6-1-2008

A Short Form Of The Maximization Scale: Factor Structure, Reliability And Validity Studies

G. Y. Nenkov

M. Morrin

Andrew Ward
Swarthmore College, award1@swarthmore.edu

Barry Schwartz
Swarthmore College, bschwar1@swarthmore.edu

J. Hulland

Judgment and Decision Making, Vol. 3, No. 5, June 2008, pp. 371–388

A short form of the Maximization Scale: Factor structure, reliability and validity studies

Gergana Y. Nenkov*
Department of Marketing
Boston College

Maureen Morrin
Department of Marketing
Rutgers University

Andrew Ward
Department of Psychology
Swarthmore College

Barry Schwartz
Department of Psychology
Swarthmore College

John Hulland
Department of Marketing
University of Pittsburgh

Abstract

We conducted an analysis of the 13-item Maximization Scale (Schwartz et al., 2002) with the goal of establishing its factor structure, reliability and validity. We also investigated the psychometric properties of several proposed refined versions of the scale. Four sets of analyses are reported. The first analysis confirms the 3-part factor structure of the scale and assesses its reliability. The second analysis identifies those items that do not perform well on the basis of internal, external, and judgmental criteria, and develops three shorter versions of the scale. In the third analysis, the three refined versions of the scale are cross-validated to confirm dimensionality, reliability, and validity. The fourth analysis uses an experiment in an investment decision making context to assess the reliability and nomological validity of the refined scales. These analyses lead us to conclude that a shorter, 6-item Maximization Scale performs best and should be used by future researchers. It is hoped that clarification of the conceptual underpinnings of the maximization construct and development of a refined scale will enhance its use among researchers across several of the social science disciplines.

Keywords: maximizing, satisficing, scale refinement, psychometric analysis.

1 Introduction

Researchers have long recognized that decision making is an adaptive process, with individuals making tradeoffs between accuracy and effort (e.g., Payne et al., 1988). However, Schwartz et al. (2002) have suggested that the tendency to optimize when making decisions may manifest as a dispositional variable, and they formalized a distinction between maximizers and satisficers as an individual difference. Whereas some people consistently try to choose the "best," others tend to "satisfice" and settle for options that are simply good enough (Simon, 1955). Schwartz, and his colleagues (2002) proposed that this difference may represent a general behavioral tendency, and they developed a scale to capture the distinction between decision makers who tend to "maximize" and those who tend to satisfice.[1]

Schwartz et al. (2002) validated the Maximization Scale across a number of survey and experimental studies. It was administered to over 1700 participants in the U.S. and Canada, ranging in age from 16 to 81 and coming from diverse ethnic backgrounds. The results indicated that maximizers tend to pursue the best option, not simply an option that is good enough, and are constantly asking themselves "is this the best outcome" rather than "is this a good outcome?" In addition, an examination of the relation between scores on the Maxi-

*The authors gratefully acknowledge support for this research provided by a generous grant from the FINRA (formerly NASD) Investor Education Foundation (#2005–08). The authors would like to thank Tilottama Chowdhury, Samuel M. Y. Ho, Matt Wallaert, Rachael E. Wells, and the authors of the original Maximization scale — Barry Schwartz, Andrew Ward, John Monterosso, Sonja Lyubomirsky, Katherine White, and Darrin R. Lehman for generously providing their datasets for the analysis in this paper, and Arch Woodside for his comments on an earlier version. Address: Gergana Y. Nenkov, Carroll School of Management, Boston College, Fulton 450D, Chestnut Hill, MA 02467. Email: gergana.nenkov@bc.edu.

[1] Examples of items in the Maximization Scale are: "When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I am relatively satisfied with what I'm listening to" and "I often find it difficult to shop for a gift for a friend." People who score above the median on this scale are typically classified as maximizers, whereas those who score below the median are typically called satisficers.

mization Scale and a range of psychological correlates, including regret, happiness, depression, optimism, self-esteem, perfectionism, neuroticism, and subjective well-being showed that not only do maximizers exhibit a different style of decision-making from satisficers, but they also appear to experience different emotional concomitants of decisions. They experience higher levels of regret and dissatisfaction than satisficers, and are less happy, more depressed and less optimistic than satisficers (Iyengar et al., 2006; Schwartz et al., 2002). They are also more affected by social comparison, especially upward social comparison, than satisficers. Thus, the maximizing strategy seems not only to be associated with the choice process, but also with experience after the choice has been made, perhaps including satisfaction with life as a whole. The phenomenon wherein the context of choice affects the context of experience has elsewhere been referred to as "leakage" (Keys & Schwartz, 2007).

Iyengar and her colleagues (2006) subsequently studied college seniors looking for jobs, and found that students possessing maximizing tendencies pursued more job opportunities and obtained starting salaries almost 20% higher than those offered to satisficers. Despite their relative success, however, maximizers were less satisfied with the outcomes of their job search, and more pessimistic, stressed, overwhelmed, and depressed by the job search process. In other domains, researchers have examined the impact of maximization on gift giving behavior (Chowdhury et al., 2008), retirement investing (Morrin et al., 2008) and post-decisional regret (Huang & Zeelenberg, 2008).

Since the Maximization Scale was first published, it has been employed in numerous studies in different countries, and the maximization construct appears to be of growing interest to researchers in various domains (e.g., Chowdhury et al., 2008; Hackley 2006; Iyengar et al., 2006; Morrin et al., 2008; Zeelenberg & Pieters, 2007). Given this increasing interest, a reexamination of the Maximization Scale and its measurement properties is warranted. The current paper examines the reliability, factor structure, and validity of the Maximization Scale, and also proposes several refined, shorter forms of the scale.

Development of shorter forms of the Maximization Scale is important because, especially when maximization is not the focal interest of research, a short scale will allow researchers to include this construct in large, multivariate studies without making survey instruments excessively long (Smith et al., 2000). Perhaps more important, the existing Maximization Scale is a candidate for refinement because both past research employing the scale and the current set of analyses, reported below, suggest that the original 13-item scale contains several items that tend not to perform well psychometrically and thus should be considered for elimination. In addition, the original Schwartz et al. (2002) study suggested that the scale could be analyzed into three distinct factors — one reflecting choice difficulty, one reflecting difficulty with large numbers of options, and one reflecting high standards. Nothing has been done since to confirm the existence of these three factors. Further analysis is warranted both because these factors suggest different psychological processes and because the original Schwartz et al. (2002) results were less than ideal with respect to factor structure.

The analysis below suggests that a shorter, 6-item version of the Maximization Scale not only performs adequately, but actually performs at a level superior to the original, 13-item scale. We also define more carefully and examine the three dimensions of maximization reported by Schwartz et al. (2002) and conclude that they are differentially predictive of various psychological characteristics of respondents. Therefore future researchers are advised to examine not only peoples' maximization scores but their sub-dimension scores as well.

Having a shorter, yet more valid and reliable instrument with which to measure people's tendency to maximize should enhance research efforts that examine how people's tendencies to maximize or satisfice during the choice process affect their decisions and choices, and ultimately their happiness and well-being.

In order to re-examine the original Maximization Scale, and develop a refined, shorter version that exhibits superior psychometric properties, we conduct four sets of analyses. Analysis 1 examines the internal consistency and the dimensional purity of the Maximization Scale using ten pre-existing datasets that included the maximization construct. Analysis 2 uses the same ten datasets to develop refined, shorter versions of the Maximization Scale (9-item, 6-item, and 3-item versions). Analyses 3 and 4 independently establish the reliability and validity of the newly developed scales, as recommended by Smith et al. (2000): in Analysis 3 we cross-validate the newly developed refined scales using the ten datasets previously employed, plus two new datasets, and in Analysis 4, we collect additional data to assess and validate further the newly developed refined Maximization Scales.

Bearden and Netemeyer (1999) summarized the psychometric qualities of a sound measurement instrument: content validity, dimensionality, internal consistency, reliability, and construct validity. In this paper, we evaluate the Maximization Scale using all of these criteria and then develop several refined forms of the scale for comparison purposes. In the process of revising the Maximization Scale, we followed a set of rules and procedures consistent with past work (Richins, 2004; Smith et al., 2000; Stanton et al., 2002). In our analyses, we rely on the internal, external, and judgmental criteria proposed by Stan-

Table 1: Samples used in Analyses 1, 2, 3, and 4.

Data set	Sample	Sample size	13-Item Maximization mean (s.d.)	Data set used in Analysis #
1.	USA , general population	749	3.46 (0.82)	1, 2, 3
2.	USA, general population	87	4.33 (0.84)	1, 2, 3
3.	Italy, general population	1023	4.18 (0.85)	1, 2, 3
4.	USA & Canada, students & general population	1725	3.88 (0.91)	1, 2, 3
5.	USA, students	102	4.25 (0.85)	1, 2, 3
6.	USA, general population	92	3.62 (0.80)	1, 2, 3
7.	USA, general population	499	4.41 (0.86)	1, 2, 3
8.	USA, students	219	4.57 (0.61)	1, 2, 3
9.	China, general population	605	4.20 (0.79)	1, 2, 3
10.	USA, students	99	4.36 (0.78)	1, 2, 3
11.	USA, general population	111	2.00 (1.00)	3
12.	USA, general population	523	5.54 (1.07)	3
13.	USA, researchers (content validity survey)	8	NA	2
14.	USA, students (readability survey)	40	NA	2
15.	USA, general population (investment study)	176	3.23 (0.54)	4

Notes: Of the 12 preexisting samples, #1 to #10 contained the 13-item version of the scale, and #11 and #12 contained the 9-item version of the scale. In all samples maximization is measured on a 7-point scale, except for samples 11 and 15, where it is measured on a 5-point scale and sample 12 where it was measured on a 9-point scale.

ton et al. (2002). Internal criteria relate to the internal consistency and dimensionality of a measured construct, external criteria are explicitly concerned with construct validity, and judgmental criteria deal with assessment of content validity and readability (Richins, 2004). Furthermore, we follow the procedure recommended by Smith et al. (2000) in order to avoid the common sins of short scale development.

The research presented here is based on an analysis of pre-existing datasets and new data. There were 12 pre-existing datasets, representing a total of over 5,800 respondents, which were obtained from several authors, across several disciplines, in both the U.S. and overseas, (see Table 1). The new data were collected in three studies: (1) a questionnaire administered to academic researchers (n = 8) regarding the content validity of the Maximization Scale; (2) a survey of a general population sample (n = 40) that assessed readability of the individual scale items; and (3) an experiment in the domain of investment decision making with a sample of adult participants (n = 176) that tested both the new and original versions of the scale.

2 Analysis 1: Reassessing the Maximization Scale

The purpose of Analysis 1 was to assess the psychometric properties of the original Maximization Scale. More specifically, we used 10 pre-existing samples that contained the original 13-item Maximization Scale to assess the scale's dimensionality, internal consistency, and construct validity.

2.1 Data

We used datasets #1 to #10 in Table 1, since they contained the original 13-item Maximization Scale, while datasets #11 and #12 contained only the 9-item scale version. The datasets were obtained by contacting researchers in the fields of psychology and consumer behavior who have used the scale in their published and unpublished research. They were used to evaluate the original 13-item scale using three criteria: dimensionality, internal consistency, and construct validity.

Table 2: Analysis 1: Factor structure of the original 13-item scale. (Loadings on appropriate factors from confirmatory factor analysis are averaged across ten samples.)

Item	Factor 1	Factor 2	Factor 3
1. When I watch TV, I channel surf, often scanning through the available options even while attempting to watch one program.	.68		
2. When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I am relatively satisfied with what I'm listening to.	.69		
3. I treat relationships like clothing: I expect to try a lot on before finding the perfect fit.	.29		
4. No matter how satisfied I am with my job, it's only right for me to be on the lookout for better opportunities.	.36		
5. I often fantasize about living in ways that are quite different from my actual life.	.29		
6. I'm a big fan of lists that attempt to rank things (the best movies, the best singers, the best athletes, the best novels, etc.).	.28		
7. I often find it difficult to shop for a gift for a friend.		.57	
8. When shopping, I have a hard time finding clothing that I really love.		.54	
9. Renting videos is really difficult. I'm always struggling to pick the best one.		.61	
10. I find that writing is very difficult, even if it's just writing a letter to a friend, because it's so hard to word things just right. I often do several drafts of even simple things.		.48	
11. No matter what I do, I have the highest standards for myself.			.72
12. I never settle for second best.			.75
13. Whenever I'm faced with a choice, I try to imagine what all the other possibilities are, even ones that aren't present at the moment.			.37

2.2 Results

Dimensionality. Exploratory factor analysis (EFA) was conducted first for all 10 datasets used in this analysis in order to explore the factor structure of the scale. Results from the EFA revealed that the three-factor model proposed by Schwartz et al. (2002) was not always supported (e.g., there were items that loaded onto more than one factor). Overall, however, results were largely consistent with findings reported by Schwartz et al. and revealed three principal factors. Schwartz et al. referred to one of these factors as "high standards," while the other two were not explicitly labeled but were noted as being more behaviorally-oriented.

Next, confirmatory factor analysis (CFA) was conducted for all ten datasets. Using Lisrel 8.72[2] we estimated a second-order factor model in which maximization was the higher-order factor and the three maximization dimensions proposed by Schwartz et al. (2002) and uncovered in our EFA were second-order factors, each represented by its respective scale items. We label the first dimension, which measures the tendency to seek better options, *alternative search*. The second dimension we label *decision difficulty*, as it represents the difficulty associated with choosing and making decisions. Finally, the third dimension, which represents decision makers' tendency to hold high standards for themselves and things in general, we label, in accord with Schwartz et al. (2002), *high standards*.

The confirmatory factor analysis revealed some problematic items, as six out of the thirteen items in the scale had factor loadings below .50 (see Table 2 for the 13 items and their average CFA factor loadings).

CFA model fit indices were found to vary considerably across the samples as summarized in Table 3. The root mean square error of approximation ranged from .05 to .11, and in some of the samples it exceeded the recommended levels of .06 (Hu & Bentler, 1999; Hulland et al., 1996), suggesting that one or more of the items was not performing well.

Internal consistency. The coefficient alphas for the 13-item Maximization Scale ranged from .54 to .75, with a mean alpha of .70 (see Table 3). The mean alphas for the subscales were .60 for the alternative search subscale, .62 for the decision difficulty subscale, and .61 for the

[2] Available from Scientific Software International, Lincolnwood, IL, 60712, U.S.A.

high standards subscale. A commonly adopted convention is to claim satisfactory internal consistency if alpha is greater than 0.70 (Nunnally & Bernstein, 1994), so internal consistency of the original Maximization Scale and its dimensions is close to recommended levels, yet varies somewhat across samples.

Construct validity. The 10 datasets used in this analysis contained measures of four variables that have been hypothesized to correlate with maximization. The four variables were regret (Schwartz et al., 2002; 10 samples), subjective happiness (Lyubomirsky & Lepper, 1997; 5 samples), optimism (Scheier et al., 1994; 2 samples), and depression (Beck et al., 1961; 3 samples). These measures are described in more detail in Analysis 4. Schwartz and his colleagues found that a tendency for people to be maximizers rather than satisficers was significantly correlated with a tendency to experience more regret and depression, as well as to be less optimistic, and less happy (Schwartz et al., 2002).

Observed correlations ranged from .02 to .52. The validity index (average correlation) for maximization was .28. The construct validity of the subscales was also evaluated and is reported in Table 3. The validity indices for the high standards subscale varied considerably from sample to sample and ranged from -.03 to .22, which points to some potential problematic characteristics associated with this particular dimension.

2.3 Summary

The analysis conducted here examined the psychometric properties of the original Maximization Scale using 10 pre-existing datasets that contained the scale along with four related psychological measures. Results suggest that the Maximization Scale possesses reasonable internal consistency and construct validity. However, given the significant variation in the coefficients of reliability, validity, and model fit across samples, we conclude that some of the scale's psychometric properties are unsatisfactory. The dimensionality of the scale is particularly problematic, as the confirmatory factor analysis we conducted revealed that the second-order factor model with maximization as the higher-order factor and the three scale sub-dimensions as second-order factors, which was proposed by Schwartz et al. (2002), does not always fit the data well, as evidenced by the CFA goodness of fit indices and by the fact that about half of the scale items had low factor loadings. This issue is further explored in Analysis 2, which goes beyond examining the psychometric properties of the scale and looks into the properties of individual scale items in an attempt to identify items that have sub-optimal properties and could be eliminated from the scale.

Table 3: Analysis 1: Reliability, dimensionality, and validity of full 13-item Maximization Scale

	Range	Mean
Cronbach's alpha[a]		
Maximization summed scale	.54 to .75	.70
Alternative Search dimension	.40 to .68	.60
Decision Difficulty dimension	.52 to .69	.62
High Standards dimension	.53 to .68	.61
CFA fit indices[b]		
RMSEA	.05 to .11	.07
GFI	.83 to .96	.91
AGFI	.75 to .95	.88
CFI	.74 to .90	.83
Validity Index[c]		
Maximization summed scale	.02 to .52	.28
Alternative Search dimension	.14 to .38	.23
Decision Difficulty dimension	.20 to .27	.25
High Standards dimension	–.03 to .22	.08

Notes: CFA — confirmatory factor analysis; RMSEA — root mean square error of approximation, GFI — goodness of fit index; AGFI — adjusted goodness of fit index; CFI — comparative fit index.

[a] Higher alpha indicates better internal consistency.

[b] Superior fit is indicated by lower RMSEA values, and higher GFI, AGFI, and CFI indices.

[c] Average absolute value of correlations with four criterion variables: regret (averaged across 10 samples), optimism (2 samples), subjective happiness (5 samples), and depression (3 samples).

3 Analysis 2: Item analysis and development of refined short scales

The purpose of Analysis 2 was twofold: 1) to identify the best and worst performing items in the original Maximization Scale, and 2) to develop refined, shortened versions of the scale. In this analysis we followed established procedures for reducing scale length (Richins, 2004; Stanton et al., 2002), and evaluated the scale's items using internal, external, and judgmental criteria. We then proceeded to selecting the best performing items to be included in three short, refined versions of the scale.

3.1 Data

The same ten datasets used in Analysis 1 and described in Table 1 were used for this analysis.

3.2 Item analysis

In order to select items for a refined scale, we evaluated individual scale items based on internal, external, and judgmental criteria. Detailed item analysis results for the four internal, one external, and two judgmental criteria we employed are shown in Appendix A and are discussed below.

Internal criteria. As discussed above, the dimensionality of the original Maximization Scale is somewhat problematic, and thus criteria pertaining to the interrelations of scale items are especially important in improving the psychometric properties of the scale. To this end, we used four measures of internal item quality: (1) average item-total correlation; (2) average item-subscale correlation; (3) item factor loadings from confirmatory factor analysis; and (4) residuals index. High residuals indicate greater differences between the hypothesized covariance matrix of a second-order, three-factor model, and the actual covariance matrix, which suggests poor fit of the model. This index presents the average number of times that each variable was in a variable pair with a residual greater than 0.15.

Items 3, 5, 6, 8, 10, 11 and 12[3] had low item-total correlations, and 3, 5, 6, and 13 also had low item-subscale correlations. Items 3, 5, 6, 10, and 13 had low CFA factor loadings on their respective factors, and Items 4, 5, 6, and 13 were most frequently implicated in high residuals in the CFA analysis.

External criteria. A refined, short version of an established scale should have the same nomological network as the original measure. That is, the shorter scale should correlate with the same criterion variables, and to the same magnitude as the full scale (Richins, 2004). To achieve this objective, it is recommended that item-level indices of external item quality be calculated (Richins, 2004; Stanton et al., 2002). These indices reflect the performance of each item relative to a variety of criterion variables from the original measure's nomological net. For the purpose of establishing the items' external criteria quality, we used a validity index comprised of the average absolute value of the item-criterion correlation with four criterion variables that are conceptually related to maximization. These correlations were averaged across the datasets that contained these criterion variables. The four variables were regret, subjective happiness, optimism, and depression, as described in Analysis 1. Items 3, 11, and 12 were found to perform very poorly on this index.

Judgmental criteria. We used two judgmental measures of item quality: an assessment of content validity and an assessment of readability. In accordance with the recommendation of Smith et al. (2000) for a thorough content analysis, we evaluated the content validity of the total scale and subscales by assessing the extent to which each scale item was representative of the maximization construct and the maximization domain to which it belongs.

As recommended by Haynes and colleagues (1995) we used multiple judges of content validity and quantified judgments using formalized scaling procedures. Content validity was judged by a panel of eight scholars who had studied the maximization construct and agreed to take part in a mail survey, completing several seven-point scale items ranging from 1—*not representative* to 7—*very representative* of the construct and of the domain. Employing this criterion in the scale refinement process ensures that the target content domain of the original scale will be represented in the reduced scale (Smith et al., 2000).

Readability of the scale items was also assessed by asking a convenience sample of 40 adult respondents (45% female, ranging in age from 18 to 59, and covering a wide range of education levels) about the ease with which each maximization item could be understood "by a person who has slightly less education than you do," using seven-point scales ranging from 1—*not very easy to understand* to 7—*very easy to understand*.

Results from the judgmental criteria analysis revealed that items 3, 5, 6, 10, and 11 were rated as less representative of the maximization construct, and Items 5, 6, and 13 were rated as less representative of their respective subscales. Overall, all of the items were judged to have good readability, with items 5, 7, 9, and 10 somewhat lower on this index.

3.3 Selecting items for the refined short scales

We investigate three reduced scales: a 9-item scale, a 6-item scale, and a 3-item scale. When items need to be selected for inclusion in a refined scale, it is recommended that items be sorted in order of performance on external, internal, and judgmental criteria (Stanton et al., 2002). When the performance of an item conflicts across these criteria, the researcher's judgment is used to resolve the conflict. Richins (2004), however, has noted that performance on the three sets of criteria tends to operate in an interdependent fashion, with scale quality depending on a combination of all three factors; hence, there is no single criterion that is more important than the rest, and items

[3]The order of items we are using in the paper is consistent with the order presented in Table 2.

Table 4: Analysis 2: Shortened Maximization Scales.

	Alternative search	Decision difficulty	High standards
Nine item scale	1. When I watch TV, I channel surf, often scanning through the available options even while attempting to watch one program. 2. When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I am relatively satisfied with what I'm listening to. 4. No matter how satisfied I am with my job, it's only right for me to be on the lookout for better opportunities.	7. I often find it difficult to shop for a gift for a friend. 8. When shopping, I have a hard time finding clothing that I really love. 9. Renting videos is really difficult. I'm always struggling to pick the best one.	11. No matter what I do, I have the highest standards for myself. 12. I never settle for second best. 13. Whenever I'm faced with a choice, I try to imagine what all the other possibilities are, even ones that aren't present at the moment.
Six item scale	2. When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I am relatively satisfied with what I'm listening to. 4. No matter how satisfied I am with my job, it's only right for me to be on the lookout for better opportunities.	7. I often find it difficult to shop for a gift for a friend 9. Renting videos is really difficult. I'm always struggling to pick the best one.	11. No matter what I do, I have the highest standards for myself. 12. I never settle for second best.
Three item scale	2. When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I am relatively satisfied with what I'm listening to.	9. Renting videos is really difficult. I'm always struggling to pick the best one.	11. No matter what I do, I have the highest standards for myself.

that are retained in a short scale need to perform well on all criteria.

Item selection for the shortened scales followed the above-mentioned recommended process. Our target in creating the shorter scales was to weigh the three dimensions of maximization equally; therefore, we constructed the 9-item scale so that it included three items for each of the three dimensions, the 6-item scale included two items for each dimension, and the 3-item scale included one item for each dimension. Because it is not recommended to use only one item to measure a construct or a construct's dimension (see Bergkvist & Rossiter, 2007; Nunnally & Bernsein, 1994), the 3-item scale is not likely to be useful in practice. We nevertheless report our findings for the 3-item scale for the sake of completeness and for the purpose of comparing them with findings for the two other shortened scales.

The proposed 9-item, 6-item, and 3-item shortened scales are presented in Table 4 and the item selection process used to derive these scales is described below. We first deal with the item selection process for the 9- and 6-item scales and then describe the 3-item scale item selection process.

For the alternative search dimension, items 1, 2, and 4 were retained for the 9-item scale as they performed well on all criteria. Item 5 performed well on the external criteria, but performed poorly on all other indices and was less representative of the maximization construct and the alternative search domain than the other items. For the 6-item scale, items 2 and 4 were retained. Items 1 and 2 are very similar to each other in terms of content, and to retain both might overly restrict the content validity of this dimension (through inadequate domain sampling). Because item 2 is superior to the other items on all criteria, it was favored over item 1.

For the decision difficulty dimension, item 10 was dropped for the 9-item scale, and items 10 and 8 were dropped for the 6-item scale. Item 10 performed well

on the external criteria index, but it was lower than the other items on both the internal and judgmental criteria. Item 8 was dropped for the 6-item scale, as the internal and judgmental criteria suggested it was less representative of both the maximization construct and the decision difficulty domain than were items 7 and 9.

The high standards dimension from the original Maximization Scale consists of only three items, so all three were included in the 9-item scale. For the 6-item scale, there was a conflict between the items' performance across the three criteria. Items 11 and 12 performed well on internal and judgmental criteria, but poorly on external criteria. They were representative of the high standards subscale, as indicated by good factor loadings, good item-subscale correlations, and good validity subscale ratings. However, they did not correlate highly with the criterion variables expected to relate to maximization and also had a somewhat low item-total correlation. Item 13, on the other hand, correlated well with the criterion variables and had higher item-total correlations, but exhibited very low item-subscale correlations, low factor loadings, and low validity subscale ratings. Thus, item 13 appears to measure a construct that is distinct from maximization, yet nevertheless related to it. It is important to choose items with a high correlation with their respective subscale score, so that the retained set of items sufficiently represents each dimension (Smith et al., 2000). Therefore, we opted to retain items 11 and 12 for the 6-item reduced scale, as they are representative of the high standard dimension, whereas item 13 is not.

For the 3-item scales, in which only one item can be chosen to represent each domain, it is very important that the only item retained is representative of its respective domain. Therefore, the three items we chose were the ones that performed best on the item-subscale correlation index, and on the subscale validity judgmental index (i.e., items 2, 9 and 11).

3.4 Summary

To this point, we have assessed the psychometric properties of the Maximization Scale and found that it possesses some sub-optimal properties, which suggest that it is a good candidate for shortening. Next, we went one step further by examining the properties of the scale's individual items and identifying the best and worst performing items based on a number of internal, external, and judgmental criteria recommended in the literature (e.g., Stanton et al., 2002). We then used this information to propose 9-, 6-, and 3-item versions of the Maximization Scale. We now proceed to assessing the psychometric characteristics of the newly developed shortened scales in order to establish their reliability and validity.

4 Analysis 3: Cross-validation of the refined short Maximization Scales

The purpose of this analysis was to cross-validate the three shortened scales developed in Analysis 2 using both internal and external criteria. In order to cross-validate the newly-developed versions and to determine whether developing a such a Maximization Scale is warranted, we employed the following criteria (Richins, 2004): 1) the shortened scales should possess levels of reliability and validity similar to or better than those of the original scale, 2) content validity should be maintained by including measures for all three maximization dimensions, and 3) predictive validity of the shortened scale should be similar to or better than that of the original scale. In this study we used the ten datasets from Analyses 1 and 2 along with two new datasets not used in the previous analyses (datasets #11 and #12 in Table 1), which contained data only on the 9- and 6-item scales.

4.1 Psychometric characteristics of the shortened scales

Cronbach's alpha (Cronbach, 1951) was calculated for the 9- 6- and 3-item versions of the Maximization Scale, and the results are presented in Table 5. Even though shorter scales tend to have lower alpha coefficients since alpha increases with the number of scale items, the 9-item scale's alpha coefficients for the Maximization Scale and its sub-dimensions were only slightly lower than those of the 13-item scale, indicating good internal consistency for the former. As expected, alphas for the 6-item scale were lower. This drop was most pronounced for the alternative search dimension, likely the result of sacrificing some internal validity in order to preserve adequate domain sampling. It is notable that the alpha for the high standards dimension actually increased in the 6-item scale even though the number of items decreased. This increase resulted from the removal of item 13 in the 6-item scale, which, as discussed above, had very low correlations with the other two items on this sub-dimension. The alpha for the 3-item scale was even lower, given the fewer items involved, and exhibited significant variance across the samples, ranging from -.01 to .36, providing further confirmation for our recommendation against further use of the 3-item scale.

To examine model fit and dimensional characteristics of the shortened scales, confirmatory factor analyses were conducted using all 12 pre-existing datasets (datasets #1 to #12 in Table 1). We made use of a second-order factor model, with maximization as the higher-order factor, and the three maximization sub-dimensions as the first-order

Table 5: Analysis 3: Reliability and validity of shortened scales. 13-item scale estimates are based on samples #1 to 10; 9- and 6-item scale estimates are based samples #1 to 12 (see Table 1).

	13-item scale		9-items scale		6-items scale		3-items scale	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Cronbach's alpha[a]								
Maximization summed scale	.54 to .75	.70	.55 to .73	.63	.36 to .60	.47	–.01 to .36	.19
Alternative Search dimension	.40 to .68	.60	.46 to .71	.59	.22 to .58	.36	NA	NA
Decision Difficulty dimension	.52 to .69	.62	.48 to .69	.58	.37 to .63	.47	NA	NA
High Standards dimension	.53 to .68	.61	.44 to .78	.61	.52 to .79	.67	NA	NA
Validity Index[b]								
Maximization summed scale	.16 to .41	.28	.13 to .37	.25	.09 to .33	.22	.04 to .27	.14
Alternative Search dimension	.14 to .38	.25	.14 to .20	.18	.12 to .30	.20	NA	NA
Decision Difficulty dimension	.20 to .27	.24	.21 to .26	.24	.17 to .25	.21	NA	NA
High Standards dimension	–.07 to .21	.05	–.07 to .22	.04	–.10 to .13	–.02	NA	NA
Model Fit[c]								
Chi-square	88.6 to 423.4 *(62 df)*	193.6	27.8 to 175.7 *(24 df)*	81.8	1.8 to 20.4 *(6 df)*	8.19	NA	NA
RMSEA	.05 to .11	.07	.03 to .09	.07	0 to .08	.03	NA	NA
Goodness of fit index	.83 to .96	.91	.91 to .98	.95	.96 to 1.0	.99	NA	NA

[a] Higher alpha indicates better internal consistency, however alpha is directly proportional to the number of items in a scale and generally scales with more items have higher mean alpha values.
[b] Average absolute value of correlations with four criterion variables across the samples: regret (averaged across 11 samples), optimism (2 samples), subjective happiness (5 samples), and depression (3 samples). Higher values indicate superior validity.
[c] Superior fit is indicated by lower chi-square values, lower RMSEA values, and higher goodness of fit indices.

factors. Detailed results from the CFA analyses for the full 13-item model, as well as the 9- and 6-item models are presented in Appendix B.

As indicated by its superior CFA goodness-of-fit indices, which all exceed recommended levels (Hu & Bentler, 1999), the 6-item scale model provided best fit to the data, followed by the 9-item model. The original 13-item model provided the poorest fit. Furthermore, we examined whether the reduced models had a better fit than the full model by comparing chi-square values across the models. Results reveal that for all 12 samples, the 9-item model provides a significantly better fit to the data than the full 13-item model, as indicated by the likelihood ratio chi-square statistics, and the 6-item scale model provided a significantly better model fit than the 9-item scale for all but two samples. This analysis suggests that both the 9- and 6-item scales possess good model fit as indicated by superior goodness of fit coefficients, along with significant improvement in chi-square goodness of fit relative to the 13-item scale. In short, both constitute reasonable reduced versions of the original scale.

4.2 Validity assessment of the shortened maximization scales

A validity index was calculated for each shortened scale using those datasets that contain both maximization and related variables. This index represents the average of the absolute values of the maximization correlations with the four criterion variables in the datasets. Results of the validity assessment for the shortened scales are presented in Table 5. The mean validity index for the ten datasets which contained variables related to maximization was .25 for the 9-item version; .22 for the 6-item version; and .14 for the 3-item version. In comparison, the validity index for the full 13-item scale was .28. The validity indices of the 9- and 6- item scales were thus similar to that of the full 13-item scale. These results suggest that

shortening the Maximization Scale will not result in a significant loss of nomological validity.

We also examined the validity indices separately for each of the three maximization sub-dimensions. We found some variance in the sub-dimension indices (see Table 5), prompting further analysis of the correlations of the three sub-dimensions with the related variables. This analysis suggested that all three dimensions have consistent positive correlations with regret. However, we found some differences in the sub-dimension correlations with the other related variables. While the decision difficulty and alternative search dimensions correlated with happiness, depression, and optimism in the expected direction, the high standard dimension was not strongly related to any of these three variables. It seems that although having high standards relates positively to tendencies to experience regret, it does not necessarily decrease happiness, satisfaction with life, or optimism. These findings indicate that the three dimensions of maximization may be differentially related to different psychological traits, and it may be worthwhile for future research to examine not only peoples' scores on the summed Maximization Scale, but also their scores on its three sub-dimensions.

4.3 Summary

Results of the psychometric assessment of the shortened versions of the Maximization Scale provide evidence that a decision to develop a shorter version of the scale is indeed justified. In terms of internal criteria, the shorter scales possess good levels of reliability, have better dimensional characteristics, and provide better fit to the data than does the full scale. Results concerning external criteria also reveal that the shortened scales possess good nomological validity, as their validity indices indicate that the 9- and 6-item scales have correlations with criterion variables similar to those of the full scale.

Results from this study suggest that both the 6-item and 9-item shortened scales possess superior psychometric properties to those of the original 13-item scale. However, based solely on this analysis, we cannot conclude that the 9- and 6-item scales are more useful than the full scale, or recommend the use of one shortened scale over the other. In particular, the data described above were all derived from respondents' ratings for all 13 items of the Maximization Scale, and thus the shorter 9-, 6-, and 3-item scales were embedded in the larger set of 13 maximization items. A stronger test of the usefulness of the shortened scales requires that the scales be administered in a survey in which key items are isolated from the influence of surrounding items (Richins, 2004). In Analysis 4 we address this issue by administering separately the three versions of the Maximization Scale, which enables us to test the reliability and validity of the short scales on independent samples in which the full scale was not administered (Smith et al., 2000).

5 Analysis 4: Maximizing and investment decision making

The purpose of this study was to examine further the psychometric properties of the newly developed 9- and 6-item short scales in comparison to the original 13-item scale. In this study we collected data using the original and shortened Maximization Scales in different experimental conditions, each featuring a different version of the scale.

Included in this study was an explicit comparison of the predictive validity of the shortened scales with that of the original 13-item scale. In particular, we presented participants with a decision scenario in which they needed to evaluate a number of alternatives and make a choice in an investment context. We chose investing since it is a decision-making domain of growing importance, with more individuals than ever before participating in financial markets.

Based on prior research using the full Maximization Scale (Schwartz et al., 2002; Iyengar et al., 2006), we predicted that maximizers and satisficers would differ in their decision-making processes and behaviors, and maximizers, as compared to satisficers, would spend more time making a decision, search for more information before deciding, and find it more difficult to make a decision.

In addition to the decision scenario, we measured several additional variables that have been related to maximization in past research (Schwartz et al., 2002; Schwartz & Ward, 2004) in order to examine the correlations of these related variables with the shorter versions of the Maximization Scale as compared to their correlations with the original scale. Past research has argued that the proliferation of choice options can have a variety of negative effects on people's well-being (Schwartz 2000). These negative effects seem to be even more pronounced for people who tend to be maximizers. More specifically, increased opportunities for choice, coupled with the goal of getting the "best" of any situation, increases maximizers' potential to experience regret at having chosen suboptimally and makes them more unhappy and depressed than their satisficing peers (Schwartz & Ward, 2004). Furthermore, Schwartz and his colleagues (2002) investigated maximization's relationship with people's regret, depression, satisfaction with life, subjective happiness, perfectionism, and optimism. Using both survey and experimental procedures the authors identified maximizers as more prone to regret. They suggested that the potential for regret is ever present, because maximizers are always

asking themselves if the outcome they chose is the best and are always experiencing lingering doubt that they could have made a better choice. In accord with Schwartz (2000), they also uncovered a clear tendency for maximizers to report being significantly less happy, less satisfied with life, less optimistic, and more depressed than satisficers. In addition, the authors observed a positive correlation between maximization and perfectionism — the tendency to hold exceedingly high standards for oneself in variety of domains.

In this analysis we included measures assessing all these variables related to maximization in the past, as well as a measure of one additional personality variable - need for cognition. Need for cognition is conceptualized as the relative proclivity to process information and enjoy thinking, which we expect would be positively related to maximization (Cacioppo & Petty, 1982).

5.1 Method

5.1.1 Sample

Data were collected via an online survey, which was emailed to undergraduate and graduate students and staff members on three university campuses. Participants were offered a small cash incentive to participate or the opportunity to enter a lottery for a larger cash incentive. Participants were 211 adults (93 female) ranging from 25 to 65 years of age. Thirty-five people did not complete the entire online survey due to technical difficulties and were excluded from the analyses. The remaining 176 participants form the basis for our analyses.

5.1.2 Procedure

Participants were randomly assigned to one of three experimental groups, with one group receiving the reduced 6-item Maximization Scale, the second group receiving the reduced 9-item Maximization Scale, and the third group receiving the 13-item original Maximization Scale. The rest of the stimuli were identical across the three groups.

The questionnaire participants received described a scenario in which they had just begun working for a company that offered them an opportunity to invest in a 401(k) retirement plan. Study participants were given general information about 401(k) plans and told that they had $10,000 that they expected to invest in the 401(k) plan. They were then shown descriptions of 10 mutual funds presented in alphabetical order and were asked to indicate the percent of their investment that they would allocate to each of the funds. After making their choice, participants were asked to indicate the amount of time it took them to make a decision, whether they read all the fund information provided, whether they considered many funds before making a decision, and the level of difficulty of making a decision. Following these questions, participants filled out a version of the Maximization Scale (6-, 9-, or 13-item), as well as measures of the traits described below. All variables were measured on a scale of 1—*strongly disagree* to 5—*strongly agree,* except for depression, which was measured on a scale of 1–*rarely* to 3–*most of the time*. Finally, we asked participants to indicate their age and gender.

5.1.3 Measures

Regret. The regret scale developed by Schwartz and colleagues (2002) consists of five items measuring people's tendency to experience regret about their choices. The average regret score for our sample was 3.18 (*SD* = .79; α = 0.76).

Depression. We measured depression using a short form of the Center for Epidemiologic Studies-Depression scale (CES-D) (Cole et al., 2004), which is a 10-item depression screening tool for general populations. The average depression score for our sample was 1.86 (*SD* = .31; α = 0.71).

Perfectionism. We measured perfectionism using a 15-item scale measuring self-oriented perfectionism—people's tendency to strive to be perfect in everything they do (Hewitt & Flett, 1990). The average perfectionism score for our sample was 3.61 (*SD* = .67; α = 0.90).

Satisfaction with life. The satisfaction with life scale developed by Diener and his colleagues (1985) is a 5-item scale that measures global life-satisfaction as a cognitive-judgmental process. This scale measures the concept of life satisfaction by asking participants for an overall judgment of their life. The average satisfaction with life score for our sample was 3.58 (*SD* = .93; α = 0.90).

Subjective happiness (SHS). The SHS scale (Lyubomirsky & Lepper, 1997) is a 4-item measure of dispositional happiness. This scale provides a global, subjective assessment of whether one is a happy or an unhappy person. The average SHS score for our sample was 3.88 (SD = .83; α = 0.86).

Optimism. The optimism scale (Scheier et al., 1994) is a 6-item scale measuring dispositional optimism. It describes peoples' generalized positive/negative outcome expectancies about the future. The average optimism score for our sample was 3.72 (*SD* = .69; α = 0.82).

Need for cognition (NFC). Need for cognition is conceptualized as the relative proclivity to process information (Cacioppo & Petty, 1982). We used a short version of the NFC scale (Wood & Swait, 2002), which consists of five reverse-scored items measuring peoples' tendency to engage in and enjoy thinking in general. The average NFC score in our sample was 4.08 (*SD* = .89; α = 0.89).

5.2 Results and discussion

5.2.1 Psychometric assessment

Psychometric assessments of the original scale and the two reduced versions of the scale are presented in Table 6. Results from the reliability, validity, and model fit estimates suggest that the psychometric properties of the 6-item scale are superior to those of both the original 13-item scale and the reduced 9-item scale. First, we calculated reliability estimates for all three scale versions using Nunnally & Bernstein's formula for reliability of linear combinations (1994). Results confirm that the 6-item scale possesses good reliability, as indicated by its relatively high reliability coefficient. Second, the 6-item scale exhibits superior nomological validity, with a validity index higher than that of the other two scale versions. Furthermore, the 6-item shortened scale, as compared to the 13-item and 9-items scales, reveals the most consistent and significant validity correlations with participants' self-reported decision-making behaviors. More specifically, results reveal that, as expected, maximization has a significant positive correlation with the amount of time taken to make a decision; significant positive correlations with the amount of information participants read about the mutual funds before they made a decision and with the number of funds they considered; and a directionally positive correlation with participants' reported decision difficulty.

Third, we assess the degree to which the short scales preserve the factor structure of the original scale (Smith et al., 2000). We conducted a confirmatory factor analysis of the original and two short scales, and found that the 6-item scale possesses superior model fit, as indicated by the insignificant chi-square test, superior goodness of fit indices, and high factor loadings, as indicated by the confirmatory factor analysis.

Table 6: Analysis 4: Psychometric assessment of the shortened Maximization Scales

	13-item scale (n = 61)	9-item scale (n = 54)	6-item scale (n = 61)
Reliability estimate [a]	.84	.76	.75
Validity estimates			
Validity Index [b]	.14	.10	.28
Validity correlations:			
Time taken to make a decision	.04	.01	.32 **
Amount of information read	.06	.13	.33 **
Number of funds considered	.19	– .10	.22 **
Difficulty of making decision	.12	.27*	.15*
Model Fit			
Chi-square	92.14 *(62 df)*	33.41 *(24 df)*	2.43 *(6 df)*
RMSEA	0.08	0.09	0.00
Goodness of Fit Index	0.81	0.87	0.99
Adjusted Goodness of Fit Index	0.73	0.76	0.95
Average CFA factor loading	0.39	0.50	0.66

*** p < .05; * p < .1*

[a] Reliability estimate for linear combinations (Nunnally & Bernstein, 1994)

[b] Average absolute value of correlations with seven criterion variables: need for cognition, regret, perfectionism, satisfaction with life, subjective happiness, optimism, and depression.

5.2.2 Correlation with related variables

Next, we expanded on the analysis above by examining the specific correlations of maximization and its subdimensions to the related variables we measured in this analysis. Table 7 presents the correlations of maximization, as well its three sub-dimensions, with need for cognition, regret, perfectionism, satisfaction with life, subjective happiness, optimism, and depression. Regardless of scale version used, maximization is found to correlate highly with regret, as expected, and in accordance with prior research. However, overall, the pattern of correlations obtained with the 6-item scale (versus the 13- and 9-item scales) is most consistent with our predictions and with past literature. When using the 6-item Maximization Scale, we find that, as expected, maximizers tend to have higher need for cognition and higher tendency to experience regret, are more likely to be perfectionists, report lower satisfaction with life, and tend to be less happy, less optimistic, and more depressed.

Based on these findings, it seems that the 6-item scale possesses superior nomological validity to both the original 13-item scale and the reduced 9-item scale. These results support findings from the previous analyses and argue for use of the 6-item reduced scale in future research.

Smith et al. (2000) suggest that researchers developing a short form of a scale need to assess the trade-off between reductions in assessment time and reductions in validity that occur when the scale's number of items is

Table 7: Analysis 4: Maximization correlations with related variables

	Need for cognition	Regret	Perfectionism	Satisfaction with life	Subjective happiness	Optimism	Depression
Thirteen-item scale							
Maximization	–.05	.27**	.19	–.20*	–.07	–.28**	.07
Alternative search	–.08	.14	.13	–.26**	–.06	–.17	.02
Decision difficulty	–.12	.26**	–.02	–.04	–.10	–.37**	.08
High standards	.21*	.51**	.45**	–.07	.04	–.01	.05
Nine-item scale							
Maximization	–.04	.51**	.31**	.02	–.04	.06	–.04
Alternative search	–.10	.54**	.10	–.08	–.03	.08	–.02
Decision difficulty	–.16	.40**	.10	–.08	–.23*	–.19	.18
High standards	.14	.17	.48**	.13	.14	.27*	–.25**
Six-item scale							
Maximization	.33*	.38**	.34**	–.27**	–.23*	–.20*	.22*
Alternative search	.18	.31**	.18	–.28**	–.07	–.09	.07
Decision difficulty	.21*	.24*	.08	–.21*	–.31**	–.18	.30**
High standards	.36**	.26**	.50**	–.02	–.06	–.01	.05

** $p < .05$; * $p < .1$

reduced. Therefore, we next assessed the reduction in validity. Using the approach recommended by Smith et al. (2000) we estimate the impact of item reduction on the full scale's average validity index. Our analysis reveals that reducing the number of items from 13 to 6 gives an estimated loss of shared variance with a criterion of 6%. This represents a trivial loss of validity for the significant savings in assessment time by reducing the scale by more than half.

Results from Analysis 3 revealed that the three maximization dimensions might be differentially related to various traits. Therefore, in Analysis 4 we went beyond examining correlations between the overall maximization score and related variables, and looked at correlations involving the three sub-dimensions as well (see Table 7). We found that all three dimensions exhibited positive correlations with regret. However, there are some differences across the three dimensions as far as the other related variables are concerned. In particular alternative search does not relate negatively to happiness or positively to depression or optimism, but reveals consistent correlations in the expected direction with the other measured related variables, with the strongest correlations occurring with regret and satisfaction with life and the weakest, only directionally consistent, occurring with need for cognition and perfectionism. Decision difficulty has a negative and significant correlation with satisfaction with life and subjective happiness, a directionally negative correlation with optimism, and a positive significant correlation with depression.

On the other hand, the high standards dimension is positively and significantly related to need for cognition and regret and more strongly related to perfectionism than the relevant correlations involving either decision difficulty or alternative search. Furthermore, this dimension does not have a strong negative correlation with satisfaction with life, subjective happiness, or optimism; it also does not correlate positively with depression. Therefore, if an individual scores high on this single dimension of the Maximization Scale, s/he is not likely to exhibit several of the various negative affective correlates of the maximization trait.

In sum, this study, along with our earlier analyses, suggests that future research should continue to examine the three maximization dimensions separately. Such analyses may provide further insights beyond findings associated with the summed Maximization Scale. It seems that having a strong tendency to search alternative options is negatively associated with people's satisfaction with life and positively associated with their tendency to experience regret, but does not relate negatively to optimism and happiness or positively to depression. On the

other hand, people who have a difficulty making decisions seem to be less happy, less satisfied with their lives, and less optimistic, as well as more depressed. Finally, having high standards does not relate negatively to peoples' happiness, satisfaction with life, or optimism, nor does it relate positively to depression, but it does seem to relate positively to regret and to peoples' tendency to enjoy thinking and be perfectionists.

5.3 Summary

Based on results from our analyses of reliability, predictive and nomological validity, and model fit, we conclude that the short 6-item Maximization Scale exhibits superior psychometric properties as compared to the other two versions of the scale we tested in Analysis 4, namely, the original 13-item scale and the short 9-item scale. The 6-item scale possesses good internal consistency and superior model fit as compared to the other two scale versions. Furthermore, it possesses good validity: its nomological net is similar to that of the original 13-item scale and its correlations with related traits are more consistent with our predictions and past literature than those of both the 9-item scale and the original scale. The 6-item scale's nomological validity, as indicated by its consistent correlations with participants' information processing and decision making behaviors, was also superior than that of the other two scale versions.

Furthermore, in this study we examined not only peoples' scores on the summed Maximization Scale, but also their scores on the three sub-dimensions of the scale. Our results confirmed findings from Analysis 3 that the three dimensions of maximization might be differentially predictive of various traits and behaviors. Therefore, we recommend that future researchers examine not only peoples' maximization scores but also their sub-dimension scores.

6 General Discussion

In this paper we re-examined the Maximization Scale. Based on analysis of 15 datasets, we conclude that the original 13-item Maximization Scale possesses suboptimal psychometric properties and should be replaced with a shorter, 6-item version of the scale that has superior reliability and validity, and a more stable dimensional structure. We investigated possible 9-, 6-, and 3-item versions of the scale and found that the 6-item version possesses better psychometric properties than the other two short versions, as well as the original 13-item version. Furthermore, we demonstrated that the proposed 6-item short form offers meaningful savings in administration time as compared with an insignificant reduction in validity (Smith et al., 2000).

Developing a short version of the Maximization Scale has several advantages: the new short scale possesses robust dimensional properties, good reliability, and superior validity for measuring maximization. It also encompasses the same three dimensions as the original scale but has an important advantage (Richins, 2004): the three dimensions are equally weighed in the summed scale, unlike the original Maximization Scale, in which the number of items arbitrarily varies across domains.

This research contributes to the existing literature on maximization in several important ways. First, the Maximization Scale length is reduced by more than half (from thirteen to six items), while its psychometric properties are improved. As discussed earlier, there is growing interest in the maximization construct on behalf of researchers in areas such as social psychology, positive psychology, and consumer psychology. The shorter Maximization Scale proposed in this paper will provide these researchers with a measure of the construct that is brief, yet reliable and valid.

Second, we show that the short 6-item scale possesses very good nomological validity, since it was the only version that consistently correlated to several related psychological traits and to participants' information processing and decision making behaviors in an investment decision-making situation. It should be noted, however, that the behavioral measures we used in this analysis were self-reported retrospective measures and hence our results should be interpreted with caution. Validity testing of a new or a revised measure is an ongoing process and while we have shown that the revised Maximization Scale is related to several self-reported behaviors there is need for further validity testing. Thus, an effort to more fully validate the revised Maximization Scale should include a broader range of behaviors measured using a variety of methods.

Third, we assessed the Maximization Scale's dimensionality, and defined and examined the three scale subdimensions. Our results suggest that the three subdimensions are related to different psychological variables, and researchers should therefore examine people's scores on the three maximization sub-dimensions in addition to their summed maximization scores. Past research has found a clear tendency for maximizers to report being significantly less happy, less satisfied with life and with their choices, and more depressed than satisficers (Iyengar et al., 2006; Schwartz et al., 2002). Our results build on these findings, and suggest that the real problem with maximizing is not having high standards, but rather, having high standards in a world of limitless choice alternatives that demands extensive search and creates decision difficulty. It seems that the source of maximizers'

psychological trouble is the need to search extensively and make difficult decisions, and not their tendency to set high standards for themselves.

Though this analysis clearly requires further empirical support and elaboration, it might also be wise to offer some conceptual clarification. What, exactly, is "maximizing"? Is it all three of the subdimensions reported here, or only a subset of them? And are "maximizing" and "satisficing" opposite poles along a single dimension? Is "maximizing" a search strategy, a goal, or both? In Simon's (1955) formulation, maximizing and satisficing seemed to refer to both goals of search and search strategies. Maximizing seeks the "best" which demands an exhaustive search of the options. Satisficing seeks "good enough" which can be met by a non-exhaustive search. Simon certainly did not imply that maximizing and satisficing were opposite ends of a continuum. But the Maximizing Scale, especially as discussed by Schwartz et al. (2002) and elaborated by Schwartz (2004), seems to imply that they are.

There is no reason to believe that maximizing and satisficing are on opposite ends of a continuum. It is not even clear what it might be a continuum of. We can reasonably specify what each of these strategies implies, both about goals and search strategies, but maximizing and satisficing do not exhaust the possibilities. For example, while dining at a restaurant, one could choose what one chose the last time, choose what one's companion recommends, or choose what a patron at another table orders. Of course, each of these alternatives to maximizing might be considered a species of satisficing in that each implies a willingness to settle for good enough. But if one adopts this stance, then satisficing becomes a term for a goal and implies nothing about process. And again, the "continuum" for which maximizing and satisficing are the anchors remains mysterious.

A possible view of the relation between maximizing and satisficing that might appeal to an underlying continuum is that there is a "meta-process" people engage in of trading off decision-making cost and the utility of the option chosen. "Maximizing" is a willingness to spend resources in search of an option that is even slightly better than the best one found thus far. Satisficing involves refusing to pay that cost, either because one's subjective assessment of the cost is higher, or because one's subjective assessment of the benefit is lower, or both. "Cost" might be defined objectively, mostly in terms of time and effort expended, or subjectively, in terms of the disutility of time and effort expended. If the latter, one could imagine an optimal point on a trade-off function, at which marginal cost equaled marginal benefit. "Rational" choice strategy would be at this point, and maximizing and satisficing might then be seen as deviations, in opposite directions, from this rational optimum. Although thinking about maximizing and satisficing in this way is appealing, we believe that such a view is incomplete. It neglects the notion of "leakage." Maximizers feel bad even about good decisions. As Schwartz (2004) has suggested, maximizing as a search strategy brings along with it regret, concern about missed opportunities, and raised expectations, all of which make good outcomes less good. Satisficing does not seem to suffer from any of these effects. A proper analysis of the optimal trade-off would have to consider these asymmetric effects, thus moving the optimum more toward satisficing than it would otherwise be.

Finally, there is the question of whether all three subdimensions of the Maximizing Scale are properly considered to be a part of what we mean by maximizing. We believe that what Simon (1955) meant was what we refer to here as "high standards," the pursuit of the "best" under the classical economic assumptions of perfect information and no search costs. Our data suggest that high standards are related to perfectionism, regret, and need for cognition, but not to happiness, optimism, satisfaction with life, or depression. It seems to be the other sub-dimensions of the Maximizing Scale that do most of the psychological "heavy lifting." Whether "maximizing" should refer only to high standards or to all three sub-dimensions elaborated in this paper will perhaps be resolved by future research on the relations among these sub-dimensions.

One final point: The Maximization Scale contains some items that refer to behaviors that are rather culture-specific (e.g., renting videos, listening to the car radio). The present research has tried to provide increasing conceptual and empirical clarification of what maximizing means, and we believe that enhancing the theoretical clarity of the maximization construct will facilitate researchers' efforts to construct scales that measure maximization and its subdimensions with items that are culturally appropriate. This will enable researchers to determine the cultural generality of what has been reported thus far.

7 Conclusion

Decision making research long ago recognized that people often choose not to maximize during the choice process. Since then, much research has focused on contextual variables that influence the likelihood of maximizing or engaging in more compensatory decision making efforts (e.g., information overload, accountability, etc). The recent discovery that individuals' decision processes are influenced not only by such contextual factors but also by a dispositional tendency to maximize, suggests that much work remains to be done to explore the interac-

tion of this dispositional tendency and other, contextual variables. Having a shorter, yet more valid and reliable instrument with which to measure this maximizing tendency should enhance these efforts, leading, we hope, to the empirical and conceptual clarification of what maximizing means and what it implies about people's decision strategies and decision satisfaction.

References

Bearden, W. O. & Netemeyer, R. G. (1999). *Handbook of marketing scales*, 2nd ed. Thousand Oaks, CA: Sage.

Beck, A.T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry,* 4, 561–571.

Bergkvist, L. & Rossiter, J. R. (2007). The predictive validity of multiple-item versus single-item measures of the same constructs. *Journal of Marketing Research*, 44, 175–184.

Cacioppo, J. T. & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology*, 4, 116–131.

Chowdhury, T., G., Ratneshwar, S., & Mohanty, P. (2008). The time-harried shopper: Exploring the differences between maximizers and satisficers. *working paper*, Quinnipiac University.

Cole, J. C., Rabin A. S., Smith, T. L., & Kaufman. A. S. (2004). Development and validation of a Rasch-derived CES-D short form. *Psychological Assessment,* 16, 360–372.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297–334.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment,* 49, 71–75.

Hackley, S. (2006). Focus your negotiations on what really matters. *Negotiation,* September, 9–11.

Haynes, S. N., Richard, D. C. S., & Kubany, E. S. (1995). Content validity in psychological assessment: A functional approach to concepts and methods. *Psychological Assessment*, 7, 238–247.

Hewitt, P. L. & Flett, G. L. (1990). Perfectionism and depression: A multidimensional analysis. *Journal of Social Behavior and Personality,* 5, 423–438.

Hu, L. & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternations. *Structural Equation Modeling*, 6, 1–55.

Huang, W. & Zeelenberg, M. (2008). Investment decisions and post-decisional regret: Expectation moderates the impact of forgone gains and losses. *working paper*, Soochow University, Taiwan.

Hulland, J., Chow J., & Lam, S. (1996). Use of causal models in marketing research: A review. *International Journal of Research in Marketing*, 13, 181–197.

Iyengar, S. S., Wells, R. E. & Schwartz, B. (2006). Doing better but feeling worse: Looking for the 'best' job undermines satisfaction. *Psychological Science,* 17, 143–150.

Keys, D. J. & Schwartz, B. (2007). "Leaky" rationality: How research on behavioral decision making challenges normative standards of rationality. *Perspectives on Psychological Science, 2,* 162–180.

Lyubomirsky, S. & Lepper, H. S. (1997). A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research*, 46, 137–155.

Morrin, M., Inman, J. J., Broniarczyk, S. M., & Broussard, J. (2008). Decomposing the 1/n heuristic: The moderating effects of assortment size and decision style. *working paper*, Rutgers University, Camden, NJ.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory.* New York: McGraw-Hill.

Payne, J. W., Bettman, J. R., & Johnson, E. J. (1988). Adaptive strategy selection in decision making. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 14, 534–552.

Richins, M. L. (2004). The material values scale: Measurement properties and development of a short form. *Journal of Consumer Research*, 31, 209–219.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the life orientation test. *Journal of Personality and Social Psychology,* 67, 1063–1078.

Schwartz, B. (2000). Self-determination: The tyranny of freedom. *American Psychologist*, 55, 79–88.

Schwartz, B. (2004). *The paradox of choice: Why more is less*. New York: Ecco.

Schwartz, B. & Ward, A. (2004). Doing better but feeling worse: The paradox of choice. In P. A. Linley, & S. Joseph (Eds.), *Positive Psychology in Practice* (pp.86–104). Hoboken, N.J.: John Wiley and Sons.

Schwartz, B., Ward, A., Monterosso, J., Lyubomirsky, S., White, K., & Lehman, D. R. (2002). Maximizing versus satisficing: Happiness is a matter of choice. *Personality and Social Psychology,* 83, 1178–1197.

Simon H. A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics,* 59, 99–118.

Smith, G. T., McCarthy, D. M., & Anderson, K. G. (2000). On the sins of short-form development. *Psychological Assessment*, 12, 102–111.

Stanton, J. M., Sinar, E. F., Balzer, W. K., & Smith, P. C. (2002). Issues and strategies for reducing the length of self-report scales. *Personnel Psychology*, 55, 167–194.

Wood, S. L. & Swait, J. (2002). Psychological indicators of innovation adoption: Cross-classification based on need for cognition and need for change. *Journal of Consumer Psychology*, 12, 1–13.

Zeelenberg, M. & Pieters, R. (2007). A theory of regret regulation. *Journal of Consumer Psychology*, 17, 3–18.

Appendix A:
Analysis 2: Item analysis and item selection process description

	Internal criteria				External criteria	Judgmental criteria		
Item	Average item-total correlation	Average item-subscale correlation	Average CFA factor loading	Residuals index[a]	Validity index	Validity rating, maximization	Validity rating, subscale	Readability rating
1	0.371	0.433	0.68	5.22	0.13	5.38	5.88	5.25
2	0.394	0.436	0.69	3.78	0.18	5.63	6.00	5.33
3	0.266	0.251	0.29	4.89	0.00	4.50	5.00	5.20
4	0.333	0.308	0.36	6.00	0.14	5.63	5.88	5.40
5	0.302	0.272	0.29	5.67	0.24	4.38	4.25	4.98
6	0.272	0.240	0.28	5.89	0.12	4.38	3.75	5.45
7	0.314	0.427	0.57	4.22	0.11	5.13	6.00	4.90
8	0.294	0.407	0.54	2.80	0.18	5.00	5.75	5.38
9	0.398	0.448	0.61	4.33	0.16	5.88	6.13	4.65
10	0.308	0.350	0.48	4.33	0.21	4.25	5.00	4.93
11	0.273	0.516	0.72	3.56	−0.01	4.63	7.00	6.00
12	0.302	0.470	0.75	3.70	0.02	6.13	6.88	5.90
13	0.333	0.286	0.37	6.11	0.16	5.63	4.75	5.48

Notes: Internal criteria indexes are averaged across ten samples; External criteria indexes represent the average correlation of each item with regret (averaged across 10 samples), optimism (2 samples), happiness (5 samples) and depression (3 samples); Judgmental criteria indexes are based on the following sample sizes: validity ratings (n = 8) and readability rating (n = 40).
[a] Lower residuals index indicates better model fit.

Appendix B:
Analysis 3: CFA for full and reduced models

13-item scale

Sample	χ^2_{62}	RMSEA	GFI	CFI
1	184.95	.05	.96	.90
2	109.50	.11	.83	.74
3	353.34	.07	.95	.78
4	423.36	.06	.96	.90
5	88.68	.06	.88	.87
6	95.65	.08	.86	.79
7	183.57	.06	.95	.89
8	130.81	.07	.92	.76
9	250.01	.07	.94	.85
10	116.30	.09	.85	.79
11	NA	NA	NA	NA
12	NA	NA	NA	NA
Average	193.61	.07	.91	.83

6-item scale

Sample	χ^2_{24}	RMSEA	GFI	CFI	$\Delta\chi^2_{18}$ 9 vs. 6
1	6.40	.01	1.0	.99	71.14
2	7.95	.06	.97	.95	27.96
3	4.88	.00	1.0	1.0	116.45
4	14.71	.04	.99	.98	161.05
5	2.22	.00	.99	1.0	39.33
6	5.52	.00	.99	1.0	22.29 (NS)
7	20.48	.07	.99	.96	60.20
8	3.18	.00	.99	1.0	61.41
9	6.08	.01	.99	.97	130.06
10	1.83	.00	.99	1.0	26.58 (NS)
11	10.20	.08	.96	.93	41.07
12	14.90	.05	.98	.90	124.75
Average	8.19	.03	.99	.97	

9-item scale

Sample	χ^2_{24}	RMSEA	GFI	CFI	$\Delta\chi^2_{38}$ 13 vs. 9
1	77.54	.05	.98	.94	107.41
2	35.91	.08	.91	.87	73.59
3	121.33	.06	.97	.86	232.01
4	175.76	.06	.98	.94	247.60
5	41.55	.08	.92	.89	47.13
6	27.81	.04	.94	.97	67.84
7	80.68	.07	.97	.93	102.89
8	64.59	.08	.95	.85	66.22
9	136.14	.09	.95	.88	113.86
10	28.41	.03	.94	.94	87.89
11	52.27	.09	.91	.87	NA
12	139.65	.09	.95	.75	NA
Average	81.8	.07	.95	.89	

Notes: CFA — confirmatory factor analysis; RMSEA — root mean square error of approximation, GFI — goodness of fit index; CFI — comparative fit index; $\Delta\chi^2$ (13 vs. 9) is the difference in chi-square fit between the 13- and 9-item models (with the df for the difference), and likewise for $\Delta\chi^2$ (9 vs. 6); all differences are statistically significant, except where noted; degrees of freedom for each modes are noted in the first row of each group and are the same across all samples; CFA was not conducted for the 3-item model, since each first-order factor would only have a single associated measurement item.