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ARE ALL NONFINANCIAL PERFORMANCE MEASURES CREATED EQUAL?

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Are All Nonfinancial Performance Measures Created Equal?
Evidence on Customer Satisfaction and Employee Satisfaction Measures from the Homebuilding Industry

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Abstract

We test the business model of a company in the homebuilding industry using its monthly customer satisfaction, employee satisfaction, and financial data for over 200 projects for the period 2001-2004. While prior research often uses a single customer satisfaction measure, our research site uses two sets of customer satisfaction measures, which allows us to "run a horserace" between the two measures and examine the effect of measurement alternatives on the forward-looking properties of customer satisfaction. We find that: 1) customer satisfaction measures provided by a boutique customer research firm that specializes in the homebuilding industry are leading indicators of future performance, as measured by higher referrals, revenues, and profits, and lower warranty costs, but the customer satisfaction measure provided by a national multi-industry customer research firm is not; 2) overall employee satisfaction is not a significant leading indicator of either customer satisfaction or financial performance, but employee satisfaction in the sales department is positively associated with customer satisfaction; and 3) while most prior research has treated customer satisfaction and employee satisfaction as unidimensional constructs by using a single customer satisfaction or employee satisfaction index, we find that both customer and employee satisfaction are comprised of several distinguishable dimensions with differential impact on other variables in the business model. Our findings suggest that the validity of a business model depends not only on the soundness of the conceptual model per se, but also on how the variables in the business model are measured.

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I.   Introduction

A growing body of research has documented significant positive associations between some nonfinancial performance measures, such as quality and customer satisfaction, and future financial performance (e.g. Amir and Lev 1996; Banker et al. 2000; Ittner and Larcker 1998a; Nagar and Rajan 2001). These nonfinancial measures are interpreted to be "performance drivers." Incorporating these performance drivers into firms' performance measurement systems can help managers look beyond short-term financial performance to focus at least some attention on longer-term aspects of their businesses (e.g. Banker et al. 2000; Hemmer 1996; Ittner and Larcker 1998a, 1998b, 2001, 2003; Kaplan and Norton 1992, 1996). Customer satisfaction, in particular, has attracted significant attention from both researchers and practitioners. For example, senior executives from 148 financial services firms ranked customer relations as the most important driver of firm's long-term organizational success (Ittner and Larcker 2001). In comparison, short-term financial performance ranked only the fifth most important.

However, as Ittner and Larcker (2001) point out, studies on non-financial performance measures tend to examine only one of many potential non-financial measures and ignore interactions with other potential non-financial measures (e.g. Banker et al. 2000; Behn and Riley 1999; Davis and Albright 2004; Hoque and James 2000; Huselid 1995; Iaffaldano and Muchinsky 1985; Ittner and Larcker 1998). They caution that these limitations can result in misleading inferences if non-financial measures are highly correlated, or if different non-financial measures are complements or substitutes.

Along the same line, advocates of a "business model" or "strategy mapping" approach to performance measurement propose formulating performance measurement systems around a diverse set of financial and non-financial performance measures that are linked to firm-specific strategies (Eccles 1991). Kaplan and Norton (1996) argue that a balanced scorecard should not just be a collection of financial and nonfinancial measures in various categories, but rather an integrated set of measures developed from a business model that articulates the cause-and-effect relationships between the selected performance measures and outcomes.

However, survey evidence shows that only 23% of companies consistently build and test the strength and validity of their hypothesized business models (Ittner and Larcker 2003). If the hypothesized links in the models are incorrect, these models can actually guide the firm down a path to failure. For example, Rucci, Kirn, & Quinn (1998) shows how Sears' managers' poor understanding of their business model doomed that firm to failure in the early 1990's. Corresponding to the lack of model validation among practitioners, the academic literature provides surprisingly little evidence on how companies develop explicit business models, whether these models can be validated, and how these models vary depending on contextual factors such as strategy, competitive environment, and organizational design (Ittner and Larcker 2001).[1]

A well-known exception is the Sears model illustrated in Rucci et al. (1998). More than 100 top-level executives at Sears, Roebuck and Co. spent three years rebuilding the company around its customers. The Sears model hypothesizes a chain of cause and effect running from employee behavior to customer behavior to profits. This

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[1] Malina and Selto (2003) and Abernethy et al. (2005) provide field-based evidence on how companies develop explicit business models.

model shows that a 5% improvement in employee attitudes would drive a 1.3% improvement in customer satisfaction, which in turn would drive a 0.5% improvement in revenue growth. The increase in customer satisfaction led to an estimated $200 million increase in revenues, and ultimately an estimated $250 million increase in market capitalization. Two recent studies, Campbell et al. (2006) and Nagar and Rajan (2005), also provide empirical evidence on whether business models can be validated and how they vary with contingency factors.

Another limitation in the prior literature on nonfinancial performance measures is that we know very little about how measurement alternatives affect the strength of the relations between non-financial measures and future financial performance (Ittner and Larcker 1998b). It is important to study the impact of different measurement alternatives on nonfinancial performance measures' forward-looking properties because nonfinancial performance measures included in incentive contracts perform both a decision-influencing role and a decision-facilitating role (Datar et al. 2001; Feltham and Xie 1994; Sedatole 2003; Sprinkle 2003). Poorly constructed nonfinancial measures would distort manager performance and lower the quality of manager decision-making. Despite the large number of studies on the relation between customer satisfaction and future financial performance, there is little evidence on the effect of measurement alternatives on customer satisfaction measures' forward-looking properties. This is largely due to the lack of data since most companies would only use one set of customer satisfaction measures. The current research site provides us with a unique opportunity to address this limitation. Our research site employs two sets of customer satisfaction measures from two independent companies: a national multi-industry consumer sentiment survey firm

and a boutique customer satisfaction consulting firm that specializes in the homebuilding industry. The availability of two different customer satisfaction measures for the same company enables us to examine the effects of measurement alternatives on the predictive ability of customer satisfaction measures.

The research site, hereafter referred to as "IJK Homes", is a medium-size builder that has adopted a business model including customer satisfaction, employee satisfaction, and financial performance measures. This study examines the validity of each link in the business model and provides evidence on the following research questions: (1) Are customer satisfaction and employee satisfaction measures leading indicators of future performance? (2) Is employee satisfaction a leading indicator of customer satisfaction? (3) How do measurement alternatives of customer satisfaction affect its forward-looking properties?

There are four primary empirical results. First, the customer satisfaction measure provided by the homebuilding industry specialist is a leading indicator of future performance, as measured by higher referrals, revenues, and profits, and lower warranty costs, but the customer satisfaction measure provided by the national multi-industry consumer sentiment survey firm is not. Second, overall employee satisfaction is not a significant leading indicator of either customer satisfaction or financial performance. However, when examined at a disaggregated level, employee satisfaction in the sales department is found to be positively associated with customer satisfaction. Third, while most prior research has treated customer satisfaction and employee satisfaction as unidimensional constructs by using a single customer satisfaction or employee satisfaction index (Anderson 1994; Anderson et al. 1994; Bernhardt et al. 2000; Ittner and

Larcker 1998a; Nagar and Rajan 2005), we find that both customer and employee satisfaction are multi-dimensional constructs. Each is comprised of several distinguishable dimensions with varying impact on other variables in the business model. Finally, consistent with prior research (Anderson and Mittal 2000; Ittner and Larcker 1998a), we document diminishing returns to the improvements in customer satisfaction.

Our study contributes to the non-financial performance measurement literature by testing a business model with multiple non-financial performance measures instead of focusing on one non-financial performance measure. In addition, we contribute to the customer satisfaction literature by "running a horserace" between two different customer satisfaction measures and examining the effect of measurement alternatives on the forward-looking properties of customer satisfaction measures. Finally, this study contributes to the nonfinancial performance measurement literature by demonstrating the multi-dimensionality of customer satisfaction and employee satisfaction measures. Our findings suggest that the validity of a business model depends not only on the soundness of the conceptual model per se, but also on how the variables in the business model are measured.

This paper proceeds as follows: Section II introduces the research site. Section III reviews the literature and develops the hypotheses. Section IV describes the data and measures. Section IV presents the results and Section V concludes.

II.   Research Site

This study's research site, IJK, is one of the largest privately held homebuilders in the U.S. IJK concentrates its homebuilding efforts in the Western U.S., where they run nine divisions. Being a well-established company with more than 100 years' experience,

IJK consistently earns top industry rankings in architectural design, construction excellence, customer care, and overall homebuyer satisfaction. IJK finished 2004 with revenues of well over $1 billion from over 2,000 residential closings. Compared to the large public homebuilders that leverage economies of scale and emphasize short-term financial results, IJK places greater emphasis on quality and customer service. IJK managers also place great emphasis on employee satisfaction, claiming that the employees are "the most immediate customers." They believe that high employee satisfaction will help transmit the team's passion on to the customers.

Consistent with its corporate culture and organizational strategy, IJK has devoted large amounts of money and effort to the measurement and management of both customer and employee satisfaction. The firm includes both measures in their management incentive program.

One thing that makes IJK an interesting research site is the fact that the company uses two independent companies, with different research methods, to measure its customers' satisfaction — a national multi-industry consumer sentiment survey firm (hereafter "NMCS") and a boutique survey consulting firm (hereafter "BCSC") that specializes in the homebuilding industry. The boutique customer satisfaction consulting firm also assesses IJK's employee satisfaction levels.

NMCS is a national surveyor that collects customer satisfaction data across a wide range of industries. In the homebuilding industry, NMCS collects homebuyer data from public records and administers the survey questionnaire in the 2nd quarter of each year to those who have purchased homes in the prior calendar year. This translates to surveys completed by people at widely varying times in their home-buying life cycle. Some may

complete the survey within one month of closing on their home while others may complete the survey a year or more after closing. The survey instrument is identical across all firms in the homebuilding industry.

Unlike NMCS, BCSC tailors the content of its homebuyer satisfaction survey instrument to the needs of IJK Homes. BCSC measures homebuyer satisfaction at three different, fixed time intervals: at move-in (30 days after closing), mid-year (5 months after closing), and year-end (11 months after closing). Each survey measures overall satisfaction and also focuses on a unique aspect of customer satisfaction deemed to be particularly important at that point in time. The 30-day survey focuses on homebuyer satisfaction with the purchasing and building process. The 5-month survey focuses on satisfaction with the customer service provided since closing. The 11-month survey focuses on satisfaction with the quality of the home.

Thus, the above-mentioned two customer satisfaction measurement alternatives differ in two major ways. First, they differ in content. NMCS's customer satisfaction survey instrument is generic; BCSC's instrument is tailored to the IJK Homes setting. And second, they differ in timing. NMCS measures customer satisfaction annually. BCSC measures customer satisfaction at three different points in time in order to capture different aspects of customer satisfaction in a more timely manner.

Senior managers of IJK were motivated to participate in our study because they valued the answers that we might be able to provide. They wanted to test their assumptions that both customer satisfaction and employee satisfaction measures are leading indicators of future performance. Additionally, they wanted to know if both of their customer satisfaction measure alternatives had reliable predictive ability.

III.   Literature Review and Hypothesis Development

Performance Effects of Customer Satisfaction

Prior studies have predominantly documented positive associations between customer satisfaction and future financial performance (Behn and Riley 1999; Ittner and Larcker 1998a; Banker et al. 2000; Bernhardt et al. 2000; Smith and Wright 2004; Dikoli et al. 2005). For instance, Bernhardt et al. (2000) finds a positive and significant relationship between customer satisfaction and one-year-ahead profitability at a fast-food restaurant chain. Similarly, Banker et al. (2000) finds a positive relationship between customer satisfaction and six-month-ahead financial performance in the hospitality industry. They also find that incentive bonus contracts that incorporate customer satisfaction measures positively affect future financial performance. Ittner and Larcker (1998a) found positive relationships between customer satisfaction and future financial performance at the customer level (in a telecommunications firm), the business division level (in the banking industry), and the firm level (using the American Customer Satisfaction Index). They also show that market value of public companies is positively associated with customer satisfaction for the transportation, utilities and communication sectors. The above evidence is consistent with the marketing literature, which suggests that higher customer satisfaction increases customer retention (Fornell 1992), reduces price elasticities, lowers marketing costs (Anderson et al. 1994; Zeithaml 2000), and increases repurchase and referral intentions (Anderson and Sullivan 1993; Cronin and Taylor 1992), all of which should improve financial performance.

Prior studies, however, have also demonstrated variations in the relation between customer satisfaction and financial performance. For example, Anderson et al. (1997) find that the positive effects of customer satisfaction are more prominent in manufacturing firms than in service firms. Ittner and Larcker (1998a) find customer satisfaction to be positively associated with market values in the manufacturing and financial service industries, but negatively associated with market values in the retail industry.

Through discussions with managers of IJK about its business model, we predict that customer satisfaction contributes to future financial performance in the homebuilding industry mainly through two mechanisms: by increasing customer referrals and by reducing warranty costs. First, homebuyers who are more satisfied with the quality of their homes and the home-buying experience are more likely to recommend the same homebuilder to their family and friends. This increase in referrals will then translate into an increase in revenues for the firm. Second, previous marketing research suggests that high customer satisfaction is likely to reduce warranty claims and thus warranty costs (Anderson et al. 1994; Anderson et al. 1997; Fornell 1992). In the homebuilding industry, homebuyer satisfaction is largely driven by home quality. Therefore, a satisfied homebuyer is more likely to be satisfied with home quality and thus incurs lower warranty costs. In addition, a homebuyer who is more satisfied with the homebuying experience is also less likely to report small problems in his or her home. This will again decrease warranty costs for the homebuilder. Lower warranty costs will translate into higher profit.

Drawing on previous research in both the marketing and accounting literatures and IJK managers' assumptions about their company's business model, we posit the following compound hypothesis:

H1: In the homebuilding industry, higher customer satisfaction is significantly associated with:

a . more customer referrals;
b. lower future warranty costs;
c. higher future financial performance.

Are all indicators of customer satisfaction equally effective in predicting future performance? This issue has not been well studied, presumably due to the unavailability of data: most companies only use a single set of customer satisfaction measures. Our research site, however, provides a unique setting to study this question because, as describe above, IJK Homes collects customer satisfaction measures from two consulting companies that employ distinct research methods—NMCS and BCSC.

We use these differences to construct two hypotheses. First, we expect that the more specific content in the BCSC instruments will have greater predictive value than does the generic NMCS instrument. IJK Homes has set out to carve a niche in its industry by providing a certain type of home, in a certain type of neighborhood, by a certain type of process. Customer satisfaction for IJK should not just measure how good IJK is compared to any other homebuilder, but instead should measure how well IJK has met the expectations it has created in the target homebuyer's mind (e.g., Joan and Cote 2000; Sedatole 2003). Marketing theory suggests that the difference between a customer's expectation of a product or service and the actual outcome determines the level of customer satisfaction (Anderson et al. 1994; Anderson and Mittal 2000; Cronin and Taylor 1992). The BCSC survey is built around specific expectations set by IJK, whereas

the NMCS survey is built around generic expectations set by the average homebuilder in the industry. We, therefore, posit the following hypothesis:

H2a: A customer satisfaction measure built around the expectations of the homebuilder's target homebuyers (i.e., BCSC customer satisfaction measure) is more strongly associated with future performance than a customer satisfaction measure built around the expectations of generic homebuyers (i.e., NMCS customer satisfaction measure).

Second, we posit that the timeliness of the measurement of satisfaction levels matters. This issue has largely been ignored in prior literature. Most prior research has used the American Customer Satisfaction Index (ACSI) to measure customer satisfaction. ACSI computes each firm's customer satisfaction score by using telephone survey data obtained from a sample of consumers who purchased or used the company's product within the past six months (Ittner and Larcker 1998a). This aggregate measure may work well for retailers and nondurable manufacturing firms, since customers may formulate a relatively stable impression of their consumption experience once they complete the transactions or consume the products in these industries. However, the satisfaction levels of purchasers of durable goods may vary over time. In particular, a customer who is happy right after moving into the new home may not have the same satisfaction level six months or one year later after they have become familiar with the house, its quality of construction, and the neighborhood. The quality of the satisfaction measures might also vary over time. A long time lag between customers' consumption experience and the assessment of their satisfaction levels may result in distorted satisfaction measures due to memory lapses. For instance, a year after closing on a home, the homebuyer may confuse the poor service of the mortgage company with the service of their builder. The homebuilding industry, therefore, requires customer satisfaction measures that capture

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different aspects of and fluctuations in homebuyer satisfaction in a timely manner. Measures that aggregate these fluctuations, such as the NMCS measure, may lose predictive power both due to the introduction of noise created by the averaging effect and due to the long time lag between the homebuyers' experience and the assessment of their sentiment. As mentioned above, BCSC measures homebuyer satisfaction at three different time intervals and each survey attempts to measure particular dimensions of homebuyer satisfaction in a timely manner. Since prior research has shown that customers best represent their experiences when the experiences are fresh in their mind, and since a single measurement introduces a large amount of noise, we predict that more timely measurement has better predictive value:

H2b: A more timely customer satisfaction measure (e.g., BCSC customer satisfaction measure) is more strongly associated with future performance than a less timely customer satisfaction measure (e.g., NMCS customer satisfaction measure).

Managers at our research site believe that delighting customers to the greatest extent possible—creating "evangelical buyers"—is the best way to ensure strong financial performance in the future. However, academic research suggests that there are sometimes diminishing returns to the improvements in customer satisfaction (e.g., Anderson and Mittal 2000; Ittner and Larcker 1998a). Anderson and Mittal (2000), for instance, document that there exists a point in the satisfaction-profit chain where the cost of increasing the level of customer satisfaction begins to outweigh its benefits. To ascertain whether diminishing returns exist in this industry, we propose to test the following hypothesis:

H3: There are diminishing returns to the improvements in customer satisfaction in the homebuilding industry.

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Performance Effects of Employee Satisfaction

Like the Sears model (Rucci et al. 1998), IJK's business model hypothesizes a chain of relations from employee satisfaction to customer satisfaction to financial performance. We think it is worthwhile to test whether the Sears based model holds at our research site.

Previous research provides mixed evidence on the relationship between employee satisfaction and future financial performance with no explanation as to why (e.g. Huselid 1995; Iaffaldano and Muchinsky 1985; Petty et al. 1984; Ren 2001). Drawing on the psychology literature, some studies have shown a positive association between job satisfaction and individual performance (e.g. Petty et al. 1984), while others have shown a modest association at best (e.g. Iaffaldano and Muchinsky 1985). This work then translates into studies of the relationship between job satisfaction and firm performance in the management literature. However, the results there are mixed as well. For example, Huselid (1995) shows a positive relationship between employee satisfaction and firm performance in an economy-wide survey. He shows that this relationship is both direct, acting on both short-term and long-term indicators of firm performance, and indirect, acting through employee turnover and productivity. Ren (2001), however, shows mixed evidence on the employee satisfaction performance relationship in his study of the commercial banking industry. Despite mixed evidence in academic literature, we posit the following hypothesis based on IJK's hypothesized business model:

> *H4: There is a positive association between employee satisfaction and financial performance in the homebuilding industry.*

H4 relates to the direct relationship between employee satisfaction and firm performance. Both previous research and IJK's hypothesized business model, however, suggest that this relationship may be mediated by customer satisfaction. The theory behind the relation between employee satisfaction and customer satisfaction lies in the concept of "emotional contagion," which refers to the idea that the receiver (the customer) catches the emotion being experienced by the sender (the service provider), and as a result, the emotion of the receiver converges with that of the sender (Chartrand and Bargh 1999; Gump and Kulik 1997; Howard and Gengler 2001). In general, previous studies provide support for a positive relation between employee satisfaction and customer satisfaction (Brandt 2000; Brown & Mitchell 1993; Homburg and Stock 2004; Johnson et al. 1994; Schmitt and Allscheid 1995). Dissatisfaction and emotional tension of salespeople will be felt by the customer (Singh, Goolsby, and Rhoades 1994) and affect the customer's satisfaction via the process of emotional contagion. This, in turn, will create cognitive tension for the customer, thus reducing customer satisfaction (Russo, Meloy, and Medvec 1998). Drawing on prior literature, we posit the following hypothesis:

> **H5: There is a positive association between employee satisfaction and customer satisfaction in the homebuilding industry.**

Just as with customer satisfaction measures, we argue that all employee satisfaction measures are not created equal. Previous literature suggests that high frequency of customer interaction should strengthen the "employee satisfaction - customer satisfaction" link (e.g., Homburg and Stock 2004). This is consistent with the "emotional contagion" concept that underlies the positive association between employee satisfaction and customer satisfaction. If an employee has little or no interaction with

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customers, "emotional contagion" would be minimal. In the current study, we are able to

break down the employee satisfaction data by departments and examine the differential

impact of employee satisfaction measures for customer satisfaction.   Three of these

departments stand out as having significantly more interaction with customers than the

others: Sales, Customer Service, and Construction.[2]   The remaining departments are

support departments that have less customer interaction: Accounting, Legal, Executives,

etc. We posit the following hypothesis:

> *H6: The employee-customer satisfaction relationship will be stronger in those*
> *departments that have greater customer interaction.*

Figure 1 summarizes IJK's business model.

Figure 1
Illustration of the IJK Business Model
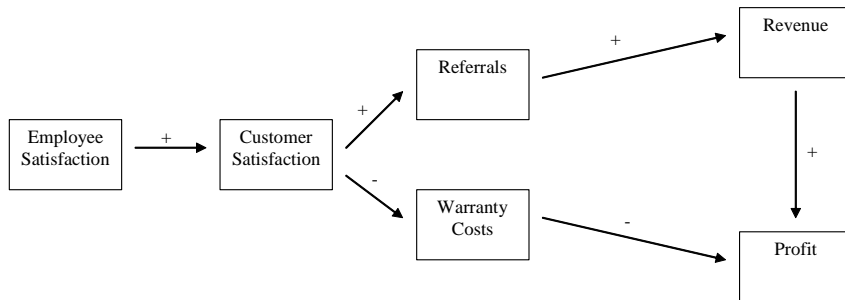
IV.   Data and Measures

We collected four sets of proprietary data from IJK Homes: financial data,

customer satisfaction data provided by NMCS, and customer and employee satisfaction

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[2] Construction refers to the employees which are the middle-men between the actual construction workers
and home-buyers.

data provided by BCSC. The first dataset consists of IJK's financial data from the first quarter of 2002 through the fourth quarter of 2004. This includes monthly financial performance data for over 200 projects across seven divisions of IJK.[3] This dataset includes the following variables: total assets (TA), revenue (REV), gross margin (GM), warranty costs (WC), and profit from operations (PROF).

The second dataset consists of customer satisfaction data collected by NMCS. In the homebuilding industry, NMCS administers its customer satisfaction survey questionnaires in the second quarter of every year to all new homebuyers of qualifying builders in the prior calendar year. For a firm to be included in the NMCS survey, it must have a minimum of 150 closed homes appearing in the market's public records in the prior calendar year. We obtain the NMCS customer satisfaction data for IJK for over 200 projects across seven divisions of IJK for the period between 2001 and 2004. Appendix A describes the major categories and sample items in the NMCS survey instrument.

The third dataset is customer satisfaction data collected by BCSC. This data consists of three surveys for each individual homebuyer, which are administered to the homebuyer at 30-days, 5-months, and 11-months post close. BCSC has worked with IJK to ensure that the questions asked are tailored to the expectations that IJK has sought to create in the minds of their target homebuyers. We obtain monthly BCSC move-in customer satisfaction data from 2002/11 to 2004/10, monthly BCSC mid-year customer satisfaction data from 2002/09 to 2004/04, and monthly BCSC year-end customer satisfaction data from 2003/01 to 2003/12, for over 200 projects across seven divisions of

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[3] For IJK, a project is considered to be the entire neighborhood plan. As such, over 200 neighborhoods were included in the analysis, each containing 250 to 300 homes.

IJK. Appendix B presents the major categories and sample items in the BCSC customer satisfaction survey instruments.

We obtain employee satisfaction data for IJK for the period 2002-2004. The employee satisfaction survey questionnaire is administered annually to approximately 790 employees of the firm. The employees are classified into the following functional areas: Sales, Marketing, construction, Land Acquisition/Development, Finance/Accounting, Administration, and Executive. Appendix C describes the employee satisfaction survey instrument.

Finally, we obtain referral data from customers' self reports of referral intention (REFINT) and actual referral numbers (REFN) from the customer satisfaction surveys. Both the 30-day and 11-month BCSC surveys contain data on both the referral intention and actual referrals. The NMCS survey also provides data on both actual referrals and referral intention. The 5-month BCSC survey does not contain referral data.

V. Results

Customer Satisfaction Analyses

In their test of the Sears model, Rucci et al. (1998) notice that asking a single question regarding the level of customer satisfaction provided more information than asking multiple questions. Similarly, most marketing and accounting studies use a single index to measure customer satisfaction (Anderson 1994; Anderson et al. 1994; Bernhardt et al. 2000; Ittner and Larcker 1998a; Nagar and Rajan 2005), implying that customer satisfaction is a unidimensional construct. However, some researchers (e.g. Mels et al. 1997) argue that customer satisfaction is a multi-dimensional construct. We think

whether customer satisfaction is a unidimensional or multi-dimensional construct is an empirical question and is likely to depend on the research setting.

Before we test the business model, we first run principal component factor analyses with oblimin rotation on the four customer satisfaction measures (the BCSC move-in satisfaction, mid-year satisfaction, and year-end satisfaction measures as well as the NMCS satisfaction measure) and the employee satisfaction measure.[4] The factor analyses results are more consistent with both customer and employee satisfaction being multi-dimensional constructs in our research setting. The results in Table 1 demonstrate two factors from the BCSC move-in (30-day) satisfaction measure, one factor from the BCSC mid-year (5-month) satisfaction measure, and two factors from the BCSC year-end (11-month) satisfaction measure. In sum, we extract five distinguishable dimensions from the BCSC customer satisfaction measure, and they are labeled as follows:

(1) Satisfaction with sales, construction, and customer service (SCSC) (30-day survey);

(2) Satisfaction with loan and closing process (LCP) (30-day survey);

(3) Satisfaction with customer service (OS) (5-month survey);

(4) Satisfaction with home quality (HQ) (11-month survey);

(5) Satisfaction with customer service (CS) (11-month survey).

We extract one factor from the NMCS satisfaction measure[5].

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[4] The Varimax rotation method, which assumes orthogonality between the factors, yields similar results.
[5] Results are not tabulated.

Table 1
Customer Satisfaction Factor Analysis *

Panel A: BCSC 30-Day Survey

Survey instrument items	Factors	
	1	2
1	**0.876**	0.029
2	**0.536**	0.224
3	**0.564**	0.406
4	-0.011	**0.707**
5	**0.874**	-0.112
6	**0.885**	-0.028
7	**0.712**	0.086
8	**0.918**	-0.188
9	-0.010	**0.601**
10	0.049	**0.751**
11	**0.784**	0.004
12	**0.682**	0.330
Eigenvalue	6.32	1.19
Cumulative % of Total Variance Explained	52.63	62.61
Factor Labels	*SCSC*	*LCP*

Panel B: BCSC 5-Month Survey

	Factors
Survey instrument items	1
1	**0.830**
2	**0.830**
3	**0.852**
4	**0.820**
5	**0.867**
6	**0.855**
7	**0.871**
8	**0.778**
9	**0.823**
10	**0.887**
11	**0.827**
12	**0.869**
13	**0.815**
14	**0.780**
15	**0.854**
16	**0.878**
17	**0.768**
Eigenvalue	11.89
Cumulative % of Total Variance Explained	69.93
Factor Labels	*OS*

Panel C: BCSC 11-Month Survey

Survey instrument items	Factors	
	1	2
1	0.290	**0.738**
2	0.232	**0.758**
3	**0.755**	0.130
4	**0.807**	0.137
5	**0.877**	-0.071
6	**0.940**	-0.126
7	**0.918**	-0.038
8	**0.942**	-0.152
9	**0.912**	0.003
10	**0.938**	-0.001
11	**0.932**	-0.049
12	**0.959**	-0.129
13	**0.774**	0.140
14	**0.824**	0.183
15	**0.673**	0.278
16	**0.829**	0.136
17	**0.642**	0.298
18	**0.824**	0.139
19	**0.792**	0.182
20	**0.757**	0.160
21	**0.734**	0.224
22	**0.771**	0.136
23	**0.779**	0.130
24	**0.843**	0.053
25	**0.883**	-0.214
26	**0.905**	-0.084
27	**0.898**	-0.105
Eigenvalue	19.79	1.04
Cumulative % of Total Variance Explained	52.63	62.61
Factor Labels	*HQ*	*CS*

Notes:
*Panels A through C present results from principal component factor analysis with oblimin rotation.
Please refer to Appendix A and Appendix B for descriptions of customer satisfaction surveys.

SCSC = The Sales, Customer Service, and Construction Factor as determined in factor
analysis of the BCSC 30-Day Move-In Survey
LCP = The Loan and Closing Process Factor as determined in factor analysis of the BCSC 30-Day Move-In
Survey
OS = The Overall Satisfaction Factor as determined in factor analysis of the BCSC Mid-Year Survey
CS = The Customer Satisfaction Factor as determined in factor analysis of the BCSC Year-End Survey
HQ = The Home Quality Factor as determined in factor analysis of the BCSC Year-End Survey
REV = Revenue, as measured by sales unit per year

PROF = Profit, as measured by sales unit per year
WARR = Warranty Costs, as measured by sales unit per year
REFN = Number of recommendations made by an individual homebuyer as indicated on customer
      satisfaction surveys
REFINT = The homebuyer's level of intent to recommend IJK as indicated on customer satisfaction
      surveys

Results in Table 2 reveal five factors of employee satisfaction, which we label as follows: job prospects, personal growth, teamwork, homebuyer focus, and communication between company and employees.

Table 3 provides descriptive statistics for these different dimensions of customer satisfaction measures as well as for financial and referral data. The satisfaction measures are elicited with 6-point scales, where 1 indicates extremely low satisfaction and 6 indicates extremely high satisfaction.

Table 3
Descriptive Statistics

Panel A: BCSC 30-Day Move-In Survey

	N	Mean	Std. Dev.	Lower Quartile	Median	Upper Quartile
SCSC	335	5.395	0.671	5.224	5.770	5.975
LCP	335	5.029	0.741	4.636	5.400	5.727
REV	232	$1,194,993	$2,549,224	$0	$0	$1,326,009
PROF	177	$261,098	$649,834	-$1,727	$0	$202,269
WARR	232	$8,938	$17,354	$970	$3,848	$8,800
REFN	1257	5.313	10.356	1.000	3.000	5.000
REFINT	1485	5.537	0.966	5.000	6.000	6.000

Panel B: BCSC 5-Month Mid-Year Survey

	N	Mean	Std. Dev.	Lower Quartile	Median	Upper Quartile
OS	273	5.159	0.824	4.830	5.330	5.825
REV	232	$1,194,993	$2,549,225	$0	$0	$1,326,009
PROF	232	$230,257	$604,972	-$1,790	$0	$163,716
WARR	232	$8,938	$17,355	$970	$3,848	$8,801

Panel C: BCSC 11-Month Year-End Survey

	N	Mean	Std. Dev.	Lower Quartile	Median	Upper Quartile
CS	208	4.733	0.776	4.8182	5.5455	6
HQ	207	5.078	0.951	4.0665	4.6622	5.4243
REV	208	$1,036,918	$2,412,316	$0	$0	$870,909
PROF	208	$202,823	$600,461	-$2,311	$0	$95,213
WARR	208	$10,005	$18,534	$1,398	$4,861	$10,726
REFN	809	5.431	10.057	0.500	3.000	6.000
REFINT	877	5.218	1.119	5.000	6.000	6.000

Panel D: NMCS Survey

	N	Mean	Std. Dev.	Lower Quartile	Median	Upper Quartile
REV	86	$13,195,696	$26,855,389	$0	$1,329,394	$14,730,584
PROF	86	$1,410,342	$3,464,814	-$22,012	$146,995	$2,657,209
WARR	86	$162,235	$347,098	$18,524	$70,451	$148,046
REFN	108	4.971	4.299	2.341	4.000	6.007
REFINT	109	3.030	0.914	2.596	3.075	3.531

Panel E: Employee Satisfaction Survey *

	N	Mean	Std. Dev.	Lower Quartile	Median	Upper Quartile
JP	26	4.399	0.208	4.274	4.371	4.494
PG	26	4.109	0.272	3.969	4.151	4.282
TW	26	4.465	0.150	4.365	4.427	4.515
HF	26	4.482	0.258	4.275	4.487	4.710
COMM	26	4.488	0.223	4.298	4.528	4.637

Notes:

Please refer to Appendix A through Appendix C for descriptions of customer satisfaction and employee satisfaction surveys.

SCSC = The Sales, Customer Service, and Construction Factor as determined in factor analysis of the BCSC 30-Day Move-In Survey

LCP = The Loan and Closing Process Factor as determined in factor analysis of the BCSC 30-Day Move-In Survey

OS = The Overall Satisfaction Factor as determined in factor analysis of the BCSC Mid-Year Survey

CS = The Customer Satisfaction Factor as determined in factor analysis of the BCSC Year-End Survey

HQ = The Home Quality Factor as determined in factor analysis of the BCSC Year-End Survey

REV = Revenue, as measured by sales unit per year

PROF = Profit, as measured by sales unit per year

WARR = Warranty Costs, as measured by sales unit per year

REFN = Number of recommendations made by an individual homebuyer as indicated on customer satisfaction surveys

REFINT = The homebuyer's level of intent to recommend IJK as indicated on customer satisfaction surveys

JP = Employee satisfaction with job prospects as determined in factor analysis of employee satisfaction survey

PG = Employee satisfaction with personal growth as determined in factor analysis of employee satisfaction survey

TW = Employee satisfaction with teamwork as determined in factor analysis of employee satisfaction survey

HF = Employee satisfaction with homebuyer focus as determined in factor analysis of employee satisfaction survey

COMM = Employee satisfaction with the communication between company and employees as determined in factor analysis of employee satisfaction survey

* Employee satisfaction data are aggregated by division for data analysis.

H1 predicts a positive relationship between customer satisfaction measures and referrals. To test this hypothesis, we run OLS regressions of referral intention and actual number of referrals on different dimensions of customer satisfaction measures. These regressions are run at the survey questionnaire respondent level. Table 4 summarizes the results. We find significantly positive coefficients on both dimensions of the BCSC move-in satisfaction measure (SCSC and LCP). We also find significantly positive coefficients on both dimensions of the BCSC year-end satisfaction (CS and HQ).[6] In addition, we find a positive association between the NMCS satisfaction measure and referral intention and actual referrals. These results are consistent with H1.

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[6] No result is shown for the BCSC mid-year satisfaction due to missing data.

Table 4
Regressions of Number of Referrals and Referral Intention on Customer Satisfaction

	REFF					REFINT				
	Coefficients (p-value)					Coefficients (p-value)				
Intercept	1.276	-11.291	-3.635	-4.698	-1.811	4.167	-0.661	1.811	1.611	0.668
	0.822	-4.017***	-1.894*	-2.364**	-1.230	33.443***	-3.797***	10.793***	8.975***	2.668***
LCP	0.075					0.279				
	2.649***					11.198***				
SCSC		0.165					0.681			
		5.939***					35.783***			
CS			0.167					0.574		
			4.809***					20.685***		
HQ				.179					.568	
				5.177***					20.403***	
NMCS					0.42					0.686
					4.765***					9.749***
F-Statistic	7.015***	35.271***	23.122***	26.806***	22.706***	125.402***	1280.371***	427.857***	416.297***	95.045***
Adjusted R^2	0.005	0.027	0.027	0.031	0.169	0.077	0.463	0.329	0.322	0.465
N	1255	1256	804	808	107	1483	1484	870	875	108

Note: Refer to Table 3 for variable definition.
*** denotes significance at the 0.01 level (2-tailed). ** denotes significance at the 0.05 level (2-tailed). * denotes significance at the 0.10 level (2-tailed).

H1 also predicts a negative relationship between customer satisfaction measures and warranty costs. We regress six-month-ahead and one-year-ahead warranty costs on the different dimensions of customer satisfaction to test this hypothesis. These regressions are run at the project level. Table 5 summarizes the results. In the regression with a six-month lag, we find significant results for every dimension of the BCSC measure of customer satisfaction except for the 30-day satisfaction with the loan and closing process. In the regression with a one-year lag, we find a significant negative relationship between customer satisfaction and warranty costs only for one dimension of customer satisfaction: the BCSC measure of homebuyers' year-end satisfaction with home quality. It seems that the impact of customer satisfaction on warranty costs is most pronounced within a relatively short period of time. Our analysis reveals no significant relation between the NMCS measure and future warranty costs.

Table 5
Regressions of Warranty Costs on Customer Satisfaction

$WARR_{t+6mos}$ is the unit's warranty costs of the period 6 months after the measurement of the customer satisfaction variable. $WARR_{t+1}$ is the unit's warranty costs in the period following the measurement of the customer satisfaction variable by one year. *** denotes significance at the 0.01 level (2-tailed). ** denotes significance at the 0.05 level (2-tailed). * denotes significance at the 0.10 level (2-tailed).

	$WARR_{t+6mos.}$					$WARR_{t+1}$					
Intercept	26063.552	11853.551	35651.386	32766.68	24766.818	7928.44	6031.396	16786.759	25918.852	19420.13	215131.83
	4.000***	2.199**	4.898***	4.725***	4.006***	0.667	0.653	2.336**	3.284***	2.790***	0.647
SCSC	-0.153					0.019					
	-2.695***					0.249					
LCP		-0.034					0.04				
		-0.596					0.531				
OS			-0.207					-0.059			
			-.3.526***					-0.91			
HQ				-0.225					-0.132		
				-3.319***					-1.895*		
CS					-0.165					-0.084	
					-2.412**					-1.203	
NMCS											0.021
											0.15
F-Statistic	11.164***	7.535***	10.277***	9.379***	6.710***	2.665*	2.778*	4.562**	5.039***	3.934**	0.022
Adjusted R^2	0.066	0.043	0.064	0.075	0.053	0.019	0.02	0.03	0.038	0.028	-0.02
N	290	290	272	207	206	176	176	231	207	206	51

Finally, H1 predicts positive associations between customer satisfaction and future financial performance in the homebuilding industry. To test these hypotheses, we run regressions of one-year-ahead revenue and profit on the various dimensions of customer satisfaction measures at the project level. As shown in Table 6, we find that not all measures of customer satisfaction are created equal. We find that the BCSC move-in satisfaction with sales, construction, and customer service and the BCSC mid-year satisfaction measure are positively associated with one-year-ahead revenue and profit. The NMCS satisfaction measures as well as the other dimensions of BCSC do not have a significant impact on one-year-ahead revenues and profit.

Table 6
Regressions of Revenue/Profit on Customer Satisfaction

REV$_{t+1}$ is the unit's revenue of the period following the measurement of the customer satisfaction variable. PROF$_{t+1}$ is the unit's profit from operations in the period following the measurement of the customer satisfaction variable. *** denotes significance at the 0.01 level (2-tailed). ** denotes significance at the 0.05 level (2-tailed). * denotes significance at the 0.10 level (2-tailed).

| | REV$_{t+1}$ | | | | | | PROF$_{t+1}$ | | | | | |
	Coefficients (p-value)						Coefficients (p-value)					
Intercept	-2,145,429	435,366	-970,396	-530,801	-199,230	3,287,422	-620,178	125,830	-258,411	-115,200	-126,689	247,970
	-1.594	0.41	-1.100	-.583	-.249	.181	-1.716*	.441	-1.092	-.463	-.581	.105
SCSC	0.131						0.153					
	2.124**						2.171**					
LCP		0.015						0.008				
		0.241						.112				
OS			0.097						0.104			
			1.774*						1.689*			
HQ				0.078						.069		
				1.261						1.025		
CS					0.063						0.083	
					1.024						1.232	
NMCS						0.054						0.053
						.382						.378
F-Statistic	47.37***	44.017***	55.837***	34.389***	33.801***	.146	15.918***	13.211***	18.843***	10.995***	11.172***	.143
Adjusted R^2	0.345	0.336	.322	0.244	0.242	-.017	.145	.122	0.134	0.088	0.090	-.017
N	176	176	231	207	206	51	176	176	231	207	206	51

Hypotheses 2a and 2b argue that because the BCSC satisfaction measures are more timely and more reflective of the specific expectations that IJK creates in the minds of its target customers, they will be more strongly associated with future performance than the NMCS satisfaction measure, which is less timely and more generic. Results in Tables 4 through 6 are largely consistent with these hypotheses. Several dimensions of the BCSC measures of customer satisfaction are found to be leading indicators of referrals, warranty costs, revenues and profit, whereas the NMCS satisfaction measure is only found to be a leading indicator of referrals. However, since the BCSC survey and the NMCS survey differ in both content and timing, our study cannot determine which one drives the superior predictive power of the BCSC survey. We conjecture that both factors play a role in it.

H3 predicts that there are diminishing returns to the improvements in customer satisfaction. Figure 2a plots the BCSC move-in customer satisfaction against the associated one-year-ahead profit and shows that the point of diminishing returns starts at about the 95% level (or 5.8 on a 6-point customer satisfaction scale). Figure 2b shows that the point of diminishing returns starts at around the 90% mark for the BCSC mid-year satisfaction measure and Figure 2c shows that the point of diminishing returns starts at around the 80% level for the BCSC year-end satisfaction measure.

Figure 2
Relationship between BCSC Customer Satisfaction Measures and One-Year Ahead Profit
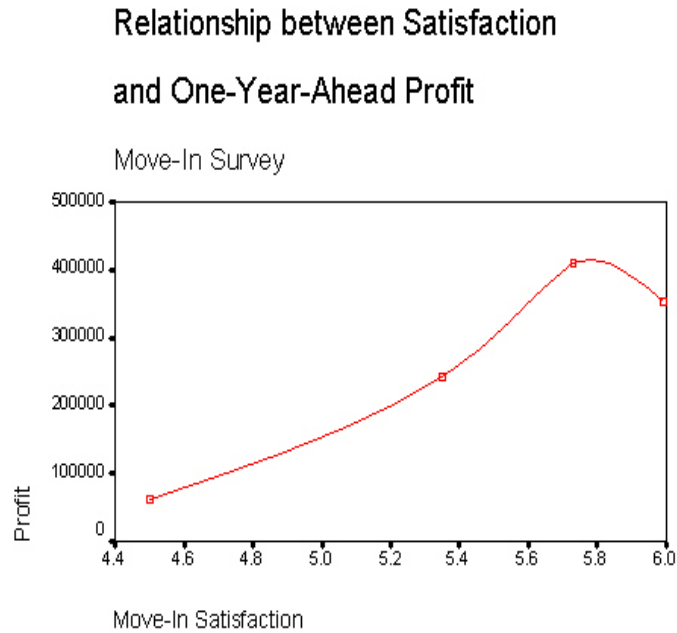
Figure 2a: BCSC Move-In Customer Satisfaction

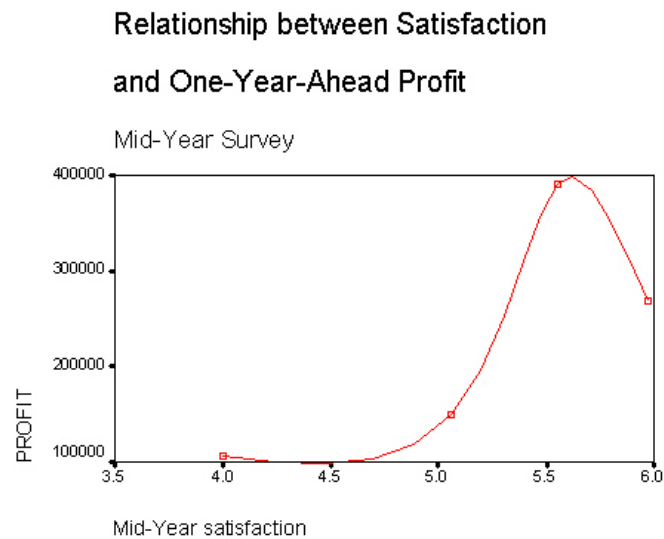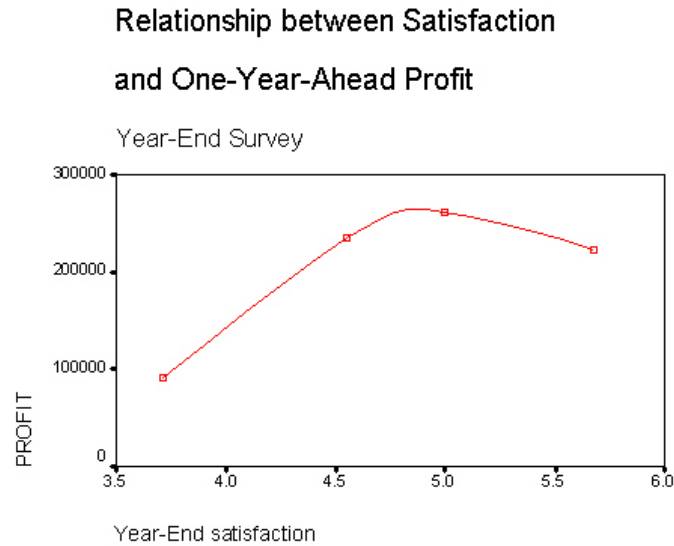Figure 2b: BCSC Mid-Year Customer Satisfaction

Figure 2 (Cont.)

Figure 2b: BCSC Year-End Customer Satisfaction

Relationship between Satisfaction
and One-Year-Ahead Profit

We also test the nonlinearity in the relationship between customer satisfaction and financial performance using the General Linear Method (GLM). We form portfolios based on the customer satisfaction scores separately for different dimensions of the BCSC customer satisfaction measure.[7] We then calculate the mean one-year-ahead revenues and profits for each of the deciles and compare the means across the deciles using GLM. The least squares estimates of these means and their significance are presented in Table 7. The results for different dimensions of customer satisfaction measures show the same general pattern of nonlinearity consistent with H3 and the pattern is stronger for profit than for revenues. As customer satisfaction levels increase from Decile 1 to Decile 10 we see increases in both revenue and profit through the lower and mid deciles on average. However, after the point of diminishing returns, which occurs at different deciles depending on the measure, we see significant decreases in the

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[7] This non-linearity analysis could not be completed for the NMCS data due to small sample size.

financial performance measures. For example, in the year-end analysis, profit increases on average through the first eight deciles, but there is a significant drop in profit in the ninth decile where customer satisfaction scores become perfect.

In sum, these results support diminishing returns to the improvements in customer satisfaction. These results also suggest that the point of diminishing returns varies depending on the facets of customer satisfaction measured.

Table 7
Non-Linearity Analysis

Least Squares Means from the General Linear Model (GLM). Estimates of the associations between portfolios formed on the basis of customer satisfaction levels and one-year ahead revenue and operating income.

Panel A: The BCSC Move-In Customer Satisfaction Analysis

| | | Dependent Variable | |
Decile	Mean Move-In Customer Satisfaction	Mean Revenue	Mean Operating Income
1	4.39	2,183,579	419,177
2	5.10	1,393,147	230,417
3	5.29	1,351,775	368,175
4	5.41	2,641,200	504,904
5	5.56	3,328,552 [3]	372,117
6	5.69	2,554,633	465,695
7	5.83	4,596,867 [1-3,6]	1,171,136 [1-6]
8	5.90	2,771,509	628,830 [7]
9	5.94	8,815,986 [1-8]	2,680,580 [1-8]
10	6.00	2,078,556 [7,9]	341,418 [7,9]
R^2		0.122	0.194
F-Statistic		2.202**	3.089***

Panel B: The BCSC Mid-Year Customer Satisfaction Analysis

Decile	Mean Mid-Year Customer Satisfaction	Dependent Variable	
		Mean Revenue	Mean Operating Income
1	3.44	2,100,075	416,954
2	4.57	1,402,988	187,895
3	4.89	1,950,619	431,987
4	5.14	2,441,795	533,604
5	5.30	3,567,443	397,312
6	5.40	4,012,135 [2]	993,199 [1-3,5]
7	5.55	4,484,112 [1-3]	1,206,369 [1-5]
8	5.73	2,841,974	542,845 [7]
9	5.88	1,331,602 [6,7]	129,929 [6,7]
10	6.00	2,888,132 [2,9]	648,291 [7,9]
R^2		0.008	0.04
F-Statistic		1.082	1.437

Panel C: The BCSC Year-End Customer Satisfaction Analysis

Decile	Mean Year-End Customer Satisfaction	Dependent Variable	
		Mean Revenue	Mean Operating Income
1	3.37	2,183,579	419,177
2	4.45	1,254,825	199,227
3	4.83	1,551,144	411,524
4	4.99	2,681,482	515,980
5	5.13	3,385,721	162,227
6	5.43	2,835,835	586,899
7	5.59	4,231,841 [2-3]	1,051,501 [1-5]
8	5.76	4,494,124 [1-4]	1,210,130 [1-6]
9	6.00	1,877,590 [7,8]	299,223 [7,8]
R^2		0.044	0.082
F-Statistic		1.471	1.910*

*** - Denotes results significant at the 1% level.
** - Denotes results significant at the 5% level.
* - Denotes results significant at the 10% level.

[a]Superscripted numbers next to the least squares means indicate the mean is significantly different (p<0.15, two-tail) from the mean for the indicated decile (e.g. a superscripted 1 next to the mean for decile 3 means the mean revenue for decile 3 is significantly different from the mean of decile 1).
[b]The year-end analysis only has nine deciles due to the large number of customer satisfaction scores which are perfect 6.0's. In order to keep the deciles similar in size, only nine deciles could be formed.

Employee Satisfaction Analyses

H4 predicts positive associations between employee satisfaction and financial performance. To test this hypothesis, we regress contemporary and one-year-ahead revenue/profit on the five dimensions of employee satisfaction. Results in Table 8 show that only the first factor of employee satisfaction, job satisfaction, comes out significant in the contemporary revenue regression. Therefore, H4 is not supported.

Table 8
Regressions of Revenue and Profit on Employee Satisfaction

REV_t is the unit's revenue of the period contemporaneous with the measurement of the customer satisfaction variable. REV_{t+1} is the unit's revenue of the period following the measurement of the customer satisfaction variable. $PROF_t$ is the unit's profit from operations in the period contemporaneous with the measurement of the customer satisfaction variable. $PROF_{t+1}$ is the unit's profit from operations in the period following the measurement of the customer satisfaction variable. JP is the Job Prospects factor as determined with factor analysis of the employee satisfaction data. PG is the Personal Growth factor as determined with factor analysis of the employee satisfaction data. TW is the TeamWork factor as determined with factor analysis of the employee satisfaction data. HF is the Homebuyer Focus factor as determined with factor analysis of the employee satisfaction data. COMM is the Communication factor as determined with factor analysis of the employee satisfaction data. *** denotes significance at the 0.01 level (2-tailed). ** denotes significance at the 0.05 level (2-tailed). * denotes significance at the 0.10 level (2-tailed).

	REV_t	REV_{t+1}	$PROF_t$	$PROF_{t+1}$
Intercept	-44033113	373771823	2904113.3	-96437150
	-0.0967	0.465	0.038	-0.563
JP	-0.841	-1.143	-0.073	-0.62
	-2.866**	-1.544	-0.211	-0.538
PG	-0.084	0.238	-0.155	-0.073
	-0.329	0.686	-0.512	-0.136
TW	0.481	0.367	-0.179	0.587
	1.447	0.491	-0.454	0.504
HF	0.071	0.329	0.204	0.453
	0.246	0.797	0.594	0.705
COMM	0.2	-0.765	0.294	-0.196
	.698	-1.877	0.867	-0.309
F-Statistic	2.093	1.426	0.921	0.121
Adjusted R^2	0.267	0.191	-0.027	-0.954
N	15	9	15	9

H5 posits a positive association between employee satisfaction and customer satisfaction. To test this hypothesis, we run both contemporaneous and lagged regressions of different dimensions of customer satisfaction on the various dimensions of employee satisfaction. Results in Table 9 show that in the contemporaneous regression, there is a significant relationship between employee satisfaction with communication and the BCSC move-in satisfaction. When we regress one-year-ahead customer satisfaction on employee satisfaction, we find significantly positive relationship between employee satisfaction with job satisfaction, homebuyer focus, and communication with the BCSC move-in satisfaction. Therefore, H5 is only partially supported.

Table 9
Regressions of Customer Satisfaction on Employee Satisfaction

MIA$_t$ is the measure of average customer satisfaction from the Move-In survey. MDA$_t$ is the measure of average customer satisfaction from the Mid-Year survey. YEA$_t$ is the measure of average customer satisfaction from the Year-End survey. MIA$_{t=1}$ is the measure of average customer satisfaction from the Move-In survey the year following the employee satisfaction measures. MDA$_{t=1}$ is the measure of average customer satisfaction from the Mid-Year survey the year following the employee satisfaction measures. YEA$_{t=1}$ is the measure of average customer satisfaction from the Year-End survey the year following the employee satisfaction measures. JP is the Job Prospects factor as determined with factor analysis of the employee satisfaction data. PG is the Personal Growth factor as determined with factor analysis of the employee satisfaction data. TW is the TeamWork factor as determined with factor analysis of the employee satisfaction data. HF is the Homebuyer Focus factor as determined with factor analysis of the employee satisfaction data. COMM is the Communication factor as determined with factor analysis of the employee satisfaction data. *** denotes significance at the 0.01 level (2-tailed). ** denotes significance at the 0.05 level (2-tailed). * denotes significance at the 0.10 level (2-tailed).

	MIA$_t$	MDA$_t$	YEA$_t$	MIA$_{t+1}$	MDA$_{t+1}$	YEA$_{t+1}$
Intercept	2.290	1.771	-6.112	6.148	-1.782	6.960
	0.568	0.317	-0.941	2.713**	-0.290	4.314
JP	0.301	0.066	0.190	1.278	0.064	1.323
	0.758	0.177	0.367	2.400**	0.090	0.111
PG	0.107	-0.007	-0.004	-0.278	0.069	0.002
	0.277	-0.020	-0.011	-0.095	0.177	0.013
TW	-0.010	0.005	0.263	-0.465	0.379	-0.510
	-0.025	0.015	0.633	-0.934	0.572	-2.558
HF	-0.242	0.510	0.461	-0.829	0.134	0.042
	-0.517	1.280	1.080	-2.183*	0.266	0.420
COMM	0.276	-0.220	-0.085	0.774	0.141	-0.517
	0.801	-0.686	-0.252	2.107*	0.288	-3.543
F-Statistic	0.503	0.697	1.606	2.031	0.532	66.961*
Adjusted R^2	-0.184	-0.092	0.202	0.3	-0.242	0.982
N	16	18	12	12	12	6

H6 predicts that the relationship between employee satisfaction and customer satisfaction will be stronger in those departments that have more interactions with customers. Correlational analysis between customer satisfaction and employee satisfaction broken down by departments summarized in Table 10 provides preliminary evidence regarding this hypothesis. Most of the correlations are insignificant. However, we do find a positive correlation between satisfaction of sales employees and the BCSC move-in customer satisfaction measure (r=0.511). The results provide modest support for H6. Sales department employees have a greater impact on customer satisfaction presumably because they interact more frequently with the customer.

Table 10

Pearson Correlations of Employee Satisfaction by Department and Customer Satisfaction

AD/ADL are the measures of employee satisfaction for the Administration department contemporaneously and lagged respectively. The following measures are done in the same manner with the following department respectively CSTR/CSTRL-Construction, CS/CSL-Customer Service, EXEC/EXECL-Executives, ACCT/ACCTL-Finance/Accounting, LAND/LANDL-Land, PROD/PRODL-Production, PUR/PURL-Purchases, SM/SML-Sales & Marketing. MIA_t is the measure of average customer satisfaction from the Move-In survey. MDA_t is the measure of average customer satisfaction from the Mid-Year survey. YEA_t is the measure of average customer satisfaction from the Year-End survey.
*** denotes significance at the 0.01 level (2-tailed). ** denotes significance at the 0.05 level (2-tailed). * denotes significance at the 0.10 level (2-tailed).

	AD	CSTR	CS	EXEC	ACCT	LAND	PROD	PUR	SM	ADL	CSTRL	CSL	EXECL	ACCTL	LANDL	SML	MDA	MIA	YEA
AD	1.000	0.170	-0.348	0.183	0.082	-0.032	-0.435	-0.073	0.006	-0.190	-0.025	0.033	0.291	-0.003	-0.036	-0.199	0.112	-0.079	-0.114
CSTR		1.000	0.268	-0.151	0.061	0.287	0.296	0.040	-0.084	0.196	0.035	0.147	-0.377	0.478*	0.695**	-0.045	0.186	-0.077	-0.126
CS			1.000	-0.305	-0.182	0.354	0.289	0.157	-0.187	0.339	0.135	0.071	-0.099	-0.160	0.306	0.030	-0.146	0.117	-0.169
EXEC				1.000	-0.157	-0.328	.	0.468	0.126	0.193	-0.007	0.159	0.040	0.085	0.761*	-0.033	0.247	-0.194	0.313
ACCT					1.000	0.189	-0.419	0.293	0.201	-0.159	0.457	0.169	0.057	-0.305	-0.122	-0.513*	-0.158	0.206	0.269
LAND						1.000	-0.100	0.256	-0.381*	-0.154	-0.465	0.715	-0.130	-0.093	0.055	-0.038	-0.390	-0.090	-0.591**
PROD							1.000	-0.323	-0.118	0.918***	0.325	-0.290	-0.484	-0.360	0.473	-0.331	-0.298	-0.177	.
PUR								1.000	-0.047	0.224	0.111	0.123	-0.118	-0.186	0.035	-0.416	0.331	-0.137	0.243
SM									1.000	0.245	0.047	-0.449	0.087	0.230	-0.210	0.197	0.021	0.511**	0.111
ADL										1.000	0.498*	-0.467*	0.182	0.028	0.190	-0.237	0.082	0.206	-0.481
CSTRL											1.000	-0.114	-0.173	-0.022	0.255	-0.402	0.320	0.464	0.721*
CSL												1.000	-0.330	-0.189	0.289	-0.160	0.123	-0.308	-0.210
EXECL													1.000	-0.163	-0.344	0.481	-0.137	-0.414	-0.156
ACCTL														1.000	0.305	0.254	0.388	0.566*	0.575
LANDL															1.000	0.092	-0.106	0.250	0.958**
SML																1.000	0.183	0.016	0.569
MDA																	1.000	-0.112	0.513*
MIA																		1.000	0.304
YEA																			1.000

V. Conclusions

In this study, we test the business model of a company in the homebuilding industry using its monthly customer satisfaction, employee satisfaction, and financial data for over 200 projects for the period 2001-2004. While prior research often uses a single customer satisfaction measure, our research site uses two sets of customer satisfaction measures, which allows us to "run a horserace" between the two measures and examine the effect of measurement alternatives on the forward-looking properties of customer satisfaction. We find that: 1) customer satisfaction measures provided by a boutique customer research firm that specializes in the homebuilding industry are leading indicators of future performance, as measured by higher referrals, revenues, and profits, and lower warranty costs, but the customer satisfaction measure provided by a national multi-industry customer research firm is not; 2) overall employee satisfaction is not a significant leading indicator of either customer satisfaction or financial performance, but employee satisfaction in the sales department is positively associated with customer satisfaction; and 3) while most prior research has treated customer satisfaction and employee satisfaction as unidimensional constructs by using a single customer satisfaction or employee satisfaction index, we find that both customer and employee satisfaction are multi-dimensional constructs. Each is comprised of several distinguishable dimensions with differential impact on other variables in the business model.

We make a number of contributions to the performance measurement literature. First, we have shown that neither customer satisfaction nor employee satisfaction is a

unidimensional construct. In particular, we show that customer satisfaction is made up of different aspects at different points in the homebuyer's life cycle.

Second, we also find that how and when customer satisfaction is measured influences its predictive ability. The results suggest that a customer satisfaction measure that is built around more specific expectations of customers outperforms more generic customer satisfaction data. More importantly, our study calls attention to the importance of the time aspect of customer satisfaction measurement. The NMCS customer satisfaction data measures customer satisfaction once every year and the survey date corresponds to different times in the life cycle of the homebuyer. The BCSC survey, however, collects data at three different time points, each of which corresponding to a set time in the homebuyer's life-cycle (30-days, 5-months, and 11-months post close). We find that the BCSC customer satisfaction measure has greater predictive power than the NMCS customer satisfaction measure. One limitation of our study is that we cannot disentangle the two possible drivers (i.e., more accurate expectations and more precise timing of survey) of the superior forward-looking properties of the BCSC customer satisfaction measure. We conjecture, however, that both factors contribute to the greater predictive power of BCSC.

Third, not only do we find that not all customer satisfaction measures are created equal, we also find that not all employee satisfaction measures are created equal. For example, out of five different employee satisfaction measures, only employee satisfaction with job prospects is significantly related to future financial performance. Also, out of employee satisfaction measures across different departments, only satisfaction levels of

the sales department employees are found to be positively associated with customer satisfaction.

Last but not least, a major contribution of this study is that we test a firm-specific business model, which has often been called for but seldom practiced in prior literature. We test each link in IJK's business model and find strong evidence consistent with some links (e.g., the link between customer satisfaction and referral, the link between customer satisfaction and warranty costs) but not others (e.g., the link between employee satisfaction and customer satisfaction). In fact, perhaps the most important insight that comes from our study is that the validity of the business model depends not only on the theoretical soundness of the business model, but also on how the variables in the business model are measured.

This study challenges us to reassess prior research on non-financial performance measures. For example, most prior research has used the ACSI index to measure customer satisfaction. How useful is this commonly used measure? Evidence presented in this study challenges the ideas of measuring customer satisfaction with a single "key measure" as well as the idea of measuring customer satisfaction with a generic survey across diverse industries. We have shown that constructs such as customer satisfaction and employee satisfaction are much more complex than have been put forth in prior literature and possibly in practice as well. It is not until we fully understand their complexity that proper measurement and understanding of their consequences can be achieved.

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Appendix A
Descriptions of NMCS Survey Instrument *

The NMCS survey instrument includes 78 questions in total in the following categories. Most of the questions are elicited using a 1 to 10 scale where 1 is Unacceptable and 10 is Outstanding. Categories L, M, and N are elicited using a 1 to 6 scale where 1 is Strongly Disagree and 6 is Strongly Agree.

Categories:

- A. Overall Satisfaction with experience
    - a. Price of home.
    - b. Reputation of builder
- B. Builder's sales staff
    - a. Professional appearance and dress.
    - b. Honesty and integrity
- C. Design Center
    - a. Variety of Upgrades (floor/carpet)
    - b. Convenience of location
- D. Home readiness
    - a. Condition of home at walk-through
    - b. Accuracy of home completion
- E. Customer service representative
    - a. Knowledge of construction
    - b. Clarity explaining warranty
- F. Price/Value
    - a. Value for price
    - b. Value for upgrades
- G. Physical design elements
    - a. Floor plan design
    - b. Main Entry
- H. Workmanship/Quality
    - a. Quality of garage door
    - b. Quality of Interior Paint
- I. Location
    - a. Home/community location
- J. Recreational Facilities
    - a. Recreational facilities
- K. Overall Satisfaction with builder
- L. Likelihood to buy next home from builder
- M. Likelihood to recommend builder
- N. Number of recommendations made for builder

* Under a confidentiality agreement, we are not allowed to disclose specific questions.

I. BCSC Move-In Survey

The BCSC move-in survey instrument is administered to a homebuyer 30 days post close. The instrument includes 138 questions in total in the following categories. Most of the questions are elicited using a 1 to 6 scale where 1 is Strongly Disagree and 6 is Strongly Agree.

Categories:
- A. Overall Satisfaction
    - a. My home is all that I expected it to be.
    - b. I would recommend my builder to a friend or family member.
- B. Satisfaction with sales representative
    - a. Was honest and trustworthy.
    - b. Looked out for my interest as well as my builder's interest.
- C. Satisfaction with my construction options and upgrades
    - a. Provided enough selection from which to choose.
    - b. Flexible in scheduling my option and upgrade selection appointments.
- D. Satisfaction with my design center representative
    - a. Was knowledgeable about the choices available.
    - b. Helped me reach design solutions that fit my home and my family's lifestyle.
- E. Satisfaction with my construction representative
    - a. Treated me in a courteous and respectful manner.
    - b. Provided clear answers about how my home was built.
- F. Satisfaction with the readiness of my home on the move-in date
    - a. My promised purchase-to-move-in time frame was acceptable.
    - b. My home was delivered clean inside.
- G. Satisfaction with my builder's subcontractors
    - a. Performed quality work on my home.
    - b. Conducted themselves professionally and respected my property.
- H. Satisfaction with my orientation/walk-through representative
    - a. Conducted an informative and organized orientation.
    - b. Proactive in identifying necessary repairs during my walk-through.
- I. Satisfaction with my lender representative
    - a. Clearly explained the financing options and the loan process.
    - b. Final loan documents were complete and accurate.
- J. Satisfaction with my closing/title/escrow representative
    - a. Closing office hours/location were convenient to me.
    - b. Clearly explained closing documents to me
- K. Satisfaction with my initial customer care/service representative
    - a. Knowledgeable about my home and features.
    - b. Service personnel arrived on time or called if delayed.
- L. Quality of installation and workmanship
    - a. Countertops
    - b. Plumbing
    - c. Concrete

II. BCSC Mid-Year Survey

The BCSC Mid-Year survey instrument is administered to a homebuyer 5 months post close. The instrument includes 20 questions in the following categories. Most of the questions are elicited using a 1 to 6 scale where 1 is Strongly Disagree and 6 is Strongly Agree.

Categories:
- A. Overall Satisfaction
  - a. My home is all that I expected it to be.
  - b. I would recommend my builder to a friend or family member.
- B. Satisfaction with customer service
  - a. Was flexible in scheduling my service appointments.
  - b. Adequately addressed my warranty service needs.

III. BCSC Year-End Survey

The BCSC Year-End survey instrument is administered to a homebuyer 11 months post close. The instrument includes 207 questions in the following categories. Most of the questions are elicited using a 1 to 6 scale where 1 is Strongly Disagree and 6 is Strongly Agree.

Categories:
- A. Overall Satisfaction with home quality
  - a. My builder met its commitment to me.
  - b. I feel as valued by my builder now as I did when I moved in.
- B. Satisfaction with my customer care/service personnel
  - a. Treated me in a courteous and respectful manner.
  - b. Adequately addressed my service needs.
- C. Satisfaction with home features
  - a. Windows – e.g. Adequate placement/ventilation
  - b. Plumbing – e.g. Uniform water pressure
  - c. Cabinets – e.g. Quality of materials used
  - d. Countertops – e.g. Kitchen (materials, workmanship, grout, maintenance)
  - e. Storage – e.g. Closets (bedroom, linen, coat, etc.)
  - f. Heating & A/C – e.g. Placement of vents
  - g. Doors – e.g. Quality of front door
  - h. Flooring – e.g. Carpet
  - i. Electrical – e.g. Electrical outlets
  - j. Interior lighting and switches - e.g. Placement and number of light switches
  - k. Grading & Landscaping – e.g. Builder installed walkways/driveways
  - l. Framing – e.g. Framing (general appearance and alignment)
  - m. Roofing – e.g. Construction quality, performance, and appearance
  - n. Insulation – e.g. Thermal insulation (walls and ceiling)
  - o. Soundproofing – e.g. Lack of sound transmission between walls and floors
  - p. Exterior walls – e.g. Stucco, siding, stone
  - q. Exterior paint – e.g. Coverage, uniform color, and trim
  - r. Interior paint – e.g. Coverage, durability, uniform color, ease of cleaning
  - s. Drywall – e.g. Wall/ceiling finish, cracks, joints, nail bubbling
  - t. Concrete – e.g. Driveways. Slab, garage floors, walkways
  - u. Fireplace – e.g. Operation
  - v. Pool, Hot tub – e.g. Operation, Appearance

       w. Staircase – e.g. Banisters, spindles
       x. Appliances – e.g. Oven, range, etc.
  D. Satisfaction with the neighborhood
       a. Adequate guest parking.
       b. Attractive appearance and entrances.

* Under a confidentiality agreement, we are not allowed to disclose specific questions.

Appendix C
Descriptions of Employee Satisfaction Survey Instrument *

The employee satisfaction survey instrument includes 22 questions in the following categories. Most of the questions are elicited using a 1 to 6 scale where 1 is Strongly Disagree and 6 is Strongly Agree.

Categories:
A. Personal Satisfaction
    a. In the last 30 days I have received recognition or praise for doing good work.
    b. At work, my opinions seem to count.
B. Personal Growth
    a. In the last six months, my manager has met with me to review my progress.
    b. IJK has provided me with sufficient training opportunities for learning and growing.
C. Homebuyer Focus
    a. We provide the best new home experience.
    b. The results of our division's "Homebuyer Satisfaction Survey" have been utilized.
D. Teamwork
    a. Other departments work well with my department as a team.
    b. I understand how my job performance impacts the success of other departments.
E. Overall Perception
    a. I understand the overall vision of my division.
    b. I am confident I have a future with IJK.

* Under a confidentiality agreement, we are not allowed to disclose specific questions.