PERCEPTUAL AND OBJECTIVE PERFORMANCE MEASURES: AN EMPIRICAL ANALYSIS OF THE DIFFERENCE AND ITS IMPACT

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December 10, 2003

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Acknowledgments: We thank the Marketing Science Institute for financial support, Judith White, Don Lehmann, J.B. Steenkamp, Scott Neslin, Paul Farris, Peter Verhoef, Praveen Kopalle, Karen Gedenk, Koen Pauwels, John Farley, Roland Rust, and Punam Keller for their valuable suggestions, and Pen-Che Ho for computing assistance. We also thank session attendees at the 2003 AMA Winter Educators Conference, the 2003 INFORMS Marketing Science Conference, and the Tuck Marketing Seminar Series for their comments.
Abstract

This paper quantifies the extent of bias that occurs in the estimated relationship of performance with other marketing variables when perceptions of both are obtained from the same respondents using the same method. We econometrically separate the bias due to factors like response style and measurement format, which affect all estimated relationships uniformly and are stable over time, from that due to respondents’ psychological processes like positive illusions, cognitive consistency, and self-serving attributions, which differentially influence some estimated relationships. We predict the direction of these biases and test our hypotheses using five years of objective data on the performance of the independent agents of a retailer, along with the agents’ perceptions of their performance and of other marketing constructs gathered in surveys conducted during the same years.
1. Introduction

Several important marketing constructs, like market orientation, culture, innovation, customer satisfaction, and relationship quality, are difficult to measure and even more difficult to relate to performance. Researchers have to develop and validate perceptual measures of these constructs, and then gather data on them through self-report surveys. Given the cost and effort involved, longitudinal panels are usually impractical. More importantly, objective performance data, especially for comparable units of analysis, are difficult to obtain, and researchers often rely on self-reported perceptual measures of performance. The use of such measures, while appropriate and/or necessary in many cases, brings with it the potential for inaccuracy and bias.\(^1\)

Mezias and Starbuck (2003), among others, have shown that managers are not very accurate in their judgments. However, neither random inaccuracy nor systematic mean-shifts (e.g., everybody thinks and/or claims that their performance is better than it really is) in perceptions of performance pose a serious problem for the researcher who wishes to study the relationship of performance with other marketing variables. More serious is the bias that can occur due to common method variance when perceptions of performance and other variables of interest to the researcher are obtained from the same respondents using the same measurement method (Bagozzi and Yi 1991; Campbell and Fiske 1959; Podsakoff et al. 2003). Measurement instrument characteristics like item and scale format and respondent characteristics like response styles affect all measured constructs uniformly and inflate the correlation between them (Baumgartner and Steenkamp 2001). But, peoples’ perceptions of several constructs are also influenced by psychological processes like positive illusions, cognitive consistency and self-

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\(^1\) We use the terms “perceptual” and “subjective” interchangeably to describe self-reported perceptual measures of performance.
serving attribution bias, whose impact depends on the research context and the other variables that are being measured along with performance. As we will discuss subsequently, the bias generated by these processes differs across variables and may be asymmetrically related to whether people will over- or under-estimate their performance.

Researchers certainly recognize the general problem of common method variance. Cote and Buckley (1987) and Williams, Cote, and Buckley (1983) have shown that it is a significant portion of the total variance in measured constructs; Bagozzi and Yi (1991), Bollen and Paxton (1998) and Podsakoff et al. (2003) have evaluated confirmatory factor analysis-based and other statistical approaches to isolate its impact; and Baumgartner and Steenkamp (2001) have demonstrated how a specific source of common method variance, i.e., response styles, can be assessed and controlled for. However, as Baumgartner and Steenkamp (2001) note, few empirical studies in marketing control for bias due to common method variance. And, to the best of our knowledge, none of them separate out the effects of different sources of common method variance or examine the direction and magnitude of their impact on the individual variables whose relationship with performance is being studied.

In this paper, we empirically examine the impact of different sources of common method variance in the context of the channel relationship between a principal and its independent agents. Our objective is to (1) quantify the extent of bias due to all sources of common method variance in the channel context; (2) econometrically separate the influence of sources like measurement instrument format and response styles that are stable over time and bias all estimated relationships uniformly from respondents’ psychological processes that differentially bias some estimated relationships versus others; and (3) predict the direction of these differential biases and test for their presence. We conduct our analysis using five years of
annual data on agents’ perceptions of their performance as well as other constructs pertaining to the channel interaction that have been studied in the literature, combined with objective data on the performance of the same agents during the same period.

We want to note at the outset that “objective” performance measures may not always be the ideal against which perceptual measures must be validated, especially if the latter span more and/or different dimensions than the former. For instance, a manager’s subjective assessment of salesperson performance may include dimensions such as “citizenship” that the organization considers to be important but that are not included in objective measures like sales volume, commissions, or percentage of quota achieved (Bommer et al. 1995; Podsakoff and MacKenzie 1994). Similarly, subjective judgments of performance may take into account long-term orientation and the strategy of the company better than objective measures like market share (Jaworski and Kohli 1993). Clearly, one might observe a low correlation between perceived and objective performance measures in such cases not so much because the former are biased but because the latter are incomplete. Kumar, Stern, and Achrol (1992) identify eight facets of reseller performance and use them to develop perceived performance measures. It would be difficult for any single measure to encompass all these facets. Also, objective measures like profit or rates of return may suffer from the vagaries of accounting methods, as recent events in the corporate world have shown. This paper deals with situations in which the perceived performance measure is supposed to span the same dimension(s) as the objective measure, and the latter is largely free from accounting problems.

The rest of this paper is organized as follows. In Section 2, we present the econometric framework underlying our empirical analysis and develop hypotheses about the direction of bias in the estimated relationships between various channel constructs and perceived performance.
Section 3 briefly describes the data we use for our analysis. We present the results of our empirical investigation in Section 4, and Section 5 concludes the paper with a discussion of our findings and their implications for researchers.

2. Econometric Framework and Hypotheses

2.1 Econometric Framework

Let \( \text{ACTPERF}_{it} \) depict actual performance of individual \( i \) in period \( t \), \( X_{kit} (k=1, 2, \ldots K) \) depict the \( k' \)th antecedent variable whose relationship with performance we are interested in studying, and \( \text{PERPERF}_{it} \) depict a perceptual measure of actual performance. If we have data on \( \text{ACTPERF} \), we can estimate the following equation:

\[
\text{ACTPERF}_{it} = \beta_0 + \sum_{k=1}^{K} \beta_k X_{kit} + \epsilon_{it}
\]

Further, denoting measurement error in \( \text{PERPERF} \) by \( \eta_{it} \), we have:

\[
\text{PERPERF}_{it} = \text{ACTPERF}_{it} + \eta_{it}
\]

Consider the following regression of \( \text{PERPERF} \) on \( \text{ACTPERF} \) and \( X_k \):

\[
\text{PERPERF}_{it} = \text{ACTPERF}_{it} + \eta_{it} = \gamma_0 + \sum_{k=1}^{K} \gamma_k X_{kit} + \gamma_{k+1} \text{ACTPERF}_{it} + \epsilon_{it}
\]

Since \( \text{PERPERF}_{it} = \text{ACTPERF}_{it} + \eta_{it} \), \( \gamma_k \) can be written as \( \hat{\gamma}_k + \gamma_k \) where \( \hat{\gamma}_k \) and \( \gamma_k \) are estimates of (Farris, Parry, and Aialwadi 1992):

\[
\text{ACTPERF}_{it} = \gamma_{10} + \sum_{k=1}^{K} \gamma_{1k} X_{kit} + \gamma_{1k+1} \text{ACTPERF}_{it} + \epsilon_{1it}
\]

\[
\eta_{it} = \gamma_{20} + \sum_{k=1}^{K} \gamma_{2k} X_{kit} + \gamma_{2k+1} \text{ACTPERF}_{it} + \epsilon_{2it}
\]

Since equation (4) regresses \( \text{ACTPERF} \) on itself and other explanatory variables, \( \hat{\gamma}_{1k} \) would be zero for \( k = 1 \) through \( K \). However, \( \hat{\gamma}_{2k} \) would depend upon the nature of

2 Any mean-shift can be accounted for by standardizing \( \text{ACTPERF} \) and \( \text{PERPERF} \).
measurement error in PERPERF. If $\eta_{it}$ is purely random measurement error, i.e., PERPERF is a valid measure of ACTPERF, then any effect of $X_k$ on PERPERF must occur only through ACTPERF since those variables should not have any association with the random term, $\eta_{it}$.

Thus, $\hat{\gamma}_{2k}$ should not be significantly different from zero, and, consequently, neither should $\hat{\gamma}_k$.

However, if there is some systematic measurement error in PERPERF due to the method variance it shares with $X_k$, then $\eta_{it}$ can be expressed as the sum of three components, $\alpha_i$, $\mu_{it}$, and $\nu_{it}$. $\alpha_i$ represents systematic measurement error due to time invariant common method factors, e.g., characteristics of the measurement instrument such as item and scale format, and response style of the respondents such as yea-saying and proclivity to use extreme responses or midpoints. These factors are stable over time for each respondent since he/she completes the same survey in each time period (Horan, DiStefano, and Motl 2003). $\mu_{it}$ represents systematic measurement error due to method factors that may vary over time, e.g., psychological processes that link the response of a respondent to one question in a given time period with his/her response to other questions. $\nu_{it}$ represents random measurement error.

In that case, $\hat{\gamma}_k$ can be written as $\hat{\gamma}_{ik} + \hat{\gamma}_{3k} + \hat{\gamma}_{4k}$ where $\hat{\gamma}_{ik}$ is zero as noted earlier and $\hat{\gamma}_{2k}$, $\hat{\gamma}_{3k}$, and $\hat{\gamma}_{4k}$ are estimates from:

$$\alpha_i = \gamma_{20} + \sum_{k=1}^{K} \gamma_{2k} X_{kit} + \gamma_{2k+1} ACTPERF_{it} + \varepsilon_{2it} \quad (6)$$

$$\mu_{it} = \gamma_{30} + \sum_{k=1}^{K} \gamma_{3k} X_{kit} + \gamma_{3k+1} ACTPERF_{it} + \varepsilon_{3it} \quad (7)$$

$$\nu_{it} = \gamma_{40} + \sum_{k=1}^{K} \gamma_{4k} X_{kit} + \gamma_{4k+1} ACTPERF_{it} + \varepsilon_{4it} \quad (8)$$
Since $\alpha_i$ and $\mu_i$ are correlated with the $X_k$ variables due to common method, the biasing influence of the common method will show up in the form of non-zero $\hat{\gamma}_{2k}$ and $\hat{\gamma}_{3k}$, and therefore, non-zero $\hat{\gamma}_k$. Thus, regressing PERPERF on ACTPERF and the $X$ variables, as in equation (3), allows us to test for the existence of bias due to common method variance.

Further, we can separate the impact of time invariant and time variant sources of common method variance by first differencing both sides of equation (3):

$$
\text{PERPERF}_{it} - \text{PERPERF}_{i,t-1} = (\text{ACTPERF}_{it} - \text{ACTPERF}_{i,t-1}) + (\mu_i - \mu_{it-1}) + (\nu_i - \nu_{i,t-1})
$$

$$
= \sum_{k=1}^{K} \gamma_k (X_{k,i} - X_{k,i-1}) + \nu_{i+1}(\text{ACTPERF}_{it} - \text{ACTPERF}_{i,t-1}) + (\nu_i - \nu_{i,t-1})
$$

(9)

Since the time invariant measurement error component has been differenced out from the dependent variable, any non-zero $\hat{\gamma}_k$ obtained from this first-difference regression will reflect bias due to the time variant sources only.

Figure 1 translates this econometric framework into our conceptual model in the context of the relationship between the agents in a channel and their principal. Three points are made in the figure. First, actual performance of the agent may be influenced by five key sets of factors based on the literature (e.g., Bello and Gilliland 1997; Cannon and Perreault 1999; Gatignon and Xuereb 1997; Jap 1999; Lusch and Brown 1996; Verhoef 2003). These factors, depicted as $X_k$ in equation (1) are: (i) the agents’ own capabilities (e.g., customer orientation, product/service quality, competence); (ii) the principal’s capabilities (e.g., product/service quality, operational support); (iii) the quality of the relationship between them (e.g., flexibility, cooperation, mutuality); (iv) the nature of the environment in terms of its capacity and flux (e.g., dynamism and diversity); and (v) demographic characteristics of agents and the markets in which they operate. Second, actual performance directly determines agents’ perceived performance, as in
equation (2). Third, if the perceived performance measure is perfectly valid, it should be completely determined by actual performance (other than random measurement error). The impact of any other factors on perceived performance should occur only through their effect on actual performance. Any direct effect on perceived performance that does not go through actual performance, i.e., the $\gamma_k$ in equation (3), would be a biasing influence. We develop hypotheses below about the biasing influences of each of the factors in Figure 1.

2.2 Hypotheses Development

Sources of common method variance such as format effects and response style apply to all constructs measured using similar scales, and can be controlled away if one has longitudinal data because they are quite stable over time. However, the psychological processes of respondents providing data on several constructs can also contribute greatly to common method variance bias. We focus on these in our hypotheses development because their impact varies with the specific constructs that are measured and it may not be removed by first differencing.

The social psychology literature identifies three types of psychological processes that are relevant in the context of agents providing perceptual data on their own and others’ capabilities, environmental factors, and performance. First is the existence of positive illusions. There is substantial evidence that normal individuals possess highly skewed positive views of themselves (Taylor and Brown 1988). They judge positive traits to be much more characteristic of themselves than negative traits, show poorer recall for information related to failure than to success, recall their performance on a task as more positive than it really was, and rate themselves more positively than observers do. Individuals who are low in self-esteem are more likely to be balanced and unbiased in their self-perceptions (Coyne and Gottleib 1983).
Second is the need for cognitive consistency whereby individuals behave in ways that maximize the internal consistency of their cognitive systems and groups behave in ways that maximize the internal consistency of their interpersonal relations (Abelson et al. 1968). In particular, according to Festinger’s (1957) original dissonance theory, pairs of cognitions or knowledge elements that are relevant to one another can be either consonant or dissonant. Individuals have a need for psychological consistency among important cognitions, so they try to reduce dissonance by changing or removing dissonant cognitions, adding consonant ones, or changing their relative importance (Harmon-Jones and Mills 1999).

Third is the concept of a self-serving bias, whereby people attribute their success to themselves and failure to others or external factors in order to enhance or protect their self-esteem. There has been some debate in the social psychology literature about whether and when such self-serving biases are exhibited (Bradley 1978; Folkes 1988; Miller and Ross 1975). However, there seems to be sufficient evidence that, when concerns for self-esteem are aroused, e.g., when performance is public or competitive, the task is important or more skills-oriented, or unexpected negative outcomes occur, individuals tend to take responsibility for positive outcomes and, when possible, deny responsibility for negative outcomes (Campbell and Sedikides 1999; Federoff and Harvey 1976; Luginbuhl et al. 1975).

When the same respondents provide perceptions of performance and the variables depicted in Figure 1, each of these psychological processes can bias the estimated association of the variables with performance. We discuss them below.

Agents’ Own Capabilities: If some agents, e.g. those with low self-esteem, do not exhibit positive illusions while others do, the result would be a positive association between perceptions of own capabilities and performance, outside of any real structural relationship
between own capabilities and actual performance. This bias may be alleviated in an analysis of changes if agents’ self-esteem is relatively stable over time. Agents’ need for cognitive consistency too would result in an artifactually positive association between perceptions of own capabilities and performance, which would not get differenced away in an analysis of changes. This is because people expect covariation between behavior and outcome. If agents believe their capabilities are strong they are also likely to believe their performance is strong. Poor performance is dissonant with a positive perception of their capabilities and agents may reduce this dissonance by changing (upwards) their cognition of their own performance.

The consequences of positivity and cognitive consistency are symmetric -- the more positive agents’ perception of their own capabilities is, the more likely they would be to over-estimate their actual performance. And, the less positive their perception of their own capabilities is, the more likely they would be to under-estimate their actual performance. In contrast, the consequence of self-serving bias is asymmetric. If agents attribute superior performance to themselves but not inferior performance, there would be an artifactual positive association between perceptions of own capabilities and performance when perceived performance is high, but not when perceived performance is poor. As a result, over-estimates of performance should be associated with more positive perceptions of own capabilities but under-estimates of performance should not have a significant association with perceptions of own capabilities. Thus, we hypothesize:

H1a: After controlling for the influence of objective performance, agents’ perception of their own capabilities will have a positive association with their perceived performance.

H1b: After controlling for changes in objective performance, changes in agents’ perception of their own capabilities will have a positive association with changes in perceived performance.
H1c: Agents’ perception of their own capabilities will have a positive association with the probability of over-estimating performance but it will not be related to the probability of under-estimating performance.

**Principal’s Capabilities**: Since individuals tend to have positive illusions about themselves, but not about others, such illusions would not create an artifactual positive relationship between agents’ perceptions of principal’s capabilities and their own performance. In fact, by biasing perceived performance upwards for some agents, it may obfuscate any real positive effect of principal’s capabilities on performance. If agents expect the capabilities of the principal to influence their performance, cognitive consistency will lead to a positive association between perceptions of the principal’s capabilities and performance, outside of any real structural relationship between the two, and this bias will not be differenced away in an analysis of changes. Finally, if individuals are more likely to attribute inferior performance to others but not superior performance, under-estimates of performance should be associated with less positive perceptions of the principal’s capabilities, but over-estimates of performance should not have a significant association with perceptions of the principal’s capabilities. Thus, we hypothesize:

H2a: After controlling for the influence of objective performance, agents’ perception of the principal’s capabilities will have a positive association with their perceived performance.

H2b: After controlling for changes in objective performance, changes in agents’ perception of the principal’s capabilities will have a positive association with changes in their perceived performance.

H2c: Agents’ perception of the principal’s capabilities will have a negative association with the probability of under-estimating performance but it will not be related to the probability of over-estimating performance.

**Relationship Quality**: To the extent that agents expect the quality of their relationship with the principal to influence their performance, cognitive consistency should lead to a positive association between perceptions of relationship quality and performance, outside of any real structural relationship between the two. The more positive agents’ perception of the relationship
with the principal is, the more likely they would be to over-estimate their performance and the
less likely they would be to under-estimate their performance. The impact of positivity and self-
serving attributions depends upon the extent to which agents implicitly ascribe the quality of the
relationship to their own versus the principal’s efforts. If they ascribe it, at least to some extent,
to themselves, the direction of bias should be as in the case of agent capabilities, and so should
the asymmetry in the association of over- and under-estimates of performance with perceptions
of relationship quality. However, the asymmetry may not be as strong. Thus, we hypothesize:

H3a: After controlling for the influence of objective performance, agents’ perception of the
quality of their relationship with the principal will have a positive association with their
perceived performance.

H3b: After controlling for changes in objective performance, changes in agents’ perception of
the quality of their relationship with the principal will have a positive association with changes in
their perceived performance.

H3c: Agents’ perception of the quality of their relationship with the principal will have a
positive association with the probability of over-estimating performance but it will not be related
to the probability of under-estimating performance.

Environment: Cognitive consistency should lead to a positive association of perceived
environmental capacity and a possibly negative association of perceived environmental flux with
perceived performance over and above any real structural relationship with objective
performance. Self-serving bias may also exhibit itself with environmental variables if agents
attribute inferior performance to external factors but not superior performance. If so, over-
estimation of performance may not be associated with perceptions of greater environmental
capacity and less environmental flux but under-estimation of performance may be associated
with less capacity and greater flux. However, this asymmetry may be weaker than it is in
attributions to one’s own and the principal’s capabilities. Thus, we hypothesize:
H4a: After controlling for the influence of objective performance, agents’ perception of environmental capacity will have a positive association with their perceived performance, and their perception of environmental flux will have a negative association.

H4b: After controlling for changes in objective performance, changes in agents’ perception of environmental capacity will have a positive association with changes in perceived performance, and changes in their perception of environmental flux will have a negative association.

H4c: Agents’ perception of environmental capacity will have a positive association with the probability of over-estimating performance and a negative association with the probability of under-estimating performance. Their perception of environmental flux will have a negative association with the probability of over-estimating performance and a positive association with the probability of under-estimating performance.

*Demographic Factors:* Because demographic variables are generally factual rather than perceptual, and are not measured using the same Likert type scales that perceptual measures are, the potential for bias due to common method variance is alleviated. However, certain demographic variables may be systematically associated with perceptual (in)accuracy. First, agents who have a longer association with the principal or are past employees of the principal have greater experience and therefore may be more accurate in their perceptions. On the other hand, experience may make individuals more confident in their perceptions but not necessarily more accurate (Mezias and Starbuck 2001; Swann and Gill 1997). Second, perceptions may grow more accurate over time (Maule and Hodgkinson 2003), so that agents are less likely to under- or over-estimate in later surveys than in earlier ones. Third, tracking performance may be more critical to agents who have invested more resources in the business in terms of manpower, space etc., and in environments where competitive intensity is strong, so their perceptions may be more accurate. On the other hand, it may be more difficult to assess performance after controlling for resources employed and market conditions, so perceptions may be less accurate (Comer 1999). We do not propose *a priori* hypotheses about these demographic variables because the direction of the association cannot be predicted from prior research.
3. Empirical Analysis

4.1 Data:

The data used in our analysis come primarily from the independent agents of a large North American company and span a five-year period from 1996 through 2000. The agents sell the company’s products through a catalog and are paid a fixed percentage of their net sales each year in commissions. Each year, all the agents were asked to complete a survey as part of the formal interaction between the principal (retailer) and the agents. The primary motivation for these annual surveys was the principal’s desire to understand how to manage and communicate with the network of their independent agents efficiently and effectively without direct ownership of the agencies. The measures in the survey include, apart from demographic information, perceptions of (a) the agent’s capabilities; (b) the principal’s capabilities; (c) the quality of the agent’s relationship with the principal; (d) the external business environment facing the agent; and (e) the agent’s performance. We merged these survey data with objective performance data for each agent obtained directly from the principal’s financial records, and with demographic information about the geographic region served by the agent taken from census data. Appendix A lists the definitions/scales for all the constructs used in our analysis, along with literature sources from which they have been adapted.

These data have several unique features that make them useful for the purposes of our research. First, since this annual survey is part of the company’s formal interaction with its agents, response rates are good and the quality of the data should be high. Second, since the objective performance measure, annual net sales dollars (i.e., gross sales dollars less returns), is obtained directly from company records, it is very accurate. In fact, it is used to compute the commissions remitted to the agents each year, so it is highly relevant to both the principal and
agents, and less likely to suffer from accounting problems than measures in annual reports and
other public sources. Third, the perceived performance measure also taps into financial
performance so that we don’t have a “mismatch” with the objective measure in the sense of
tapping fundamentally different dimensions of performance. Fourth, we have longitudinal data
that allow us to examine lagged effects and changes in variables, control for sources of common
method variance that are stable over time, and see if perceptual accuracy improves over time.

The survey was sent to all of the principal’s agents each year, and response rates in each
year are summarized below.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Surveys Sent</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1308</td>
<td>37%</td>
</tr>
<tr>
<td>1997</td>
<td>1342</td>
<td>52%</td>
</tr>
<tr>
<td>1998</td>
<td>1363</td>
<td>60%</td>
</tr>
<tr>
<td>1999</td>
<td>1528</td>
<td>55%</td>
</tr>
<tr>
<td>2000</td>
<td>1646</td>
<td>53%</td>
</tr>
</tbody>
</table>

However, we do not have five full years of data on all the agents due to agent turnover and
incomplete census data. Our analysis is based on all complete observations, i.e., all agents in a
given year for whom we have non-missing data. We provide below some summary statistics
about the responding sample of agents as well as the sub-set in the final analysis.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Respondents</th>
<th>Final Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of observations</td>
<td>3557</td>
<td>1717</td>
</tr>
<tr>
<td>Total number of agents</td>
<td>1409</td>
<td>561</td>
</tr>
<tr>
<td>% providing three or more years of data</td>
<td>46%</td>
<td>59%</td>
</tr>
<tr>
<td>Average age of agency in years</td>
<td>7.5</td>
<td>7.9</td>
</tr>
<tr>
<td>% past employees of the principal</td>
<td>7.5%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Average number of full time equivalent employees</td>
<td>3.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Average square footage dedicated to principal</td>
<td>396</td>
<td>357</td>
</tr>
</tbody>
</table>

3 We also repeated our analysis for the subset of agents for whom we have all five years of data and did not find any
substantive differences. Details are available from the first author upon request.
3.2 Perceptual Measures:

Scales for most of the constructs in the survey are adapted from the literature, as noted in the Appendix. Table 1 provides descriptive statistics for all the constructs, several of which are categorized into four higher order groups -- agent capabilities, principal capabilities, relationship quality, and environmental flux. The table also reports their composite reliabilities, all of which are very high. Table 2 provides the average intra- and inter-construct item correlations for all the constructs. The diagonal elements in the table are the average correlations between all pairs of items within a construct and the off-diagonal elements are the average correlations between all pairs of items across two constructs. The table shows that the diagonal elements are all strong and higher in magnitude than the off-diagonal elements. It is not surprising that the off-diagonal elements corresponding to constructs within a given group because the constructs within each group should indeed have something in common.

<Insert Tables 1 and 2 About Here>

We also conducted confirmatory factor analysis for each year of data to assess the measurement quality of the constructs (Bagozzi and Yi 1988; Jöreskog and Sörbom 1999; Steenkamp and van Trijp 1991). Apart from estimating models for one construct at a time, we also estimated two other sets of measurement models. First, we estimated four single-factor models where all the items across all constructs in a given group are assumed to be indicators of a single factor, e.g., agent capabilities. Second, we estimated four second-order factor models that evaluate all the constructs within each group, and assume each individual construct in a group is in turn an indicator of a second order factor. Table 3 summarizes the fit of these models
and also provides the results of a $\chi^2$ test that compares the second-order factor models to the corresponding single-factor models.\(^4\)

<Insert Table 3 About Here>

As the table shows, the fit of the second-order factor models is within acceptable limits for all the groups. The Comparative Fit Index (CFI), the Non-Normed Fit Index (NNFI), and Root Mean Square Residual (RMSR) (Bentler and Bonnett 1980; Hair et al. 1998; Tucker and Lewis 1973) support the theoretical structures specified in the models quite well. The $\chi^2$ test rejects the single factor structures in favor of the second-order factor structures in all cases, thus providing further evidence of the validity of the constructs in each group. Although we don’t report them, all items load strongly onto the pre-specified constructs, and their t-statistics are highly significant.

3.3 Objective Performance Measure:

Net sales is a simple, unidimensional outcome measure of performance that is important for both the principal and the agents since it reflects the culmination of the efforts of both parties and the agents’ revenue is a fixed percentage of their net sales. For direct comparability with the perceived performance measure, which, in line with general practice in the literature, asks agents to rate their performance relative to other similar agents, we convert net sales into an objective sales measure relative to other similar agents. “Similarity” may be in agent demographics such as how long the agent has represented the principal and in market demographics such as the potential of the region. Therefore, we estimate a benchmark sales level for each agent based on market and agent demographics and compute the difference between the agent’s actual sales and benchmark sales. This difference, which we term “adjusted sales” (ADJSLS), is the objective relative performance measure. Clearly, the larger the adjusted sales measure, the better the

\(^4\) The table reports results for the survey year 2000. Results are similar for the remaining four years.
agent’s performance relative to other similar agents. We obtain each agent’s benchmark sales, i.e., the average sales of an agent with the same demographics, as the predicted value from the following regression of net sales on agent and market demographics and a YEAR variable to account for any time trend in sales:

\[
\text{NETSALES}_{it} = \beta_0 + \beta_1 \text{AGE}_{it} + \beta_2 \text{FTE}_{it} + \beta_3 \text{SQFT}_{it} + \beta_4 \text{RETDIST}_{it} + \beta_5 \text{MKTDIST}_{it} + \beta_6 \text{POP}_{i} + \beta_7 \text{TOTSPEND}_{i} + \beta_8 \text{YEAR}_{i} + \epsilon_{it}
\]  

(9)

\[
\text{ADJSL}_{it} = \text{NETSALES}_{it} - \hat{\text{NETSALES}}_{it}
\]

where:

\begin{align*}
\text{AGE} & = \text{Number of years the respondent has been an agent of the principal} \\
\text{FTE} & = \text{Number of full time equivalent employees dedicated to principal’s business} \\
\text{SQFT} & = \text{Number of square feet of space dedicated to principal’s business} \\
\text{RETDIST} & = \text{Distance to the nearest store owned by the principal} \\
\text{MKTDIST} & = \text{Distance to the nearest set of shops (market)} \\
\text{POP} & = \text{Population of the region where agent is located in 2001} \\
\text{TOTSPEND} & = \text{Total spending on similar products per household in the region in 2001} \\
\text{YEAR} & = \text{Year of data, 1996 to 2000.}
\end{align*}

Adjusted \(R^2\) for the regression is 0.25 and the F-statistic is highly significant (p<0.0001) at 71.94. Two points deserve mention about this ADJLS measure. First, the less than perfect explanatory power of this model should not be troubling. It simply highlights the fact that an agent’s sales are not just driven by demographic factors. If demographics alone explained a large portion of the variance in sales across agents, there would be little left for observed factors such as capabilities, effort, channel relationship etc. or unobserved firm-specific skills and resources to explain. Second, a simpler way to convert net sales into a relative measure is to divide by average sales across all agents. But, we want an objective measure relative to other
similar other agents, not relative to all other agents. That is why we report results below based on ADJSLS. However, we did repeat all our analyses with the relative sales as well, and, though there are some differences across the measures, our substantive findings stay largely the same.

4. RESULTS

We assess the validity of the perceived performance measure and potential bias in its relationship with channel constructs in three steps. First, we examine the correlation between the perceived and objective measures of performance. Second, we determine whether the observed association of performance with key channel related variables is biased when one uses the perceived performance measure instead of objective performance, and distinguish between bias due to time invariant and time varying common method factors. Third, we quantify the extent to which agents tend to under- or over-estimate performance and how this under- or over-estimation is related to their perceptions of these other variables. Note that, in all our analyses, we standardize both the perceived and objective performance measures. This controls for any “mean shift” and makes the scales of the two measures comparable.

4.1 Correlations Between Perceived and Objective Performance Measures

Table 4 contains the correlations of objective performance with the perceived performance measure and with the individual items that constitute the perceived performance scale. To see if agents’ perception of their performance either leads or lags objective performance (Frazier and Rody 1991), we also report the corresponding correlations with one-year lags between the measures. The table highlights several important results. First, the correlation of perceived performance with objective performance is significantly positive but far from perfect. Second, the individual items that comprise the perceived performance scale, including the item that specifically refers to sales, correlate with objective performance less
strongly than does the overall perceived performance scale. Third, ADJSL does not correlate with perceived performance more strongly than net sales even though the perceived measure is relative. This is consistent with Comer (1999) who found that subjective salesperson performance correlates more strongly with objective measures that do not control for externalities than with measures that do. Fourth, the correlation between objective and perceived performance measures is not strengthened when we allow for a time lag between them. It does not appear that agents’ assessments are either more in tune with future trends in objective performance or lag behind it.

<Insert Table 4 About Here>

Since some of the items in the perceived measure refer to growth, we also checked the correlations of those items with changes (i.e., growth) in objective performance. These correlations were much lower than those reported in Table 4. For instance, perceived sales growth has a correlation of 0.16 with change in net sales and a correlation of 0.12 with change in adjusted sales. Finally, it may be argued that how well agents assess changes and trends in their performance over time is as important as, perhaps even more important than, their ability to assess the level of their performance relative to others. Therefore, we examined the correlations between changes in perceived performance and changes in objective performance. However, the correlations among these changes are even lower than correlations among levels. Change in perceived performance has a correlation of 0.15 with change in net sales and a correlation of 0.10 with change in adjusted sales.

Thus, the analysis of correlations shows a statistically significant positive association of perceived performance with objective performance, but the association is far from perfect. The correlation between changes in the two types of measures is even weaker. However, the
magnitude of the correlation is just the starting point of our analysis. After all, even a stronger correlation would not be very comforting if perceived performance contains substantial systematic error so that its association with other variables is very different than the association of objective performance. We investigate this next.

4.2 Total Bias Due to Common Method Variance

In order to assess the extent to which observed associations of channel variables with performance are biased due to common method variance if the perceived performance measure is used instead of objective performance, we regress perceived performance on objective performance and these variables, as discussed in Section 2. The specific regression model is:

\[
\text{PERPERF}_i = \beta_0 + \beta_1 \text{AGENTCAP}_i + \beta_2 \text{PRINCAP}_i + \beta_3 \text{RELTNSHP}_i + \beta_4 \text{ENVCAP}_i + \\
\beta_5 \text{ENVFLUX}_i + \beta_6 \text{AGE}_i + \beta_7 \text{FTE}_i + \beta_8 \text{SQFT}_i + \beta_9 \text{MKTDIST}_i + \\
\beta_{10} \text{RETDIST}_i + \beta_{11} \text{PASTEMP}_i + \beta_{12} \text{RESPNUM}_i + \beta_{13} \text{ADJSLS}_i + \epsilon_i
\]  

(10)

where RESPNUM equals 1,2,3 etc. to reflect the number of times an agent has filled out the survey until year t, and other variables are as defined previously. Note that we use four second-order factors, agent capabilities, principal capabilities, relationship quality, and environmental flux, as independent variables instead of the individual constructs that go into these factors. We do this for model parsimony, to reduce multicollinearity, and because our hypotheses pertain to the second order factors not the individual constructs. In order to account for the longitudinal nature of the dataset where observations from the same agent over time are not independent, we specify a random effects model where the error term has an agent specific component and a random component, and obtain maximum likelihood estimates.

<Insert Table 5 About Here>

Estimates of this random effects model are provided in the first column of Table 5. The table makes several interesting points. The good news is that perceived performance does have a
significant and strong relationship with objective performance. The coefficient of ADJSLS is the strongest of all the variables in the model. The bad news, however, is that some of the channel factors have a significant association with perceived performance, holding objective performance constant. Among perceptual constructs, agents’ perceptions of their own capabilities and of the quality of their relationship with the principal stand out as biasing influences, supporting hypotheses H1a and H3a. But, hypotheses H2a and H4a about principal capabilities and the environment are not supported. This could be because, as noted earlier, respondents with positive illusions about themselves have inflated perceptions of their performance but not the principal’s capabilities or the external factors. Among agent and market characteristics, square footage and number of years as an agent stand out as biasing influences. This suggests that agents are unable to properly account for these variables in benchmarking their performance against other similar agents.

The direct association of these variables with perceived performance, holding objective performance constant, means that a researcher who uses the perceived measure to estimate the effect of these variables on performance would obtain biased estimates that would not hold up if objective performance were used. The last two columns of the table confirm this -- variables such as agents’ perceptions of their own capabilities and of the quality of their relationship with the principal show a significant association with perceived performance but not with objective performance. This puts in question the validity of observed empirical relationships of at least some types of variables with perceived performance.

Although it may appear disconcerting that constructs like agent and principal capabilities and relationship quality show no significant association with objective performance, this is consistent with the findings of researchers like Voss and Voss (2000) and Szymanski, Kroff, and
Troy (2003). They show that perceptions of variables like product quality and innovation are strongly associated with perceived performance but not with objective performance. It is also consistent with Frazier’s (1999) argument that it may be difficult to find a significant association between objective performance and channel variables in cross-sectional analyses because several other unobserved firm-specific factors affect performance and dominate the channel constructs. We find some support for this argument below.

4.3 Bias Due to Time Varying Common Method Factors

In order to assess whether any bias remains once the effect of time invariant common method factors is removed, we regress change (Δ) in perceived performance on changes in objective performance and the channel variables:

\[
\Delta \text{PERPERF}_{it} = \beta_0 + \beta_1 \Delta \text{AGENTCAP}_{it} + \beta_2 \Delta \text{PRINCAP}_{it} + \beta_3 \Delta \text{RELTNSHP}_{it} + \\
\beta_4 \Delta \text{ENVCAP}_{it} + \beta_5 \Delta \text{ENVFLUX}_{it} + \beta_6 \text{RESPNUM}_{i} + \beta_7 \Delta \text{ADJSLS}_{it} + \varepsilon_{it}
\] (11)

Estimates of this model are provided in the first column of Table 6. Again, the good news is that changes in perceived performance are significantly associated with changes in objective performance. Further, the biasing influence of agent capabilities is reduced. Consistent with hypothesis H3b, however, relationship quality continues to be a significant biasing influence in equation (11) even though time invariant common method factors like scale format and response style are controlled for.

Interestingly, a comparison of the last column of Tables 5 and 6 shows that relationship quality shows no association with objective performance in Table 5, but its effect is positive and statistically significant in Table 6. This supports the argument that a longitudinal analysis of

\[5\] All the agent specific variables that don’t vary over time drop out of this regression along with the impact of time invariant common method factors.
changes that controls for unobserved firm-specific factors may be more suited to examining how channel variables influence objective performance (Frazier 1999; Gomez, McLaughlin and Wittink 2004). Thus, longitudinal data hold promise in the context of channels research-- not only do they allow the researcher to control for several sources of common method variance, they are more likely to reveal any real association that might exist between channel variables and performance. Of course, the advantage of analyzing changes in variables over time must be weighed against the loss in efficiency that is likely to occur when there is not enough variation in the independent variables over time (Christen and Gatignon 2003).

4.4 Over- Versus Under-Estimation of Performance

As discussed in section 2, some biases operate asymmetrically for over- versus under-estimation of performance. We now examine the extent to which respondents over or under-estimate their performance relative to other agents and whether the association of channel variables with this over- or under-estimation is consistent with our hypotheses. The table below summarizes the distribution of the difference between standardized perceived and standardized objective performance for our sample.

<table>
<thead>
<tr>
<th>Standardized PERPERF minus Standardized ADJSLS</th>
<th>% of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than -1.0</td>
<td>17%</td>
</tr>
<tr>
<td>Between –1.0 and –0.5</td>
<td>11%</td>
</tr>
<tr>
<td>Between -0.5 and -0.25</td>
<td>8%</td>
</tr>
<tr>
<td>Between -0.25 and +0.25</td>
<td>18%</td>
</tr>
<tr>
<td>Between +0.25 and +0.5</td>
<td>10%</td>
</tr>
<tr>
<td>Between +0.5 and +1.0</td>
<td>18%</td>
</tr>
<tr>
<td>Greater than +1.0</td>
<td>18%</td>
</tr>
</tbody>
</table>

The table shows that about 18% of the sample is very accurate in estimating their performance relative to other agents, with a difference of less than 0.25 between the two
standardized measures. 36% of the sample substantially over-estimate their performance (difference greater than +0.5) while 28% substantially under-estimate their performance (difference less than –0.5). Since we have multiple observations per agent in our sample, we also wanted to see whether individual agents consistently over- or under-estimate their performance, or whether they oscillate from one to the other during the years of the survey. Interestingly, we find that, of the agents who respond more than twice, 49% substantially over-estimate their performance relative to other agents every time and 31% substantially under-estimate it every time.

In order to test the hypotheses we developed in Section 2 about the association of channel variables with over- versus under-estimation, we first divide the sample into three groups. Group 1 consists of “under-estimates”, for whom the difference between the standardized values of perceived and objective performance is less than -0.5. Group 2 consists of “accurates”, for whom the difference is between –0.5 and +0.5, and Group 3 consists of “over-estimates”, for whom the difference is greater than +0.5. Then, we specify two random effects binomial logit models, one that compares groups 1 and 2 to examine the correlates of under-estimation, and another that compares groups 2 and 3 to examine the correlates of over-estimation. The explanatory variables in each model are the same as in equation (2) with the exception of ADJSLS, of course. Table 7 provides the maximum likelihood estimates of the two models.

The table highlights several interesting findings. First, the estimated coefficients of agents’ own and the principal’s capabilities in the two models are consistent with hypotheses H1c and H2c, and point to the existence of some self-serving attribution bias. More positive perceptions of own capabilities are significantly related to over-estimation but more negative
perceptions are not significantly related to under-estimation. In contrast, positive perceptions of the principal’s capabilities are not at all related to over-estimation but negative perceptions of the principal’s capabilities show a statistically significant association with under-estimation. It does appear that agents are more likely to attribute perceived success to themselves and perceived failure to the principal. It is important to note that these asymmetric self-serving biases exhibit themselves despite the more symmetric forces of other sources of common method variance.

Second, there is asymmetry in the coefficient of relationship quality too. Consistent with our hypothesis in H3c, there is a positive association of this variable with over-estimation of performance and a statistically insignificant negative association with under-estimation. As we expected, though, the asymmetry is less strong than for agent capabilities. The negative coefficient of relationship quality in the model predicting under-estimation is not statistically significant but it is stronger than the coefficient of agent capabilities.

Third, the estimated coefficients of perceptions of the environment are not consistent with attribution asymmetry. Perception of flux in the environment does not have a significant relationship with perceptual accuracy. As we hypothesized in H4c, perception of high environmental capacity is positively associated with over-estimation of performance. Surprisingly, it is also positively associated with under-estimation of performance.

Fourth, the association of various demographic factors with accuracy of perceived performance is mixed but interesting. Experience with the principal does not seem to make agents significantly more accurate. The number of years an agent has been affiliated with the principal makes under-estimation of performance somewhat less likely, and it does not matter at all if the agent is a past employee of the principal. This is consistent with Mezias and Starbuck (2003). It is also interesting that increased resource investment on the part of the agent worsens perceptual
accuracy. Agents who have a greater number of FTE employees or dedicate a lot of square footage to the principal’s business are more likely to over-estimate their objective performance relative to other agents. This may reflect their desire for cognitive consistency – they expect to do better than other agents because they have invested more – but it is interesting that agents who dedicate less square footage and FTE employees to the business do not tend to under-estimate their performance. In fact, directionally, the estimated coefficients suggest that some agents with high resource investment over-estimate their performance while others under-estimate it. It appears that they are unable to accurately calibrate their high resource investment and corresponding performance vis a vis other agents. Finally, repeated experience with survey completion does not seem to improve accuracy.

5. CONCLUSION

5.1 Summary of Findings

In this paper, we have examined the validity of observed relationships between performance and the variables that might influence performance, when perceptual measures of performance and these other variables are obtained using the same method and from the same respondents. Our analysis is done in the context of a principal and its independent agents. Along with perceived agent performance, we obtained measures of other variables whose relationship with performance is typically studied in channels research. We developed and tested hypotheses about how the relationship of each of these variables with perceived performance may be biased and how they may be associated with systematic under- versus over-estimation of objective performance. We were able to do this analysis because we obtained both subjective and objective performance measures. To exclude the possibility that any lack of correspondence between the two types of measures may be because of differences in the fundamental dimensions they tap, the
perceptual measure in our work was designed to tap into the same dimension that objective performance assesses. Further, we obtained longitudinal data from the same respondents using the same survey instrument over five years. This allowed us to separate biases due to instrument format and response style from biases due to the psychological processes of respondents.

Our main findings are as follows. First, there are significant differences in the observed association of various variables with perceived performance versus with objective performance. In particular, variables like agents’ perceptions of their own capabilities and of their relationship with the principal are significantly positively associated with perceived performance but not with objective performance. Second, some, though not all, of these differences persist after we control for time invariant sources of bias. Third, these differences are consistent with the predictions of psychological processes like positive illusions and cognitive consistency. Fourth, there is an asymmetric association of variables like agents’ perceptions of their own capabilities, their relationship with the principal, and the principal’s capabilities with the probability that agents will over- versus under-estimate their performance. This asymmetric association is consistent with the predictions of self-serving bias in individuals. Fifth, agents do not appear to be able to correctly incorporate their perception of market potential into their perception of their relative performance. They are more likely to be accurate when they perceive the environment as being less munificent but the likelihood of both under- and over-estimation increases with perceptions of high environmental capacity. Sixth, agents are not able to calibrate their performance relative to others and relative to the resources they invest in the business. Their years of experience in the business do not make them more accurate and their investment in employees and space makes them more likely to over-estimate their relative performance.
5.2 Implications for Researchers

The implications of these findings for researchers are important. First and foremost, they demonstrate the danger of obtaining perceptual data on both performance and its potential antecedents from the same respondents, especially when the nature of the variables being measured is such that respondents’ psychological need for consistency, ego-enhancement or ego-protection is likely to be aroused. In the channel context, for instance, one can see that the problem is serious because the agent expects and attributes a relationship between his performance and his own and the principal’s capabilities, and his responses will likely reflect that psychological process. In contrast, if each respondent is providing information on either performance or its potential antecedents, but not both, the problem is mitigated. There may be inaccuracies but these do not bias the relationship between antecedents and performance. Perhaps that is why, even though the correlation of a supervisor’s subjective ratings of an employee’s performance with objective performance measures is far from perfect, researchers do not find significant differences in the estimated relationship of these performance measures with other variables measured separately, like age (McEvoy and Cascio 1989), integrity tests (Ones, Viswesvaran, and Schmidt 1993), and personality (Tett, Jackson, and Rothstein 1991). Thus, researchers should make an effort to separate their measures of performance from their measures of its antecedents, either by using different respondents within the organization to provide information on each, or by using multiple methods to gauge performance. Clearly, using multiple respondents to provide data on both performance and antecedents and averaging their responses doesn’t solve the problem.

Second, unlike what general one might conclude from general treatments of common method bias, the impact of different common method factors varies substantially across different
variables both in magnitude and in direction. It is not just that all correlations are inflated. Importantly, theory allows us to predict these differences \textit{a priori} for several marketing variables.

Third, our work shows that commonly used procedures for assessing the quality of perceived measures may not reveal the problem. Clearly, reliability is not an issue. Perceptions of respondents can be very reliable and yet biased. In fact, even in our analysis, the reliability of perceived performance and the other variables is very strong. Convergent validity is an important issue. But, convergent validity of perceived performance is often evaluated by correlating it with perceptual measures of other constructs that should covary with performance. However, as we have seen here, these correlations may reflect common method variance not convergent validity. Convergent validity should be assessed by examining a construct’s correlation with other constructs whose measures have been obtained by different methods (Campbell and Fiske 1959) or at least from different respondents.

Fourth, researchers should keep in mind the specific objective performance measures against which they intend to validate their subjective measures before they design their surveys and collect data. They should ensure that at least one of the subjective measures in their survey does tap into the same dimension(s) as the objective measure. A lack of convergence between subjective and objective performance measures may indeed be because subjective measures can be designed to assess multiple facets of performance that objective measures do not, but that argument would be more credible if the specific subjective performance items that are designed to tap into the same dimension(s) as objective performance do converge with the latter.

Fifth, our work reinforces the benefits of obtaining longitudinal data whenever possible. Not only can the researcher control for some sources of common method variance by examining changes over time, the true impact of variables like relationship quality may stand a better chance
of being revealed when more dominant firm-specific drivers of performance are differenced away.

To our knowledge, this research is the first to employ longitudinal data in the channel context.

A sixth implication of our research is that respondents may not be able to correctly assess their own performance relative to others. Since our objective in this paper was to assess the validity of subjective performance measures commonly used in the literature, we worded the scale in relative terms in accordance with standard practice. The exact items in the scale are taken from Lusch and Brown (1996), but others too have argued for the use of relative perceived performance measures (e.g., Doney and Cannon 1997; Kohli, Shervani and Challagalla 1998; Sujan, Weitz and Kumar 1994). The main reason is to account for differences in performance levels between respondents due to business/industry differences and market externalities. Perhaps one way to retain the advantage of the relative measure while improving the quality of the data obtained from respondents is to tell them explicitly who they should benchmark against when they assess their relative performance, e.g., the three largest competitors in their served market.

We should note, however, that the lack of correspondence we find between the perceived and objective performance cannot be attributed to the fact that the perceived performance measure is relative. Our objective measure is relative as well so that there is no “mis-match” between the two, although we do recognize that this relative objective measure is estimated using a regression, and, as such, may have some random error. Importantly, the systematic difference in the pattern of association that we observe between channel variables and perceived performance on one hand and objective performance on the other hand, cannot be explained by random inaccuracy in agents’ benchmarking of their performance versus others, or random error in the estimation of objective performance relative to others. In other words, there is no reason why agents’ capabilities and relationship quality should show a significantly positive relationship with perceived performance
but not with objective performance either because agents made random errors in assessing their relative performance, or because our estimation of objective relative performance had some error. Nor do such errors explain why we would observe the specific asymmetric associations of variables like agents’ own and principal’s capabilities with under- and over-estimation of performance. Finally, we repeated our analysis using two other objective measures – net sales and relative net sales – and found that most of our substantive findings remained unchanged.

5.3 Discussion

Perceptual performance measures are used extensively by managers and in academic research and the question of their validity is quite a sensitive one. There are strong arguments in favor of their use, at least in certain circumstances. For instance, subjective ratings of performance may encompass important dimensions that may not be reflected in commonly used objective measures of performance (Anderson 1990; Jaworski and Kohli 1993; Kumar, Stern, and Achrol 1992). Further, objective measures are simply not available in many instances, because managers are not willing to share them, or they are difficult to compare, e.g., in international contexts (Deshpandé and Farley 2003; Farley 2003). Another issue is that, at least for some constructs, perception is indeed reality. For instance, no matter what any “objective” criteria might say, whether a customer trusts a supplier or not is ultimately a matter of the customer’s perception.

Therefore, researchers need to focus on trying to (i) minimize sources of common method variance that may bias the estimated relationship of performance with other variables of interest to the researcher; and (ii) improve the accuracy of subjective or self-report measures. Our research in this paper shows that the former problem is significant, it differs across variables, and the differences can be predicted a priori. We also suggest ways to alleviate the problem.
Prior research provides several suggestions for the latter problem (e.g., Podsakoff et al. 2003). One exemplar for this is the Profit Impact of Marketing Strategy (PIMS) project and database. Although PIMS generated a large body of marketing strategy research and substantial debate, its hallmark was the ability to obtain, on a large scale, measures of own and competitive strategy, environment, and performance through a well-designed survey (Buzzell and Gale 1987). For instance, managers were asked to report not just their market share, but also their market share relative to their biggest competitors, their dollar sales disguised by a multiplicative factor, the number of their customers, their purchase frequency and purchase amounts (Farris 2003). Each of these questions was in different formats, required the responding managers to think carefully and access different types of data before responding, and allowed the researcher to test for convergent validity. Several researchers have subsequently used the PIMS scales in their research and validation attempts have been relatively successful (Farley 2003). Another exemplar for improving accuracy of subjective measures is the multiple respondent approach of Kumar, Stern, and Anderson (1993) that assesses respondent competency and uses a consensus approach to resolve discrepancies in informant reports.

In conclusion, we recognize that our analysis is limited to one dataset in one research context. However, the measures we use and the constructs we examine are very typical in the channels literature. Further, it is important to conduct such analyses in a specific research context because the validity of the perceived performance measure is influenced by the context, specifically, by which other variables are being studied and how they are being measured. We believe that our work makes a contribution to the literature by going beyond a recognition of the general existence of common method variance to an understanding of the specific sources of such variance in the relationship between individual marketing variables and performance. We also
hope that it moves the discussion forward from trying to justify the universal superiority of either subjective or objective measures to identifying situations where the validity of relationships of interest to the researcher may be influenced by the types of measures used, predicting how these influences might vary across specific relationships, and finding ways to alleviate these influences. Finally, we hope it will encourage such analyses in other important marketing contexts such as in the study of market orientation and innovativeness. For instance, are the differences in relationships of innovativeness and product quality with perceived versus objective performance found by Voss and Voss (2000) and Szymanski, Kroff, and Troy (2003) attributable to common method variance, and, if so, which particular sources of common method variance are at play? The type of analysis we have done in this paper can answer these questions and provide guidance to future researchers who can design research methods to alleviate the impact of those specific sources. On the other hand, there may well be situations where biases in observed relationships between variables are much less serious (Spector 1987) or are largely driven by time invariant common method factors that are somewhat easier to control, and these, too, should be identified.
FIGURE 1
CONCEPTUAL FRAMEWORK

Actual Performance

Perceived Performance

Agent’s Capabilities

Principal’s Capabilities

Relationship Quality

Environment
Capacity and Flux

Own Demographic Characteristics

Market Demographic Characteristics

True Effects

Bias
<table>
<thead>
<tr>
<th>Construct</th>
<th>No. of Items</th>
<th>Composite Reliability</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agent Capabilities (AGENTCAP):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer orientation</td>
<td>3</td>
<td>0.85</td>
<td>4.54</td>
<td>0.48</td>
</tr>
<tr>
<td>Adaptation</td>
<td>3</td>
<td>0.81</td>
<td>4.13</td>
<td>0.59</td>
</tr>
<tr>
<td>Service quality</td>
<td>4</td>
<td>0.83</td>
<td>4.47</td>
<td>0.46</td>
</tr>
<tr>
<td>Competence</td>
<td>3</td>
<td>0.75</td>
<td>4.00</td>
<td>0.62</td>
</tr>
<tr>
<td>Compliance</td>
<td>3</td>
<td>0.73</td>
<td>4.26</td>
<td>0.49</td>
</tr>
<tr>
<td><strong>Principal Capabilities (PRINCAP):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service quality</td>
<td>3</td>
<td>0.77</td>
<td>4.19</td>
<td>0.52</td>
</tr>
<tr>
<td>Operational support</td>
<td>4</td>
<td>0.83</td>
<td>4.21</td>
<td>0.58</td>
</tr>
<tr>
<td>Product quality</td>
<td>7</td>
<td>0.92</td>
<td>3.97</td>
<td>0.50</td>
</tr>
<tr>
<td>Trustworthiness</td>
<td>6</td>
<td>0.96</td>
<td>4.26</td>
<td>0.56</td>
</tr>
<tr>
<td><strong>Relationship Quality (RELTNSHP):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexibility</td>
<td>4</td>
<td>0.92</td>
<td>3.82</td>
<td>0.67</td>
</tr>
<tr>
<td>Mutuality</td>
<td>4</td>
<td>0.92</td>
<td>3.64</td>
<td>0.74</td>
</tr>
<tr>
<td>Conflict norms</td>
<td>4</td>
<td>0.81</td>
<td>3.56</td>
<td>0.63</td>
</tr>
<tr>
<td>Distributive justice</td>
<td>4</td>
<td>0.91</td>
<td>3.22</td>
<td>0.74</td>
</tr>
<tr>
<td>Cooperation</td>
<td>7</td>
<td>0.97</td>
<td>4.12</td>
<td>0.54</td>
</tr>
<tr>
<td><strong>Environmental Flux (ENVFLUX):</strong></td>
<td></td>
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### TABLE 2
**AVERAGE INTRA-CONTRACT AND INTER-CONSTRUCT CORRELATIONS**

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Note: The diagonal entries are the average intra-construct correlations and the off-diagonal entries are average inter-construct correlations.
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<tr>
<th>Construct Group</th>
<th>No. of Factors</th>
<th>$\chi^2_{(df)}$</th>
<th>NNFI</th>
<th>CFI</th>
<th>RMSR</th>
<th>$\Delta \chi^2_{(df)}$</th>
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<td>2307.31_{(5)}*</td>
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* $p<0.01$ for the difference in $\chi^2$ relative to the corresponding single factor model.
### TABLE 4
CORRELATIONS BETWEEN PERFORMANCE MEASURES

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<th>ADJSLS</th>
<th>Lagged SALES</th>
<th>Lagged ADJSLS</th>
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<tr>
<td>Perceived Performance (PERPERF)</td>
<td>0.32</td>
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<td>Perceived Sales Growth (PERSG)</td>
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<td>Perceived Profit Growth (PERPG)</td>
<td>0.28</td>
<td>0.24</td>
<td>0.20</td>
<td>0.18</td>
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<tr>
<td>Perceived Overall Profit (PEROP)</td>
<td>0.28</td>
<td>0.23</td>
<td>0.21</td>
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<tr>
<td>Perceived Labor Productivity (PERLP)</td>
<td>0.28</td>
<td>0.27</td>
<td>0.21</td>
<td>0.21</td>
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<tr>
<td>Perceived Cash Flow (PERCF)</td>
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<td>0.21</td>
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<td>Lagged PERPERF</td>
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TABLE 5
BIAS DUE TO ALL COMMON METHOD FACTORS

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<th>Dependent Variable</th>
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<td></td>
<td>PERPERF</td>
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<td>ADJSLS</td>
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<tr>
<td>Agent capabilities</td>
<td>0.074** (3.11)</td>
<td>0.081** (3.28)</td>
<td>-0.001 (-0.09)</td>
</tr>
<tr>
<td>Principal capabilities</td>
<td>0.034 (1.39)</td>
<td>0.026 (1.02)</td>
<td>0.007 (0.56)</td>
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<tr>
<td>Relationship quality</td>
<td>0.094** (3.83)</td>
<td>0.084** (3.32)</td>
<td>0.006 (0.46)</td>
</tr>
<tr>
<td>Environmental flux</td>
<td>0.016 (0.68)</td>
<td>0.024 (0.95)</td>
<td>0.016 (1.44)</td>
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<td>Environmental capacity</td>
<td>0.039 (1.46)</td>
<td>0.060** (2.20)</td>
<td>0.037** (3.01)</td>
</tr>
<tr>
<td>Distance to principal’s store</td>
<td>0.098 (1.28)</td>
<td>0.103 (1.25)</td>
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</tr>
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<td>Distance to market</td>
<td>-0.079 (-1.03)</td>
<td>-0.074 (-0.90)</td>
<td>--</td>
</tr>
<tr>
<td>Dedicated square footage</td>
<td>0.116** (4.27)</td>
<td>0.088** (3.08)</td>
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<tr>
<td>Dedicated FTE employees</td>
<td>0.026 (1.01)</td>
<td>0.023 (0.84)</td>
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</tr>
<tr>
<td>Number of years as agent</td>
<td>0.063* (1.94)</td>
<td>0.069** (1.96)</td>
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<tr>
<td>Respondent past employee</td>
<td>0.039 (0.35)</td>
<td>0.101 (0.85)</td>
<td>-0.069 (-0.92)</td>
</tr>
<tr>
<td>Survey response number</td>
<td>0.021 (0.93)</td>
<td>0.035 (1.51)</td>
<td>0.034** (3.93)</td>
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<td>Adjusted sales</td>
<td>0.307** (10.88)</td>
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Note: t-statistics are in parentheses
**p<0.05;  *p<0.10
### TABLE 6
BIAS DUE TO TIME VARIANT COMMON METHOD FACTORS

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<tr>
<th>Independent Variable</th>
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<th>Change in ADJSLS</th>
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<td>Change in principal capabilities</td>
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<td>-0.006</td>
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<td>(-0.28)</td>
<td>(-0.17)</td>
<td>(1.01)</td>
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<td>Change in relationship quality</td>
<td>0.081**</td>
<td>0.087**</td>
<td>0.053*</td>
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<td></td>
<td>(2.54)</td>
<td>(2.70)</td>
<td>(1.66)</td>
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<td>(-1.41)</td>
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<td>(0.23)</td>
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<td>Change in environmental capacity</td>
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<td></td>
<td>(-1.22)</td>
<td>(-1.01)</td>
<td>(1.99)</td>
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<td>Survey response number</td>
<td>-0.066**</td>
<td>-0.084**</td>
<td>-0.175**</td>
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<td></td>
<td>(-2.09)</td>
<td>(-2.71)</td>
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<tr>
<td>Change in adjusted sales</td>
<td>0.105**</td>
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<td></td>
<td>(3.33)</td>
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Note: t-statistics are in parentheses

**p<0.05;  *p<0.10
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<td>Principal capabilities</td>
<td>0.044 (0.61)</td>
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<td>Relationship quality</td>
<td>0.345** (4.71)</td>
<td>-0.101 (-1.31)</td>
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<td>Environmental change</td>
<td>-0.001 (-0.02)</td>
<td>-0.054 (-0.71)</td>
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<td>0.274** (3.53)</td>
<td>0.193** (2.34)</td>
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<td>Distance to principal’s store</td>
<td>-0.095 (-0.45)</td>
<td>-0.165 (-0.67)</td>
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<tr>
<td>Distance to market</td>
<td>0.402* (1.87)</td>
<td>0.353 (1.43)</td>
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<td>Dedicated square footage</td>
<td>0.198** (2.21)</td>
<td>0.080 (0.76)</td>
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<td>Dedicated FTE employees</td>
<td>0.138* (1.83)</td>
<td>0.139 (1.34)</td>
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<td>-0.157 (-1.55)</td>
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<td>0.143 (0.40)</td>
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<td>0.097 (1.47)</td>
<td>0.114 (1.60)</td>
</tr>
</tbody>
</table>

Note: t-statistics are in parentheses
**p<0.05;  *p<0.10

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APPENDIX A
LIST OF SURVEY ITEMS

I. AGENT CAPABILITIES

Customer Orientation (Kumar, Stern, and Achrol, Journal of Marketing 1992)
It is very important for our xxx business that we...
Go out of our way to satisfy xxx' customers
Solve customers' problems involving xxx' products and services
Willingly accept returns of xxx products from our customers

Adaptation (Kumar, Stern, and Achrol, Journal of Marketing 1992)
It is very important for our xxx business that we...
Change our selling tactics for xxx' products to match the market trends
Find creative ways to market xxx' products and services
Be responsive to seasonal sales fluctuations (e.g., by changing hours of operations, staff, local advertising)

Service Quality (Dabholkar, Johnston, and Cathey, Journal of the Academy of Marketing Science 1994)
Our store performs the service right the first time
Our customers feel safe in their transactions with us
Our employees are consistently courteous to our customers
When a customer has a problem, we show a sincere interest in solving it

Competence (Kumar, Stern, and Achrol, Journal of Marketing 1992)
We have the detailed knowledge of xxx' product lines which makes us an effective xxx agent
We understand xxx' business procedures and can help customers that require special assistance in dealing with xxx
We have invested considerable time and money in educating and training our employees to be more competent in selling xxx products

Compliance (Kumar, Stern, and Achrol, Journal of Marketing 1992)
We willingly agree to participate in xxx’ marketing programs when asked
We usually conform to xxx' accepted procedures for handling merchandise
We report all required information on our market and business accurately and on time

II. PRINCIPAL CAPABILITIES

Service Quality (Parasuraman, Zeithaml, and Berry, Marketing Science Institute 1986)
xxx' employees are knowledgeable and courteous to their customers
xxx treats its customers with considerate individualized attention
xxx' employees inspire trust and confidence in their customers

Operational Support
xxx’ management usually responds promptly to my needs and problems
Assistance from xxx for keeping operations running smoothly is readily available.
xxx provides me with substantial computer and/or phone support
xxx’ ASMs are always available to help us solve any day-to-day operational problems

6 Literature sources from which the scales are adapted are listed in parentheses wherever applicable.
**Product Quality**

xxx' soft goods lines represent superior value for our customers

xxx' soft goods lines have enough variety and assortment

xxx' big ticket items provide a rich assortment to the customers

xxx' big ticket goods represent superior value for our customers

I can count on xxx to acquire quality goods from the best suppliers

xxx' suppliers usually provide quality soft goods at attractive prices

xxx' big ticket items offer the right quality at the right price

**Trustworthiness** *(Crosby, Evans, and Cowles, Journal of Marketing 1990)*

I can count on xxx to be honest in their dealings with me

xxx is a company that stands by its word

I can rely on xxx to keep the promises they make to me

xxx is sincere in its dealings with me

xxx can be counted on to do what is right

xxx is a company that I have great confidence in

**III. RELATIONSHIP QUALITY**

**Flexibility** *(Kaufmann and Dant, Marketing Letters 1992)*

We would willingly make adjustments to help out xxx when faced with special problems or circumstances

We would gladly set aside the contractual terms in order to work through difficult situations with xxx

xxx willingly makes adjustments to help us out when we are faced with special problems or circumstances

xxx gladly sets aside the contractual terms in order to work with us in difficult times

**Mutuality** *(Kaufmann and Dant, Marketing Letters 1992)*

Even if costs and benefits are not evenly shared between us in a given time period, they balance out over time

We each benefit and earn in proportion to the efforts we put in

My business usually gets a fair share of the rewards and cost-savings in doing business with xxx

In our relationship, none of us benefits more than one deserves

**Conflict Norms** *(Smith and Barclay, Marketing Science Institute 1995)*

In our relationship with xxx...

Differences of opinion are encouraged and seen as beneficial

What conflict there is in our relationship tends to be beneficial in the long run

Conflict is not seen as harmful by itself as it does not prevent us from getting the work done

The way disputes are handled eventually bring us closer together

**Distributive Justice** *(Kumar, Scheer, and Steenkamp, Journal of Marketing Research 1995)*

Our earnings from xxx catalogue agency business are fair given...

The duties and responsibilities that I perform for xxx

What other xxx agents earn in markets similar to mine

What xxx earns from its sales through my catalogue store

The contributions I make towards xxx' marketing effort in my market

**Cooperation** *(Dant, Unpublished Doctoral Dissertation, Virginia Tech., 1986)*

We have a mutually beneficial relationship

We can work together well in this business
We can count on xxx to be a team player
We have a fair and equitable relationship
We look after each other's interest in this relationship
Neither party makes demands that might harm the other

IV. ENVIRONMENT

*Environmental Capacity* (*Achrol and Stern, Journal of Marketing Research 1988*)
For xxx Catalog Business in our local sales territory...
The potential for growth in sales is high
The demand for xxx products or brands is high
The potential for growth in total employment is high
The potential for growth in retail establishments is high
The general consumer purchasing levels are up

*Environmental Diversity* (*Achrol and Stern, Journal of Marketing Research 1988*)
Our customers are very diverse in terms of their...
Incomes, professions, social-class, and education
Preferences for the variety of products they want to purchase
Product price/quality preferences
Credit needs
Service needs (e.g., sales assistance/advice, product servicing/installation)

*Environmental Dynamism* (*Achrol and Stern, Journal of Marketing Research 1988*)
Major changes have occurred in our local xxx Catalog business in terms of...
Competitors’ mix of products/brands
Competitors’ sales strategies
Customer tastes/preferences in product features
Customer tastes/preferences in brands

V. AGENT PERFORMANCE

*Perceived Performance* (*Lusch and Brown, Journal of Marketing 1996*)
As compared to other similar xxx agents, our performance is very high in terms of...
Sales growth
Profit growth
Overall profitability
Labor productivity
Cash flow

VI. DEMOGRAPHIC VARIABLES

*Distance to Principal’s Store*
The nearest xxx retail store is approximately _____________ miles away from my agency.

*Distance to Market*
The nearest set of shops (or market) is approximately _____________ miles away from my agency.
Dedicated Square Footage
My retail store has a shop floor area of about ______ sq. ft., of which about ______ sq. ft. are dedicated to xxx.

Dedicated FTE Employees\textsuperscript{7}
Not counting myself, I usually have _____ full time employees at this store, of which _____ assist with xxx business. Also, I usually have ____ part time employees at this store, of which ____ assist with xxx business.

Number of Years as Agent
I have been a xxx merchant agent since the year 19____.

Past Employee
I was once a xxx employee: \hspace{1cm} \square \text{Yes} \hspace{1cm} \square \text{No}

\textsuperscript{7} Computed as number of full time employees assisting with xxx business plus 50\% of number of part-time employees assisting with xxx business.
REFERENCES


