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Emergency funds and alternative forms of saving

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Abstract

The likelihood of meeting the three-month expenditure guideline for monetary, comprehensive, and subjective emergency funds is examined using data from the 1998 Survey of Consumer Finances. Specific independent variables of interest include the household's attitude towards credit, whether the household overspent, the expectation of future income, the working status of the spouse, and alternatives to emergency funds. Results suggest the actual emergency fund level held by households is more closely related to the ability to save than to the need for emergency funds. A home equity line of credit may be a feasible alternative to emergency funds.

JEL Classification: D12; D91; E21; G29

Keywords: Emergency funds; Liquidity ratio; Subjective emergency funds; Survey of Consumer Finances; Financial ratio

1. Introduction

Because of the decline in the economy and in the aftermath of September 11th, many households experienced unexpected unemployment and other disruptions to their economic situations. An article in *Time* magazine said the fear of job loss was spreading among workers and the typical laid-off worker needed about 14.5 weeks to find a new job (Chatzky & Weisser, 2001). According to another *Wall Street Journal* report (Coleman, 2001), tens of thousands of people faced layoffs after September 11th, and many of them were financially

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unprepared for the reduction in earnings. Even during the prosperous decade of the 1990s, many people failed to put away enough money for rainy days. These events illustrate the importance of emergency funds and the consequences of inadequate preparation.

This research examines the emergency fund holdings of United States households and the variables that influence the probability of adequate objective emergency fund holdings. In addition, the adequacy of the household's subjective emergency fund level is also studied. The subjective measure captures the household's perception of the appropriate level of emergency fund holdings and could differ from the actual holdings.

The liquidity ratio is a useful tool for studying household emergency funds. The ratio relates the level of monetary assets to the household's monthly expenses, thus providing a metric for assessing the adequacy of household emergency funds. Much of the previous research uses data that is now at least 10 years old, and/or uses monthly income, instead of monthly expenditure, as the denominator of the liquidity ratio (e.g., Chang, 1995; Chang & Huston, 1995; DeVaney, 1995; and Huston & Chang, 1997). The income-based ratio guideline may result in levels of emergency fund holdings that are too high or too low for households spending less or more than income. This study will contribute to the body of emergency funds research by using more recent data, the 1998 Survey of Consumer Finances (SCF), and by using monthly expenditure to assess the adequacy of household emergency funds. Another contribution of this research is that other resources that could be used to meet expenses in an emergency are considered. Households that do not meet the guidelines may not really be vulnerable to financial problems when other available resources are considered. The alternatives considered in this study include borrowing against retirement accounts, borrowing against home equity, and using credit.

2. Background information and theoretical framework

The liquidity ratio, defined as the ratio of monetary assets to monthly expenditures, is commonly used in emergency funds research. Monetary assets, also known as liquid assets, include cash and near-cash items that can be readily converted to cash (DeVaney, 1997). Johnson and Widdows (1985) classified three measures of emergency funds based on their degree of liquidity: (1) Monetary emergency funds: assets held in saving, checking and money market accounts; (2) Intermediate emergency funds: monetary assets plus CDs and saving certificates; and (3) Comprehensive emergency funds: intermediate assets plus the value of stocks and bonds. Measures based on all three definitions have been used in previous empirical research and are summarized in Table 1.

In this study, both monetary and comprehensive assets are examined as measures of emergency fund holdings. Monetary assets are readily available for use in an emergency. Investment assets may also be available in an emergency, but the use may involve risks in terms of penalty costs, illiquidity, or potential financial loss. Analyzing multiple ratios rather than a single ratio provides more information about a household's economic well being.

To assess the adequacy of emergency funds, the amount of emergency funds needed must be defined. Conceptually, the amount of emergency funds needed is related to the level of monthly expenditure. Most previous research has used gross household income to proxy

expenditure (e.g., Chang, 1995; Chang & Huston, 1995; DeVaney, 1995; and Johnson & Widdows, 1985) because of the difficulty of obtaining information on both assets and monthly expenditure in existing secondary data sets. The SCF provides comprehensive information on financial assets of U.S. households but contains no information on household expenditure. The Consumer Expenditure Survey (CES) contains detailed information on household expenditures but does not contain detailed household financial information.

Although income may be an acceptable expenditure proxy for many households, there are cases where it is inappropriate to base emergency fund guidelines on income. If households spend much less than income and have long-term financial goals, a guideline based on income may require emergency fund holdings that are too high at the cost of higher rate-of-return investment assets. On the other hand, if households overspend, then a guideline based on income may result in emergency fund holdings that are too low, leaving the household inadequately prepared for emergencies. In this study, monthly expenditure is estimated for each household and then used to derive guidelines for emergency fund holdings.

The liquidity ratio is an indicator of how long the household can sustain itself if an emergency happens and the inflow of income is suspended. Greninger et al. (1996) report consensus between financial planners and educators for recommended liquidity ratios of two and one-half to three. In practice, financial planners and financial counselors recommend ratios ranging from two to six. Previous empirical studies have used different guidelines to examine the adequacy of emergency funds (Table 1). Regardless of the guideline used, the results all suggest that more than two-thirds of U.S. households do not have adequate emergency funds (Chang, 1995; Chang & Huston, 1995; and Johnson & Widdows, 1985).

The emergency most often considered in the study of emergency funds is sudden loss of income, which is highly related to unemployment. Therefore, a typical length of the unemployment period could inform the decision of an appropriate value for the liquidity ratio guideline. According to the Bureau of Labor Statistics (Labor Force Statistics, n.d.), 74.2% of all unemployed persons experienced a period of unemployment of no more than 14 weeks in 2001. The average weeks unemployed in 2001 was 13.1, and the median was 6.8 weeks. A value of three is chosen conservatively for the liquidity ratio guideline for this research. A household is considered to meet the guideline if the household emergency funds are equal to at least three months expenditure.

2.1. Theoretical framework

Life cycle savings theory provides a foundation for analyzing emergency funds and liquidity ratios. The theory suggests that people desire to smooth consumption and seek to maximize utility over their lifetime (Ando & Modigliani, 1963). Thus, from a life cycle perspective, when current period income exceeds permanent income, people are expected to save, and dissaving is expected when current period income is less than permanent income.

The purpose of emergency funds (i.e., one component of savings) is to cover unforeseen events or emergencies that result in the current period income being insufficient to meet the current period consumption. Emergencies can result in unexpected decreases in or loss of current period income, or unexpected increases in consumption. When current period income

Table 1
Summary of previous research

Researchers	Dataset	Measure of emergency fund	Guideline for adequate emergency funds
Johnson & Widdows (1985)	1977 & 1983 Survey of Consumer Finances (SCF)	Monetary Intermediate Comprehensive	2 months gross household income 6 months gross household income
Hanna, Chang, Fan & Bae (1993)	1990-1991 Consumer Expenditure Survey (CES)	Liquid assets*	3 months before-tax income 3 months take-home income 3 months spending
Chang & Huston (1995)	1983-1986 panels of SCF	Intermediate	3 months gross household income
Chang (1995)	1983-1986 panels of SCF	Comprehensive	3 months gross household income
DeVaney (1995)	1977 & 1989 SCF	Comprehensive	3 months gross household income
Hanna & Wang (1995)	1990-1991 CES	Comprehensive	3 months spending
Huston & Chang (1997)	1992 SCF	Monetary Intermediate Comprehensive	3 months gross household income
Ding & DeVaney (2000)	1998 SCF	Monetary Comprehensive	3 months gross household income
Chen & DeVaney (2001)	1998 SCF	Monetary Comprehensive	3 months gross household income

* By the authors' definition, liquid assets include the amount in checking accounts, brokerage accounts, savings accounts, savings and loans, credit unions, stocks, bonds, mutual funds, and U.S. savings bonds.

is less than consumption other resources, including savings, credit, or borrowing against assets, can be used to cover the temporary gap.

A household's need for emergency funds are influenced by several factors. Hatcher (2000) uses a cost-benefit decision model and suggests that emergency funds are optimal only when the rates of return on alternative investments are fairly low and/or when the emergencies are expected to occur relatively frequently.

Hanna, Fan, and Chang's (1995) prescriptive life cycle savings model suggests that the income growth pattern affects the optimal savings pattern. If real income is expected to increase in the future, the household should delay saving, and even borrow in the current period, while an expected decrease in future income would result in saving more in the current period and a decreasing saving rate over time. Thus, it's reasonable to save less than the recommended guideline or not to save for emergencies if the household expects future income growth.

Another variable that influences emergency fund holdings is uncertainty. Unexpected income drops might result from events such as being laid off, and unexpected consumption increases might result from events such as accidents or illness. Because the latter kinds of events are more likely to be covered by insurance or other types of protection program, it's

Table 2
Hypothesized effects of factors on the likelihood that a household meets the three months expenditure guideline

Factors	Monetary measure	Comprehensive measure
Age	+	+
Education level	+	+
Non-Hispanic White	+	+
Over-spending	−	−
Willing to take higher financial risk	−	+
Accepting the idea of borrowing to cover living expenses when income is cut	−	−
Expecting an income decline in the future	+	+
No saving motives/Don't or can't save	−	−
Having a full-time working spouse/partner	−	−
Able to borrow against retirement accounts	−	−
Home equity line of credit level	±	±
Amount of available credit	±	±

reasonable to treat emergency funds mainly as protection against income drops. Chang, Hanna, and Fan's (1997) three-period model of consumption posits that the probability of an income drop is positively related to the percentage of income saved.

2.2. *Previous empirical results*

Previous research finds that age, education, and homeownership are positively associated with adequacy of intermediate emergency funds. Black householders are less likely than White householders to have adequate intermediate emergency funds (Chang & Huston, 1995; Huston & Chang, 1997; and Chen & DeVaney, 2001). Chang and Huston (1995) find that the effect of income is not significant. Huston and Chang (1997) find that income significantly increases the probability of holding adequate comprehensive emergency funds, however, the magnitude is negligible. Saving motives for emergencies and willingness to accept at least some financial risk increase the likelihood of holding adequate emergency funds (Huston & Chang, 1997; and Chen & DeVaney, 2001). Chen and DeVaney (2001) also find a positive association between saving motives and adequacy of emergency funds. Income again is significant only for the comprehensive measure of emergency funds.

2.3. *Hypotheses of current study*

According to the theoretical framework, the level of emergency fund holdings should be related to whether current period income is above or below permanent income, the expected future income pattern, the probability of an income drop, risk tolerance, and the availability of other resources to enable households to smooth consumption, such as credit, home equity or other assets that can be borrowed against. Table 2 summarizes the corresponding research hypotheses.

3. Methodology

3.1. Data

The primary source of data for the analysis is the 1998 SCF, a triennial survey of U.S. households sponsored by the Federal Reserve Board with the cooperation of the U.S. Department of Treasury (Kennickell, Starr-McCluer, & Surette, 2000). The 1998 SCF public-use data contains information on 4,305 U.S. households and provides very comprehensive and detailed financial and demographic information that is important to this study. The Federal Reserve Board employs multiple imputation techniques to handle missing responses. As a result, the 1998 SCF consists of five complete data sets (Kennickell, 2000). Data from all five complete data sets are used to generate all empirical estimates in this research. All descriptive analyses are weighted using the SCF final nonresponse adjusted sampling weights to produce point estimates that are generalizable to all U.S. households.

The only information needed but not available in the SCF is information on household expenditure. Data from the 1997 Consumer Expenditure Survey are used to derive ratios of expenditure to after-tax income separately for overspending and nonoverspending households. The ratios are then applied to information on after-tax income of SCF households to derive estimates of expenditure. After-tax income of SCF households is estimated using information from the SCF on the adjusted gross income reported in tax returns, the household's tax filing status, whether the household itemized deductions or took the standard deduction, charitable contributions, real estate taxes, and mortgage payments. The procedures are summarized in the Appendix. (For more details see Bi, 2002.)

3.2. Dependent variables

Two objective measures of emergency funds, monetary assets and comprehensive assets, and one subjective measure of emergency funds are examined in this study. Using the SCF's definition, monetary assets include assets held in checking, saving, brokerage accounts, and money market funds (Kennickell, 2000). Comprehensive assets include monetary assets plus investment assets held in certificates of deposit, mutual funds, stocks, and bonds. Financial assets held in retirement accounts are excluded from emergency fund reserves since these funds cannot be withdrawn without paying a penalty. The question about subjective emergency funds asked in the SCF is:

> About how much do you think you (and your family) need to have in savings for emergencies and other unexpected things that may come up?

The household could respond from nothing needed to a specific amount of savings.

Three dichotomous dependent variables are created accordingly in this study. Meet1 equals 1 if the household has monetary assets equal to at least three months expenditure and equals 0 otherwise. Meet2 equals 1 if the household has comprehensive assets equal to at least three months expenditure, and equals 0 otherwise. Meet3 equals 1 if the household's subjective emergency fund level is equal to at least three months expenditure, and equals 0 otherwise.

3.3. Independent variables

Independent variables include categorical variables for age, education, race of the householder, whether the household overspends, risk tolerance, attitude towards borrowing, the expected income change in the future, working status of the spouse/partner, saving motives, and access to funds from other sources, such as retirement accounts, home equity lines of credit, and credit cards.

Based on the theoretical framework, the household income level, per se, does not have a direct effect on the likelihood of holding adequate emergency funds. However, most previous research includes income as an independent variable. To be consistent with the theory, but also to be able to compare our research with the previous research, logistic regressions are estimated with and without household income as an independent variable. Definitions and description of all independent variables are provided in Table 3.

3.4. Statistical analysis

Separate logistic regressions are estimated for each of the dependent variables to determine the factors affecting the likelihood of holding adequate emergency funds. Rubin's (1987) repeated-imputation inference techniques are used for more valid inference (Montalto & Yuh, 1998).

4. Results

4.1. Descriptive results

Table 4 shows the distribution of before-tax income, after-tax income, and estimated expenditure. The overall average after-tax income was $44,548. The estimates of income taxes paid appear reasonable based on comparisons to IRS tax survey data. The average estimated annual household expenditure is $31,274, and the median is $23,650. In general, the estimated annual expenditure is lower for nonoverspending households than that for overspending households. For households with nonpositive or very low after-tax income, the household poverty threshold is used to represent the household expenditure level.

The level of monetary emergency funds, comprehensive emergency funds, and subjective emergency funds vary across households. The mean value of monetary emergency funds for the sample is $15,242, while the median is only $2,500 (Table 5). In terms of comprehensive emergency funds, the variation is even greater. The mean value of comprehensive emergency funds is $73,958, and the median is only $4,200. The large variance shows that financial assets are distributed very unevenly among all the households in the United States. Interestingly, nearly all households (99.06%) think they need at least some emergency funds, suggesting that most households realize the importance of emergency funds. On average, households indicate that they need $20,744 in savings for emergencies and other unexpected events. Three out of 10 households meet the three-month expenditure guideline based on monetary assets, and 44% meet the guideline based on the comprehensive emergency funds

Table 3
Definitions and descriptive statistics of independent variables (n = 4305)

Independent variables	Definition	% of sample
Age		
Under 35	Reference group	23.28
35 to 44	1 if yes, 0 otherwise	23.26
45 to 54	1 if yes, 0 otherwise	19.20
55 to 64	1 if yes, 0 otherwise	12.84
65 and over	1 if yes, 0 otherwise	21.43
Education		
Less than high school	Reference group	16.46
High school graduate	1 if yes, 0 otherwise	31.87
Some college	1 if yes, 0 otherwise	24.63
Bachelor's degree	1 if yes, 0 otherwise	15.61
Graduate school	1 if yes, 0 otherwise	11.43
Race/ethnicity		
White, non-Hispanic	Reference group	77.74
Black, non-Hispanic	1 if yes, 0 otherwise	11.86
Hispanic	1 if yes, 0 otherwise	7.19
Other	1 if yes, 0 otherwise	3.21
Consumption pattern		
Over-spender	1 if yes, 0 otherwise	14.22
Non-over spender	Reference group	85.78
Risk tolerance		
Take substantial risk	Reference group	4.93
Take above average risk	1 if yes, 0 otherwise	17.86
Take average risk	1 if yes, 0 otherwise	38.47
No risk	1 if yes, 0 otherwise	38.75
Attitude towards borrowing		
Accept	1 if yes, 0 otherwise	42.77
Not accept	Reference group	57.23
Expectation of future income		
Constant, sure	Reference group	34.80
Growth, sure	1 if yes, 0 otherwise	15.34
Decline, sure	1 if yes, 0 otherwise	19.46
Not sure	1 if yes, 0 otherwise	30.39
Working status of spouse/partner		
Working, full time	Reference group	28.20
Working, part time	1 if yes, 0 otherwise	7.53
Not working	1 if yes, 0 otherwise	22.40
No spouse/partner	1 if yes, 0 otherwise	41.88
Saving motives		
Emergency funds	Reference group	33.67
Others	1 if yes, 0 otherwise	61.50
Don't save	1 if yes, 0 otherwise	4.83
Access to other financial resources		
Retirement account		
Yes	1 if yes, 0 otherwise	19.45
No	Reference group	80.55
Borrow against home equity		
$< = 0$	Reference group	46.59
\$1 ≈ \$18,000	1 if yes, 0 otherwise	13.07
\$18,001 ≈ \$45,000	1 if yes, 0 otherwise	14.01
\$45,001 ≈ \$85,000	1 if yes, 0 otherwise	13.09

Table 3
(Continued)

Independent variables	Definition	% of sample
>85,000	1 if yes, 0 otherwise	13.25
Borrow against credit card		
< = 0	Reference group	34.21
$1 ≈ $3,000	1 if yes, 0 otherwise	16.15
$3,001 ≈ $8,000	1 if yes, 0 otherwise	16.54
$8,001 ≈ $17,000	1 if yes, 0 otherwise	16.58
>$17,000	1 if yes, 0 otherwise	16.52
Gross annual income		
< = $13,000	Reference group	19.65
$13,001 ≈ $25,000	1 if yes, 0 otherwise	19.57
$25,001 ≈ $42,000	1 if yes, 0 otherwise	21.40
$42,001 ≈ $67,000	1 if yes, 0 otherwise	19.47
> $67,000	1 if yes, 0 otherwise	19.90

Sources: 1998 Survey of Consumer Finances. Statistics derived from weighted analyses of data pooled from all five implicates.

measure. About 42% of all households mention an adequate amount for emergency funds in response to the subjective measure. Based on the three measures, the median ratios of emergency funds to monthly expenditure are 1.14, 2.06, and 2.32, respectively.

4.2. Results of logistic multivariate results

Because three models are used, the results for the monetary emergency funds are discussed first followed by results for the comprehensive emergency funds and then for subjective emergency funds. Table 6 summarizes the logistic results of the three models.

Table 4
Distribution of before-tax income, after-tax income, and estimated expenditure (n = 4305)

Quantile	Estimate ($)				
	Before-tax Income	After-tax Income	Expenditure		
			All	Over-spenders	Non-over-spenders
99%	351,000	267,276	150,109	155,882	145,785
95%	129,000	108,184	67,108	90,563	58,449
90%	93,000	81,615	47,380	70,791	45,456
75% Q3	60,000	53,541	36,777	45,854	35,301
50% Median	33,000	30,505	23,650	30,506	22,115
25% Q1	17,000	16,000	16,141	21,758	15,475
10%	8,100	8,000	10,748	16,333	10,234
5%	5,200	5,100	8,350	13,537	8,350
1%	0	0	7,698	8,350	7,698
Mean	52,296	44,548	31,274	39,783	29,864

Sources: 1998 Survey of Consumer Finances. Statistics derived from weighted analyses of data pooled from all five implicates.

Table 5
Mean and median of households emergency fund holdings and percentage meeting the guideline (n = 4305)

Measure of emergency funds	Mean (SD)	Median	% Meeting the guideline	Median ratio of EF/EXP*
Monetary	$15,242 ($55,055)	$2,500	30.11	1.14
Comprehensive	$73,958 ($334,571)	$4,200	43.66	2.06
Subjective	$20,744 ($51,841)	$5,000	41.94	2.32

* EF = Amount of emergency funds (monetary, comprehensive or subjective, respectively). EXP = Monthly expenditure.

Except for households with a householder age 35 to 44, and except for households with a householder with a high school diploma, age and educational attainment of the householder are significantly and positively related to the likelihood of meeting the three-month expenditure guideline. Non-Hispanic Black householders are less likely than otherwise similar White non-Hispanic householders to meet the guideline.

Overspending households are only 28.4% as likely as nonoverspending households to meet the guideline. Contrary to the hypothesis, households not sure about next year's income are less likely to meet the guideline than households sure to have the same level of income in the next year. Households reporting they do not save are only 58% as likely to meet the guideline as households that save for emergencies.

Contrary to our expectation, householders with a part-time working spouse/partner are less likely to meet the guideline than householders with a full-time working spouse/partner. For a householder without a spouse or partner, the likelihood is increased by 31%, compared to a householder with a full-time working spouse/partner.

Having a larger home equity line of credit increases the likelihood of meeting the guideline, but the effect is nonlinear. Meeting the guideline is most likely for households with a $45,001-$85,000 home equity line of credit. Similarly, the effect of available credit is nonlinear, with households having $8,001-$17,000 available credit the most likely to have enough emergency funds.

The general patterns for comprehensive emergency funds are similar to those for monetary emergency funds, with only a few exceptions: All categorical variables for age, education, borrowing against home equity, and borrowing against credit cards are statistically significant; risk tolerance has a statistically significant effect, but the effect of the working status of the spouse/partner is not significant when considering comprehensive assets.

As the education level increases, not only is the household more likely to meet the guideline but also the chance of meeting the guidelines increases more with each level of education attained, and the improvement is larger compared to the improvement with respect to monetary assets.

Households willing to take above average financial risks are 56% more likely than those willing to take substantial financial risk to have adequate comprehensive emergency funds. Households not willing to take any risk are much less likely to meet the guideline. Households certain that next year's income would increase are more likely to meet the guideline, while households not sure about next year's income are less likely to have enough comprehensive assets.

Table 6
Logistic results of the likelihood of meeting the guideline based on objective and subjective emergency fund measures

Characteristics	Odds ratio		
	Monetary measure	Comprehensive measure	Subjective measure
Age of householder (reference category = under 35)			
35 to 44	1.278	1.417**	1.632***
45 to 54	1.447*	1.699***	2.297***
55 to 64	1.884***	2.671***	3.159***
65 and over	3.792***	7.001***	4.117***
Education of householder (reference category = less than high school)			
High school graduate	1.230	1.417*	1.136
Some college	1.716**	2.150***	1.279
Bachelor's degree	1.803**	3.076***	1.516**
Graduate school	2.062***	4.277***	1.513**
Race/ethnicity of householder (reference category = White, non-Hispanic)			
Black, non-Hispanic	0.623**	0.521***	1.157
Hispanic	0.877	0.616*	1.023
Other	1.288	1.143	1.563*
Consumption pattern of household (reference category = non-over-spender)			
Over-spender	0.284***	0.361***	0.538***
Risk tolerance of household (reference category = take substantial risk)			
Take above average risk	0.953	1.561*	0.979
Take average risk	1.092	1.335	1.087
No risk	0.636	0.581**	0.958
Attitude towards borrowing (reference category = not accept)			
Accept	0.958	0.885	1.038
Expectation of future income (reference category = constant, sure)			
Growth, sure	0.985	1.278*	1.126
Decline, sure	0.912	0.892	1.180
Not sure	0.771**	0.762**	1.417***
Saving motives (reference category = saving for emergency)			
Others	0.957	0.886	0.898
Don't save	0.580*	0.420***	0.596**
Working status of spouse/partner (reference category = working, full time)			
Working, part time	0.753*	0.738	0.991
Not working	0.945	1.019	1.162
No spouse/partner	1.309**	1.156	1.505***
Retirement account (reference category = can't borrow)			
Can borrow	0.984	1.144	0.717***
Borrow against home equity (reference category = no more than 0)			
$1 ≈ $18,000	1.168	1.346*	0.987
$18,001 ≈ $45,000	1.702***	1.696***	1.248
$45,001 ≈ $85,000	2.581***	3.213***	1.551***
>$85,000	2.333***	4.001***	1.659***
Borrow against credit cards (reference category = no more than 0)			
$1 ≈ $3,000	1.255	1.493**	0.973
$3,001 ≈ $8,000	2.057***	2.249***	1.361**
$8,001 ≈ $17,000	2.876***	3.390***	1.441**
>$17,000	2.812***	4.265***	1.496***

* Significant at $p \leq .05$; ** significant at $p \leq .01$; *** significant at $p \leq .001$.

Source: 1998 Survey of Consumer Finances. Statistics derived from an unweighted analysis of data pooled from all five implicates with RII techniques.

The third column in Table 6 shows the logistic results of the likelihood of the household's subjective emergency funds meeting the three-month expenditure guideline. There are some noticeable differences from the results based on the objective emergency fund measures.

Only householders with a Bachelor's degree or a graduate school degree are significantly more likely to identify an adequate amount of emergency funds and the magnitude of the effect is smaller, compared to the objective measures. The likelihood of non-Hispanic Black householders and Hispanic householders meeting the guideline subjectively is not significantly different from that of non-Hispanic White householders.

Compared to households who are certain that next year's income would remain the same, households not sure about next years income are 42% more likely to mention an adequate level of emergency funds. Having retirement accounts that can be borrowed against in emergencies lower the likelihood of meeting the guideline.

5. Discussion

As expected, age of the householder and educational attainment of the householder are positively related to the likelihood of meeting the guideline for objective emergency funds. Households with non-Hispanic Black householders, households that overspend, and households without a saving motive are less likely to meet the objective guidelines. Home equity lines of credit and available credit from credit cards turn out to have positive effects. The effect of the household's attitude towards borrowing is not significant for any of the measures of emergency funds. Other variables, such as risk tolerance, expectation of future income, working status of spouse/partner, and the ability to borrow against retirement accounts don't support the hypotheses when objective measures of emergency funds are analyzed.

Results based on the household's subjective emergency funds are different in terms of the effect of race, expectation of future income, and ability to borrow against retirement accounts. These differences suggest that factors affecting people's perception about emergency funds are different from the factors affecting people's actual behavior. To some extent, the adequacy of the actual level of emergency funds held by households seems more closely related to the ability to save than to measures of the need for emergency funds, while the adequacy of a household's subjective assessment of emergency fund levels seems more closely related to the measures of need. For example, households who are uncertain about the future are more likely to meet the guideline based on their subjective level of emergency funds but less likely to meet the guidelines based on the objective measures. Households with non-Hispanic Black householders are less likely to reserve adequate objective emergency funds than households with non-Hispanic White householders. However, there are no significant differences by race based on subjective emergency funds. Therefore, it may be that non-Hispanic Black householders recognize the importance of emergency funds, but they are less able to save for emergencies. As Chang and Huston (1995) suggest, these householders have lower lifetime income and this lowers their ability to accumulate sufficient emergency funds.

The effects of risk tolerance and expected income changes on subjective emergency fund levels are more consistent with our expectation than the effects of these variables on the

objective emergency fund levels. A possible explanation could be that households with characteristics indicating the need for more emergency funds may often be households with limited financial resources currently. As a result these households are unable to save even though they recognize the importance of emergency funds. Similarly, Huston and Chang (1997) explain the nonsignificant effect for risk tolerance by suggesting that a household might not be willing to take financial risk until they have a comfortable level of monetary assets.

The effect of the household's attitude towards borrowing to cover living expenses when income is cut turns out to be insignificant. It's likely that attitude towards borrowing could be affected by race and consumption patterns (overspending or not), so after controlling for these factors, it no longer has a direct impact.

Resources other than savings, such as a spouse/partner's income, borrowing, and credit may be available in the event of an emergency and may be useful substitutes for emergency funds. Do households really consider these resources when they prepare for emergencies? We expect that householders with a nonworking or part-time working spouse/partner would be more likely to have adequate emergency funds, because there is no income or less earned income from a spouse/partner to cushion the loss of a respondent's income. In fact, households with a part-time working spouse/partner are less likely than those with a full-time working spouse/partner to have enough monetary assets for emergencies. It could be that part-time employment of a spouse/partner is in response to tight household resources, thus leaving very little for emergency funds.

The results based on the households' subjective emergency fund level are consistent with the notion that if the households can borrow against their retirement accounts, they save less for emergencies, since they have another cost-effective way to cover their expenses if needed. However, the ability to borrow against a retirement account does not have a significant effect on objective emergency fund holdings. Households may be deterred from exercising this option because of restrictions on allowable types of borrowing or repayment restrictions and because of the thought that early withdrawal could reduce the potential growth of savings for the future.

Borrowing against home equity may be a more appealing and flexible alternative. The interest rate on a home equity loan tends to be lower than the interest rate on credit cards and personal loans, and the interest is tax deductible. Home equity may have two effects on emergency fund holdings. First, if households can borrow against home equity, they may choose to save less for emergency funds, especially in monetary form. On the other hand, after households accumulate a certain level of home equity, they may be more able to save for other purposes such as emergencies. The empirical results suggest the latter effect. Though home equity lines of credit are commonly recommended (Chieffe & Rakes, 1999), the results suggest that they are not commonly viewed as substitutes for emergency funds.

Finally, credit available through credit cards is another resource to consider. Two-thirds of all households had at least some available credit. Purely regarding its substitution effect on emergency funds, it is expected that higher amounts of available credit would decrease the probability of holding adequate emergency funds. However, this is not supported by the results. Because the credit limit is related to the card applicant's credit rating, which is affected by the applicant's holding of financial assets, this may introduce a positive rela-

tionship between the level of liquid or comprehensive assets and the available line of credit. Also, the relatively high interest rate may deter households from depending upon credit cards when income is reduced.

The results with the categorical income variables (available from the authors) are similar to those without income variables, and the effect of income is consistent with previous empirical results (Huston & Chang, 1997; and Chen & DeVaney, 2001). Income is less strongly related to monetary emergency fund holdings than to comprehensive emergency fund holdings. Because comprehensive assets include investments, a positive relationship between income and investment may be driving this result. Alternatively, the income effect may be picking up the effect of a household's surplus. The expenditure to after-tax ratios suggest that the higher the income, the more likely that the households have more surplus, thus making them more able to save. The amount of the surplus is not controlled for because of the unavailability of data. Interestingly, income levels of $42,001 and more have negative effects on the likelihood of subjectively stating an adequate amount of emergency funds. High income may give households a perception of financial security and a lower possibility of encountering emergencies, so they perceive less need for emergency funds.

6. Implications

To improve the adequacy of emergency fund holdings, efforts should be taken both to educate households with respect to the importance of emergency funds and to improve household's real ability to save. Nearly all households know they should have some emergency funds, but more than half fails to indicate an adequate target emergency fund level. This suggests that even though most households realize the importance of emergency funds, an understanding of what constitutes an adequate level is less universal. The current economic environment reinforces the need for educators, financial planners, and the media to promote the knowledge of emergency funds, particularly to younger, less educated households, as well as households that overspend.

Efforts should also be made to improve the household's ability to save. Financial planners could first help households set up saving goals, and then outline steps toward meeting these goals. The government could entice households to save more by offering tax breaks for target levels of monetary assets, such as money in savings accounts and short-term CDs. Direct deposit of tax refunds could encourage saving by households.

Finally, alternatives to holding emergency funds could be recommended to some households. For households with home equity, home equity lines of credit may provide needed resources in the event of an emergency. Based on data from the 1998 SCF, 64% of households are homeowners, but only 7% have taken out home equity lines of credit. If eligible households activated home equity lines of credit, the percentage of households with adequate emergency funds would increase 28% when combined with monetary assets and 19% when combined with comprehensive assets. Because it's far more likely to get approved for a line of credit while still employed, it may be prudent to activate a home equity line of credit since the downside to taking out a line of credit that is never used is negligible (Chatzky & Weisser, 2001).

While the use of expenditure to define the needed level of emergency funds is better than income, our empirical approach assumes that households keep the same level of spending before and during emergencies. In reality households may change their spending in response to emergencies. For example, high income households may reduce their luxury expenditures, while lower income households may incur more out of pocket expenses, such as the cost of looking for a new job. Future research should give careful consideration to the estimation of necessary living expenses in the event of an emergency.

Appendix: calculation of the estimated monthly expenditure

Expenditure is estimated as a percentage of after-tax income. Data from the Consumer Expenditure Survey is used to estimate the ratio of expenditure to after-tax income, while tax information in the SCF is used to estimate the household's taxes paid. The estimated taxes paid are then subtracted from the household's before-tax income, which is available in the SCF, to estimate the household's after-tax income.

Calculation of individual income tax and after-tax income

The SCF contains information about the adjusted gross income reported in tax returns, information about the household's tax filing status, and information about whether the household itemized deductions or took the standard deduction. Using these pieces of information, the filing status, amount of personal and dependent exemptions, the standard deduction level for all households, and the itemized deduction level for households who took this form of deduction are determined.

The SCF contains information that enables us to estimate some, but not all components of itemized deductions. We are able to estimate real estate taxes, charitable contributions, and home mortgage interest deductions, which are the most common types of itemized deductions. Except for state and local income tax deductions, all the other missing items are less important, either less common, or with low mean values. The most complicated calculation is for the home mortgage interest. The basic idea of the estimation is as follow:

Balance at the end of 1997: $p_1 = a \times [1-1/(1+r)\hat{n}_1]/r$
Balance at the end of 1996: $p_2 = a \times [1-1/(1+r)\hat{n}^2]/r$
Interest paid in 1997 = total payment in 1997 – principal reduced in 1997 = A × payment frequency per year – $(P_2 - P_1)$
A — regular payment for per payment period;
r — interest rate per payment period;
n_1 — number of payments left at the end of 1997;
n_2 — number of payments left at the end of 1996.

For each household indicating they itemized deductions, the standard deduction level is compared to the estimated itemized deduction and the higher value is used to calculate taxes paid. This approach is taken since the estimated itemized deduction tends to be lower than

the actual value for some households, since some items, such as state income tax, are missing because of the limitation of information in the SCF.

Taxable income is calculated as the AGI (available in the SCF) minus deductions (the larger of the standard deduction or the estimated itemized deductions), and exemptions. Based on the1997 tax rate schedules, taxes paid by each taxpayer can be estimated. Whenever taxable income is not positive, both taxable income and taxes paid are defined to be zero.

After-tax income is calculated as total income less the taxes paid. For households that had the filing status married filing jointly, after-tax income is calculated as total household income less total taxes paid. For households where only the head or spouse/partner filed a return, after tax income is calculated as total household income less taxes paid by the head or spouse/partner. For households where both the head and spouse/partner filed, after tax income is calculated as total household income less taxes paid by the head and taxes paid by the spouse/partner.

Estimated monthly household expenditure

Household expenditure is estimated as a percentage of after-tax income. Data from the CES were used to estimate the ratio of annual expenditure to annual after-tax income for households with different levels of after-tax income. These ratios were then applied to the SCF households. Only CES households that were interviewed in four consecutive quarters (excluding the initial bounding interview) including at least one quarter of 1997 data, that is, between the second quarter of 1996 and the first quarter of 1998, were used. All dollar values were adjusted to 1997 dollars. For households with four consecutive quarters of data, the quarterly expenditure data are summed to obtain annual household expenditures. Contributions to retirement pension plans are excluded from the calculation of annual expenditures. Ratios of expenditure to after tax income are obtained from the CES separately for overspending households and nonoverspending households. The median values of the ratios for households in each income quintile are applied to the after-tax income for SCF households to estimate monthly household expenditure for the SCF households. For households with nonpositive after-tax income or unreasonably low estimated consumption levels, the poverty threshold is used to represent the subsistence level of expenditure.

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