Financial Numeracy, Net Worth, and Financial Management Skills: Client Characteristics That Differ Based on Financial Risk Tolerance

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Abstract: Financial advisors commonly observe important differences among current and prospective clients in terms of financial numeracy, net worth, and financial management skills. This study shows that these types of financial advisor observations and perceptions are accurate, and that individual differences on these three dimensions differ significantly based on a person's financial risk tolerance. Findings suggest that individuals who exhibit the lowest level of financial risk tolerance tend to (a) be the least competent in terms of financial matters, (b) have the lowest subjective evaluations of net worth, and (c) experience the least satisfaction with their financial management skills. The questions used in the study might be appropriate for inclusion in advisory data-gathering tools as a way to help differentiate individuals into categories of potential recommendation implementation.

Introduction

The personal financial planning literature over the past two decades, particularly papers published in the academic press, has increasingly focused on the exploration of the role demographic, socioeconomic, and psychosocial factors play in impacting individuals' appetite for risk.[1] There is an obvious reason for this interest in risk tolerance and resulting risk-taking activities on the part of consumers. As Roszkowski and Davey pointed out, "Assessment of risk tolerance is now generally recognized as a prerequisite to the development of a sound financial plan...."[2] As such, it is important for financial advisors to have a defensible understanding of the factors associated with a current or potential client's tolerance for risk. Furthermore, gaining a better understanding of the types of factors related to a person's willingness to engage in financially risky behavior can be helpful as a way to improve the financial literacy of individuals (as clients and citizens) by enhancing their financial well-being.[3]

According to Grable,[4] financial risk tolerance is defined as the maximum amount of uncertainty that someone is willing to accept when making a financial decision. Additionally, the concept can be viewed as a person's "willingness or unwillingness to undertake a nonguaranteed course of action."[5] Finke and Huston stated, "People are rationally willing to take risks because they expect the additional utility derived from the positive outcome will, on average, outweigh the reduced utility from a negative outcome. In personal finance, willingness to take risk involves accepting an increased probability or degree of potential loss."[6] From a financial advisor's perspective this simply means that clients ought to be willing to take on additional levels of

investment risk in order to increase potential returns, which, if the returns are actually realized, should increase the client's level of satisfaction and happiness. For example, Finke and Huston demonstrated in their study that a willingness to take financial risk was associated with a significantly higher net worth and that, for persons over the age of 65, risk tolerance was among the strongest predictors of a higher net worth.

The link between financial risk tolerance and wealth accumulation, as suggested above, is relatively well-known in the practitioner and academic communities. More recently, the associations among risk tolerance, financial numeracy, and financial management skills, the latter concepts both being individual psychosocial factors, have garnered attention at the highest policy levels. The creation of the Consumer Financial Protection Bureau in 2010, for example, had as much to do with regulating financial services firms as it did with providing a mechanism for increasing consumer awareness of the financial markets. A key argument for the passage of the controversial bill was that lack of prudent financial decision making at the household level resulted, in part, from a lack of basic financial knowledge and skills among the general population.

It appears that across the spectrum of interests, policy makers, financial services practitioners, and researchers are looking for more evidence to help consumers make better financial decisions. Financial numeracy may provide a link to such evidence. The term financial numeracy is relatively new. Championed by Huhmann and McQuitty, financial numeracy is defined as "proficiency in processing, understanding, acquiring, and using financial information and concepts based on a consumer's capacity and prior knowledge in this area."[7] Huhmann and McQuitty proposed a model of financial numeracy in an attempt to close the gap in the literature that shows an extremely limited amount of research by scholars to develop consensus definitions of related concepts, such as financial literacy, financial education, financial knowledge, or financial capability.[8] In a sense, it appears that what some have called financial capability and financial literacy appear to be migrating and morphing into this new, broader construct known as financial numeracy. Huhmann and McQuitty argued that factors such as financial information-processing

capacity, knowledge, and experience combine to allow individuals to navigate the complex financial marketplace. While related to cognitive ability and financial knowledge, the concept is as much a subjective evaluation of one's own financial processing ability as it is an objective measure of intelligence.

It has been hypothesized in the literature that "financial savviness,"[9] or what is referred to in this study as including both financial numeracy and financial management skill, plays a key role in the accumulation and preservation of wealth, especially during bear markets. For example, financial knowledge, as a generalized aspect of financial numeracy, is known to be positively associated with both risk tolerance and wealth accumulation,[10] as is a person's proficiency in making financial decisions based on training and experience—i.e. financial management skill. It is not surprising then that households that exhibit relatively high risk tolerance, financial numeracy, and financial management skills might also display signs of wealth accumulation that exceeds that of households with low tolerances for risk and low levels of financial knowledge and management skills.

The purpose of this study was to test the extent to which there are differences in financial risk tolerance based on a linear combination of financial numeracy, net worth, and financial management skills, while controlling for age. The outcomes associated with this study have workable applications for practicing financial advisors. Specifically, measures of financial numeracy, net worth, and financial management skills are introduced and tested. As will be shown, these three measures appear to provide a useful insight into the subjective attitudes of clients. It is possible that these measures could be included in an advisor's data gathering materials and assist the advisor in the process of educating clients to achieve their financial objectives. The discussion of results provides guidelines on how the measures are related to risk tolerance and how scores can be interpreted in relation to financial risk tolerance.

Conceptual Background and Research Hypotheses

As many financial advisors readily acknowledge, and as the personal financial planning literature attests, there

appears to be a positive association between financial risk tolerance, on the part of clients, and financial numeracy, net worth, and financial management skills. It is generally assumed that clients who display financial numeracy characteristics, a high net worth, and enhanced levels of financial management skill will also exhibit a high willingness to engage in financial activities that involve financial risk. When viewed from an alternative perspective, those with high risk tolerance tend to be more financially savvy, wealthier, and more skilled.

For nearly all practicing financial advisors these insights are intuitive and confirmed through observation. However, in the financial planning literature the assumed relationships among risk tolerance and financial numeracy, net worth, and financial management skill are a bit more problematic. Few studies have attempted to test these risk-tolerance linkages in a single study. Instead, the academic perspective tends to be built on data obtained from multiple tests. Whether or not the relationships remain intact, or if the associations are consistent across risk-tolerance levels, are questions as of yet unanswered.

In this study, financial numeracy, net worth, and financial management skills are predicted simultaneously using financial risk tolerance as the primary independent variable. A person's age is controlled for in the study. Age is an important factor to consider in any study of risk tolerance because, as financial advisors already know, the risk tolerance of clients tends to vary with age.[11] As individuals age their appetite for risk often declines. This is less likely a biological function and more an issue associated with the investment time horizon shrinking. Older clients simply do not have the same investment time horizon, compared to younger clients, to recoup portfolio losses.[12] Additionally, age is an important variable to control for in risk studies because age tends to be positively correlated with increased knowledge[13]. Older clients often have a greater pool of experiences to gauge gain and loss situations, risk-taking activities, and potential pitfalls associated with financial planning strategies. In terms of financial numeracy, net worth, and financial management skills, one would expect older clients to exhibit higher objective and subjective scores on these measures.

Three research hypotheses were developed to guide this study. In social science research it is customary to test hypotheses using a traditional null statement. This is followed by the alternate hypothesis, which is directional in nature and which represents the anticipated relationship between variables. The following hypotheses were tested in this study:

H_{0-1}: There is no linear association between financial risk tolerance and financial numeracy, controlling for age.

H_{0-1A}: There is a positive linear association between financial risk tolerance and financial numeracy, controlling for age.

H_{0-2}: There is no linear association between financial risk tolerance and net worth, controlling for age.

H_{0-2A}: There is a positive linear association between financial risk tolerance and net worth, controlling for age.

H_{0-3}: There is no linear association between financial risk tolerance and financial management skills, controlling for age.

H_{0-3A}: There is a positive linear association between financial risk tolerance and financial management skills, controlling for age.

Methodology

As stated previously, few studies have attempted to test the relationships among financial risk tolerance, as the independent variable, and financial numeracy, net worth, and financial management skills, as dependent variables, simultaneously. There is an important reason to do so, however. By only testing relationships among these related variables separately, any association between financial numeracy, net worth, and financial management skills could be lost. In this study, a multivariate analysis of covariance (MANCOVA) statistical test was used to evaluate the research hypotheses. A MANCOVA allows researchers to account for associations among these three dependent variables while providing insights into differences in risk tolerance based on a combination of dimensions. In other words, the MANCOVA method, as applied in this study, provides a profile of the risk tolerance of individuals that is based on three dimen-

sions, rather than one. In addition, by employing a MANCOVA analysis, the chances of encountering a Type I Error, or "false positive"—which is akin to finding an effect when, in fact, one does not actually exist—are reduced. Finally, we control for age, as a covariate, to reduce the chance of error when running the statistical model. As mentioned above, prior research studies have shown that risk tolerance decreases with age.[14] In this study, we want to be certain that the interaction effects, if any, are attributable to the inclusion of the dependent variables and not merely due to the effect of age. PASW (version 18), a business and social science statistical package, was used to conduct all analyses.

Sample

Data for this analysis were collected from a sample of individuals living in a midwestern U.S. state. Addresses were obtained from public file utility records. The choice of possible respondents was based on a proportional representative sampling technique, where the sampling frame was purposely chosen to include individuals across the lifespan who were actively engaged in making daily financial decisions. In addition to receiving information about the research project, those who completed the survey received a $20 cash incentive. In terms of population and area coverage, the sample was distributed within a three-county district consisting of over 500 square miles. Of the 1,000 surveys that were mailed, 108 were returned as nondeliverable, while overall 259 surveys were completed. For this study, 247 responses were used in the analysis.

The sample was demographically diverse. Approximately 83% of respondents were non-Hispanic White, while 4% were Hispanic, 6% were African-American, 2% were Pacific Islanders, 2% were Asian, 1% were Native American, and 2% were biracial. More women (64%) than men (36%) responded to the questionnaire, and the sample included both married respondents (41%) and others, as well as individuals who were employed full time (51%).

Measure of Financial Risk Tolerance

Financial risk tolerance was measured with a single item called the Survey of Consumer Finances (SCF)

risk question. The SCF risk question has been used as a measure of financial risk tolerance by the Federal Reserve Board for over two decades, and tests using the question have been published every year in a wide variety of contexts. For the purposes of this study the question was altered slightly from that used by the Federal Reserve as follows:

Which of the statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?

1. Take substantial financial risk expecting to earn substantial returns.
2. Take above-average financial risks expecting to earn above-average returns.
3. Take average financial risks expecting to earn average returns.
4. Not willing to take any financial risk.

The validity and reliability of the question has been reported in the literature. Research conducted by Grable and Lytton showed that the item provides researchers and practitioners with a reasonable level of face validity.[15] The question seems to be a particularly effective measure of investment risk tolerance. Consider the following insight from Yao and Hanna: "The SCF risk-tolerance measure may be a useful indicator of intentions in investing, and may be superior to measures of risk tolerance based on actual portfolio allocation, since many households have no investment assets."[16] So, while the risk question may not provide a comprehensive view of a person's overall tolerance for financial risk, the question is generally thought to do a reasonable job of helping researchers and practitioners evaluate tolerance for investment risks.

In this study, the risk question was employed as a categorical predictor containing and defining multiple levels of risk. Respondents to this question classified themselves according to one of the levels of risk. Responses were coded as follows: "Not willing to take any financial risks" = 1; "Take average financial risks expecting to earn average returns" = 2; "Take above-average financial risks expecting to earn above-average returns" = 3; and "Take substantial financial risks expecting to earn substantial returns" = 4. Using the language of PASW, the risk question was entered into

the model as the primary fixed factor. Descriptive statistics for the question are shown in Table 1.

Dependent Variables

The dependent variables employed in this analysis consisted of Likert-type subjective self-assessments of financial numeracy, net worth, and satisfaction with present financial management skills. Financial numeracy was proxied with the following question: "How knowledgeable do you think you are about personal finances compared to others?" This item was used as a proxy of financial numeracy because the question contains aspects of both learning and experience that are based on subjective comparisons to others. Respondents answered the query by choosing from a set of possible answers, with 1 = lowest level and 10 = highest level. Net worth was based on responses to a question regarding the hypothetical complete liquidation of the respondents' major possessions and use of the proceeds in the repayment of all debts to the extent of realized proceeds. Respondents used a Likert-type scale to assess their financial outcomes from this hypothetical situation ranging from "be in serious debt" (coded 1), to "break even" (coded 5), to "have something left over" (coded 10), thereby classifying their subjective evaluation of personal financial net worth. Financial management skills were assessed by asking respondents how satisfied they were with their financial management skills. A scale of 1 = dissatisfied and 10 = satisfied was used to evaluate answers. This question was chosen to represent skill levels because the item provides a subjective evaluation of the respondent's proficiency, based on experience, when making financial decisions. Descriptive data for these outcome measures are reported in Table 1.

Age: The Covariate

The actual reported age of respondents was included as a covariate in the analysis, as there is some literature suggesting that younger individuals may be more willing to take financial risk than their older counterparts, while supporting the conventional belief that risk taking decreases with age.[17] Respondent ages ranged from 18 to 98 years. The mean age of respondents was 40.94 years (SD = 17.62 years).

Results

Patterns of Risk Tolerance

As noted above, there were four risk-tolerance categories examined in this study. Respondents were unevenly distributed across the categories, with 22.20% assessing themselves as risk avoiders, 52.40% as average risk takers, 19.10% as above-average risk takers, and the balance (6.30%) as substantial risk takers. Table 2 provides an insight into where respondents identified themselves in terms of financial numeracy, net worth,

TABLE 1

Descriptive Statistics of Fixed Factor and Dependent Variables

Variable	Category	N	Percentage
Risk tolerance	None	56	22.20
	Average	132	52.40
	Above average	48	19.10
	Substantial	16	6.30
Financial numeracy	Lowest level	4	1.60
	Level 2	10	3.90
	Level 3	13	5.10
	Level 4	15	5.90
	Level 5	48	18.8
	Level 6	32	12.50
	Level 7	43	16.80
	Level 8	55	21.50
	Level 9	25	9.80
	Highest level	11	4.30
Net worth	In debt	13	5.10
	Level 2	10	3.90
	Level 3	18	7.00
	Level 4	14	5.50
	Break even	27	10.50
	Level 6	16	6.30
	Level 7	11	4.30
	Level 8	30	11.70
	Level 9	26	10.20
	Money left	91	35.50
Financial management skills	Dissatisfied	11	4.30
	Level 2	9	3.50
	Level 3	12	4.70
	Level 4	26	10.10
	Level 5	34	13.20
	Level 6	29	11.20
	Level 7	43	16.70
	Level 8	46	17.80
	Level 9	34	13.20
	Satisfied	14	5.40

and financial management skills on the four categories of risk tolerance. For example, of the 56 respondents who were willing to take no financial risks, their financial numeracy score was 5.54. On the other hand, the financial numeracy score of those 16 respondents who were willing to take substantial financial risks was 7.25. The pattern for net worth was also increasing; however, the highest reported net worth scores (8.11) were reported by the 46 respondents who indicated being willing to take above-average levels of financial risk. Financial management skill satisfaction showed a similar response pattern to that of net worth. The highest subjective financial knowledge assessments were made by the 46 respondents who indicated an above-average level of financial risk tolerance.

The robustness of the model was tested using Wilks' Lambda. The statistic was significant for both the risk question variable (Λ = 0.83, $F_{3,243}$ = 5.12, p < .001) and the age variable (Λ = 0.93, $F_{3,243}$ = 6.07, p < .001). In a test of between-subjects effects, the risk question variable was significantly associated with financial numeracy ($F_{3,243}$ = 5.00, p < .01), net worth ($F_{3,243}$ = 10.60, p < .001), and financial management skills ($F_{3,243}$ = 7.89, p < .001). Approximately 5.80%, 11.60%, and 8.90% of the subjective score variances in financial numeracy, net worth, and financial management skills were explained by financial risk tolerance scores, respectively.

The Effect of Age

The covariate, age, was significant for two of the three dependent variables. Specifically, as it pertains to financial management skills ($F_{1,245}$ = 7.19, p < .01), 2.9% of the variance was attributable to age with older individuals being more satisfied with their financial skills. A one-year increase in age was found to be associated with a .02 increase in financial management skill satisfaction. The relationship between age and net worth ($F_{1,245}$ = 15.84, p < .001) was also significant. In this case, older individuals reported having less wealth. Approximately 6.10% of the variance in net worth was attributable to age, with each one-year increase in age being associated with a .04 decrease in net worth (as recorded on the 10-point scale). The relationship between age and financial numeracy, however, was insignificant (p = .06).

The Effect of Financial Risk Tolerance

Table 3 provides evidence to address the three research hypotheses of this study. For financial numeracy, after controlling for age, individuals who classified them-

TABLE 2

**Means and Standard Deviations by
Risk Level per Dependent Variable**

Dependent Variable	SCF Risk	N	Mean	Standard Deviation
Financial numeracy	None	56	5.54	2.327
	Average	129	6.57	2.034
	Above average	46	6.65	1.828
	Substantial	16	7.25	1.653
In debt or break even	None	56	5.46	3.033
	Average	129	7.55	2.817
	Above average	46	8.11	2.813
	Substantial	16	7.56	2.929
Financial management skills	None	56	5.02	2.431
	Average	129	6.64	2.274
	Above average	46	6.76	1.934
	Substantial	16	6.13	2.125

TABLE 3

Parameter Estimates of Dependent Variables

Dependent Variable	Parameter	β	Partial Eta Squared
Financial numeracy	Age	0.014	0.014
	None	-1.799[a]	0.038
	Average	-0.787	0.009
	Above average	-0.647	0.005
	Substantial	Reference group	
Net worth	Age	-0.040[a]	0.061
	None	-2.338[a]	0.037
	Average	-0.305	0.001
	Above average	0.408	0.001
	Substantial	Reference group	
Financial management skills	Age	0.022[a]	0.029
	None	-1.239[b]	0.016
	Average	0.349	0.001
	Above average	0.560	0.003
	Substantial	Reference group	

[a] p<.01.
[b] p<.05.

selves as not risk seeking (SCF = 1, β = -1.80, p < .01) scored lower in financial numeracy than individuals who self-classified as average, above-average, or substantially risk tolerant. In other respects, those willing to take average, above-average, and substantial financial risk exhibited similar financial numeracy scores. The Beta coefficient (β = -1.80) denotes that there was a negative relationship between risk tolerance and financial numeracy. Those who assessed themselves as having no risk tolerance scored, on average, 1.80 points lower in financial numeracy than individuals who assessed themselves as substantial risk takers.

In terms of net worth, after controlling for age, non-risk takers displayed the lowest levels of self-assessed net worth (SCF = 1, β = -2.34, p < .01). In this case, those with no tolerance for risk scored 2.34 points lower than substantial risk takers on the net worth scale. Across and between the other risk categories, the differences in net worth were insignificant and not different from each other. The results from the test of the financial management skills dependent variable, after controlling for age, were relatively consistent with the previous findings from this study. Individuals who classified themselves as risk avoiders categorized themselves as having the lowest satisfaction with their financial management skills (SCF = 1, β = -1.24, p < .05). As was the situation with financial numeracy and net worth, average, above-average, and substantial risk takers were not significantly different from one another, although it is worth noting that above-average risk takers self-assessed at the highest financial management skill level. In terms of financial management skill satisfaction, non-risk takers scored 1.24 points lower than substantial risk takers on the satisfaction scale.

Pairwise comparisons were used to confirm the findings. It was revealed that, in terms of financial numeracy, individuals who were not willing to take risk (M = 5.53) were substantially different from average risk takers (M = 6.545), above-average risk takers (M = 6.69), and substantial risk takers (M = 7.33). A similar pattern was noted in terms of net worth. Those not willing to take risk (M = 5.46) were substantially different from average risk takers (M = 7.491), above-average risk takers (M = 8.20), and substantial risk takers (M = 7.80). The same relationships were noted in terms of financial management skills.

Respondents who indicated having no tolerance for financial risk reported the lowest financial management skills (M = 5.01) compared to average (M = 6.60), above-average (M = 6.81), and substantial (M = 6.25) risk takers.

Summary

In summary, the categories of risk tolerance, controlling for age, explained approximately 5.80% of the variance in financial numeracy, about 11.60% of the variance in net worth, and approximately 8.90% of the variance in financial management skill satisfaction. Even though the observed coefficient effect sizes were not large, these results do suggest that (a) financial risk tolerance is associated with subjective assessments of financial numeracy, net worth, and financial management skills; (b) individuals with the lowest self-assessed risk tolerance report the lowest levels of financial numeracy, net worth, and skill satisfaction; and (c) the perceptions and intuition of many financial advisors are likely correct in assuming that risk tolerance can be used to obtain a useful insight into the subjective attitudes of clients. Overall, a general positive linear association between financial risk tolerance and financial numeracy, net worth, and financial management skills, controlling for age, was noted. As such, the null hypotheses were rejected and the alternative hypotheses were supported.

Discussion

Although the results from this study are of interest from a purely academic perspective in that the findings provide evidence that financial numeracy, net worth, and financial management skills are related to financial risk tolerance, the more important implications are those that impact financial advisory practices. Advisors frequently use financial projections as a tool to demonstrate to clients and prospects challenges associated with achieving personal financial goals with a low- or no-risk approach. The results of this study may provide an additional reinforcement tool that may assist advisors when counseling their clients of possible repercussions and opportunities associated with their risk profiles. Respondents in this study who indicated having no tolerance for risk reported having the lowest levels of financial numeracy and net worth and the lowest satisfaction with their

financial management skills. While these individuals may certainly need the services of a financial advisor, it is equally likely that these three attributes are indicative of a person who might have trouble understanding and/or implementing financial planning strategies without further education and professional guidance. It is intuitive that individuals who possess low personal financial numeracy and those who are least satisfied with their financial management skills might also shun risk in favor of more conservative investment vehicles and less complex investment options. These individuals may be better suited to services provided by nonprofit financial counseling organizations, community credit unions, and extension services provided by land grant universities throughout the United States.

Financial advisors ought to also consider adding the three psychosocial questions related to financial numeracy, net worth, and financial management skills into initial data-gathering techniques. Responses to the questions can provide a brief and valid way to segment clients and prospects into service groups. Individuals who indicate having a low level of financial numeracy, a low subjective evaluation of their net worth situation, and dissatisfaction with their financial management skills are likely to concurrently exhibit the lowest levels of financial risk tolerance. This in and of itself is not a bad thing. These indicators only suggest that this type of individual's readiness to engage in financial planning activities that entail risk may be limited. Until the person shows signs of improved financial numeracy, for example, an advisor might find it difficult to convince the person to implement recommendations possessing a somewhat higher risk element.

While conventional wisdom suggests that individuals should not venture too far from their financial comfort zones—in terms of risk tolerance or risk capacity—this heuristic may unwittingly prove to be the most risky option of all when discussion turns to issues of personal financial well-being and personal financial security. The onus on each individual for one's personal financial well-being has never been greater than at present. Enhanced financial numeracy and enhanced financial management skills can help consumers weigh the benefits and drawbacks of myriad investment choices available in the marketplace. Another way to look at this is to understand that

those with the lowest levels of risk tolerance may be in the greatest need of financial education. Without basic financial literacy these individuals may have a difficult time obtaining the financial numeracy skills necessary to take risks. Without risk taking, as nearly every financial advisor knows, individuals are unlikely to obtain wealth, as evidenced in this study's risk tolerance-wealth association. Additional research may prove invaluable in helping to understand the demographic and socioeconomic factors affecting individuals' appetite for risk.

Although the findings from this study are noteworthy in several respects, it is important for financial advisors to keep in mind the limitations associated with this research. First, results were based on a sample that was not necessarily representative of the entire U.S. population. Second, the risk measure used in the study was a single question item. Even though the question is used by the Federal Reserve Board as a gauge of risk tolerance, few researchers working in the risk assessment field feel that the question is a fully adequate measure of a person's willingness to engage in risky financial behavior. Three recent studies[18] have demonstrated that the correlation of single-item risk assessments is far from perfect, and that financial advisors are better served, in practice, using a multidimensional risk measure. Finally, there is some debate among academicians regarding the use of MANCOVA models with ordinal outcome measures. In this study, financial numeracy, net worth, and skill satisfaction were measured with 10-point Likert-type items; however, as Fife-Schaw[19] and Field[20] have noted, if the dependent variables have multivariate normality within groups, which was the case in this study, this type of parametric test can be an appropriate method to test hypotheses. Future research in this area should be designed to minimize these potential limitations. For example, it would be useful to verify the findings with a larger nationally representative sample. Additionally, the way in which the outcomes are measured should be expanded, and maybe most importantly, the manner in which risk tolerance is assessed in future studies should be more multidimensional. ■

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