

Q01: Looking at the results of the Pre-Survey (and by way of review), to what extent are you directly involved in the Forecast Process (i.e. deciding on a projected number of sign-ups for your market for an upcoming year or quarter)?

Q02: About what percent of your job is devoted to determining sign-ups?

Q03: How accurate are you typically in projecting sign-ups? Please rate your accuracy on a scale from 1 (completely inaccurate) to 7 (completely accurate)?

Q04: Are your projections for sign-ups timely enough to allow you to act upon these projections? E.g. are your projections made far enough in advance so you and Home Builder A can utilize them? Please rate the timeliness on a scale from 1 (not at all) to7 (extremely timely)

2. Budget Planning

Q05: Looking at the results of the Pre-Survey (and by way of review), to what extent are you directly involved in planning the budget for an upcoming year or quarter?

Q06: Is budget planning a more central aspect of your job than the forecast process mentioned a moment ago?

Q07: About what percent of your job is devoted to planning budgets?

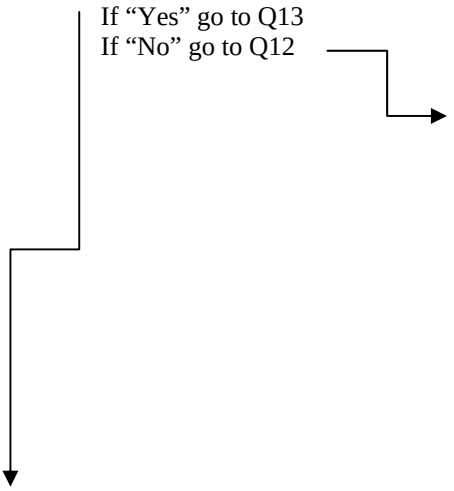
3. Market Monitoring

Q08: Looking at the results of the Pre-Survey (and by way of review), to what extent are you directly involved either monitoring the market for important changes and/or using external data to make formal predictions or forecasts?

Q09: Is monitoring the market a more central aspect of your job than the forecast process and budget planning mentioned a moment ago?

Q10: About what percent of your job is devoted to market monitoring?

Q11: Do you have a formal process developed with respect to market monitoring?



Q12: Since you don't have a formal process in place, what do you do in terms of anticipating changes in the market in which you operate?

Q13: What key aspects are you trying to predict by monitoring the market?

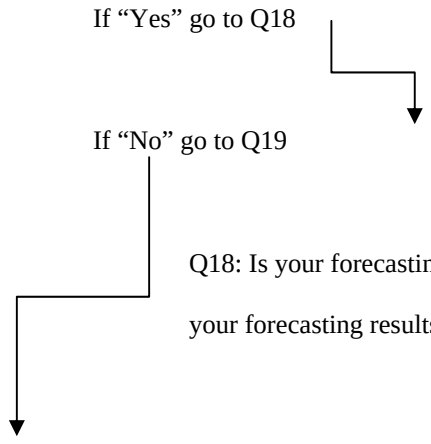
Go to Q15 if no key aspects are identified.

Q14: Do you predict changes to _____ (key variable identified in Q13) based on its changes in the past?

Q15: Do you think any other economic, industry, or demographic changes are worth monitoring in an effort to more accurately understand and predict the future? If so, can you give examples of which ones you think would be important?

Q16: Which national or local economic, industry, or demographic changes do you monitor? Can you give examples of which ones are most important? Are any of these data sources external to Home Builder A?

Q17: Do you generate different types of forecasts for different purposes? As an example, do you generate one set of forecasts for Home Builder A's corporate office, one for your local market(s), and separate forecasts in order to develop budgets?



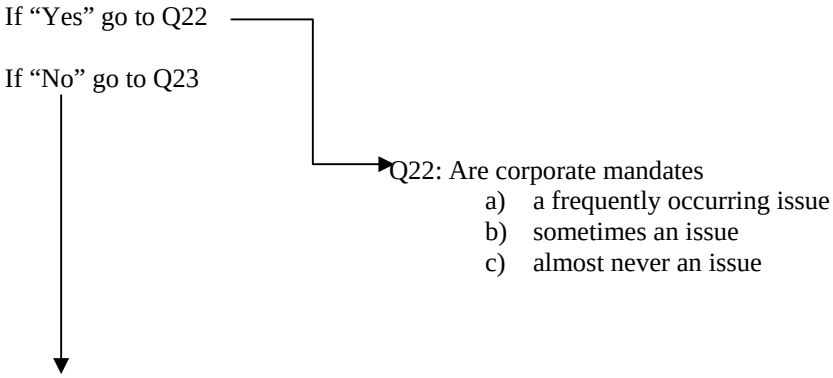
Q18: Is your forecasting process directly linked to your budgeting process? In other words, do your forecasting results get applied to the annual budget that the organization develops?

***K**: I am now switching to ask about the support you receive from others with respect to forecasting.*

Q19. Do you receive adequate support from your immediate boss for the various forecasting tasks we just discussed; particularly with respect to resources you may need to perform such tasks? Explain

Q20: Do your immediate, direct reports understand, and support these efforts?

Q21: Do corporate policies or mandates influence the way you are currently performing these tasks?



K: the next set of questions seeks to clarify whether competitors' actions impact your processes when you predict sign-ups, develop budgets, and do forecasting related work.

Q23: Do you look to your competitors to see what they do before you predict sign-ups?

If "Yes": Is this a common practice for you?

Q24: Do you look to your competitors to see what they do before you develop budgets?

If "Yes": Is this a common practice for you?

Q25: Do you look to your competitors to see what they do as a part of market monitoring?

If "Yes": Is this a common practice for you?

K: I will now ask questions regarding resources and capabilities within your organization that you might use to accurately predict the future.

Q26: Does Home Builder A provide adequate data to work with from a forecasting perspective?

If "Yes" – go to Q27
If "No" – go to Q28

Q27: How would you rank the usefulness of this data?

a. High usefulness?
b. Medium usefulness?
c. Low usefulness?

→ What are the best examples?

Q28: How is the data used for these tasks stored (i.e. in Excel, a database, a website, etc.) and then accessed?

Q29: Does your immediate boss or corporate utilize your forecasts or predictions for any purpose other than including it in their budgets?

If "Yes" go to Q 30

If "No" go to Q 31

→ If relevant: Q30: How are forecasts that you generate utilized at higher levels in the organization?

Q31: Reflecting on the time period 2003-2008, do you anything differently with respect to forecasting today than you did during that time period?

If "Yes" go to Q32
If "No" go to Q33

→ Q32: What do you do differently today?

Q33: Are there any difficulties, as you see it, with respect to forecasting between you and the corporate office?

If "Yes" go to Q34

→ **Q34: What types of difficulties exist?**

Q35: Overall, what suggestions for improvements do you have for either the forecast process, budget planning, or market monitoring at Home Builder A?

K: That concludes our interview. Do you have any questions for me?

K: Thank you very much for your participation. If you have questions later on, please feel free to contact me either via phone or email. As I stated earlier, I will provide a formal report of my findings following the completion of this study. Have a good day/evening.