

Liquidity Constraints of the Middle Class*

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Abstract

Consumption of households with liquid financial assets responds much more to transitory income shocks than the permanent-income hypothesis predicts. That is, middle class households act as if they face liquidity constraints. This paper addresses this puzzling observation with a model of impatient households that face a large recurring expenditure. In spite of impatience, they save as this expenditure draws near. We call such saving made in preparation for a foreseeable event “term saving”. Under precautionary saving, good luck drives wealth accumulation, so a high asset level implies an abundance of liquidity. With term saving, assets indicate an impending need for funds and a shortage of liquidity. The borrowing constraint will bind at the time of the expenditure. This separates planning up to that time from the rest of the household’s lifetime and thereby shortens its effective horizon. Intertemporal substitution over such a limited period generates strong consumption responses to temporary income changes. As the expenditure approaches, the effective horizon shortens further as the household accumulates assets. Hence, households with more assets have larger consumption responses. We compare a calibrated version of a model that embodies both term saving and precautionary saving motives with observed consumption responses to the 2001 U.S. tax rebate. The model replicates these observations well and also generates “excess smoothness” of aggregate consumption.

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1 Introduction

The liquidity constraints of U.S. middle class households are of key importance for resolving a host of macroeconomic questions, such as the size of the fiscal multiplier from tax cuts. It may seem implausible that middle class households face liquidity constraints because they typically hold liquid assets, which can be converted immediately into consumption by definition. Nevertheless, puzzling evidence from consumption responses to the tax changes casts doubt on this view. [Souleles \(2002\)](#) found substantial excess sensitivity of nondurable consumption to the implementation of the *preannounced* Reagan tax cuts for households regardless of their liquid assets. Similarly, [Shapiro and Slemrod \(2003\)](#) found that households with liquid financial assets spent no less and probably more out of one-time tax rebates arising from the Bush tax cuts than did poorer and more plausibly liquidity-constrained households.

Our first step towards understanding this evidence is to consider the possibility that a household's assets are accumulated to pay for an impending need. Hence, high assets signal a shortage of liquidity *relative* to the approaching expense rather than an abundance of liquidity arising from past good luck. Because the time remaining until the impending need is the key state variable in our model, we call such saving *term saving*. We provide evidence from the Survey of Consumer Finances that saving towards the purchase of a house, a child's education, or anticipated medical needs is at least as prevalent among the middle class as is precautionary saving.

Our empirical analysis classifies households into the middle class if they are not in the top few percentiles of the wealth distribution and did not receive food stamps or temporary assistance to needy families in the previous year. This definition allows for the possibility that middle-class households occasionally spend all available financial assets. Our matching theoretical definition combines impatience (relative to the market rate of interest), an occasionally-binding borrowing constraint, and a recurring major expenditure. Impatience prevents middle class households from accumulating wealth and joining the rich, while the borrowing constraint keeps them from permanent emmiseration in debt. With these two features alone, middle class households would become hand-to-mouth consumers like the "spenders" in [Mankiw \(2000\)](#). The foreseen expenditure provides the motivation to save that allows us to replicate the observed wealth of the middle class. Our presumption is that poor households – i.e. those that *always* have little wealth – either lack a taste for the goods associated with term saving (home ownership, education, and health care) or that they are too impatient to save even given the opportunity to consume them.

For simplicity, we develop our model of middle class households using a standard infinitely-

lived household representation of a dynastic life-cycle model. The foreseen expenditure has exogenous timing and endogenous size. Its periodic nature generates an easily interpretable deterministic cycle. For term saving to substantially influence household decisions, these expenditures should be large and have a hazard rate that increases with the time since their last occurrence. Periodicity starkly captures this second requirement.

Although earnings risk is also an important fact of middle-class life, we begin by illustrating term saving in a deterministic environment. In the conflict between impatience and consumption smoothing, impatience wins when the foreseen expenditure is far ahead—and so the borrowing constraint binds then. However, consumption smoothing eventually motivates the household to start saving ahead of the expenditure so that the borrowing constraint becomes slack. At the time of the expenditure, the household dissaves and the cycle repeats itself. Since our model household expects the borrowing constraint to bind in the future when it is currently saving, it exemplifies the distinction between a currently-binding liquidity constraint and a liquidity constraint that could possibly bind in the future made by [Zeldes \(1984\)](#). As he noted, such expectations effectively shorten the horizon over which a currently unconstrained household optimizes and thereby generate a large MPC out of transitory income. Of course, households with binding borrowing constraints and no wealth have their MPC s equal to one. Since asset accumulation as the foreseen expenditure approaches, the model predicts that the observed MPC rises with wealth for households that are not currently liquidity constrained.

The illustrative model raises the possibility that term saving could underly the observed relative insensitivity of the MPC to household wealth, but a quantitative assessment requires us to add earnings risk and the associated precautionary savings to the analysis. This is because precautionary saving works *against* term saving in shaping the relationship between household wealth and the MPC . As [Carroll and Kimball \(1996\)](#) proved, the consumption function from a precautionary savings model is a *concave* function of total wealth, so the associated marginal propensity to consume declines with wealth. In our quantitative analysis, we calibrate wage risk to match observations of household earnings from the PSID in [Meghir and Pistaferri \(2004\)](#) and we choose the size of the recurring expenditure to match average middle-class wealth measured from the SCF. With this calibration, the average MPC from a one-off grant to a middle-class household is a relatively flat function of wealth.

The pervasiveness of liquidity constraints has received a great deal of attention in the consumption literature. Using the 1983 Survey of Consumer Finances (SCF) [Jappelli \(1990\)](#) found that about 20 percent of U.S. households were either rejected for credit or rationally anticipated being rejected if they applied. Much more work has focused on documenting

liquidity constraints as violations of Hall’s (1978) random walk hypothesis for the marginal utility of consumption. Using food consumption data from the PSID, Hall and Mishkin (1982) find that about 20 percent of consumption is a simple function of current income, as if those households are consuming “hand-to-mouth.” Estimating a similar model with aggregate data, Campbell and Mankiw (1989) find that “Half of households follow the ‘rule-of-thumb’ of consuming their current income.” Also using the PSID, Zeldes (1989) found that the consumption growth of households with low wealth responded strongly to lagged disposable income. Because the analogous estimated responses for households with high wealth was smaller and sometimes statistically insignificant, Zeldes interprets his results as evidence in favor of liquidity constraints. With this interpretation, different definitions of “low wealth” imply that between 30 to 66 percent of households are liquidity constrained. Jappelli and Pistaferri (2010) review the considerable literature that has refined this approach and applied it to other countries and data sets. Hayashi (1987) notes that these studies have only limited implications for the average *MPC* from temporary income in part because “the horizon of those who satisfy the Euler equation is unknown ...”.¹ The importance of term saving we document with the SCF and the insensitivity of *MPC*’s to wealth documented by Souleles (2000) and Shapiro and Slemrod (2003) lead us to conclude that the average “horizon” Hayashi mentions is much less than a decade, so that most of the middle class acts as if they liquidity constrained. Our model’s assumption of a recurring large expenditure tractably embodies this conclusion and allows us to measure its significance for the average *MPC*.

The remainder of this paper proceeds as follows. In the next section, we review existing evidence on consumption and saving behavior. This includes observations of the marginal propensity to consume out of tax rebates as well as the prevalence of precautionary and term saving. Section 3 presents the deterministic version of the model, and Section 4 introduces wage uncertainty, thereby adding a precautionary motive for saving. Section 5 considers the quantitative implications of a calibrated version of the model for the evidence reviewed in Section 2. Section 6 offers concluding remarks.

2 Consumption and Saving

This section reviews existing evidence on consumption and savings that motivates our exploration of middle-class liquidity constraints. We begin with a review of extant empirical

¹See that article’s penultimate sentence for the full context of this quote.

analysis of households' marginal propensities to consume from tax-induced changes to disposable income. We then document the importance of precautionary and term saving with data from several waves of the SCF.

2.1 *MPC* Estimates

Changes in tax law have provide rich opportunities for the empirical investigation of the permanent-income hypothesis/life-cycle model in the context of economically significant and plausibly exogenous changes to household income. The Reagan tax cuts, which were implemented in three stages, are particularly useful for this because the last two stages were known to the public well before their implementation. Whereas the permanent-income model predicts that the associated anticipated changes in take-home pay should have zero impact on consumption, Souleles (2002) estimated *MPC*s between 80 and 90 percent for nondurable consumption using Consumer Expenditure Survey data.² When he split the sample by liquid wealth following Zeldes (1989), the *MPC*'s of households in the bottom quartile of wealth relative to earnings were within 15 cents of their counterparts in the top three quartiles. Furthermore, these differences were statistically insignificant.³ It seems that the majority of households acted as if they were hand-to-mouth "spenders," even those who had wealth when the tax cuts were implemented.

Shapiro and Slemrod (2003), Shapiro and Slemrod (2009), and Sahm, Shapiro, and Slemrod (2010) provide more recent evidence on households' *MPC*s from survey data. The Economic Growth and Tax Relief Act of 2001 lowered tax rates retrospectively to the start of 2001, and the Treasury mailed rebates of taxes paid to most taxpayers from July to October. Shapiro and Slemrod attached questions to the University of Michigan's monthly Survey of Consumers that solicited respondents' anticipated use of these rebated funds as well as their expectations about future government spending and taxes. They found that 22 percent of respondents anticipated spending most of the rebate, while the rest planned either to reduce their debts or increase their savings. Using plausible distributions of the marginal propensities to consume across those who would "mostly spend" and "mostly save", Shapiro and Slemrod calculated an average marginal propensity to consume of about one third.

Famously, the persistence of the Bush tax cuts was uncertain at the time of their passage. The original legislation sunset in 2011, but Congress could have either made them permanent or revoked them entirely before then. In theory, the persistence of a tax cut determines the

²See the row labelled " $d(\textit{withholding})_{t+1}$ " in his Table 2.

³See the first two rows of his Table 4.

resulting the consumption response, but [Shapiro and Slemrod](#) found no connection between a respondent's views on future taxes and her propensity to mostly spend the rebate.⁴ One might also expect that tax cuts represent real wealth to a household only if accompanied by a reduction in government spending. Again, the data reveal no such Ricardian link between expectations of government spending and the *MPC*.⁵

One common theoretical justification for finding large *MPC*s out of windfall gains is that households cannot borrow against higher expected future income to smooth consumption. Such traditional liquidity constraints should be most prevalent among households with low income and low wealth. [Shapiro and Slemrod](#) find no difference in the propensity to mostly spend the tax rebates by income.⁶ One might argue that to be liquidity constrained one must also expect higher future income. Again, [Shapiro and Slemrod](#) find that households' expectations of improvements in their personal financial conditions over the next year have no impact on the rebate spending propensities. [Shapiro and Slemrod](#) also tabulated the propensities to mostly spend from across different households based on their ownership of stocks, either in retirement accounts, mutual funds, or brokerage accounts. They do find statistically significant differences across households, but they are not consistent with the model of traditional liquidity constraints: the spending fraction *increases* with stock ownership, with exceptions for the highest bracket and that with zero-assets.⁷

[Shapiro and Slemrod \(2009\)](#) use the same survey instrument and methodology to measure households' *MPC*s from the obviously temporary Economic Stimulus Payments (*ESP*'s) of 2008. Surprisingly, the fraction of respondents who mostly spend their *ESP*'s is nearly identical to that from the 2001 rebate checks, 20 percent. Just as with the earlier tax rebates, [Shapiro and Slemrod](#) find "there is no discernable difference in spending propensity by income."⁸ Furthermore, [Sahm, Shapiro, and Slemrod \(2010\)](#) replicate [Shapiro and Slemrod's \(2003\)](#) finding that households expectations of their personal financial conditions have no impact on their spending out of the *ESP*'s.⁹ Finally, [Sahm, Shapiro, and Slemrod \(2010\)](#) find an almost identical dependence of the Mostly-Spend rate on the household's wealth in

⁴See the lines below "Size of future tax cuts" in their Table 5.

⁵See the lines below "Impact of tax cut on government spending" in their Table 5.

⁶See the rows under "Income (\$)" in their Table 2.

⁷See the lines under "Stock" in their Table 2. [Shapiro and Slemrod](#) report in their article's original working paper that this pattern also arises in regressions with dummy variables for the different stock ownership brackets, while age and other control variables are included. However, the relationship is statistically indistinguishable from a flat line. See Tables 10 through 13 of NBER Working Paper 8672.

⁸See their Table 3. This quote is from the discussion below it.

⁹See their Table 10.

Stock Ownership Class	2001 Tax Rebates		2008 Economic Stimulus Payments	
	Percentage of Sample	Percentage Spending Most of Rebate	Percentage of Sample	Percentage Spending Most of Rebate
None	42.8	19.5	33	20
\$1 – \$15,000	9.1	13.1	13	19
\$15,001 – \$50,000	9.9	18.1	14	19
\$50,001 – \$100,000	6.8	26.7	10	14
\$100,001 – \$250,000	6.2	33.6	11	25
More than \$250,000	5.1	22.9	9	39
Refused/Don't Know	20.1	25.3	11	25

Table 1: Rebate Spending Percentages

Source: Table 2 of [Shapiro and Slemrod \(2003\)](#) and Table 8 of [Sahm et al. \(2010\)](#)

stocks as that from the 2001 tax rebates.¹⁰ Table 1 presents the Mostly-Spend percentages by stock ownership level from both [Shapiro and Slemrod \(2003\)](#) and [Sahm, Shapiro, and Slemrod \(2010\)](#). It clearly shows that the survey evidence does not support the traditional liquidity constraint model for either the 2001 tax rebates or the 2008 *ESP*'s.¹¹

A pair of complementary articles, [Johnson, Parker, and Souleles \(2006\)](#) and [Parker, Souleles, Johnson, and McClelland \(2012\)](#), estimate the *MPC*s from these two tax experiments using questions appended to the Consumer Expenditure Survey that measured the when the household received the disbursed funds. The Treasury randomized this timing based on the

¹⁰[Sahm, Shapiro, and Slemrod](#) also examine the dependence of the Mostly-Spend rate on income and wealth in a multivariate setting. They find “Given the substantial positive correlation of income and wealth, it is hard to statistically identify separate effects of these two factors.” ([Sahm, Shapiro, and Slemrod, 2010](#), page 86).

¹¹[Shapiro and Slemrod \(2003, page 385\)](#) offer the following explanation for the positive effect of stock ownership on the Mostly-Spend rate: “Those stockholders with low wealth are trying to build wealth and therefore have a powerful saving motive; those with higher wealth may already have adequate assets and therefore are spenders on the margin.” [Sahm, Shapiro, and Slemrod \(2010, page 84\)](#) apply the same explanation to their findings. Unfortunately, the most natural model of “target savings” we know of, the buffer stock model of [Deaton \(1991\)](#), does *not* deliver this result. That model does have a stationary long-run distribution of wealth, and households with initial wealth above its mean tend to dissave while those below it tend to save. However, the *MPC* out of wealth *declines* with wealth. This is evident in [Deaton's \(1991\) Figure 1](#), which shows consumption as a function of wealth to be *concave*. As noted in the introduction, [Carroll and Kimball \(1996\)](#) formally prove this concavity.

second-to-last digit in the recipient’s Social Security number, so the effect of receiving the funds on current consumption can be estimated without substantial endogeneity concerns. They measure an one-quarter *MPC* for nondurable consumption of 0.462 with a standard error of 0.173.¹² This is comparable to [Shapiro and Slemrod’s \(2003\)](#) estimate of 1/3 for all consumption from the same experiment. [Johnson, Parker, and Souleles](#) sort their sample into three groups by income. Households in their low-income group spent much more than those in the middle-income group, but those with the highest income also spent more than those in the middle. The same pattern arose when they split the sample by liquid assets.¹³ Since the differences between the middle income/asset and high income/asset groups are not statistically significant, [Johnson, Parker, and Souleles](#) conclude that “In sum, we find that households with low income or low liquid wealth consumed more of their rebates than typical, which is consistent with the presence of liquidity constraints. ” ([Johnson et al., 2006](#), page 1604). However, the standard errors on the high income/asset groups’ *MPC*s for nondurable goods are large enough so that an estimate of 1 would be statistically insignificant.¹⁴ [Parker et al. \(2012\)](#) measure *MPC*s for nondurable goods and all consumption of 0.127 and 0.523. Only the latter is statistically significant.¹⁵ When they sort their sample by income and liquid assets, the resulting *MPC*’s are statistically indistinguishable from each other.¹⁶ They report that a quarter of their sample is lost due to missing income data and note that “While the point estimates suggest little spending by low-asset households, the associated confidence intervals are quite large, and none of the spending differences or even levels throughout the panel are statistically significant. The loss of precision when using the asset variable might reflect the smaller sample sizes due to missing asset values and measurement error in the available asset values. Roughly half of the data on liquid assets is missing.” ([Parker et al., 2012](#), page 18). We conclude that while the CEX-based point estimates are consistent with the irrelevance of a household’s income and assets for its consumption response to tax rebates and stimulus payments documented by [Shapiro and Slemrod \(2003\)](#) and [Sahm, Shapiro, and Slemrod \(2010\)](#), the CEX has too little power to distinguish this irrelevance from the hypothesis of traditional liquidity constraints.

In summary, the existing evidence on the marginal propensity to consume from tax-induced income changes indicates that many households act as if they are liquidity con-

¹²See the first row and final column of their Table 3.

¹³See their Table 5

¹⁴See the final row of their Table 5.

¹⁵See the third row of their Table 2.

¹⁶See their Table 6.

strained even though they have high income and/or available liquid assets for consumption smoothing. One potential explanation for this is that households imperfectly incorporate available information into current decisions or base their consumption and saving decisions on “rules of thumb”. [Parker \(1999\)](#), [Hsieh \(2003\)](#), and [Browning and Collado \(2001\)](#) all argue that households fail to optimize the intertemporal allocation of relatively small seasonal fluctuations in income. In particular, [Hsieh \(2003\)](#) shows that Alaskan households in the CEX raise their consumption following forecastable tax rebates, as originally documented for the whole United States by [Souleles \(1999\)](#), but they smooth their much larger annual dividend payments from the Alaska Permanent Fund over the year. [Browning and Collado \(2001\)](#) support the view that there is a threshold size above which households smooth seasonal income by showing that Spanish households receiving large predetermined “bonuses” in July and December (which are *not* tied to performance on the job) have no different seasonal consumption patterns than their counterparts paid with equally-sized paychecks throughout the year.¹⁷ In the absence of further information, fiscal interventions of macroeconomic interest could plausibly fall into either of these two categories. However, [Shapiro and Slemrod \(2003\)](#) provide evidence that such rules of thumb cannot explain their observations from the 2001 Bush tax cut by sorting respondents by whether or not they have a budget and if they do, whether it targets spending, saving, or debt repayment. (Multiple responses to this last question were allowed.) They report

These findings are different than what one might have expected from an economic model of targeting, in which a household that spends a routine amount would save residual income and vice versa. The survey evidence is the opposite: target spenders tend to spend on the margin and target debt payers tend to save on the margin. There is no substantial difference in spending rates for target savers. ([Shapiro and Slemrod, 2003](#), page 387)

While we do not wish to rule out the possibility that rules of thumb or other predictions of behavioral economics can illuminate households’ responses to substantial fiscal policy shocks, this evidence leads us to believe that an explanation based on rational expectations and fully-optimizing behavior can be at least equally enlightening.

¹⁷Just as with the responses to large one-time tax-induced changes in income, the failure of households to smooth consumption in the face of small seasonal income fluctuations is not limited to low income or low asset households. [Souleles \(1999\)](#) finds a higher *MPC* for total consumption for households with high wealth to earnings ratios. (See his Table 4). Similarly, [Parker \(1999\)](#) finds a higher *MPC* for nondurable consumption for households with high wealth to consumption ratios. (See his Table 5.)

2.2 Term and Precautionary Saving

The explanation for high $MPCs$ among middle-class households that we put forward relies on saving to finance occasional large expenditures. Before proceeding with its theoretical development, we present here evidence on the importance of such expenditures in the savings decisions of middle-class households. The principle expenses we have in mind are buying a new house, college education of children, and old-age medical costs. These all are

1. large in relation to a typical middle-class household's annual income,
2. likely to occur sequentially over the life-cycle. Buying a new house typically comes first, then college expenses, and later on in life old-age medical costs, and
3. forecastable well in advance of their occurrence.

Typically, the last two features imply that the hazard for incurring such a large expense *increases* with the time elapsed time since the last expense. For example, a couple with a 35 year old head that just purchased a home and have a single child that is eight years old faces a hazard of incurring college expenses that is close to zero for the next ten years. Thereafter, the hazard jumps sharply. This increasing hazard is the most important technical distinction between our model of term saving and the more familiar theory of precautionary saving. Precautionary saving has been extensively explored empirically. The remainder of this section examines data on saving motives and behavior from the Survey of Consumer Finances (SCF) to place the importance of term saving for middle-class households into the perspective of previous evidence on precautionary saving.

2.2.1 The Sample

For our sample, we draw on five cross-sectional waves of the SCF; 1995, 1998, 2001, 2004, and 2007; and the 2007-2009 panel SCF. We wish to focus the analysis on working-age middle class households. The first row of Table 2 lists the number of households represented in each of the five cross-sectional waves. This ranges from 99 million in 1995 to 116.1 million in 2007. Membership in our sample requires that the household answered all of the questions regarding savings motives that we use below. Table 2's second line gives the number of represented households after dropping those that fail this screen. The total number of households lost varies between 2 and 3 million. Next, the household head must be between 25 and 64 years old at the survey date. This requirement removes between 20 and 25 percent of the households.

The next two criteria remove the poor from our sample. The first requires the household to have not received Temporary Assistance to Needy Families (TANF) in the previous year, and the second requires the household's after tax labor income to exceed the official poverty line for a household of that demographic composition. To measure after-tax income for the previous year; we use the pre-tax labor income of the household head and his or her spouse, the household's Adjusted Gross Income, the household's federal tax filing status, and the federal income tax and social-insurance (FICA and Medicare) tax tables. The SCF includes no information on state of residence, so we make no attempt to estimate state income taxes. However, we do assume that each worker with an IRA account that is eligible to contribute to it makes the maximum possible contribution. Because our model treats retirement savings and dissavings as taxes and transfers, we include these contributions in the taxes used for this calculation. Table 2's fourth and fifth rows list the number of households that these two poverty criteria retain. Together, they remove between 20 and 25 percent of the remaining represented households from our sample.

To exclude the wealthy from our sample, we first measure each household's financial assets: stocks, bonds, and balances in checking, saving, money market, and mutual fund accounts. For consistency with our treatment of tax-advantaged retirement saving in the measurement of after-tax labor income, we exclude balances in IRA accounts from financial assets. We then define the wealthy to be those households in top five percent of the all households represented in that wave of the SCF. Our final sample-selection criterion removes households in which either the household head or spouse reports being self-employed. This removes between 10 and 15 percent of the remaining households. Our final sample represents 43.1 million households in 1995 and 53.1 households in 2007.

Since an understanding of a sample's wealth distribution necessarily precedes the study of its savings behavior, Table 3 reports summary statistics of the ratio of financial wealth to after-tax labor income for each SCF cross section. In each panel, the leftmost column gives the income-weighted average of this ratio, and the remaining columns give this income-weighted average for each decile of this ratio itself. For the top panel, we used all financial assets in the numerator. In 1995, the overall average equals 30.8 percent. This climbs quickly to 47.6 percent in 1998 and 50.4 percent in 2001. For 2004 and 2008, they are substantially lower, 43.7 percent and 46.1 percent. Since the rise and fall of this ratio coincides with the growth and decline of the internet stock boom, we calculated the same ratios excluding directly held stocks and stock-based mutual funds from financial wealth. The bottom table reports these. By construction, these ratios are less than those in the top panel. The average ratio still increases by 7 percentage points from 1995 to 1998, but excluding equities makes its behavior

	SCF Survey Year					
	1995	1998	2001	2004	2007	
Households Represented in Original Sample,	99.0	102.5	106.5	112.1	116.1	
& without imputed Age or Saving Survey responses,	97.0	100.3	103.5	109.9	114.5	
& with heads between 25 and 64 years old,	71.3	74.4	76.3	80.4	84.9	
& that received no TANF,	63.9	68.8	71.7	74.3	76.5	
& that had labor income above the poverty line,	54.2	59.2	61.5	62.5	64.3	
& are among least wealthy 95% of remaining households	49.9	54.3	57.0	57.9	60.2	
& are not self-employed.	43.1	46.9	48.8	49.1	53.1	

Table 2: Number of Households (in millions) Represented in the Surveys of Consumer Finances

thereafter much smoother: hovering at around 30 percent. Even though the sample focuses on middle-class households, the distribution of the ratio is quite skewed. The average ratio for households in the fifth decile is between 9.2 and 13.1 percent. The analogous averages for households in the tenth decile range from 171.6 percent to 263.8 percent. One might think that this skewness reflects past realizations of idiosyncratic returns to investment. However, the skewness remains even after excluding equities from the financial wealth.

If one defines being liquidity constrained as violating the Euler equation for intertemporal substitution between the current and next periods, then wealth statistics like these are sufficient for measuring the extent of liquidity constraints. For example, [Zeldes \(1989\)](#) divides his PSID sample into “constrained” and “unconstrained” groups based on wealth in several ways, one of which is easily mimicked here: Classify a household as constrained if and only if its financial wealth is less than two months of its annual earnings. For these SCF observations, the dividing line between constrained and unconstrained is a ratio of 16.6 percent. In 1995, 2004, and 2007; this falls between the means of the sixth and seventh deciles. Therefore this rule would classify between sixty and seventy percent of those years’ middle-class households as constrained. In the internet stock boom years of 1998 and 2001, 16.6 percent falls between the means of the fifth and sixth deciles. Remarkably, [Zeldes \(1989\)](#) reports that this measure classifies 67 percent of his sample as constrained.

2.2.2 Reasons for Saving

We begin the empirical case for term saving by examining households’ answers to the following question:

Question 1 *Now I’d like to ask you a few questions about your family’s savings. People have different reasons for saving, even though they may not be saving all the time. What are your family’s most important reasons for saving?”*

Each respondent could give up to six answers (five in 1995) from a detailed list, which we broke into three categories, Retirement and Estate, Precaution, and Anticipated Expenditure. Both Retirement and Estate had distinct entries on the list of answers, although the Estate answer included inter vivos transfers. We assigned an answer to Precaution if it was

- Reserves in case of unemployment,
- In case of illness; medical/dental expenses,

Year	Full	Deciles									
	Sample	1	2	3	4	5	6	7	8	9	10
Including All Financial Assets											
1995	30.8	0.1	1.5	3.6	6.2	9.2	13.4	22.4	37.1	71.1	171.6
1998	47.6	0.3	2.1	4.6	8.0	13.1	20.4	32.3	54.7	100.5	247.7
2001	50.4	0.4	2.3	4.9	8.1	13.0	21.0	32.2	54.3	100.6	263.8
2004	43.7	0.1	1.5	3.6	6.2	10.3	16.0	25.4	42.4	85.5	214.9
2007	46.1	0.3	1.7	3.7	6.5	10.3	16.4	26.0	44.2	84.2	220.8
Excluding Equities											
1995	22.9	0.1	1.3	3.1	5.2	7.8	10.9	16.2	27.1	49.2	134.3
1998	29.8	0.3	2.0	4.0	6.6	10.1	15.0	22.7	35.5	62.9	162.9
2001	31.7	0.4	2.2	4.2	6.5	9.7	14.2	22.7	35.1	62.7	174.6
2004	29.4	0.1	1.3	3.0	5.3	8.3	12.4	18.6	29.8	51.4	150.9
2007	32.1	0.2	1.5	3.2	5.6	8.4	12.8	19.6	31.5	56.6	158.0

Table 3: Ratios of Financial Assets to Annual After-Tax Labor Income ($\times 100$)

Note: Each cell reports an weighted average of nonretirement financial assets to labor income net of federal income taxes, Social Security taxes, and contributions to tax-advantaged retirement accounts. The weights are proportional to this after-tax income measure. The leftmost column uses the entire sample, while the remaining columns use observations grouped by deciles of this ratio. The top panel measures financial wealth with the sum of checking accounts, savings accounts, money-market deposit accounts, money-market mutual fund accounts, certificates of deposit, non-money-market mutual fund accounts, savings bonds, brokerage call accounts, directly-held bonds, and directly-held stocks. The bottom panel excludes directly-held stocks and stock-based mutual funds from this calculation.

- Emergencies; “rainy days”; other unexpected needs; For “security” and independence, or
- Liquidity; to have cash available/on hand.

Finally, we assigned an answer to Anticipated Expenditure In spite of our conjecture that medical expenses in old age motivate term saving, we include the answer of medical/dental expenses in precautionary saving because the given answer embodies both term saving when approaching old age from precautionary saving against unanticipated illness when young. We assigned term-saving motives if any of these answers was:

- Children’s education; education of grandchildren,
- Own education; spouse’s education; education – NA for whom,
- Wedding, Bar Mitzvah, and other ceremonies,
- Buying own house,
- Purchase of cottage or second home for own use,
- Buy a car, boat or other vehicle,
- To travel; take vacations; take other time off, or
- Burial/funeral expenses.

Table 4 reports the frequencies for each of these three classes. Because a given household can give multiple answers, these frequencies sum to more than 100 percent. In every year but 1995, Retirement and Estate of these three motivations with frequencies at about 60 percent. Again with the exception of 1995, between 30.9 and 33.8 percent of households reported Precautionary motives, while between 39.2 and 43.7 percent of them reported motivation by an Anticipated Expenditure. In 1995, the Precautionary motive is much more frequent and the Retirement and Estate motive is much less frequent. Overall, we conclude that saving for an anticipated expenditure is widespread and at least as salient for middle-class households as precautionary saving.

	1995	1998	2001	2004	2007
Retirement & Estate	44.6	60.1	55.4	57.9	64.2
Precaution	45.1	30.9	31.9	31.3	33.8
Anticipated Expenditure	43.6	43.7	41.9	42.6	39.2

Table 4: Percentage Frequencies of Stated Reasons for Saving from the SCF

2.3 Term Saving

Fortunately for us, the SCF has an additional question on savings motives particularly relevant for term saving:

Question 2 *In the next five to ten years, are there any foreseeable major expenses that you and your family expect to have to pay for yourselves, such as educational expenses, purchase of a new home, health care costs, support for other family members, or anything else?*

If the answer is positive, the first follow-up question is:

Question 3 *What kinds of obligations are these?*

The interviewer then showed the respondent a list of possible expenditures. A follow-up question also inquired whether or not the household was currently saving for the expense. A household that is not currently saving might either have not begun saving or have already completed saving. In 2007, the SCF questionnaire addressed this ambiguity by asking respondents if their saving was completed.

Table 5 reports the frequencies with which respondents reported a foreseen expense, saving now for that expense, and (for 2007) whether or not the saving was complete. In all of the waves, about 60 percent of households report an anticipated expense, and about 35 percent report that they are saving now for it. This is not far below the approximately 40 percent of households that claim an Anticipated Expenditure as one of possibly several savings motivations when answering Question 1. Perhaps surprisingly, only a very small fraction of households report that their saving for anticipated expenditures is complete.¹⁸

¹⁸One might wonder why many more households report an anticipated expense when responding to Question 2 than report an anticipated expense as a motive for saving in their answers to Question 1. One simple reason is that the latter explicitly includes foreseen health costs. Another is that the specific reference to “the next five to ten years” could expand the respondent’s horizon.

	1995	1998	2001	2004	2007
Foresees Expense	63.1	58.8	60.5	59.0	57.5
Saving Now	38.1	37.1	36.8	35.8	33.9
Saving Complete					1.6

Table 5: Percentage Frequencies of Saving for Anticipated Expenditure

Intuition suggests that the major expenses listed in Question 2 – education, purchase of a new home, and health care costs – are concentrated at specific stages of the life cycle. Saving for a new home purchase comes early in a person’s adult life. Education expenses for children arrive in middle age, and the old incur exceptionally large medical expenses. Table 6 verifies this intuition by reporting the the frequencies with which households responded to Question 3 with that particular category both overall and by age of the household’s head. (The denominators for these frequencies include *all* households, not just those that answered Question 2 affirmatively.) Between 13.3 and 17.7 percent of households anticipate a home purchase in the next five to ten years, and as expected these are concentrated among younger households. Anticipated educational expenses are somewhat more frequent, and these are concentrated among the middle aged. Surprisingly to us, the overall frequency of anticipated medical expenses never exceeds 10 percent. In the 2001, 2004, and 2007 surveys this frequency is highest among those late in their working life, but one can hardly say that a typical older household is saving for medical care. Overall though, Table 6 indicates that households tie anticipated expenditures to their life cycles.

The cross sectional evidence from survey questions clearly indicates that households believe that large anticipated expenditures are relevant to their consumption and saving decisions, but it is silent about how those beliefs impact their actual decisions. To measure this, we turn to the 2007-2009 SCF panel. Of course, the Federal Reserve’s Board of Governors only initiated this panel’s collection to measure the impact of the 2007-2008 financial crisis, so one can hardly say that this time period is “typical.” Nevertheless, these are the only repeated observations provided by the SCF project.

To measure the association between self-reported saving for a particular anticipated expenditure and wealth dynamics, we began by dividing households into four categories based on whether or not they were saving for that expense in 2007 and again in 2009. We then calculated the average growth rates for financial wealth for households in each of those bins. If the answers to the term saving questions have real economic content, we expect that

Table 6: Frequency of Saving for a Specific Major Forecastable Expenditure by Age Group

Age Category	Home Purchase				Education				Medical Care						
	1995	1998	2001	2004	1995	1998	2001	2004	1995	1998	2001	2004	2007		
All	15.5	17.7	17.1	15.5	13.3	18.6	19.9	17.8	19.2	17.1	7.6	5.8	5.4	5.9	6.8
25-29	28.3	33.5	24.0	29.5	35.1	11.8	18.5	11.1	16.3	13.7	5.7	5.3	2.5	5.1	4.3
30-34	25.2	28.1	29.0	21.2	14.4	14.7	16.9	16.9	14.9	13.3	9.5	7.1	6.5	2.6	5.2
35-39	16.9	19.0	22.6	16.1	16.4	27.0	26.8	20.5	22.1	23.4	6.3	7.9	4.7	5.6	4.8
40-44	8.3	15.3	14.8	11.8	11.5	24.5	29.4	26.6	27.3	21.6	7.7	6.1	6.0	3.3	4.0
45-49	9.4	15.4	11.2	12.7	8.5	26.9	19.1	23.1	26.4	25.3	7.5	5.8	3.4	5.7	7.5
50-54	8.9	5.3	12.6	10.4	11.0	13.4	19.2	15.7	15.5	15.5	8.4	3.8	7.0	6.0	8.1
55-59	11.9	6.1	6.4	11.3	5.0	7.1	6.4	7.7	11.8	9.3	7.9	2.0	6.4	11.3	11.8
60-64	5.9	3.4	6.1	7.3	3.0	4.9	2.2	2.6	6.2	6.7	9.5	6.0	10.1	14.3	10.2

This table reports the frequency of the three major forecastable expenses listed among households with some forecastable major expense for the Surveys of Consumer Finance in 1995, 1998, 2001, 2004, and 2007. The first row reports the frequencies for all households, and the remaining rows report the frequencies for households in the indicated 5-year age bins.

- among those who were not saving in 2007, wealth growth was higher for those who were saving in 2009;
- among those who were saving in 2007, wealth growth was higher for those who were saving in 2009; and
- among those who were not saving in 2009, wealth growth was lower for those who were saving in 2007.

The first prediction is relatively mechanical: a transition to saving from not saving should raise wealth. The second prediction is also somewhat mechanical, but we expect the expenditure of funds to amplify the effects of the mere cessation of saving. This expenditure also justifies the third prediction.

Table 7 reports the results of this exercise for each of the three anticipated expenditures highlighted above. For each expense, the right-hand matrix reports the transition rates (for the sample as a whole) between saving and not saving for the particular expense. The left-hand matrix gives the wealth growth rates. Since some observations in our data have zero wealth, we measured each household's growth rate as the difference between the two years' financial wealth measures divided by their average value. The resulting growth rates lie between -2 and 2 by construction.

Only 23 percent of those saving for a home purchase in 2007 report the same status in 2009. One might expect the sharp depreciation of home values during this period to have emptied the stock of potential new home buyers at an extraordinary rate, so we think it would be a mistake to infer from this that saving for a home purchase takes very little time. In line with our predictions, the mean wealth growth rate of those who stopped saving for a home between 2007 and 2009 was 29 growth points below that of those that continued their saving. Furthermore, that growth rate was 10 growth points below the average wealth growth rate of those than never saved for a home in either year. Finally, the average growth rate of wealth for those who began saving for a home between 2007 and 2009 exceeds that of those who never saved for a home by 36 growth points. In short, all three of the predictions above hold good for this expenditure. The same is true, but somewhat less dramatically, for Educational expenses. However, the results for Medical Expenses violate one of the predictions: The mean wealth growth rate for households that were saving in 2007 but not in 2009 is higher than that for households that never saved at all. However, we find the results overall to confirm our basic intuition about the effects of term saving on wealth dynamics.

Saving for a Home Purchase

		in 2009?				in 2009?	
		No	Yes			No	Yes
in 2007?	No	0.95	0.05	in 2007?	No	-0.04	0.32
	Yes	0.77	0.23		Yes	-0.14	0.15
Transition Frequencies				Mean Wealth Growth Rates			

Saving for Educational Expenses

		in 2009?				in 2009?	
		No	Yes			No	Yes
in 2007?	No	0.93	0.07	in 2007?	No	-0.03	0.26
	Yes	0.56	0.44		Yes	-0.16	-0.06
Transition Frequencies				Mean Wealth Growth Rates			

Saving for Medical Expenses

		in 2009?				in 2009?	
		No	Yes			No	Yes
in 2007?	No	0.97	0.03	in 2007?	No	-0.04	0.26
	Yes	0.86	0.14		Yes	0.04	0.35
Transition Frequencies				Mean Wealth Growth Rates			

Table 7: Saving Transition Rates and their Accompanying Wealth Dynamics

3 The Model

Our model of middle-class consumption and savings decisions adds a motivation to save to the impatient, borrowing-constrained household in [Campbell and Hercowitz \(2009\)](#). For this, we give the household utility from a special expenditure with predetermined timing but endogenous size. The household lives forever and is impatient relative to the market rate of interest. In spite of the impatience, the household saves in anticipation of the periodic expenditure. Recall from the introduction that a household is globally liquidity constrained if its borrowing constraint either binds in the present or is expected to bind in the future. Term saving induced by the periodic expenditure generates a meaningful difference between current and global liquidity constraints: As we show later, the borrowing constraint should bind at least at the time of the expenditure. Hence, to different degrees, the household will always be liquidity constrained in the global sense. The economics of term saving are most easily appreciated in an environment with only the periodic expenditure changing over time, so we hold the household's earnings constant in this section. However, we add stochastic earnings to the model below because quantitative realism requires precautionary savings from earnings risk.

3.1 The Basic Model

The model proceeds in discrete time, and we denote a point in time as a “year”. A single infinitely lived household values two goods, standard consumption and periodic consumption. We denote the quantities of these consumed in year t with C_t and M_t . The utility function is

$$\sum_{t=0}^{\infty} \beta^t \{ \ln C_t + \mu_t \ln M_t \} \tag{1}$$

with $0 < \beta < 1$. Here, the indicator μ_t follows a cycle with $\mu_t = \mu > 0$ every τ years and $\mu_t = 0$ at other times. This specification generates a periodic expenditure with exogenous timing and endogenous size.

The household is endowed with one unit of labor which it supplies inelastically at the wage rate W_t . Denote lump-sum taxes with T_t and net financial assets at the end of the previous year with A_t . The household's budget constraint is

$$C_t = W_t - T_t + RA_t - A_{t+1} - M_t, \tag{2}$$

where R is the gross interest rate, assumed to be constant. We assume that $\beta R < 1$, so the household is impatient.¹⁹

The household's choices of all goods must satisfy nonnegativity constraints. Furthermore, the household faces the standard borrowing constraint

$$A_{t+1} \geq 0. \tag{3}$$

Given A_0 , the household chooses sequences of C_t , M_t and A_{t+1} to maximize its utility subject to the sequence of nonnegativity and budget constraints.

Denote the Lagrange multipliers on the year t budget and borrowing constraints with Ψ_t and Γ_t . The first-order conditions for optimization are

$$\Psi_t = \frac{1}{C_t}, \tag{4}$$

$$\Gamma_t = \Psi_t - \beta R \Psi_{t+1}, \tag{5}$$

$$\Psi_t M_t = \mu_t. \tag{6}$$

Without borrowing constraints, Ψ_t equals the marginal current utility of lifetime resources. Here, it represents the marginal value of current resources. The multiplier Γ_t equals the marginal value of relaxing the borrowing constraint, which is the deviation from the standard Euler equation; Γ_t is zero when the borrowing constraint is slack. Because Ψ_t is always positive, the periodic expenditure M_t is positive when $\mu_t > 0$ and zero otherwise. We elaborate on the life-cycle interpretation of M_t below in Section ??.

3.2 The Nonstochastic Cycle

Because of the periodic changes in preferences, the household's problem has no steady state, even if wages and taxes remain unchanged. Nevertheless, there does exist a nonstochastic cycle when W_t and T_t are constant. This cycle is the analogue of a steady state in our model, so we begin with the cycle's characterization, and focus in particular on term saving, i.e., the level of assets along the cycle. For this, we denote ordinary consumption and assets κ years after the most recent periodic expenditure in a nonstochastic cycle with C^κ and A^κ .²⁰

¹⁹See [Campbell and Hercowitz \(2009\)](#) for a general equilibrium environment in which such a low interest rate arises endogenously from trade with a more patient household.

²⁰Our model has a deterministic asset cycle in common with the models of [Baumol \(1952\)](#) and [Tobin \(1956\)](#). This and those models, however, differ in key respects. There, the length of the cycle is the key endogenous variable, while here it is exogenous. We focus is on the link between the asset cycle and liquidity constraints, while those models focused on the link between assets and money demand.

From (4) and (5), the necessary conditions which a nonstochastic cycle must satisfy are

$$\frac{1}{C^\kappa} \geq \frac{\beta R}{C^{\kappa+1}} \text{ for } \kappa = 1, 2, \dots, \tau - 1, \quad (7)$$

$$\frac{1}{C^\tau} \geq \frac{\beta R}{C^1}. \quad (8)$$

The corresponding budget constraints are

$$\begin{aligned} C^\kappa + A^{\kappa+1} &= W - T + RA^\kappa \text{ for } \kappa = 1, 2, \dots, \tau - 1, \\ (1 + \mu)C^\tau + A^1 &= W - T + RA^\tau. \end{aligned}$$

We replaced here the periodic expenditure with its optimal level from (4) and (6), μC^τ .

To solve these conditions, it is helpful to begin with the case of $\mu = 0$, which corresponds to the standard optimization under impatience. The only path for A^κ and C^κ satisfying these conditions is the standard steady state for impatient agents in which the borrowing constraint always binds and the household consumes all labor earnings. That is, $A^\kappa = 0$ and $C^\kappa = W - T$ in all periods, and hence (7) and (8) hold with strict inequalities.

Raising μ above zero generates a positive M every τ years. However, if μ is less than $\hat{\mu}^\tau \equiv (\beta R)^{-1} - 1$, then the borrowing constraint still binds at all times. That is, for $\kappa = 1, \dots, \tau - 1$, $C^\kappa = W - T$, and $C^\tau = (W - T) / (1 + \mu)$. Thus, conditions (7) and (8) still hold with strict inequalities. Mechanically, this follows from the fact that the reduction of C^τ as μ goes up is not enough to bring

$$\frac{1}{C^{\tau-1}} \geq \frac{\beta R}{C^\tau} \quad (9)$$

to an equality while $C^{\tau-1}$ still equals $W - T$. Intuitively, the anticipated reduction in consumption is too small to induce the household to save in year $\tau - 1$ towards the expenditure in year τ , so the household finances the expenditure only by reducing C^τ .

Now, suppose that $\mu > \hat{\mu}^\tau$ and define $\hat{\mu}^{\tau-1} \equiv (\beta R)^{-2}(R + 1) - 1 > \hat{\mu}^\tau$. When $\mu = \hat{\mu}^{\tau-1}$, then the saving for the periodic expenditure reduces $C^{\tau-1}$ to $\beta R(W - T)$, so that:

$$\frac{1}{C^{\tau-2}} = \frac{\beta R}{C^{\tau-1}}. \quad (10)$$

That is, the borrowing constraint in cycle year $\tau - 2$ does not bind, but the household nevertheless saves nothing. If μ is less than $\hat{\mu}^{\tau-1}$, then the borrowing constraint in cycle year $\tau - 2$ binds; $A^1 = A^2 = \dots = A^{\tau-1} = 0$, and $A^\tau > 0$. If instead $\mu > \hat{\mu}^{\tau-1}$, then $A^{\tau-1} > 0$. Applying this reasoning to higher and higher values of μ yields the following result.

Proposition 1 *There exist positive and finite threshold values of μ , $\hat{\mu}^2 > \hat{\mu}^3 > \dots > \hat{\mu}^\tau$, such that $A^\kappa > 0$ if and only if $\mu > \hat{\mu}^\kappa$.*

Note that progressively higher values of μ generate positive assets for year $\tau - 1$ first, then for year $\tau - 2$, and so on backwards until year 1 of the cycle. The constraint always binds in the cycle's final year, so that $A^1 = 0$.²¹ We conclude that the borrowing constraint “switches off” at most once during the cycle. It switches back on in the year of the special expenditure. We use this result to link the level of assets to the stage in the cycle.

Proposition 2 *Assume that the constraint switches off in year κ of the deterministic cycle, where $1 \leq \kappa < \tau$. Then, because $W - T \geq C^\kappa > C^{\kappa+1} > \dots > C^{\tau-1}$, we have that $A^{\kappa+1} < A^{\kappa+2} < \dots < A^\tau$.*

In words, the saving towards the next periodic expenditure monotonically increases the level of assets.

3.3 Shortening of the Planning Horizon and the MPC

Zeldes (1984) noted that a binding borrowing constraint in the future works like a terminal condition which shortens the effective planning horizon. The household's response to an unanticipated temporary increase in $W_t - T_t$ on the nonstochastic cycle illustrates this. If the borrowing constraint binds in the year of the increase, then $MPC = 1$ as expected. If instead, the borrowing constraint is slack then, the household allocates the increase in current income across consumption between the present year in the cycle, κ , and the next time the borrowing constraint binds. The resulting marginal propensity to consume is

$$MPC^\kappa = \left(\frac{1 - \beta^{\tau-\kappa+1}}{1 - \beta} + \mu\beta^{\tau-\kappa} \right)^{-1}.$$

This exceeds the marginal propensity to consume of an unconstrained household facing the interest rate $\beta^{-1}(1 - \beta)$ if and only if $\mu < \beta/(1 - \beta)$.²² The model's calibration satisfies this condition comfortably, so we proceed under this assumption.

²¹The borrowing constraint must bind at some point along any deterministic path, not just one which forms a nonstochastic cycle. Assume otherwise, so that for some t $A_{t'} > 0$ for all $t' \geq t$. This cannot be the optimal behavior, because increasing C_t , and hence all subsequent consumption levels, at the expense of reducing all future asset levels, gives higher present value utility.

²²If instead, $\mu > \beta/(1 - \beta)$, then the periodic expenditure has such a large share that most of the temporary increase goes towards it.

We began this paper highlighting the empirical puzzle of MPC s substantially larger than the rate of interest for households with wealth. To see our model’s implications for these observations, we differentiate MPC^κ above with respect to κ . The upper bound for μ signs the derivative positively. Therefore, we conclude:

Proposition 3 *If $\mu < \beta/(1 - \beta)$, and if the borrowing constraint becomes slack in year κ of the cycle, then $MPC^\kappa < MPC^{\kappa+1} < \dots < MPC^{\tau-1}$.*

Propositions 2 and 3 together imply that if we sampled households uniformly distributed across the deterministic cycle, we would find that MPC_t covaries positively with A_t among households with assets.

4 Quantitative Analysis

In this section, we enrich the model with the addition of ongoing wage risk, calibrate its remaining parameters, and calculate the MPC s to transitory income changes and balanced-budget tax experiments. Comparing the results with the evidence requires us to resolve a financial indeterminacy: Since the household pays the same interest rate on debt as it receives on savings, it can save either by purchasing assets or by accumulating equity in its durable goods. We resolve this by assuming that repaying debts faster than required and then extracting the funds with new borrowing incurs a small cost. To avoid it, the household repays its debt at the minimum required pace. Under this assumption, we measure the household’s gross debt with V_t and its gross assets equal $A_t + V_t \equiv A_t^g$.

Our addition of wage risk follows Meghir and Pistaferri (2004). Using annual PSID observations, they estimate a stochastic process of household heads’ log earnings that sums a random walk with a first-order moving average. The resulting process for W_t is

$$\begin{aligned} \ln W_t &= \ln W_t^P + \ln W_t^T, \\ \Delta \ln W_t^P &\sim N(0, 0.177^2), \\ \ln W_t^T &= \varepsilon_t + 0.2566\varepsilon_{t-1} \\ \varepsilon_t &\sim N(0, 0.173^2) \end{aligned}$$

Although they estimate several processes with heteroskedasticity, we focus on this homoskedastic process for the sake of simplicity. For the other model parameters, we set $R = 1.04$ and $\beta = 1/1.06$. Motivated by the phrasing of Question 2, we set τ to 10. The last remaining parameter to be determined is μ . We set this so that the average financial wealth to after-tax

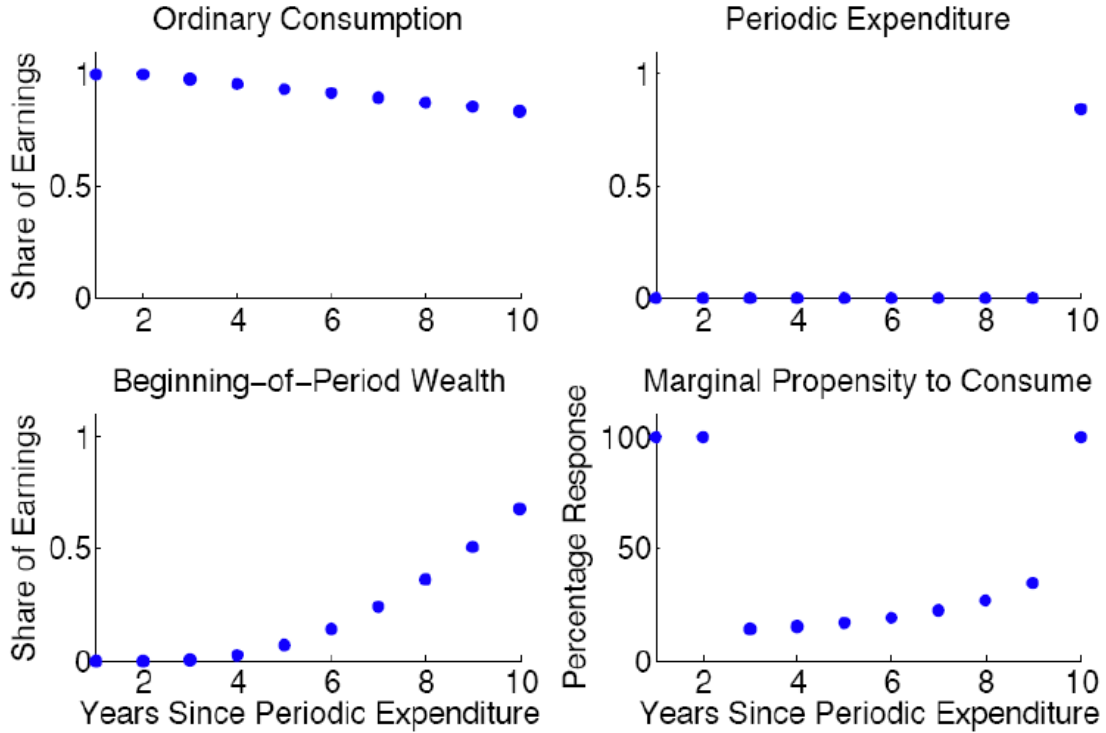


Figure 1: The Deterministic Cycle in the Calibrated Model

income ratio calculated from a large random sample of model households equals that from the 2001 SCF, 50.1 percent. Given the other parameters, this sets μ to 1.0135.

Figure 1 plots the model’s deterministic cycle at the calibrated parameter values (holding W_t constant). In the year of the expenditure and for the two years following, the household chooses zero wealth, so its marginal propensity to consume in those years equals 100 percent. In the third year after the expenditure, saving begins, wealth begins to accumulate, and consumption begins to fall. Although the marginal propensity to consume when saving is ongoing is far below 100 percent, it also greatly exceeds the permanent-income benchmark of the interest rate. Furthermore, the MPC increases as the expenditure approaches. Since wealth simultaneously increases, those saving households with the highest wealth also have the highest MPCs.

Table 8 reports MPCs from the full model with ongoing wage uncertainty. For these, we begin with the model’s steady-state distribution of households across wealth and earnings, both scaled by earnings’ permanent component. For each point in the support, we calculate the household’s responses to four changes in lump-sum transfers. In the first, each household

		Marginal Propensities to Consume out of a			
12A/W	Frequency	One Year Transfer	One Year Tax Cut	Three Year Tax Cut	Five Year Tax Cut
0	7	35	33	54	68
1	8	28	25	47	63
2	8	19	17	41	60
3	7	18	15	40	59
4	7	18	15	41	58
5	8	19	16	41	58
6	7	22	19	43	59
7	7	25	22	46	60
8	7	27	25	47	61
9	6	29	26	48	62
10	5	28	22	48	62
11	4	21	21	47	62
12	4	23	17	46	62
13+	15	20	16	43	61

Table 8: Average Marginal Propensities to Consume from the Calibrated Model

receives a one-time transfer equal to one percent of its earnings. This is *not* a balanced-budget experiment, but the next experiment balances the budget with a lump-sum tax in all subsequent years equal to the interest cost of perpetually servicing the government debt used to fund the initial transfer. The next two experiments extend the initial tax cut to three and five years and increase the following permanent tax increase accordingly. Each row reports the MPCs in each experiment’s *first* year for the group of households with income to wealth ratios in 14 ranges. The first contains all households with exactly zero wealth (seven percent of the households), the second contains households with positive wealth that is less than one month of its current earnings, households in the third group have wealth greater than or equal to one month’s earnings but less than two month’s earnings, etc. The table’s column labeled “Frequency” shows that households are approximately uniformly distributed across the first nine of these bins. Thereafter, the density falls.

For the first experiment of a one-time transfer, households with zero wealth unsurprisingly have the highest MPC, 35 percent. Consistent with the intuition from a precautionary savings

model, the majority of these households are actually accumulating wealth and so have MPCs below 100 percent. The MPC declines to 28 percent for households with between zero and one month of income in wealth, and then to 19 percent for households with wealth between one and two months' income. Thereafter, the MPC flattens out until it begins to rise for households with wealth between 5 and 6 months' earnings. The MPC achieves a local peak of 29 percent for households with wealth between 8 and 9 months' earnings, and thereafter falls. For the 15 percent of households with wealth exceeding a full year of earnings, the MPC equals 20 percent.

Perhaps very surprisingly, permanently raising taxes to pay for the one-year tax cut reduces the MPCs very little. For those with no wealth, the MPC drops from 35 percent to 33 percent, and for those with more than a year of wealth it drops from 20 to 16 percent. Furthermore, the relationship between the MPCs and household wealth remains unchanged. Extending the tax cuts to three and five years raises the MPCs and flattens them. For a five-year tax cut, the average MPC of households without wealth equals 68 percent. For those with wealth exceeding annual earnings, it equals 61 percent.

5 Concluding Remarks

How liquidity constrained are middle-class households in the U.S.? To address this question, we developed a model where households are home owners and hold financial assets, and measured liquidity constraints with the fraction spent out of a temporary tax rebate—compared to the unconstrained Ricardian response of zero.

In the model, a future binding borrowing constraint effectively shortens the planning horizon of households who are infinite-horizon planners. These households value liquidity in spite of being currently unconstrained. This model has two main implications:

- The spending responses to a transitory transfer in the model are much higher than for a permanent-income consumer. The responses to a transitory transfer and to a tax cut financed by a future permanent tax hike are very similar. In other words, future tax changes have little effect on current decisions. This implies that the response of these households to a balanced-budget tax rebate differs greatly from the zero-response of a Ricardian permanent-income consumer.
- The volume of assets owned reflects a forthcoming demand for liquidity rather than a liquidity surplus arising from past luck. This feature combined with the negative

relationship between the MPC and wealth predicted by the theory of precautionary saving together yield a relatively flat relationship between financial assets and the marginal propensity to consume out of temporary income.

The second implication provides a rationalization of the finding in [Shapiro and Slemrod \(2003\)](#), that among households with positive amounts of shares, the fraction of households who spent most of the 2001 rebate weakly *increases* with stock ownership. Our interpretation of these results is that middle-class households with financial assets face quantitatively significant liquidity constraints.

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