

# RiskCAT: A Framework for Identifying Maximum Risk Thresholds in Personal Portfolios

by John E. Grable, Ph.D., CFP®

John Grable, Ph.D., CFP®, teaches financial planning courses at Kansas State University, in Manhattan, Kansas. He also serves as the director of the Institute of Personal Financial Planning and as the director of Kansas State University's Ph.D. program in Personal Financial Planning.

How are the building blocks of personal portfolio construction—risk tolerance, risk capacity, and time horizon—combined to help guide the development of a multi-asset diversified portfolio? Regardless of the theoretical modeling that has gone into explaining portfolio development processes (such as modern portfolio theory and the capital asset pricing model), the method of combining these portfolio building blocks tends to be based on professional judgment. Almost every financial advisory professional has heard advice such as “Of course, the less risk tolerant the client, the lower the stock percentage for a given time horizon” (Cordell 2005, p. 36). From a theoretical point of view, this advice is clear and to the point. As risk tolerance decreases and the time horizon shortens, the allocation of a client's portfolio to price volatile securities, such as equities, ought to decrease. The problem is that it is nearly impossible for the typical financial advisor, let alone the average consumer, to determine with any degree of specificity the amount by which portfolio risk should fall.<sup>1</sup> There have been attempts to link risk tolerance and risk capacity, and risk tolerance and time horizon, within single models

## Executive Summary

- This paper answers a key financial planning question: How can risk tolerance, risk capacity, and time horizon be combined to shape the development of diversified investment portfolios? A framework—RiskCAT—is presented that allows planners to determine a single risk profile score for clients. Risk profile scores indicate the maximum amount of systematic risk that is appropriate within a portfolio.
- The RiskCAT framework extends the concept of multiplicative modeling as proposed by Cordell (2002). The challenge is that standardization does not yet exist within the profession to incorporate valid and reliable measures of risk tolerance, risk capacity, and time horizon. This paper offers prospective definitions for each input.
- The risk tolerance input was developed from the many risk-tolerance

instruments already available. A focus group of 22 experienced financial advisors created and standardized an index of risk capacity, which measures a person's financial ability to take on risk.

- The investor's time horizon works as a mediating factor between risk tolerance and risk capacity. The same focus group provided a scaling system for a given investment time frame.
- The multiplication of these three scores results in a beta score that measures the maximum exposure to systematic risk the client should take within the portfolio.
- A value-at-risk method for validating risk profile scores is presented. The paper demonstrates that the application of RiskCAT profile scores to client situations results in a unique way to define systematic risk and place limits on risk exposures within client portfolios.

(Cordell 2002, 2005; Droms and Strauss 2003), but efforts to implement these techniques with clients have been hampered by the complexity of calculations needed to account for changing specific client and general economic variables. Further, no model has been developed that accounts for risk tolerance, risk capacity, and time horizon within a single framework.

The purpose of this paper is to present a framework for portfolio development modeling that is based on a theoretical foundation, yet easy to apply in practice management situations. The framework presented here is called RiskCAT, which is a descriptor of the three primary portfolio development building blocks—risk tolerance (Risk), risk capacity (CA), and time horizon



(T). The following discussion reviews each of these important building blocks as components within the framework. The paper then follows with a description of the framework development process and concludes with a value-at-risk validation discussion using historical data.

## Building Blocks of Portfolio Development and Design

**Risk tolerance.** Several important building blocks need to be accounted for whenever a portfolio is developed for a client (Droms and Strauss 2003). Client-specific factors such as investment objectives, risk tolerance, financial stability, and time horizon are among the most important of these building blocks (Cordell 2005, Rattiner 2004). Once a client's financial objective related to the investment decision has been established, the client's risk tolerance should be measured before further action. According to Boone and Lubitz (2003), "Getting a sense of a client's willingness to tolerate risk is critical to finding the right portfolio design so that the client will stay true to the [investment] course during both good and difficult times" (p. 58). Some have even suggested that the portfolio development process must begin by determining a client's willingness to take risk (van Welie, Janssen, and Hoogstrate 2004).

Risk tolerance, as it relates to portfolio development modeling and portfolio management, refers to a client's willingness to engage in financial behaviors in which gains are uncertain and losses are identifiable. Risk tolerance, according to Adkins (1997), specifically relates to a client's emotional and intellectual ability to withstand volatility and a given degree of loss. The optimal approach to assessing risk tolerance involves the use of a risk scale or item. This is the preferred method of assessment if the scale or item focuses exclusively on a client's willingness to engage in risky financial behaviors (Roszkowski, Davey, and Grable 2005; Roszkowski and Grable 2005). Ideally, a

risk-tolerance measure should be valid.<sup>2</sup> A measure should also be reliable.<sup>3</sup> The worst possible assessment tool is one that provides diverse risk scores for people who are, in fact, quite similar. Finally, a risk-assessment method ought to provide some type of score that can be compared against a benchmark index. This allows an advisor to determine the relative risk tolerance of one client compared with another. As discussed later, a number of measures meet these requirements.

**Risk capacity.** Kitces (2006) noted that "a client's total risk profile is composed of two elements, which though often used to mean the same thing, are quite different: risk tolerance and risk capacity" (p. 56). The concept of risk capacity differs both theoretically and practically from the notion of risk tolerance. Schooley and Worden (2003) and others define risk capacity as a "client's financial ability to incur risk" (p. 59). Cordell (2002) noted that risk capacity can be swayed by a client's age and family situation. Other factors associated with risk capacity include the amount and stability of household income, expenses in relation to income, portfolio diversification, risk exposures, adequacy of insurance coverage, and the size and structure of household debts and contractual commitments (Adkins 1997). Unlike risk tolerance, there are no existing tools in common use to measure risk capacity.

**Time horizon.** A client's time horizon associated with a financial goal is one of the key factors that financial advisors must incorporate into portfolio models. The concept of investment time can be split into two parts. The first is a client's decision time frame. This is the evaluation period over which clients "measure their investment results in order to decide on the success of their investment strategy" (Garmaise 2006, p. 68). Garmaise summarized how most financial advisors view decision frames by stating that investors with more conservative goals tend to have shorter decision time frames. The second concept of time is known as the investment time

horizon. This is the period from the establishment of a financial goal up to the point when a client will need the assets they have invested. The decision time frame is almost always shorter than the investment time horizon. Although knowing a client's decision time frame is of great importance in managing the advisor-client relationship, portfolio modeling tends to be based on the investment time frame (Foundation for Fiduciary Studies 2003). But as Droms and Strauss (2003) point out, most existing approaches to developing client portfolios fail to account for time explicitly. This may be attributable to the lack of common time-horizon definitions within the profession or the absence of models that adequately incorporate time horizons. Regardless of the reason, this omission often leads to problematic client outcomes.

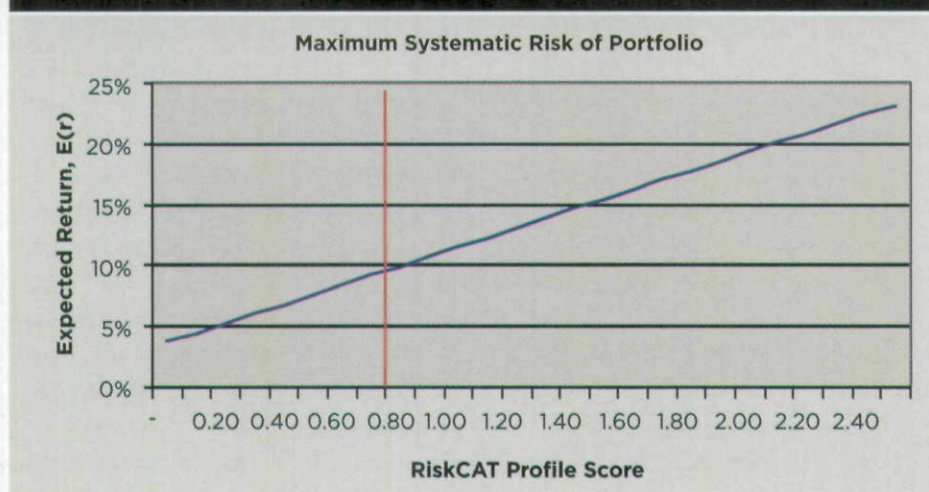
## Risk Profiling: Bring the Pieces Together

In 2001, Cordell introduced the idea that a client's overall risk profile could be measured by assessing attitude, capacity, knowledge, and risk propensity. He defined attitude as a person's willingness to incur monetary risk. His use of "attitude" is closely linked with the more generally recognized term "risk tolerance." Cordell referred to capacity as a client's ability to incur risk. He defined financial knowledge as a client's relative understanding of risk and risk/return trade-offs. When using the term "risk propensity," Cordell was referring to a "client's real-life decisions in financial situations" (Cordell 2001, p. 36). He warned that financial advisors who confuse a client's propensity to take risks as an indicator of risk tolerance may be confusing themselves. How a person has acted in the past in relation to financial risks is not necessarily a predictor of how they will act in the future or an indicator of underlying risk preferences. Factors such as procrastination and ignorance, according to Cordell, mediate between risk tolerance and risk propensity.

Cordell (2002) later took a more systematic approach in linking risk tolerance and



**Figure 1: Illustration of Risk Threshold Based on RiskCAT Profile Score**



risk capacity in the development of a risk-taking model. He argued that a client's financial knowledge and propensity to take risks are incorporated into the definitions of tolerance and capacity. For example, Cordell pointed out that a client's risk tolerance is "greatly influenced by an improved understanding of financial risks, sometimes increasing and sometimes decreasing the client's willingness to accept risk" (p. 32). As such, in his final model, the concepts of propensity and knowledge were not specifically measured, but rather merged into the definitions of risk tolerance and risk capacity.

The most striking aspect of Cordell's (2002) model was his proposal that a multiplicative approach be used to develop global risk profile scores for clients. "With this approach, a client with a 2 capacity and a 10 attitude has a risk tolerance score of 20. In contrast, a client with a 6 capacity and 6 attitude has a risk tolerance score of 36, or 80 percent higher" (p. 32). Although he did not specify which factors would be included in a risk-capacity index or how risk tolerance should be measured, Cordell's hypothesis that the multiplicative approach captures the nature of risk-tolerance and risk-capacity constraints offered a new way to gauge a client's willingness and ability to engage in risk-taking behaviors. The RiskCAT

methodology presented in this paper validates Cordell's hypothesis and extends his concept further in two ways: First, the RiskCAT method suggests that a client's time horizon can mediate between risk capacity and risk tolerance, and second, a RiskCAT profile score can be tied directly to a measure of systematic risk.

### The RiskCAT Framework

Nearly all financial advisors attempt, in some manner, to assess a client's risk profile using measures of risk tolerance, risk capacity, and time horizon as inputs in the portfolio development process. But there is little theoretical basis to explain how advisors actually bring these interrelated factors together; the process is highly intuitive. Few investing texts address the choice of portfolios beyond explaining utility theory and encouraging advisors to choose portfolios appropriate for risk-seeking, risk-neutral, and risk-averse clients (Campbell, Chan, and Viceira 2003).

The RiskCAT framework was conceptualized as a way to simplify the portfolio development decision-making process. The framework brings together the key building blocks of portfolio development into a formula that can be applied across different client situations. The RiskCAT framework can be summarized with the following formula:

$$RPS = (R \times CA \times T)/100$$

where

RPS = RiskCAT profile score

R = risk-tolerance score

CA = risk-capacity score

T = time horizon

The resulting RiskCAT profile score provides an upper numerical threshold of systematic portfolio risk appropriate for a client. In other words, by calculating a client's risk-tolerance score, risk-capacity score, and determining an appropriate time horizon for the portfolio, this information can be used to establish the maximum exposure to systematic risk, as measured by beta ( $\beta$ ), that a client should take within a diversified investment portfolio.

Visually, the risk threshold developed from a client's RiskCAT profile score can be illustrated as a vertical line imposed on the security market line (Figure 1). The point of intersection shows the efficient portfolio that matches a client's risk profile. If a client's risk profile score is .80, as shown in Figure 1, this would lead to two conclusions. First, the client should invest in a portfolio offering less than market risks and returns, and second, the client's portfolio should be designed with a maximum weighted beta of .80.

### Conceptualization and Measurement of RiskCAT Factors

To fully utilize the RiskCAT method, it is important to incorporate into the formula valid and reliable measures of risk tolerance, risk capacity, and time horizon. Unfortunately, standardization does not yet exist within the profession for these constructs. As such, steps were taken, for the purposes of this study, to offer prospective definitions for each input. A focus group methodology using 22 financial advisors<sup>4</sup> was used to address the issue of input standardization.<sup>5</sup> This group was asked to review existing definitions of risk tolerance, risk capacity, and time horizons, and to provide feedback and guidance on how



**Table 1: Use and Rank of Risk-Capacity Measures**

Capacity Measure	Percent of Advisors Who Use Capacity Measure	Mean Rank (Most Important to Least Important)
Positive Net Worth	68%	2.67
Positive Cash Flow (Income)	64%	2.43
Emergency Fund Ratio	59%	3.33
Savings Ratio	50%	3.71
Adequate Life Insurance	45%	3.14
Current Ratio	45%	4.00
Debt Ratio	45%	3.89
Adequate Health Insurance	41%	4.67
Adequate Disability Insurance	41%	6.67
Adequate Long-Term Care Insurance	32%	5.40
Debt Limit Ratio	32%	3.50
Adequate Property Insurance	27%	6.00
Long-Term Debt Ratio	27%	5.20
Other Measures	10%	8.00

seasoned professionals measure and use these factors when working with clients. The results of the focus group discussions are presented below.

**Risk tolerance.** The first factor, risk tolerance, is in some ways the easiest feature of the model to measure and standardize. There are numerous risk-tolerance instruments, including individual items and scales, in use within the financial advisory profession. While some have questioned the effectiveness of risk-tolerance questionnaires (Yook and Everett 2003), others have noted that a well-designed risk scale can be both valid and reliable (Roszkowski et al. 2005). For the purposes of the framework, it is necessary to use a measurement of risk tolerance that allows for a client to be categorized into one of five risk levels, scored 1 to 5: Low (1), Below Average (2), Average/Moderate (3), Above Average (4), and High (5). Several possible scales are identified in the endnotes.<sup>6</sup>

**Risk capacity.** Risk capacity is more difficult to standardize. Outside the work conducted by Cordell (2001, 2002), little research has been published regarding ways to measure risk capacity in a systematic way. Cordell (2002) recommended the following approach as a way to assess risk capacity: "Although there is no simple risk-capacity formula with specific coefficients

for each of these and the many other possible variables, a risk-capacity model would take a similar approach to credit scoring models that lenders use. However, instead of leading to an accept/reject decision, a risk-capacity model would assign a value on a scale" (p. 32).

For this study, focus group participants were asked to discuss the possibility of creating and standardizing an index of risk capacity that would fit Cordell's (2002) vision. Thirteen potential capacity measures were presented to and ranked by the group. Table 1 shows these measures ranked by the percent of focus group participants who indicated using each measure when working with clients.

Focus group participants were asked first about the number of risk-capacity measures that would be of practical use if combined to generate a risk-capacity score, given constraints of measurement and usage. The consensus was that five to six of the highest ranked items could be combined into an index to provide a relatively accurate estimate of a client's risk capacity. As shown in Table 1, the six most widely used capacity measures in the field are net worth, positive cash flow (income), emergency fund ratio, savings ratio, adequate life insurance, and current ratio (defined as monetary assets divided by current liabilities).

Focus group participants were particularly vocal in suggesting that clients who request primarily equity investment guidance should have, at a minimum, a positive cash-flow position. They felt that a zero or negative cash flow position was indicative of no risk capacity.

In addition, the participants felt that clients ought to have a positive net worth. In the case of the emergency fund ratio, advisors expected clients to have, on average, 4.5 months of monetary assets, or equivalent, set aside for living expenses. And for the savings ratio, they suggested that clients need to save 10 percent of their annual gross income.<sup>7</sup> Additionally, the focus group felt that clients should have adequately funded life insurance in place as an indicator of risk capacity. Finally, they determined that having a current ratio equal to or greater than 1.0 and a debt ratio (defined as total liabilities divided by total assets) of less than .39 are also indicative of risk capacity.

The third column in Table 1 lists the mean rank of each factor in terms of importance when assessing risk capacity. The lower the score, the more important the factor.

A scoring system, similar to the one envisioned by Cordell (2002), emerged from the focus group discussion. The system provides insights into a client's ability to incur risk (risk capacity). The first step toward arriving at a risk-capacity score involves screening clients either away from or into the portfolio development process by determining if a client has positive household cash flow or the ability to generate positive cash flow. This is an all or nothing hurdle. Clients who do not meet this minimum requirement are deemed to have no capacity to take risk, regardless of how many other capacity measures are met, and as such, they receive a zero risk-capacity score. Assuming that a client has positive cash flow, a scoring system based on responses to the measurement questions shown in Table 2 can be used to assess a client's risk capacity.

Interpreting risk-capacity scores is straightforward. Scores can range from



zero to five. A score of zero indicates no risk capacity. A score of five indicates a high level of risk capacity. In other words, someone who obtains a five on the scoring system has the financial ability to withstand significant financial risk. Someone who scores one, on the other hand, has a low level of ability to incur financial risk. It is possible to have positive cash flow but also to have a zero score.

**Time horizon.** The final factor in the RiskCAT framework is a client's investment time horizon. There are no consensus definitions in the field for what constitutes any given time frame. Focus group participants were asked to address the issue of time in an attempt to define what time horizon would be so short as to make investing outside of cash equivalent assets unwise. Additionally, participants were asked to identify what constitutes a long-term time horizon. On the short end, those in the focus group concluded that anyone with a time horizon of nine months or less (in other words, ultra-short term) should not be in the investment markets. On the long end, it was decided that anyone with a time horizon of ten years or more has a long-term investment time horizon.

A client's time horizon, within the RiskCAT framework, works as a mediating factor between risk tolerance and risk capacity. At the short end of the time spectrum, clients with less than nine months to invest should, as Scott (1993) and Rattiner (2003) suggest, invest only in safe fixed-income securities resulting in a portfolio beta of close to zero—regardless of risk tolerance or risk capacity. Anyone with less than nine months to invest receives a zero time-horizon score in the RiskCAT profile calculation. At the long end of the time spectrum, the RiskCAT formula is constrained by the long-term time-horizon category. In this case, the maximum formula input for time is ten years, regardless of a client's risk tolerance or capacity. In all other cases, the actual time horizon for those falling between these two extremes is used in the model. So, for example, assume that a client has a four-year investment

time horizon. In this case, the number four would be used as the time input. There is some flexibility inherent in the model, especially at the short end of the time horizon. If an advisor believes that clients should be exposed to no systematic risk if their time horizon is less than, say, two years, zero could be substituted for the time-horizon input.

### Summary of the RiskCAT Framework Rules

RiskCAT framework formula input rules can be summarized as follows:

1. Risk tolerance needs to be measured with a valid and reliable item or scale resulting in the grouping of clients into one of five risk-tolerance categories.
2. Risk capacity should be measured first by determining if a client has positive cash flow or the ability to generate a positive cash flow. RiskCAT profile scores should be developed only for clients who meet this initial guideline.

Risk-capacity scores are based on measuring a client's net worth, emergency fund ratio, saving ratio, life insurance coverage, and debt.

3. Time horizon is measured and used as an interval variable with two exceptions. First, clients with an investment time frame of less than nine months receive a time-horizon score of zero, while clients with an investment time frame of ten years or more receive a time-horizon score of ten.

### Validation of the Framework

Application of the RiskCAT framework to client case situations is a relatively uncomplicated task. Assume, for example, that a client has an above-average risk tolerance (score of four), an above-average risk capacity (score of four), and a five-year time horizon (score of five). Multiplying the factors together ( $4 \times 4 \times 5$ ) and dividing by 100 results in a RiskCAT profile



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**Table 2: Risk-Capacity Scoring Questions**

Capacity question: Does client have...	Yes	No
1. A positive net worth?	1	0
2. An emergency fund equal to 4.5 months of living expenses?	1	0
3. Savings ratio equal to 10 percent of annual gross income?	1	0
4. Adequate life insurance in place and funded?	1	0
5. A current ratio equal to or greater than 1.00 and debt ratio less than .39?	1	0
<b>TOTAL SCORE (Total 1-5)</b>		

Risk-capacity scores are as follows: 1 = Low; 2 = Below Average; 3 = Average/Moderate; 4 = Above Average; 5 = High.

score of .80. This figure indicates the maximum level of systematic risk ( $\beta$ ) appropriate within a portfolio.

A key question that must be answered is whether this RiskCAT profile score—in other words, portfolio beta equivalent—is valid when working with clients and their portfolios. The framework's validity was tested using a variance-covariance value-at-risk methodology.<sup>8</sup> A long-run equity index return of 10.95 percent, with a standard deviation of returns equal to 23.38 percent, was calculated using Ibbotson Associates'

maximum loss is 18.97 percent

- With 95 percent confidence, the maximum loss is 27.62 percent
- With 99 percent confidence, the maximum loss is 43.51 percent

As these data indicate, someone who held the index portfolio would have achieved an annualized average return of 10.95 percent over the period; however, this return was associated with significant volatility. Assuming the level of volatility remains the same in the future, someone holding the portfolio can expect to

encounter significant decreases in value in any given year.

Given the average return, standard deviation, and a measure of the risk-free rate, it is possible to calculate expected investment returns with the capital asset pricing model (CAPM) (Table 3). Ibbotson Associates (2006) reported that the average risk-free

rate from 1926 through 2005 was 3.7 percent. As such, someone holding the index portfolio from above, with a beta of 1.0, should expect to match the market in returns (10.95 percent) and volatility (23.38 percent). It holds that a person who invests in a portfolio with, say, a beta of .50 (that is, RiskCAT profile score) will expect a return of 7.33 percent in the same market. On the other hand, a more aggres-

sive investor who has the risk tolerance, risk capacity, and time horizon to take more risk of, say, 1.5 will realize a 14.58 percent return in the same market environment.

Clients, however, tend to be most interested in potential losses—value at risk. A RiskCAT profile score provides a measure of value at risk. Assuming that a score of .20 represents a low-risk profile, then someone interested in knowing with 90 percent confidence their maximum potential one-year loss can easily calculate the number. Specifically, the index portfolio is expected to lose a maximum of -18.97 percent in any given year, with a confidence interval of 90 percent. Multiplying the RiskCAT profile score (.20) by this loss amount provides an estimate of value at risk of -3.79 percent. Someone with a moderate-risk profile, represented with a RiskCAT profile score of .60, can expect a maximum one-year loss of 11.38 percent  $[-18.97 \times .60]$ . Similarly, an investor with a RiskCAT profile score of 1.3 has -24.66 percent value at risk in any given year.

How do these results compare with client loss benchmarks used in the field? Overall, the value-at-risk estimates match closely with generally accepted guidelines. For example, Scott (1993) suggested that those with a low-risk profile can tolerate a maximum loss of 5 percent. Moderate-risk-profile investors can withstand losses in the range of 6 to 15 percent. High-risk-profile investors can accept losses up to 25 percent or more in any given year. RiskCAT profile scores, when used to estimate value at risk, meet Scott's maximum portfolio loss guidelines at the 90 percent confidence level, indicating that the framework, at least in the context of historical equity market returns, can be used to estimate the maximum level of systematic risk someone should take when building an investment portfolio.

### In Summary

To summarize, a RiskCAT profile score indicates the maximum amount of systematic risk appropriate within a portfolio. The

“A RiskCAT profile score indicates the maximum amount of systematic risk appropriate within a portfolio.”

(2006) nominal return data from 1926 through 2005 for a portfolio consisting of 75 percent large and 25 percent small stocks. Based on these data, it is possible to estimate the largest one-year loss for someone holding this index portfolio ( $\beta = 1.0$ ), as shown below:

- With 68 percent confidence, the maximum loss is 12.43 percent
- With 90 percent confidence, the maxi-



**Table 3: Expected Average Returns of an Index Consisting of 75% Large and 25% Small Stocks**

RiskCAT Profile Score	E(r) from CAPM
0.00	3.70%
0.10	4.43%
0.20	5.15%
0.30	5.88%
0.40	6.60%
0.50	7.33%
0.60	8.05%
0.70	8.78%
0.80	9.50%
0.90	10.23%
1.00	10.95%
1.10	11.68%
1.20	12.40%
1.30	13.13%
1.40	13.85%
1.50	14.58%
1.60	15.30%
1.70	16.03%
1.80	16.75%
1.90	17.48%
2.00	18.20%
2.10	18.93%
2.20	19.65%
2.30	20.38%
2.40	21.10%
2.50	21.83%

Source: Ibbotson Associates (2006).

score provides a maximum risk threshold for use when a portfolio is being designed or managed. The actual choice of investments and the weightings applied within the portfolio are left entirely up to the advisor and client. Some clients, for example, may prefer a higher weighting in stocks, while others may prefer real estate. The risk profile allows both clients and their advisors to develop portfolios with an eye on allocating assets in a way that does not cross the risk threshold.<sup>9</sup>

RiskCAT profile scores also can be used within traditional efficient frontier models or adaptations, such as the security market line. When developing a portfolio using an

efficient frontier, portfolios are chosen based on the utility gained by taking additional risk and comparing this with the risk tolerance of the client. Instead of relying solely on risk tolerance, a client's risk profile can be substituted. In this way, it may be easier to match a client's implied utility function to a point on the efficient frontier, or as illustrated in this paper, to choose the portfolio where the efficient frontier intersects the RiskCAT profile threshold (see Figure 1).

The RiskCAT framework thus extends the concept of multiplicative modeling as proposed by Cordell (2002) by allowing risk tolerance, risk capacity, and time horizon to be included in a single RiskCAT profile score. Future research is needed to confirm the findings presented here. Specifically, additional qualitative and quantitative inquiries are needed to confirm the estimates and assertions suggested in this study. Also, it is important that the RiskCAT framework be continually evaluated in terms of meeting advisors' basic tests of validity. Even so, RiskCAT appears, at the early stages of development, to offer a new approach for managing the portfolio development process.



## Endnotes

1. Efficient-frontier models can be used to help an advisor calculate the efficient portfolio that matches a client's risk tolerance; however, these models do not provide guidance on portfolio risk in relation to risk capacity or time constraints. The risk capacity and time horizon of a client, in relation to an investment goal, must still be incorporated into the selection of a portfolio by way of the advisor's professional judgment.
2. Validity refers to how well a scale or item measures a client's risk tolerance.
3. Reliability measures how consistently a scale or item works with different audiences.
4. Twenty-two financial advisors, each representing a broad U.S. geographical

region, took part in the focus group. The advisors in the group participated in a discussion of risk tolerance, risk capacity, time horizon, and other advisory topics. They also completed a survey designed to record each participant's opinions about the measurement and use of factors associated with the portfolio development process.

5. Participants were distinguished financial advisors and represented professionals with broad knowledge and expertise. The gender breakdown of the group resembled the financial advisory profession. Eighty-six percent were male. On average, participants were 56.15 years of age (SD = 9.78 years). The average participant reported having 21.86 years of experience in the profession (SD = 10.23 years). Fifty percent indicated having a graduate or professional degree, while 45.50 percent held a bachelor's degree. The remainder had either some college or a high school diploma. All participants held at least one recognized financial planning credential, such as Certified Financial Planner™, Registered Financial Consultant™, Chartered Life Underwriter™, Personal Financial Specialist™, or Chartered Financial Consultant™. Nearly all participants held a securities license, and most were licensed to sell life insurance and annuity products. Fifty percent of participants indicated that their primary profession was financial planning. Others indicated insurance advisor (13 percent), investment advisor (18 percent), industry consultant (5 percent), educator (9 percent), or another profession (5 percent). Only 27 percent of participants said commissions were their primary source of compensation. The majority reported compensation from fees and commissions (46 percent), with others reporting only fees (14 percent) and salary (13 percent). In general, the participants matched the profile of financial advisors who have the knowledge and expertise to make meaningful and valid



observations on important portfolio development inputs.

6. A number of public-use and commercial scales are available—see Barsky, Juster, Kimball, and Shapiro (1997); Grable and Lytton (1999); Hanna and Lindamood (2004); and Roszkowski (1999). A reliable commercial scale is the *Survey of Financial Risk Tolerance*® developed by Roszkowski. This 40-item survey has a reported reliability coefficient of .91 (Roszkowski 1992). A similar commercially available scale is the online *FinaMetrica* product. A publicly available alternative is a 13-item scale compiled by Grable and Lytton. The scale's reliability falls between .75 and .83. A scale developed by Weber, Blais, and Betz (2002) measures multiple domains of risk tolerance. Those interested in developing indifference curves will find measures by Barsky et al. and Hanna and Lindamood to be particularly useful.
  7. Practitioners concluded that savings can include both personal savings and employer contributions to retirement plans.
  8. The variance-covariance value-at-risk method allows an investor to determine, with a given degree of statistical confidence, the maximum potential exposure to loss for a given time horizon. The method multiplies the standard deviation of returns by a confidence interval (measured with a z-score) and subtracts this from the mean or average return.
  9. Although not explicitly stated, it is implied that advisors need to periodically reevaluate their client's risk tolerance, risk capacity, and investment time horizon. Significant changes in these inputs will alter the maximum level of systematic risk appropriate within a portfolio.
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