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## *The Wealthy Hand-to-Mouth*

**ABSTRACT** The “wealthy hand-to-mouth” are households that hold little or no liquid wealth, whether in cash or in checking or savings accounts, despite owning sizable amounts of illiquid assets (assets that carry a transaction cost, such as housing or retirement accounts). We use survey data on household portfolios for the United States, Canada, Australia, the United Kingdom, Germany, France, Italy, and Spain to document the share of such households across countries, their demographic characteristics, the composition of their balance sheets, and the persistence of hand-to-mouth status over their life cycle. The portfolio configuration of the wealthy hand-to-mouth suggests that these households may have a high marginal propensity to consume out of transitory income changes, a prediction for which we find empirical support in PSID data. We explain the implications of this group of consumers for macroeconomic modeling and fiscal policy analysis.

A valuable framework for analyzing both household survey and aggregate time-series data on the joint dynamics of income and consumption is the life-cycle permanent-income hypothesis. Nevertheless, economists have long recognized that certain aspects of these data are at odds with some of this theory’s most salient predictions. This is true for both the standard version of the theory (Friedman 1957; Hall 1978) and the more recent “buffer-stock” versions (Deaton 1991; Carroll 1997). At both micro and macro levels, it is common to estimate a large sensitivity of consumption to transitory changes in income, whereas according to the theory these income

dynamics should be smoothed.<sup>1</sup> Moreover, expected consumption growth often fails to correlate with the real interest rate, a result that implies a breakdown of the forward-looking Euler equation holding with equality, as long as the elasticity of intertemporal substitution is not zero.<sup>2</sup>

The most direct way to account for these facts is through the existence of a sizable share of hand-to-mouth (HtM) consumers in the population, that is, consumers who spend all of their available resources in every pay period. HtM consumers have a high marginal propensity to consume out of transitory income changes, which could account for the high correlation between consumption and the transitory component of income growth, even for anticipated income shocks. Moreover, the Euler equation does not hold with equality for HtM consumers, and thus they are a source of misalignment between movements in the interest rate and movements in aggregate consumption growth. The main challenge to this view is the claim that micro data on household balance sheets suggest that the fraction of households with near-zero net worth, and hence those who consume all their income each period, is too small for the model to quantitatively reproduce the facts discussed above.

Measuring HtM behavior using data on net worth is consistent with the vast majority of equilibrium macroeconomic models with heterogeneous agents. These models feature either a single asset or two assets with different risk profiles (but the same degree of liquidity). Notable examples are the Bewley models, which feature uninsurable idiosyncratic risk and credit constraints, in the tradition of Mark Huggett (1996), S. Rao Aiyagari (1994), Jose-Victor Ríos-Rull (1995), and Per Krusell and Anthony Smith (1998), and the spender-saver models, which feature impatient and patient consumers with complete markets, in the tradition of John Campbell and N. Gregory Mankiw (1989). Spender-saver models have been revived recently to analyze macroeconomic dynamics around the Great Recession by Jordi Gali, David Lopez-Salido, and Javier Valles (2007), Gauti Eggertsson and Paul Krugman (2012), and Alejandro Justiniano, Giorgio Primiceri, and Andrea Tambalotti (2013), among others. Models by Krusell and Smith (1997) and Christopher Carroll, Jiri Slacalek, and Kiichi Tokuoka (2014a,

1. Some notable examples of micro-level evidence on excess sensitivity are Parker (1999), Souleles (1999), Shapiro and Slemrod (2003a, 2003b, 2009), Johnson, Parker, and Souleles (2006), Parker and others (2013), and Broda and Parker (2014). See Jappelli and Pistaferri (2010) for a recent survey. Campbell and Mankiw (1989, 1990, 1991) provide evidence based on macroeconomic time-series.

2. See, again, Campbell and Mankiw (1989, 1990, 1991), but also Attanasio and Weber (1993), and Ludvigson and Michaelides (2001).

2014b) combine the spender-saver insight of heterogeneity in patience with a standard one-asset incomplete-markets model.

In this paper, we argue that measurements of HtM behavior inspired by the spender-saver class of models are misleading, because they miss what we call the *wealthy hand-to-mouth* (wealthy HtM) households. These are households that hold sizable amounts of wealth in illiquid assets, such as housing or retirement accounts but have very little or no liquid wealth, and as a result consume all of their disposable income every period. Clearly, such households would not be picked up by standard measurements since they have positive—and often substantial—net worth.

To obtain a comprehensive measurement of HtM behavior with cross-sectional survey data about household portfolios, a far better strategy is to use a model with two assets, one liquid and one illiquid, as the guiding framework. The illiquid asset yields a higher return, but it can only be accessed by paying a transaction cost. Recent analyses using this two-asset model have been carried out by George-Marios Angeletos and others (2001), David Laibson, Andrea Repetto, and Jeremy Tobacman (2003), Raj Chetty and Adam Szeidl (2007), Fernando Alvarez, Luigi Guiso, and Francesco Lippi (2012), Jonathan Huntley and Valentina Michelangeli (2014), and Greg Kaplan and Giovanni Violante (2014a, 2014b).

Viewed through the lens of this two-asset model, one discerns two types of HtM households: The *poor* hand-to-mouth (poor HtM), those who hold little or no liquid wealth and no illiquid wealth; and the *wealthy* HtM, who also hold little or no liquid wealth but have significant amounts of illiquid assets on their balance sheets. Just like the poor HtM households, wealthy HtM households have a large marginal propensity to consume out of small transitory income fluctuations. However, in this analysis we show that wealthy HtM households are more similar to non-HtM households along many other important dimensions. As a result, the wealthy HtM cannot be fully assimilated into either group. Rather, they are best represented as a third, separate class of households.

This paper investigates wealthy HtM behavior both theoretically and empirically and examines this peculiar but sizable group's implications for macroeconomic modeling and policy analysis.

First, we ask why households with significant wealth would optimally choose to consume all of their income every period, instead of using their wealth to smooth shocks. To answer this question, in section I we develop a stylized model based on Kaplan and Violante (2014a). The model reveals that, under certain parameter configurations, optimal portfolio composition has positive amounts of illiquid wealth and zero liquid

wealth. Such wealthy HtM households are better off bearing the welfare loss from income fluctuations rather than smoothing their consumption. This is because the latter option requires holding large balances of cash and foregoing the high return on the illiquid asset (and, therefore, the associated higher level of long-run consumption). This explanation is consistent with calculations by Martin Browning and Thomas Crossley (2001), who show that, in a plausibly parameterized life-cycle buffer stock model, the utility loss from setting consumption equal to income, instead of fully optimizing, is second order. John Cochrane (1989) and Krusell and Smith (1996) perform similar calculations in a representative agent environment. Our model also provides useful guidance for our empirical strategy. In section II we outline this strategy in detail and explain how we approach measurement issues.

Next, we ask how large the share of wealthy HtM households is in the total population, what these households' demographic characteristics are relative to the other two groups, how their balance sheets compare with those of the non-HtM households, and how persistent their HtM status is over their life cycle. This empirical analysis is based on cross-sectional survey data on household portfolios for eight countries: the United States, Canada, Australia, the United Kingdom, Germany, France, Italy and Spain. We describe these data in section III. In the existing literature examining these data on household portfolios, the emphasis has been on the allocation between risky and safe assets (see Luigi Guiso, Michael Haliassos, and Tullio Jappelli [2002] for a thorough cross-country comparison). Instead, our focus is on the liquidity characteristics of the portfolio. In section IV, we study U.S. data, for which we have several repeated cross-sections between 1989 and 2010, as well as a two-year panel for 2007–09. In section V, we present a comparative cross-country analysis with survey data from 2010 and surrounding years.

The analysis of U.S. data leads to six main findings. First, we find that between 25 and 40 percent of U.S. households are HtM, with our preferred estimate being one-third of the population. Second, we find that one-third of HtM households are poor and two-thirds are wealthy; therefore, the vast majority of this HtM group, being wealthy HtMs, would be missed by measurements of HtM behavior that are based on net worth. Third, households appear to be most frequently poor HtM at young ages, whereas the age profile of the wealthy HtM is hump-shaped and peaks around age 40. Fourth, the wealthy HtM typically hold sizable amounts of illiquid wealth: for example, the median at age 40 is around \$50,000. Fifth, wealthy HtM households appear very similar to the unconstrained non-HtM in the age

profiles of their income and their shares of illiquid wealth held in housing and retirement accounts. Finally, we find that wealthy HtM status is slightly more transient than poor HtM status.

Some interesting findings also emerge from a comparison of the U.S. economy with the other seven countries we study. In all the other countries, wealthy HtM households are a much greater share of the population than poor HtM households, even more so than in the United States. However, the total fraction of HtM households varies significantly across countries. As in the United States, HtM households represent more than 30 percent of the population in Canada, the United Kingdom, and Germany, but they represent 20 percent or less of the population in Australia, France, Italy, and Spain. For the euro area countries, we observe that holdings of consumer debt are minimal, suggesting that the substantial liquid wealth seen, even among the income-poor, may act as a buffer stock that substitutes for expensive and limited access to credit.

In section VI we show that a household's HtM status has strong predictive power for its consumption response to transitory shocks. We apply the identification strategy from Richard Blundell, Luigi Pistaferri, and Ian Preston (2008) to panel data on U.S. income and consumption to measure, for each type of household, the marginal propensity to consume out of transitory income shocks. We find that wealthy HtM and poor HtM households have significantly stronger responses than non-HtM households. In contrast, when we split households into HtM groups based on net worth only, we do not find a significant difference in the consumption responses of those two groups.

In section VII, we argue that the wealthy HtM deserve their own separate status in the cast of characters populating macroeconomic models. We use our empirical estimates of the share of households in each HtM group, together with simulated marginal propensities to consume from three alternative structural models of consumption behavior, to show that the wealthy HtM cannot be assimilated to either the poor HtM or the non-HtM. We highlight four areas where frameworks that do not explicitly model wealthy HtM households provide misguided intuitions about the effects of fiscal policy: the degree of nonlinearity of the marginal propensity to consume with respect to the transfer size, the asymmetry of the consumption response with respect to equal-size income windfalls and losses, the optimal phasing-out of stimulus payments with income for maximizing the impact on aggregate consumption, and the extent of cross-country dispersion in consumption responses to a fiscal transfer. Section VIII summarizes and concludes the paper.

## I. Wealthy Hand-to-Mouth Behavior: A Simple Model

We start by analyzing a simple three-period model in order to illustrate the determinants of HtM behavior. In this section, we keep the presentation to a bare minimum; online appendix A contains a more thorough analysis of the problem. The model is also useful to determine how to detect a household's HtM status in the data and, as such, it provides guidance for our measurement exercise.

### I.A. Household Problem

Consider a household that lives for three periods— $t = 0, 1,$  and  $2$ —but consumes only in the last two periods. Preferences over consumption at  $t = 1, 2$  are given by

$$(1) \quad v_0 = u(c_1) + u(c_2),$$

with no discounting between periods, and with  $u' > 0, u'' < 0$ . The variable  $c_t$  denotes nondurable consumption at date  $t$ .

In period 0, the household has an initial endowment  $\omega$  and makes a portfolio allocation decision. Two assets are available as saving instruments. An illiquid asset  $a$  pays off a gross return  $R$  before the consumption decision in period 2, but cannot be accessed at the time of the consumption decision in period 1. A liquid asset  $m$  can be accessed before the consumption decision in both periods, but pays a return  $1 < R$ . For now, we do not allow the agent to borrow, that is, to take a negative position in the liquid asset, but we later relax this assumption.

After the initial portfolio allocation decision, households receive income  $y_1$  and make their consumption and liquid saving decision at  $t = 1$ . In the last period,  $t = 2$ , they receive income  $y_2$  and consume this amount, their liquid savings from  $t = 1$ , and their savings allocated to the illiquid asset at  $t = 0$ , plus the accrued capital income. Therefore, the only two decisions to analyze are the initial portfolio allocation decision and the consumption/saving decision at  $t = 1$ . Finally, note that since the income path  $(y_1, y_2)$  is known at  $t = 0$ , there is no uncertainty.

Our characterization of HtM behavior concerns the asset position at the time of the  $t = 1$  consumption decision. We define a household as non-HtM if, after consuming at  $t = 1$ , it holds a positive amount of liquid assets, that is,  $m_2 > 0$  and  $a \geq 0$ . As is clear from equation 1, this household will choose  $c_1 = c_2$ . We define a household as poor HtM if, after consuming at  $t = 1$ , it does not hold any liquid or illiquid assets:  $m_2 = 0$  and  $a = 0$ . We define a

household as wealthy HtM if, after consuming at  $t = 1$ , it holds a positive amount of illiquid assets but no liquid assets:  $m_2 = 0$  and  $a > 0$ . Therefore, the  $t = 1$  consumption/saving decision determines whether an agent is HtM, and the initial portfolio allocation at  $t = 0$  determines whether an HtM agent is poor or wealthy HtM. For both types of HtM households,  $c_1 < c_2$ .

### *1.B. Solution*

We begin with the initial portfolio allocation decision at  $t = 0$ :

$$v_0 = \max_{m_1, a} u(c_1) + u(c_2)$$

s.t.

$$a + m_1 = \omega$$

$$c_1 + m_2 = y_1 + m_1$$

$$c_2 = y_2 + m_2 + Ra$$

$$m_1 \geq 0, a \geq 0$$

where the first line is the resource constraint in the portfolio choice; the second and third lines are the budget constraints at  $t = 1$  and  $t = 2$ ; and the final line collects the inequality constraints on the choice variables. The first-order condition of this problem with respect to  $a$  gives

$$(2) \quad u'(c_1) \left[ 1 + \frac{\partial m_2}{\partial a} \right] \geq u'(c_2) \left[ R + \frac{\partial m_2}{\partial a} \right],$$

where the inequality is strict when  $a = 0$ . The derivative  $\partial m_2 / \partial a$  reflects the dependence of the liquid savings decision at  $t = 1$  on the amount held in illiquid assets. The resulting initial portfolio allocation implicitly determines the endowment points  $(y_1 + \omega - a, y_2 + Ra)$  immediately prior to the consumption/saving decision at  $t = 1$ .

We now turn to this consumption saving decision at  $t = 1$ , given the predetermined amount invested in liquid wealth  $m_1 = \omega - a$ :

$$v_1(a) = \max_{c_1, m_2} u(c_1) + u(c_2)$$

s. t.

$$c_1 + m_2 = y_1 + \omega - a$$

$$c_2 = y_2 + m_2 + Ra$$

$$m_2 \geq 0$$

where the first and second lines are the budget constraints at  $t = 1$  and  $t = 2$ , and the third line imposes the nonnegativity constraint on the choice variable. The first-order condition of this problem is

$$(3) \quad u'(c_1) \geq u'(c_2),$$

where the strict inequality holds whenever the constraint binds and  $m_2 = 0$ . For example, when  $y_1$  is high enough relative to  $y_2$ , the agent wants to save some of his or her income into period 2, and  $m_2 > 0$ . In contrast, when  $y_1$  is low enough relative to  $y_2$ , the agent would, ideally, like to borrow and is constrained at  $m_2 = 0$ . This “short-run” Euler equation in equation 3 states that, at  $t = 1$ , the relative price of consumption between  $t = 1$  and  $t = 2$  is equal to one, the return on the liquid asset.

Combining equations 3 and 2 yields

$$(4) \quad u'(c_1) \geq Ru'(c_2).$$

This is because  $u'(c_1) = u'(c_2)$  when  $m_2$  is interior, and because  $m_2$  is unaffected by a marginal change in  $a$  when the household is at a constraint. This long-run Euler equation in equation 4 states that, from the agent’s viewpoint at  $t = 0$ , the relative price of consuming at  $t = 1$  versus  $t = 2$  is  $R$ . Comparing equations 4 and 3, the intertemporal trade-off appears to change between  $t = 0$  and  $t = 1$  because the illiquid asset is available as a saving instrument only at  $t = 0$ .

The “short-run” Euler equation (3) implies

$$(5) \quad m_2 = \max \left\{ \frac{y_1 + \omega - y_2 - (1 + R)a}{2}, 0 \right\}.$$

Since we are interested in characterizing HtM behavior, we focus on the case where  $m_1 = 0$ . Equation 5 reveals that a sufficient condition for this case is  $y_2 \geq y_1 + \omega$ : for a given initial endowment, income in period 2 is so



large, relative to period 1, that even when the total endowment  $\omega$  is saved into the liquid asset, the household still desires to consume more at  $t = 1$ .

To make further progress on the solution, we assume that  $u$  is in the constant elasticity of substitution class, with elasticity of intertemporal substitution  $\sigma$ . Then, the long-run Euler equation (4) gives

$$(6) \quad a = \max \left\{ \frac{R^\sigma(y_1 + \omega) - y_2}{R + R^\sigma}, 0 \right\}.$$

From equation 6, we conclude that the household is wealthy HtM when

$$(7) \quad R > \left( \frac{y_2}{y_1 + \omega} \right)^{\frac{1}{\sigma}}$$

and is poor HtM when the opposite (weak) inequality holds.

It is useful to explain the role of the model's parameters in determining wealthy HtM behavior. A high relative return  $R$  makes the illiquid asset more attractive by raising its effective return, thereby inducing the agent to tolerate wider consumption differences across periods in order to achieve a higher overall consumption level. Steep income growth  $y_2/y_1$  reduces the appeal of the illiquid asset as a saving instrument, since the income path already guarantees high consumption later in life. The higher the elasticity of intertemporal substitution  $\sigma$ , the more the household is willing to absorb a jump in consumption across periods, and so the more likely it is to save into the illiquid asset even if  $y_1$  is low relative to  $y_2$ .<sup>3</sup>

Since the model is deterministic, wealthy HtM households choose to invest in the illiquid asset at  $t = 0$ , even though they know with certainty that they will be constrained in the next period. By acting this way, they consume even less at  $t = 1$  and make themselves even more constrained. Put differently, the shadow value of an additional unit of income at  $t = 1$  is higher for the wealthy HtM than for the poor HtM. If we let this multiplier be  $\lambda$ , for a poor HtM  $\lambda = u'(y_1 + \omega) - u'(y_2)$ , and for a wealthy HtM agent  $\lambda = u'(y_1 + \omega - a) - u'(y_2 + Ra)$ , which is larger. Nevertheless, this choice is optimal because the welfare gain from the rise in the overall level of lifetime consumption more than compensates for the welfare loss from the consumption gap between  $t = 1$  and  $t = 2$ .

3. Equation 7 reveals that the model is homothetic in  $y_1$ ,  $y_2$ , and  $\omega$ . In this sense, a high-income household is as likely to be a wealthy HtM as a low-income one, as long as the life-cycle slope of their income profiles is the same.

**MARGINAL PROPENSITY TO CONSUME OUT OF A TRANSITORY SHOCK** Suppose that after the initial portfolio allocation decision, but before the consumption decision at  $t = 1$ , the household receives an unexpected income shock, such as a transfer  $\tau$  from the government. What is the household's marginal propensity to consume out of this transfer? A non-HtM household has a marginal propensity to consume of exactly one-half, since there is no discounting and it smooths the payment equally across the two periods. If the transfer is small enough not to throw the agent off its kink ( $m_2 = 0$ ), then the HtM household's marginal propensity to consume out of the transfer will be one. This occurs as long as  $\tau \leq y_2 - (y_1 + \omega) + (1 + R)a$ . This condition is weaker for a wealthy HtM than for a poor HtM because, as explained above, the former household is more constrained.<sup>4</sup> Finally, note that all these results carry over to the case of an anticipated transfer, as long as the transfer is small enough that it does not change HtM status at  $t = 1$ .

### *1.C. Taking Stock*

Our two-period model is an extremely stylized environment. It is useful to describe how wealthy HtM behavior can arise as a result of giving up gains from additional consumption smoothing in exchange for the opportunity of investing in a high-return asset that yields higher levels of average lifetime consumption. This insight also survives in more general environments. We now briefly discuss five extensions.

First, for some illiquid assets like housing or large durables such as vehicles, the most significant component of their return is the flow of services they provide to the owner. At the same time, they have a consumption commitment component, meaning they require periodic expenditures that cannot be avoided, such as maintenance and repair. Consider a version of our model with the following in period  $t = 1$ . The illiquid asset yields a utility flow  $\phi a$  proportional to the stock, and these services are perfect substitutes with  $c_1$  (housing can be rented out and thus transformed into  $c_1$ ); and the illiquid asset's owner must incur expenditures  $\kappa a$ . Then, the counterpart of condition (7) is one where  $R$  is simply replaced by  $R/(1 - \kappa + \phi)$ , the effective return on the illiquid asset.

Second, when the agent can access unsecured credit, there is a second kink in the budget constraint at the credit limit; this is in addition to the kink at  $m_2 = 0$ . The model in online appendix A shows that in this case,

4. In fact, Kaplan and Violante (2014a) show that, in a richer life-cycle version of this two-asset model with uninsurable income risk, the average marginal propensity to consume out of transitory income shocks is larger among wealthy HtM households than among poor HtM households. We return to this point in section VII.

households can be wealthy HtM or poor HtM either at the zero kink or at the credit limit.

Third, as we showed in earlier work (Kaplan and Violante 2014a), in the presence of income uncertainty a wealthy HtM prefers bearing the welfare loss from income fluctuations to holding the large balances of cash required for consumption smoothing. Saving in the liquid asset means forgoing the high return on the illiquid asset and the associated higher level of long-run consumption. This explanation is reminiscent of calculations made by Cochrane (1989), Krusell and Smith (1996), and Browning and Crossley (2001), who demonstrate that in several different contexts the utility loss from setting consumption equal to income, instead of fully optimizing, can be second order.

Fourth, in the model the illiquid asset is inaccessible in the intermediate period. In a more general environment where the illiquid asset can be accessed by paying a fixed transaction cost, the household may decide to deposit an unexpected positive windfall into the illiquid account, or to smooth a negative shock by withdrawing from the illiquid account. This behavior could potentially alter the model's implications for the marginal propensity to consume of wealthy HtM agents. In Kaplan and Violante (2014a), we show that this is the case only if the shock is large relative to the transaction cost. We return to this point in section VII.

Finally, in our two-period model, we have abstracted from discounting, but it is easy to see that with geometric discounting between periods, all the qualitative conclusions remain intact. Hyperbolic discounting introduces an additional reason to save in illiquid assets, since illiquidity protects quasi-hyperbolic households from future consumption splurges (see Angeletos and others 2001; Laibson, Repetto, and Tobacman 2003), and therefore makes it even easier to generate wealthy HtM behavior.

## II. Identifying Hand-to-Mouth Households in the Data

For both types of HtM household discussed in section I—wealthy and poor—there are two kinks in the intertemporal budget constraint where marginal propensity to consume out of small income changes can be large: at zero liquid assets and at the unsecured credit limit.<sup>5</sup> According to the theory, a household is HtM at the zero kink in period  $t$  if it consumes all its

5. The unsecured credit limit is always a hard constraint. The zero liquid asset position is a hard constraint for the subset of households that do not have access to credit, and a kink for virtually all others, since the interest rates on credit cards and other noncollateralized loans are typically much larger than the return on liquid assets.

cash-on-hand for the period, and carries zero liquid wealth between  $t$  and  $t + 1$ . Similarly, a household is HtM at the credit limit if, at the end of period  $t$ , it has borrowed up to the limit.

Given the theoretical definition of HtM status, ideally we would observe balances of liquid wealth at the end of the pay period—the period that starts at income receipt and ends just before the next income receipt. Unfortunately, surveys either report average balances over the period or report balances at a random point in time (the interview date). As a result, HtM status will be measured with error.

To illustrate this issue, consider a continuous-time generalization of the model in section I where income is paid discretely at the beginning of the period as liquid wealth, but consumption occurs continuously—and is constant—over the period. Given the timing mismatch between the discrete income payment and the continuous consumption expenditures, one would expect to observe positive (or above-credit-limit) balances of liquid wealth, even for the HtM households: this makes their identification especially challenging. In online appendix B, we lay out this enriched version of the model.

We now describe our identification strategy—which builds upon one we used in a separate paper (Kaplan and Violante 2014a)—starting with the case where liquid balances observed from the survey are averages over the period.

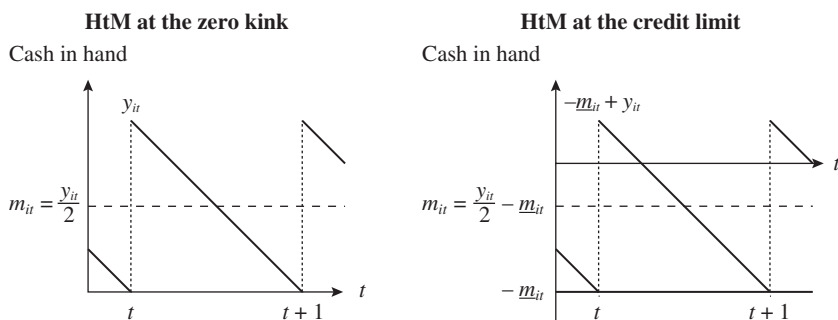
### *II.A. Average Balances*

Let  $y_{it}$  denote the income of household  $i$  in pay period  $t$ , let  $a_{it}$  denote holdings of illiquid wealth, and let  $m_{it}$  denote average balances of liquid wealth over the pay period.

The left-hand panel of figure 1 depicts the dynamics of income and average cash-on-hand  $m_{it}$  over a pay period for an HtM household that starts and ends the period at the zero kink. Its liquid balances peak at  $y_{it}$ , when income is paid into the liquid account at the beginning of the pay period, and are depleted constantly until they reach zero at  $t + 1$ . Average balances over the period are equal to one-half income.

A conservative criterion to identify HtM agents on the zero kink in the data is therefore to count those survey households whose average liquid wealth balances are positive (to capture the fact they are not borrowing), but are equal to or less than half their earnings per pay period, where “half” is due to the assumption that resources are consumed at a constant rate. Specifically, a household is poor HtM at the zero kink if

$$(8) \quad a_{it} \leq 0, \quad \text{and} \quad 0 \leq m_{it} \leq \frac{y_{it}}{2}$$

**Figure 1.** Illustration of Two Cases of Hand-to-Mouth (HtM) Behavior

Source: Authors.

and a household is wealthy HtM if

$$(9) \quad a_{it} > 0, \quad \text{and} \quad 0 \leq m_{it} \leq \frac{y_{it}}{2}.$$

The case  $a_{it} < 0$  is very rare in survey data. It occurs when housing equity is negative because a decline in house prices has pushed the market value of the house below the residual value of the mortgage. We include these households among the poor HtM because, even though they own illiquid assets, they effectively have no means of using them to smooth consumption and, as such, these households are more similar to the poor HtM.

This estimator of the number of HtM households provides a lower bound because, although all non-HtM households would always hold average liquid balances above half their earnings, some HtM households may also hold, on average, liquid balances above half their earnings. For example, a household that starts the period with positive liquid savings, in addition to its earnings, and ends the period with zero liquid savings is HtM, but its average liquid balance is above half its earnings, and so it would not be counted as HtM by this criterion. (Online appendix B makes this point formally.)

Next, consider an HtM household at the credit limit  $-m_{it} < 0$ . This is a household that consumes all its cash-on-hand for the period, as well as all its available credit. For consistency with the strategy above, we propose to count a household as poor HtM at the credit limit if

$$(10) \quad a_{it} \leq 0, \quad m_{it} \leq 0, \quad \text{and} \quad m_{it} \leq \frac{y_{it}}{2} - \underline{m}_{it},$$

and to count it as wealthy HtM at the credit limit if

$$(11) \quad a_{it} > 0, \quad m_{it} \leq 0, \quad \text{and} \quad m_{it} \leq \frac{y_{it}}{2} - \underline{m}_{it}.$$

The right-hand panel of figure 1 depicts the dynamics of income and average cash-on-hand  $m_{it}$  over a pay period for an HtM household that starts and ends the period at the credit limit. It is easy to see that this criterion is also conservative: a household that starts the period at  $t$  with liquid wealth above its credit limit and ends the period at  $t + 1$  having exhausted all its borrowing capacity would carry an average balance above the limit, and would therefore escape our criterion based on equations 10 and 11.

### *II.B. Balances at a Point in Time*

Some surveys report balances of liquid wealth at the interview date, which can be thought of as a random point during the pay period. Is it still true in this case that our estimator, based on the criteria in equations 8 through 11, provides a lower bound on the fraction of HtM households? In online appendix B we show that we would always miss some truly HtM households. However, we might mistake a non-HtM household for an HtM household if its end-of-period liquid balances are less than one-half of its income away from zero or from the credit limit if it is borrowing. For a biweekly pay period, this means that the only problematic households are those with one week or less of income in excess of their kink—households which, for practical purposes, one may want to identify as HtM anyway.

**CONSUMPTION COMMITMENTS** Recent literature has emphasized the existence of precommitted consumption expenditures—expenditures that a household is committed to incur every pay period, unless it pays a transaction cost (either monetary or in terms of time) to modify its previous commitments (see, for example, Chetty and Szeidl 2007; Stephen Shore and Todd Sinai [2010]). These expenditures include rent, mortgage or other loan payments, utility bills, fees for school, gym, or clubs, and alimony. The key feature of committed expenditures is that they are bulk expenditures incurred at a point in time that discretely deplete a household's balance of liquid wealth.

How does the presence of such expenditures affect our identification strategy? Let  $\bar{c}_{it}$  be the amount of committed expenditures for household  $i$  at date  $t$ . If  $\bar{c}_{it}$  is incurred at the beginning of a pay period, the criterion to identify an HtM household (say, at the zero kink) should be amended as

$m_{it} \leq (y_{it} - \bar{c}_{it})/2$ , while if it is incurred at the end of the period the criterion should be  $m_{it} - \bar{c}_{it} \leq y_{it}/2$ . In the first case, our baseline measurement overestimates HtM status, and in the second case it underestimates it. Instead, if committed expenditures are incurred smoothly over the period or are paid in the middle of the pay period, then the criterion should be,  $m_{it} - \bar{c}_{it}/2 \leq (y_{it} - \bar{c}_{it})/2$  which is the same as our baseline measurement. We verify the robustness of our estimates with respect to those consumption commitments that we can measure in our survey data by using these alternative assumptions about the timing of expenditures.

**DEFINITION OF HTM IN TERMS OF NET WORTH** For comparison with theories of HtM behavior based on net worth, we also compute the fraction of HtM agents in terms of net worth. Let  $n_{it} = a_{it} + m_{it}$  be the net worth of agent  $i$  in period  $t$ . Then, a household is HtM in net worth (net-worth HtM) if

$$(12) \quad 0 \leq n_{it} \leq \frac{y_{it}}{2} \quad \text{or,} \quad n_{it} \leq 0 \quad \text{and} \quad n_{it} \leq \frac{y_{it}}{2} - \underline{m}_{it}.$$

### *II.C. Direct Survey Questions*

Finally, whenever the data allow, we also use direct survey questions as alternate estimates of the fraction of HtM households. These questions typically ask whether expenditures over the last month have exceeded income, abstracting from purchases of large durable goods such as housing or cars, and whether the household usually spends more than its income. Counts of HtM households derived from these questions provide a useful check on the reliability of our identification strategy based on reported liquid wealth and income.

## **III. Survey Data on Household Portfolios**

The eight countries included in our study are the United States, Canada, Australia, the United Kingdom, and the four largest economies in the euro area: Germany, France, Italy, and Spain. Data for the first four countries come from their own separate surveys, the U.S. Survey of Consumer Finances (SCF), the Canadian Survey of Financial Security (SFS), the Household, Income and Labour Dynamics in Australia (HILDA) survey, and the United Kingdom Wealth and Assets Survey (WAS). Data for the euro area countries come from the Household Finance and Consumption Survey (HFCS), a joint project administered by all of the central banks of the Eurosystem. Online appendix C contains a detailed description of all these cross-sectional surveys.

In order to categorize a household as wealthy HtM, poor HtM, or non-HtM, we need information on its labor income and on the amounts of assets and liabilities held in various categories of its balance sheet. In the rest of this section, we discuss sample selection and comparability across surveys. Next, we present some descriptive statistics on the asset and liability distribution across countries.

### *III.A. Sample Selection and Data Comparability*

Each individual survey is tailored to its own country and, as such, the questions asked and the definitions of particular asset classes vary across surveys. Our main goal is to be as consistent as possible in selecting the sample, and in defining income, liquid, and illiquid wealth across surveys.

**SAMPLE SELECTION** In all surveys, we restrict our analysis to households in which the head is between 22 and 79 years of age, and we drop households only if their income is negative or if all of their income originates from self-employment.<sup>6</sup> Table 1 summarizes the survey years we use for each country, the sample selection, and the final sample sizes. Since all these surveys oversample the rich, we always use weights to construct sample statistics.

**INCOME** In choosing our definition of income, we try to include all labor income plus any government transfers that are regular inflows of liquid wealth. We exclude interest, dividend, and other capital income because these forms of income are realized more infrequently. For the United States, we define income (from the U.S. SCF) as gross wages and salaries, self-employment income, regular private transfers such as child support and alimony, public transfers such as unemployment benefits, food stamps, and Social Security Income (SSI), and regular income from other sources excluding investment income. For Canada, we define income (from the SFS) as after-tax total income, and there is no distinction between labor, capital, and self-employment income. For Australia, income (from the HILDA survey) is wages and salaries, self-employment income, regular private transfers such as child support and alimony, and public benefits such as the Australian Government Parenting Payment. For the United Kingdom, we define income (from the WAS survey) as net employee earnings, net self-employment income, and any public benefits such as the Jobseeker's Allowance and Maternity Allowance. For Germany, France, Italy, and Spain, we define

6. The only exception to our age range was for the U.K. WAS; since it provides ages in 5-year age bins, we include households with heads between 20 and 79 years of age.



**Table 1. Summary Information on the Survey Data Used, Sample Countries**

Survey years	United States		Canada <sup>a</sup>		Australia		United Kingdom		Germany		France		Italy		Spain	
	SCF 1989–2010		SFS 2005		HILDA 2010		WAS 2008–10		HFCs 2008–10		HFCs 2008–10		HFCs 2008–10		HFCs 2008–10	
Initial sample size	35,513		5,267		7,317		18,510		3,565		15,006		7,951		6,197	
<i>Exclusions</i>																
Not age 22–79	2,098		373		782		1,655		246		1,428		846		559	
Negative income	9		10		0		0		0		0		0		0	
All income from self-employment	4,334		—		202		334		228		890		721		658	
Final sample size	29,072		4,884		6,333		18,176		3,091		12,688		6,384		4,980	

Source: Data from national and euro area survey series. See text for full description.

a. Self-employment income is not provided in the SFS for Canada.

income (from the HFCS) as gross income from wages, salaries, and self-employment, unemployment benefits, regular private transfers such as child support and alimony, and regular public transfers.<sup>7</sup>

The main discrepancy in income measurement across surveys is that income in Canada is reported after taxes, whereas all other countries survey gross income before taxes. For most households, except the self-employed, taxes are withheld at the source, hence the amount paid into the liquid account—and available for spending—is net of taxes. Thus, using income before taxes somewhat overstates the fraction of HtM households by inflating the liquid wealth threshold. Whenever possible, we verify the robustness of our results to an adjustment for the individual tax liability.

**LIQUID WEALTH** Our definition of liquid wealth differs slightly across the surveys, depending on the specific categories of wealth that are available. In the U.S. SCF, our definition of liquid assets consists of checking, saving, money market, and call accounts as well as directly held mutual funds, stocks, corporate bonds, and government bonds. Liquid assets in the Canadian SFS are deposits in financial institutions as well as holdings in mutual funds, other investment funds, and stocks and bonds. In the Australian HILDA, liquid assets include balances in bank accounts, equity investments, and cash investments (bonds). In the U.K. WAS, liquid assets include bank accounts, individual savings accounts (ISAs), and holdings of shares, corporate bonds, and government bonds.<sup>8</sup> For the euro area HFCS, liquid assets are cash, sight (also called current, draft, or checking) accounts, mutual fund holdings, shares in publicly traded companies, and corporate or government bond holdings.

The main shortcoming in the definition of liquid wealth is the absence of information on cash holdings. To address this problem, we resort to an

7. The reference period for the income questions differs between surveys. For income variables in the SCF, the survey asks for annual income in the previous year. For example, the 2010 SCF uses 2009 as its reference period for income. The income reference period differs by country in the HFCS; France and Germany both use 2009 as a reference period, Spain uses 2007, and Italy uses 2010. Wave Two of the WAS (2008–10) asks questions regarding the “usual” amounts for monthly income and benefits. The 2005 SFS uses 2004 as its reference period and gives its respondents the option of skipping the income questions and using linked data from the 2004 tax return. Wave Ten of the HILDA uses the 2009–10 financial year, which runs from July 1, 2009, to June 30, 2010, for its reference period for income.

8. ISAs are accounts designed for the purpose of saving with a favorable tax status. A broad range of asset categories, including cash, can be held in ISAs. There are no restrictions on how much and when funds can be withdrawn.

imputation procedure based on data from the 2010 Survey of Consumer Payment Choice, administered by the Federal Reserve Bank of Boston (see Kevin Foster, Scott Schuh, and Hanbing Zhang 2013). We compute the ratio of average cash holdings measured in that survey to the median value of checking, saving, money market, and call accounts from the 2010 U.S. SCF. We then inflate the value of each household's checking, saving, money market, and call accounts by this ratio in all surveys.<sup>9</sup>

We define liquid debt in the U.S. SCF as the sum of all credit card balances that accrue interest, after the most recent payment. Liquid debt in the SFS is credit card and installment debt. Liquid debt in the Australian HILDA is credit card debt. In the U.K. WAS, liquid debt is credit card debt, plus any balances on store cards, hire purchases, and mail orders. In the euro area HFCS, liquid debts are considered to be the balance on credit cards after the most recent payment that accrue interest, together with any balances on credit lines or bank overdrafts that also accrue interest.

The measure of liquid wealth that we use to compute HtM status is net liquid wealth, or liquid assets, minus liquid debt. We also examine liquid wealth by comparing our baseline results both with results from a narrower definition that excludes directly held mutual funds, stocks, and bonds from liquid assets and with results from a broader definition, which includes outstanding debt in home-equity lines of credit. Considering alternative distinctions between liquid and illiquid wealth affects the split between poor and wealthy HtM, but does not affect the total number of HtM households.

**ILLIQUID WEALTH** Net illiquid wealth in the U.S. SCF includes the value of housing, residential and nonresidential real estate net of mortgages and home equity loans, private retirement accounts (such as 401(k)s, IRAs, thrift accounts, and future pensions), cash value of life insurance policies, certificates of deposit, and saving bonds. Net illiquid wealth in the Canadian SFS is the value of the principal residence and other real estate investment less mortgages on the properties and lines of credit that use property as collateral. It also includes retirement savings such as Registered Retirement Savings Plans, Registered Retirement Income Funds, employer pension plans, and other retirement funds. In the Australian HILDA, net illiquid wealth is net equity in home and other real estate properties plus life insurance

9. Average cash holdings, excluding large-value holdings in 2010, was \$138. Median checking, saving, money market, and call accounts in the 2010 SCF was \$2,500, making the ratio about 5.5 percent. In the HFCS, information on cash holdings is available for Spain from a noncore module. We check the median ratio of cash to sight accounts and find it to be about 5 percent in Spain.

policies and superannuation (government-supported, compulsory private retirement funds).<sup>10</sup> In the U.K. WAS, net illiquid wealth includes the value of the main residence, other houses, and land net of mortgages and land debt, plus occupational and personal pensions, insurance products, and National Savings products. The definition of net illiquid wealth in the euro area HFCS is the value of the household's main residence and other properties net of mortgages and unsecured loans specifically taken out to purchase the home, plus occupational and voluntary pension plans, cash value of life insurance policies, certificates of deposit, and saving bonds.

We also explore broader definitions of illiquid wealth that include the value of businesses for the self-employed, the resale value of vehicles net of the loans taken out to purchase them, and other nonfinancial wealth not included in our baseline, such as antiques, artwork, jewels, and gold.<sup>11</sup>

**REFERENCE PERIOD** The reference period for the liquid and illiquid wealth questions varies across surveys. In the U.S. SCF, for most assets it is the interview date; for some assets, such as checking and saving accounts, when a respondent is unsure about balances the interview can prompt for an average balance over the month. The Canadian SFS asks for information on assets and debts for "a time as close as possible to the date of the interview." Both the U.K. WAS and Australian HILDA ask for current balances or values of assets and liabilities. In the HCFS, France, Germany, and Spain use the interview date, and Italy uses December 31, 2010.

### *III.B. Descriptive Statistics*

Table 2 reports some basic descriptive statistics on household income, liquid and illiquid wealth holdings, and portfolio composition, for each country in the sample.

In all countries, the typical household portfolio structure is rather simple. It comprises a small amount of liquid wealth in the form of bank accounts, some housing equity, and a private retirement account. In particular, the median holdings of other financial assets such as directly held stocks, bonds, mutual funds, and life insurance are zero everywhere. This is a well

10. Superannuation has some features of private retirement accounts, such as 401(k) accounts in the United States, which we include in illiquid wealth, and some features of public pensions (the compulsory nature of a minimum contribution), which we exclude from illiquid wealth. Because of this ambiguity, we also offer a sensitivity analysis in which we exclude superannuation wealth from illiquid assets.

11. In our robustness checks with respect to business equity, we include all households whose income is entirely from self-employment as long as they had non-negative income from their business.

established fact borne out by empirical studies of household portfolios (see Guiso, Halassios, and Jappelli, 2002).

However, there are some interesting cross-country differences in household portfolios. First, the ratio of median net worth to median income varies widely across countries: from just above 1:1 in Germany and the United States to over 6:1 in the United Kingdom, Italy, and Spain. With respect to net liquid wealth, consumer credit appears much less frequently in the euro area: less than 10 percent of households have credit card debt in France, Italy, and Spain, compared to 30 to 40 percent in the Anglo-Saxon countries. Figure 2, which plots the distribution of net liquid wealth to monthly income for the eight countries, reinforces this observation.

Housing equity forms the majority of illiquid wealth for households in every country with the exception of Germany, where median housing wealth is zero, since only 48 percent of the population are homeowners. This homeownership rate is at least 10 percentage points less than in the other seven countries (see also Eymann and Börsch-Supan 2002). The median value of housing equity relative to median annual income is especially remarkable in Italy and Spain, where it exceeds 6:1.

There are also large differences in the fraction of households with positive private retirement wealth: in the Anglo-Saxon countries, at least half of all households hold a personal retirement account, whereas in France, Italy, and Spain less than one-tenth do. Surely, a big part of the explanation is in the generosity of the public pension system in these countries: according to the OECD, replacement rates for the median earner are between 60 and 70 percent in these countries, compared to 40 percent in the United Kingdom and the United States (see OECD 2013). The size of private retirement wealth in Australia and the United Kingdom is astonishing. In Australia, this is partly due to the “superannuation” regulations that require all employers to generously contribute to tax-deferred retirement accounts on behalf of their employees.<sup>12</sup> In the United Kingdom, the Pension Schemes Act of 1993 created tax-free employer-sponsored (defined benefits) occupational pensions and (defined contributions) personal pensions, while the Pension Act of 2008 established that workers must choose to opt out of an employer’s occupational pension plan, rather than opt in (see Banks and Tanner 2002 for more details of the options available for retirement savings in the United Kingdom).

Finally, the proportion of households with life insurance in their portfolio is much higher in the euro area than in the Anglo-Saxon countries.

12. In the survey years, the compulsory minimum employer contribution rate was 9 percent of the employee salary.

**Table 2. Household Income, Liquid and Illiquid Wealth Holdings, and Portfolio Composition, Sample Countries<sup>a</sup>**

	United States <sup>b</sup>		Canada <sup>c</sup>		Australia		United Kingdom	
	Median	Fraction positive	Median	Fraction positive	Median	Fraction positive	Median	Fraction positive
Income (age 22–59)	47,040	0.984	49,905	1.000	79,555	0.993	29,340	0.979
Net worth	56,721	0.883	112,418	0.877	380,889	0.984	187,157	0.880
Net liquid wealth	1,714	0.750	2,643	0.716	12,139	0.880	2,111	0.632
Cash, checking, saving, MM accounts	2,640	0.923	2,873	0.864	8,709	0.978	2,639	0.766
Directly held stocks	0	0.142	0	0.109	0	0.351	0	0.160
Directly held bonds	0	0.014	0	0.106	0	0.015	0	0.154
Revolving credit card debt	0	0.382	0	0.412	0	0.296	0	0.405
Net illiquid wealth	52,000	0.761	100,713	0.752	347,500	0.939	17,4999	0.843
Housing net of mortgages	29,000	0.629	64,238	0.648	250,000	0.714	81,400	0.677
Retirement accounts	1,508	0.526	871	0.518	61,000	0.863	58,560	0.766
Life insurance	0	0.186	0	0.033	0	0.064	0	0.110

	Germany		France		Italy		Spain	
	Median	Fraction positive	Median	Fraction positive	Median	Fraction positive	Median	Fraction positive
Income (age 22–59)	35,444	0.994	31,518	0.999	26,116	0.987	26,961	0.991
Net worth	46,798	0.949	108,976	0.966	165,420	0.919	178,925	0.967
Net liquid wealth	1,319	0.853	1,453	0.925	5,226	0.769	2,685	0.890
Cash, checking, saving, MM accounts	1,154	0.876	1,255	0.953	4,181	0.769	2,261	0.908
Directly held stocks	0	0.110	0	0.151	0	0.043	0	0.106
Directly held bonds	0	0.050	0	0.015	0	0.146	0	0.014
Revolving credit card debt	0	0.225	0	0.076	0	0.049	0	0.086
Net illiquid wealth	39,306	0.876	104,214	0.922	148,524	0.803	171,161	0.885
Housing net of mortgages	0	0.476	86,372	0.607	148,524	0.716	162,491	0.847
Retirement accounts	0	0.245	0	0.039	0	0.088	0	0.037
Life insurance	0	0.493	0	0.378	0	0.193	0	0.245

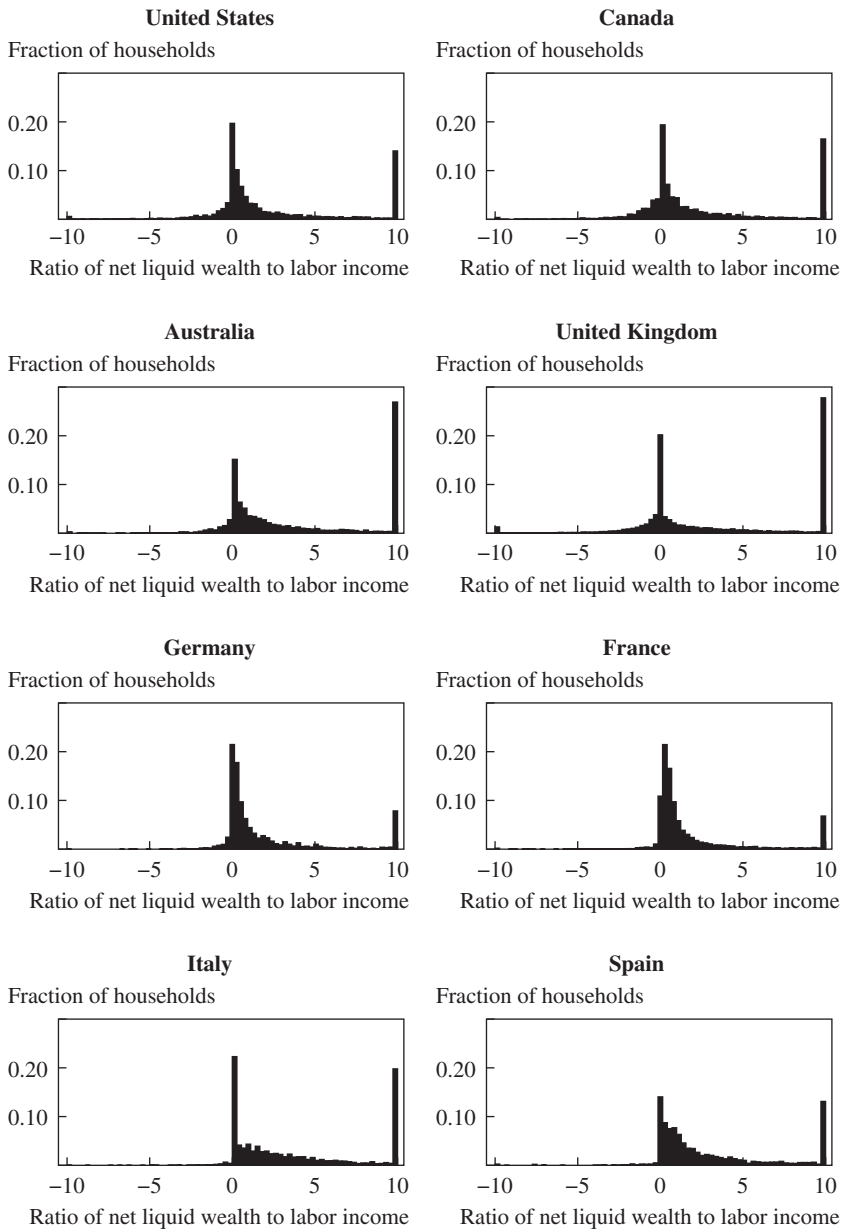
Source: Data from national and euro area survey series. See text for full description.

a. All figures are in local currency units. From the Federal Reserve Board's G.5 release, the average exchange rates in the survey years are 1.2 CA\$, 1.1 AU\$, 0.6 British pounds, and 0.7 euros per U.S. dollar.

b. Data for the United States are from the 2010 survey only.

c. Data for Canada are adjusted to 2010 Canadian dollars using the Canadian CPI.

**Figure 2.** Distribution of Liquid Wealth to Monthly Income Ratios, Sample Countries<sup>a</sup>



Source: Data from national and euro area survey series. See text for full description of the data.

a. Data for the United States are from the 2010 SCF; for Canada from the 2005 SFS; for Australia from the 2010 HILDA; for the United Kingdom from the 2010 WAS; and for euro area countries from the 2008–10 HFCS. See text for more details.



We conjecture that solid intergenerational family ties and a stronger precautionary savings motive linked to the lower rate of female participation in the workforce may account for these differences.

## IV. United States

Next we report the main findings for the United States, using data from the 1989–2010 waves of the U.S. SCF. We begin by estimating the fraction of HtM households and assessing the robustness of our estimates to a variety of aspects of the definition adopted in section II. We then analyze the key demographic characteristics of non-HtM, poor HtM, and wealthy HtM households, and we examine their portfolio composition in more detail.

### IV.A. *The Share of HtM Households*

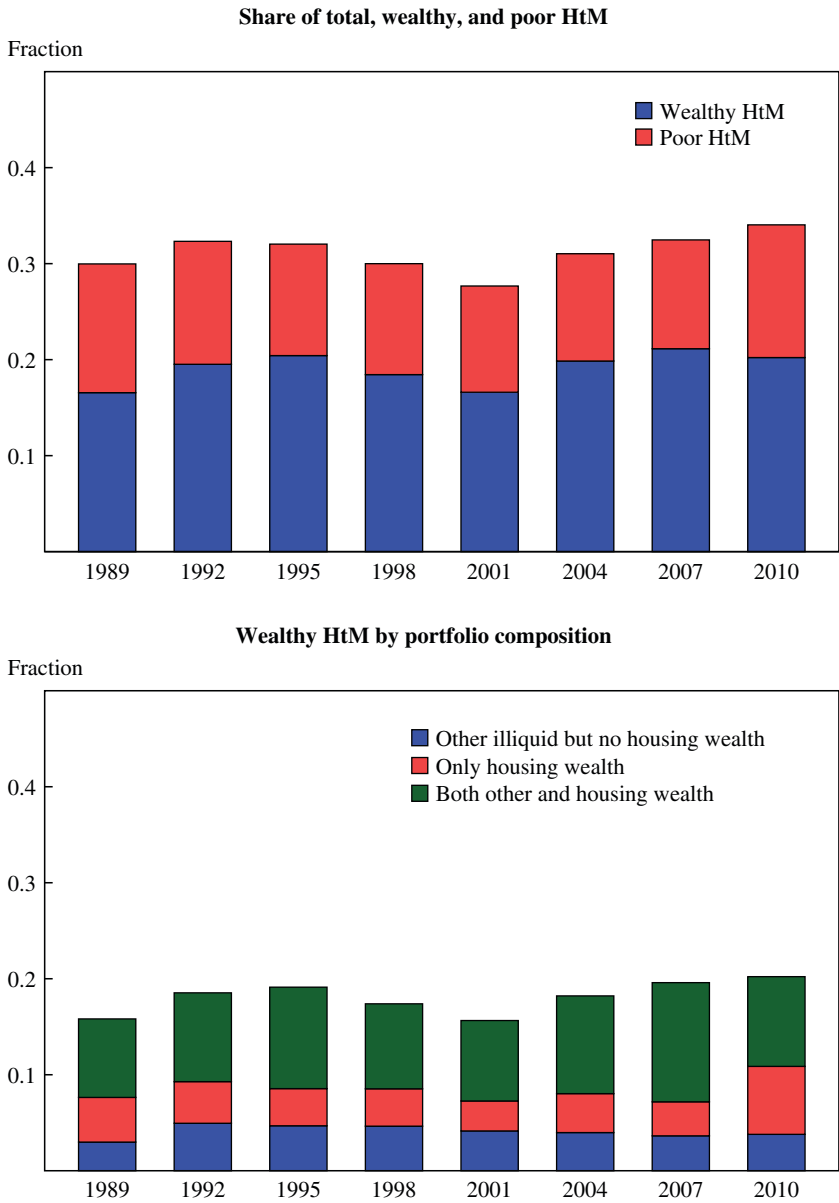
Our definition of HtM status is based on equations 8 through 12. Since the U.S. SCF does not report individual data on the frequency of pay, we need to make an assumption that applies to all households. Consumer Expenditure Survey data from 1990 to 2010 reveal that 32 percent of respondents are paid weekly, 52 percent of respondents are paid biweekly, and the rest are paid monthly or at lower frequencies.<sup>13</sup> Based on these findings, in the benchmark analysis we set the pay frequency to two weeks. In the benchmark, we also set the household credit limit to one month of income. The U.S. SCF asks respondents to report their credit limit, but most of the other surveys do not, so for comparability we choose a common limit.<sup>14</sup>

The lower panel of figure 3 plots the fraction of HtM households in the U.S. population over the period 1989–2010 and shows the split between wealthy and poor HtM. Our estimates indicate that, on average, 31 percent of U.S. households are HtM over this period. Of these, roughly one-third are poor HtM and two-thirds are wealthy HtM. This is our paper's first main result: the vast majority of hand-to-mouth households own illiquid assets. Looking at changes over time across the two decades covered by our data, the fraction of HtM households remains fairly stable and the split between poor and wealthy does not change significantly. The first line of table 3

13. We thank Yiwei Zhang for providing us with these tabulations based on Zhang (2014).

14. The choice of one month of income for the benchmark is consistent with the SCF self-reported limits. When we set the limit for households without credit cards to zero, the median self-reported limit to income ratio is 0.54 in 1989. It grows steadily to 1.7 in 2007 and then drops to 1.2 in 2010. This evolution of credit limits is even more remarkable when conditioning only on credit card holders (around 70 percent of the population): the median limit to income ratio rises from 1.2 in 1989 to 3.4 in 2007, and then drops to 2.8 in 2010.

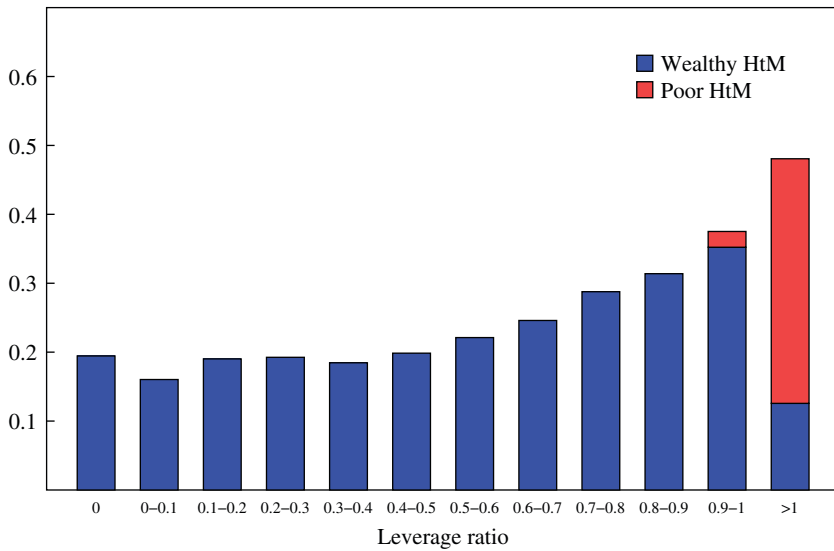
**Figure 3.** Fraction of HtM Households, United States, 1989–2010



Source: Authors' calculations, based on the U.S. SCF. See text for full description.

**Figure 4.** Share of HtM Households among Homeowners by Leverage Ratio, United States, SCF, 1989–2010<sup>a</sup>

Share of HtM among homeowners



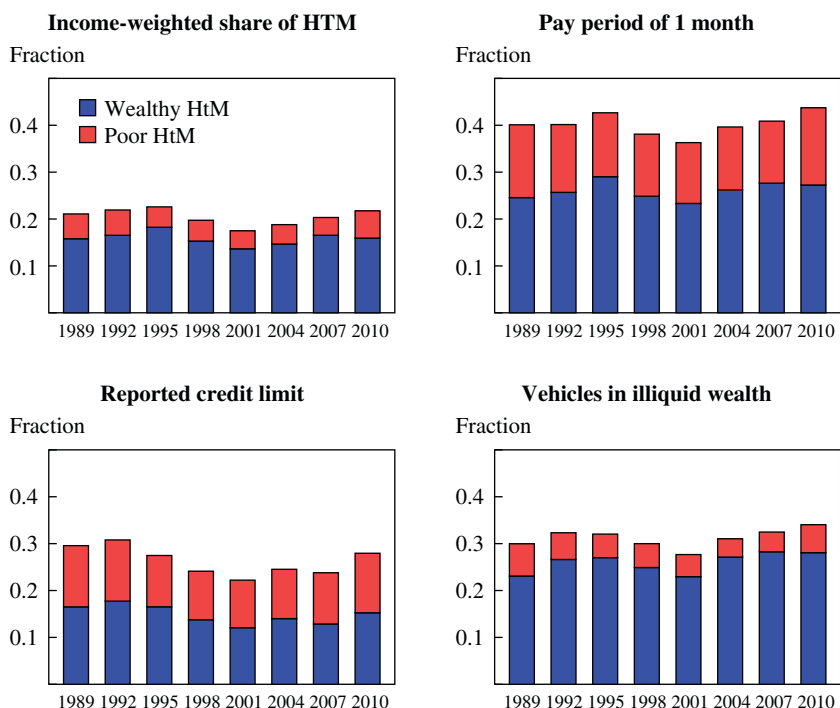
Source: Authors' calculations, based on the U.S. SCF. See text for full description.

a. Intervals include observations at the upper boundary point, but not at the lower boundary point.

reports that the share of U.S. households that are HtM in terms of net worth is less than 14 percent. Thus, looking at wealth distribution through the eyes of net worth alone misses more than half of the HtM households in the United States.<sup>15</sup>

The lower panel of figure 3 explores the illiquid asset portfolio of the wealthy HtM households by plotting the share of wealthy HtM households that own housing, nonhousing illiquid wealth, or both. About half of wealthy HtM households have both, about a third have positive housing but no nonhousing illiquid wealth, and a sixth have nonhousing illiquid wealth but no housing wealth. A deeper look into the portfolio of HtM households reveals that, if we condition on homeownership, the leverage ratio is a strong predictor of HtM status. Figure 4 shows that the fraction of HtM households doubles from 20 to 40 percent as the leverage ratio rises

15. Net-worth HtM are always more numerous than the poor HtM because there are some households with liquid wealth above the threshold, who are therefore not HtM, but with enough negative illiquid wealth (that is, negative home equity) to push their net worth below the threshold.

**Figure 5.** Fraction of HtM Households, United States, Alternate Definitions, 1989–2010

Source: Authors' calculations, based on the U.S. SCF. See text for full description.

toward one, as regular mortgage payments absorb a significant fraction of disposable income and leave households with little or no liquid savings.

**ROBUSTNESS** Figure 5 and Table 3 summarize our sensitivity analyses. In figure 5, which covers the United States, the upper-left panel plots the shares of poor and wealthy HtM households weighted by income. Not surprisingly, the weighted fraction of HtM households is smaller than its unweighted counterpart: HtM households represent roughly 20 percent of total U.S. income, since their income is below the U.S. average. When we weight by income, however, wealthy HtM households represent three-quarters of all HtM households. The upper-right panel of figure 5 plots HtM shares when the pay period is set to one month instead of two weeks: the fraction of HtM households increases by 9 percentage points and wealthy HtM households account for most of the difference with the baseline.

**Table 3. Robustness Results for Fraction HtM in Each HtM Category, United States, SCF, Pooled 1989–2010**

	<i>P-HtM</i> <sup>i</sup>	<i>W-HtM</i> <sup>i</sup>	<i>N-HtM</i> <sup>i</sup>	<i>HtM</i> <sup>i</sup>	<i>HtM-NW</i> <sup>i</sup>
Baseline	0.121	0.192	0.688	0.312	0.137
In past year, $c > y$	0.130	0.309	0.561	0.439	—
Usually, $c > y$	0.089	0.156	0.756	0.244	—
Financially fragile households <sup>a</sup>	0.173	0.331	0.497	0.503	0.209
Reported credit limit	0.114	0.147	0.738	0.262	0.126
1-year income credit limit	0.102	0.118	0.780	0.220	0.108
Weekly pay period	0.106	0.150	0.744	0.256	0.119
Monthly pay period	0.141	0.261	0.598	0.402	0.164
Higher illiquid wealth cutoff <sup>b</sup>	0.131	0.181	0.688	0.312	0.137
Retirement account as liquid for 60+ <sup>c</sup>	0.121	0.183	0.696	0.304	0.137
Businesses as illiquid assets <sup>d</sup>	0.114	0.193	0.693	0.307	0.129
Direct as illiquid assets <sup>e</sup>	0.120	0.217	0.663	0.337	0.137
Other valuables as illiquid assets	0.117	0.196	0.688	0.312	0.132
Excludes cc puzzle households	0.163	0.183	0.654	0.346	0.177
HELOCs as liquid debt	0.120	0.181	0.699	0.301	0.135
Usual income	0.119	0.198	0.683	0.317	0.137
Disposable income, reported <sup>f</sup>	0.121	0.188	0.691	0.309	0.137
Disposable income, single <sup>f</sup>	0.120	0.187	0.693	0.307	0.136
Committed consumption, beginning of period <sup>g</sup>	0.102	0.166	0.732	0.268	0.116
Committed consumption, end of period <sup>h</sup>	0.149	0.272	0.579	0.421	0.174

Source: Authors' calculations, based on U.S. SCF. See text for full description.

a. Includes those households within \$2,000 in liquid assets of their income threshold as HtM.

b. Requires households to have above \$1,000 in illiquid assets to be considered W-HtM.

c. Puts retirement accounts into liquid wealth for households above age 60.

d. Drops the self-employment income sample selection and adds business assets to illiquid wealth and self-employment income to income.

e. Classifies directly held mutual funds, stocks, corporate and government bonds as illiquid assets.

f. Subtracts federal income taxes estimated from NBER's TAXSIM from income. Disposable income (reported) assumes that each household files its actual marital status and number of children as dependents; disposable income (single) assumes that every household files as single with no dependents.

g. Assumes the household's committed consumption is incurred at the beginning of the period.

h. Assumes the household's committed consumption is incurred at the end of the period.

i. P-HtM = poor HtM; W-HtM = wealthy HtM; N-HtM = non-HtM; HtM-NW = HtM based on net worth.

Symmetrically, the fourth line of table 3 shows that, when the pay period is set to one week, the share of wealthy HtM households drops by 5 percentage points. In the lower-left panel of figure 5, we verify the robustness of our estimates with respect to the tightness of the credit limit. When we use the self-reported credit limit in the U.S. SCF, the fraction of HtM households drops by 5 percentage points, with a lower number of wealthy HtM households accounting for all of the drop. Finally, the lower-right panel shows that by including vehicles as illiquid wealth, we move roughly half of the poor HtM into the wealthy HtM group but, by construction, the total share of HtM households in the population is unchanged.

Table 3 contains a number of other sensitivity analyses. We begin with direct questions on HtM status. The U.S. SCF contains a combination of sequential questions aimed at assessing whether “over the past year, [household] spending exceeded, or was about the same as, income, and such expenditures included purchases of a home or automobile or spending for any investments.”<sup>16</sup> Based on this definition, the share of HtM households is around 44 percent. Wealthy HtM households account for two-thirds of the total, and fluctuations in this measure over time very closely follow those in the baseline definition of figure 5 (upper-left panel). The third row of table 3 also reports results for another sequence of direct questions in the U.S. SCF. The first question asks households, “Which of the following statements comes closest to describing your saving habits?” We label a household as HtM if it responds “Don’t save—usually spend more than (or as much as) income.” Roughly 24 percent of households are HtM according to this definition.

It is reassuring that our baseline estimate of HtM households sits in between the counts based on these two direct questions, since we interpret the first question as providing an upper bound and the second as providing a lower bound. Our baseline calculations refer to the current HtM status for a household. In the first set of direct questions, although households that spent more than their income over the past year because they dis-saved or borrowed are not truly HtM, they would still be classified as such based on the questions. Conversely, the second set of direct questions asks about the usual HtM status, and therefore those households that are, at the time of the survey, temporarily in an HtM status would answer the question negatively. The cross-sectional correlation between our indicator of HtM status and the one provided by these two questions is about 0.3 for each.

16. These questions (numbered X7510, X7509, and X7508) were included in the SCF survey starting from 1992.

Our estimates of HtM households are related to calculations of “financially fragile” households by Lusardi, Schneider, and Tufano (2011). Based on an ad-hoc survey, they document that a quarter of U.S. households report that they would certainly be unable to come up with \$2,000 in 30 days, and a similar fraction reports that they could probably not come up with the funds to deal with an ordinary financial shock of this size. These authors also emphasize that there are many solidly middle-class households in this last group. In line three of table 3, we compute the fraction of households that are less than \$2,000 away from the liquid wealth thresholds for being defined as HtM. We find that 50 percent of households are “financially fragile” according to this definition. Of these, 17 percent have no illiquid assets, but 33 percent own housing or retirement wealth (or both). The poor HtM could be mapped onto the ad-hoc survey respondents who would certainly not come up with this amount, and the wealthy HtM could be mapped onto those who would probably be unable to cope.

Overall, our estimates are in line with those of Lusardi, Schneider, and Tufano, but they also suggest a more nuanced interpretation. Households in the second group (who could “probably not come up the funds”) should have the means to deal with a shock of this size, for example by using their illiquid wealth as collateral for a loan. They may choose not to do so because the transaction costs involved would dominate the welfare gain from smoothing such a small shock, but for larger shocks they would choose to adjust and smooth consumption. We return to this shock-size asymmetry of behavior in section VII.<sup>17</sup>

The other robustness checks in table 3 are conducted with respect to the definition of illiquid wealth, debt, income, and the timing of consumption expenditures. Using a higher illiquid wealth threshold in the definition of wealthy HtM (\$1,000 instead of \$1) moves about 1 percentage point of households from the wealthy HtM category into that of poor HtM. Broadening the definition of illiquid wealth to include business equity, directly held stocks and bonds, or other valuables (such as artwork, antiques, and jewels) has small effects relative to the baseline.<sup>18</sup> Including all private retirement wealth as liquid wealth for households headed by persons age 60 or above reduces the share of wealthy HtM households by less than 1 percentage point.

17. Pence (2011) makes a similar point in her discussion of Lusardi, Schneider, and Tufano (2011).

18. When we include business equity, we also include in our sample all those households whose labor income comes entirely from self-employment. These households are excluded from the baseline sample.

Around one-quarter of U.S. households simultaneously have positive liquid assets above  $y/2$  and some revolving credit card debt.<sup>19</sup> One may worry that many of these households have net liquid wealth close to zero and they would therefore be counted as HtM, even though they have slack in both liquid wealth and credit. In table 3 we show that excluding this group does not affect our calculations much, because the distribution of HtM status within this group is not very different from the population distribution. Home equity lines of credit (HELOCs) were virtually nonexistent before the year 2000, but in the last decade they became a more common instrument to extract liquidity from housing.<sup>20</sup> Changing the definition of liquid debt by including used-up HELOCs—while simultaneously increasing the credit limit by the total available line of credit—decreases the fraction of HtM households, as expected, but by only 1 percentage point.

The U.S. SCF collects data on a household's normal, or usual, income as well as its actual income. This alternate definition of income has no effect on our calculations. Recall that our definition of income is gross income before taxes and tax credits. Through the National Bureau of Economic Research's TAXSIM data files, we have constructed, household by household, a measure of after-tax income.<sup>21</sup> Under this income measure, the total fraction of HtM households declines, but quantitatively this effect is very small. The reason is that, in the United States, the effective average tax rate is very small at the low end of the income distribution (around zero), mainly because of the Earned Income Tax Credit; even in the middle quintile it is only 10 percent.

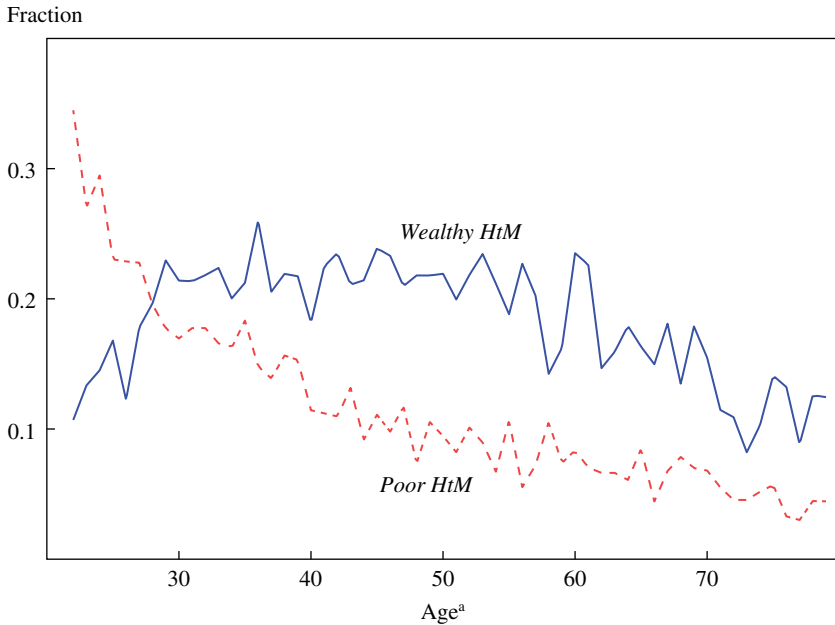
Finally, as explained in section II, accounting for committed expenditures has an ambiguous effect on the share of HtM agents, depending on whether the expenditures occur primarily at the beginning or at the end of the pay period. Table 3 shows that these two opposite timing assumptions bound the share of total HtM households between 27 and 42 percent.

19. In the household finance literature, this observation is called the credit card puzzle (Telyukova 2013).

20. The fraction of homeowners with HELOCs was 7.1 percent in 2001, 12.9 percent in 2007, and 10.7 percent in 2010. The average HELOC limit in 2001 was \$11,087, in 2007 it was \$18,984, and in 2010 it was \$19,070. The average percent of the HELOC used was 27.5 percent in 2001, 31.0 percent in 2007, and 31.6 percent in 2010.

21. The variables we used in TAXSIM are year, marital status, the number of children, and the breakdown of income into its parts (wages, UI benefits, and so on). We deducted federal taxes from gross income. We assumed each household files its actual marital status and claims all children living in the household as dependents. As an upper bound, we have also computed the case where they all file as single without dependents.



**Figure 6.** Age Profile of Fraction of HtM Households, United States, Pooled 1989–2010

Source: Authors' calculations, based on the U.S. SCF. See text for full description.

a. Age refers to that of the head of the household.

#### *IV.B. Demographics, Portfolio Composition, and Status Persistence*

**DEMOGRAPHICS** We now turn to the demographic characteristics of the three groups of HtM households. Figure 6 plots the share of the population that is wealthy HtM and poor HtM by age.<sup>22</sup> The bulk of poor HtM household behavior is observed in the early stages of the life cycle. The fraction of poor HtM households drops sharply until age 30, and keeps falling steadily over the life cycle until reaching roughly 5 percent in retirement. By contrast, the age profile of the fraction of wealthy HtM households is markedly hump-shaped: it peaks at around age 40, when over 20 percent of U.S. households are wealthy HtM, and it remains above 10 percent throughout the life cycle. Accordingly, the share of non-HtM individuals increases steadily from 50 percent at age 22 to 80 percent in retirement.

22. These plots are based on pooled data from all surveys and do not control for time or cohort effects. We verified that age profiles are similar in both cases, but they become more noisy, so we present the raw data.

The first three panels of figure 7 report some demographic characteristics of the three HtM groups by age.<sup>23</sup> Non-HtM households have on average one more year of education than wealthy HtM households, which, in turn, have one more year of education than poor HtM households. In terms of marital status, non-HtM and wealthy HtM households are indistinguishable, whereas poor HtM households are 30 percent less likely to be married. In contrast, poor HtM and wealthy HtM are both more likely to have children than are non-HtM households.

The middle-right panel of figure 7 shows that poor HtM households are income-poor, with median annual income around \$20,000 (in 2010 dollars) during the working years, while the non-HtM are high-income households whose median earnings are \$70,000 at their life-cycle peak. The most surprising finding is that the wealthy HtM look a lot like the non-HtM in their income path. The same conclusion holds for the incidence of unemployment and for the likelihood of receiving welfare benefits, which are both much lower for non-HtM and wealthy HtM households than for poor HtM households.

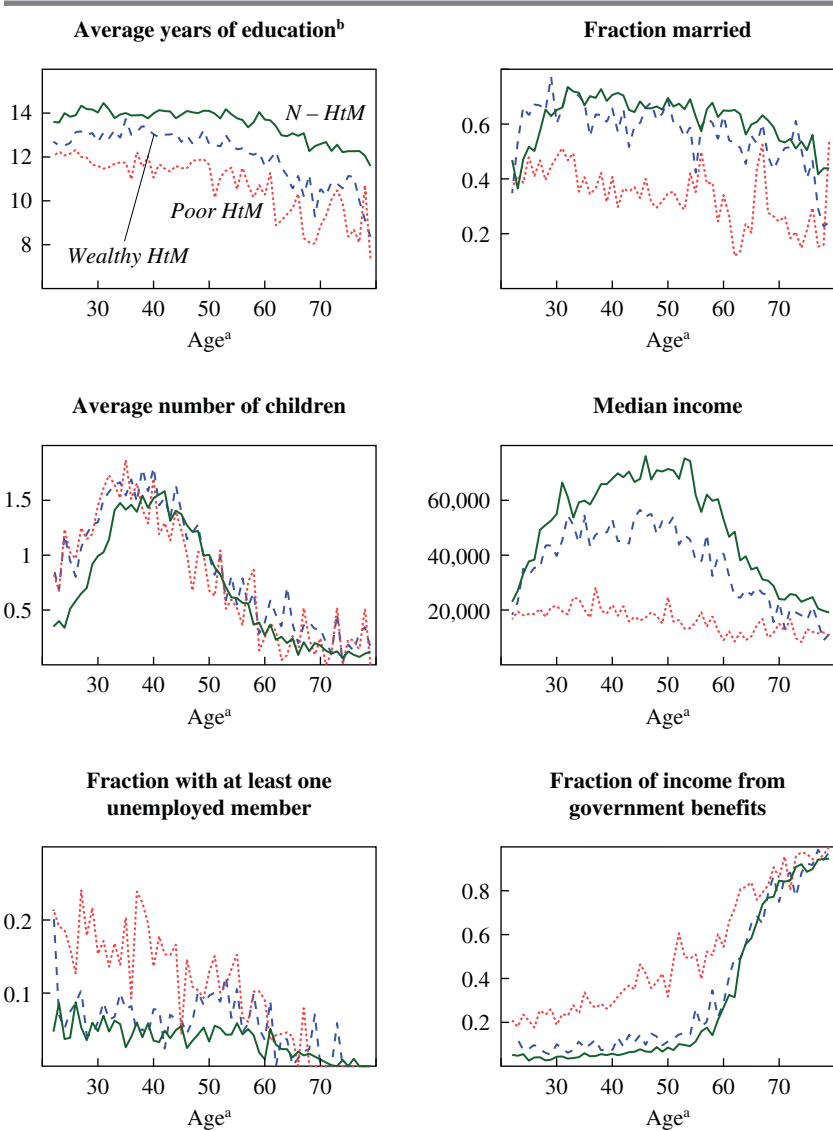
**PORTFOLIO COMPOSITION** Figure 8 digs deeper into the balance-sheet composition of the three groups of HtM households. The upper-left panel shows that median net liquid wealth holdings are zero at virtually every age for both the poor HtM and the wealthy HtM. Median net liquid wealth for non-HtM households grows steadily from about \$2,500 at age 25 until retirement, where it levels off at roughly \$15,000.<sup>24</sup> The upper-right panel reveals that the wealthy HtM households hold significant amounts of illiquid wealth: for example, median holdings at age 40 exceed \$50,000. Hence, wealthy HtM households are not just poor HtM households with small amounts of savings in less liquid assets. The two lower panels of figure 8 articulate this observation further, plotting the age profiles of the average fraction of illiquid wealth held in housing and retirement accounts for wealthy HtM and non-HtM households. The conclusion is striking: the lines are on top of each other, indicating that the portfolio allocation of these two groups is nearly identical.

**PERSISTENCE** How persistent is a household's HtM status? We answer this question by exploiting the 2007–09 panel component of the U.S. SCF. Table 4 reports the 2-year transition matrix across the three HtM statuses

23. To reduce the sensitivity to outliers, means are computed after trimming the overall top and bottom 0.1 percent of that statistic's distribution.

24. Recall, though, that the overall median net liquid wealth across the whole population is less than \$2,000 (table 2), so even among the non-HtM there are households with small amounts of liquid wealth.

**Figure 7. Age Profile of the HtM, United States, by Demographic Characteristics, Pooled 1989–2010**

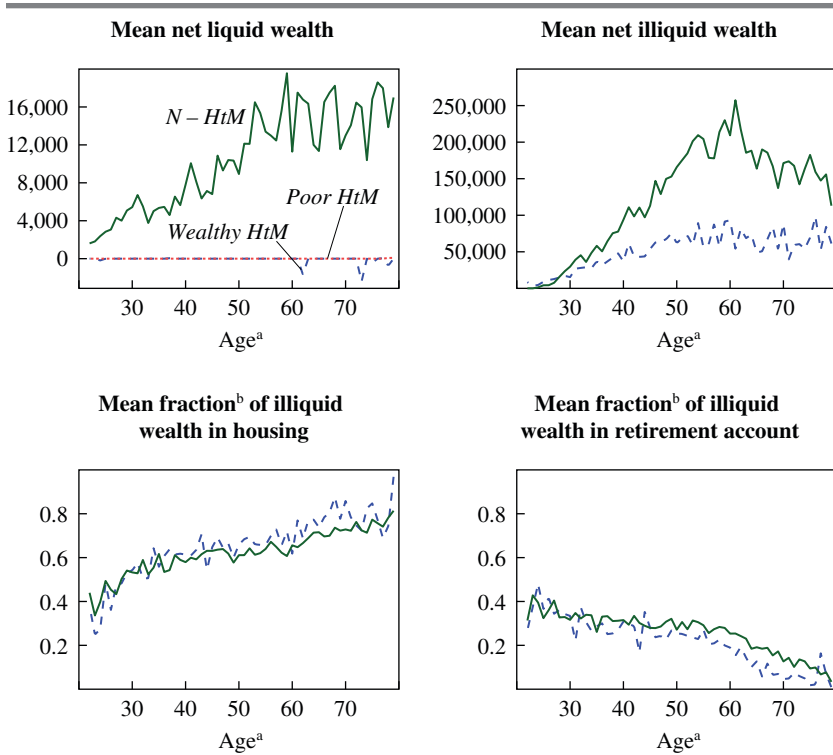


Source: Authors' calculations, based on the U.S. SCF. See text for full description.

a. Age refers to that of the head of the household.

b. Average years of education refer to that of the head of the household.

**Figure 8.** Age Profile of the Portfolio Composition of the HtM, United States, Pooled 1989–2010



Source: Authors' calculations, based on the United States SCF. See text for full description.

a. Age refers to that of the head of household.

b. To reduce the sensitivity to outliers, means are computed after trimming the overall top and bottom 0.1 percent of the statistic's distribution.

**Table 4.** Transition Matrix for the 2007–09 Panel of the SCF (United States)

07 → 09	P	W	N
P	0.548	0.127	0.326
W	0.101	0.455	0.444
N	0.055	0.129	0.816
Ergodic	0.126	0.191	0.683

Source: Authors' calculations, based on U.S. SCF. See text for full description.

Note: Fraction of households with the row HtM status in 2007 and the column HtM status in 2009. The last row reports the implied ergodic distribution.

for U.S. households. The diagonal elements of the matrix reveal that non-HtM status is by far the most persistent, and wealthy HtM status the most transient of the three. These transition probabilities imply that the expected length of HtM status is around 3.5 years for wealthy HtM households, 4.5 years for poor HtM households, and 11 years for the non-HtM.

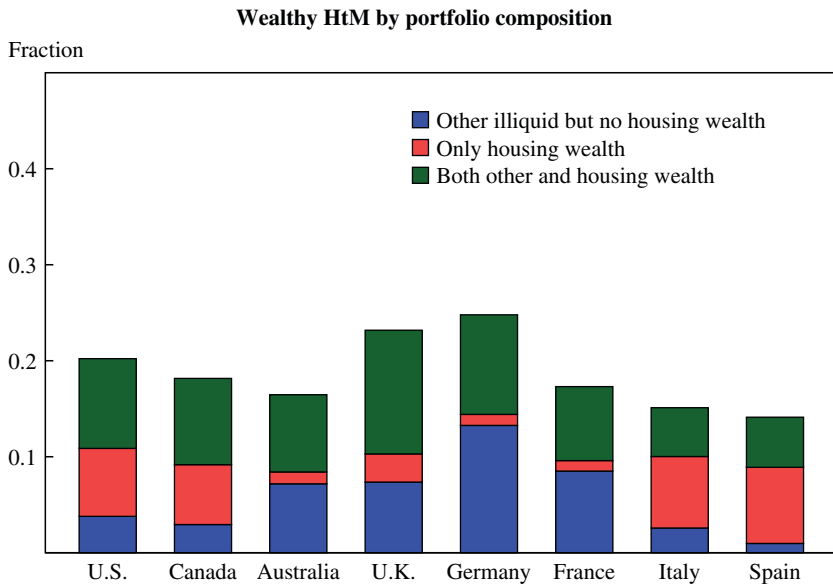
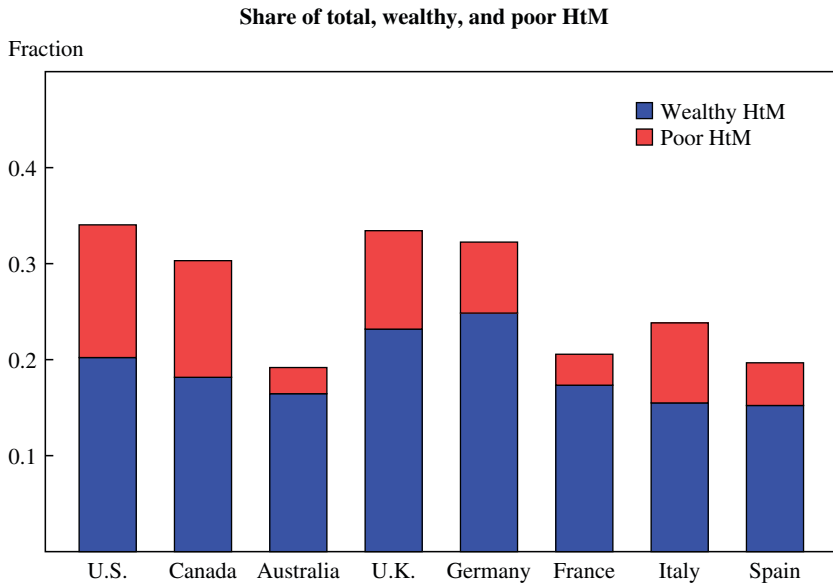
## V. Cross-Country Evidence

The previous section showed that around 30 percent of households in the United States are HtM, and that of these households one-third are poor HtM and two-thirds are wealthy HtM. In this section we use household portfolio data from seven other developed economies to assess whether the prevalence of wealthy HtM households is a common feature of the wealth distribution across countries and, if so, whether the demographic, income, and balance-sheet characteristics of wealthy HtM households in these countries are similar to those in the United States.

As discussed in section III, we focus our attention on three other Anglo-Saxon countries—Canada, Australia, and the United Kingdom—and the four largest euro area economies, Germany, France, Italy, and Spain. While data are available for more than one point in time for most of these countries, in order to keep the discussion manageable we focus on the most recent single cross-section in each country. For Australia and the European countries this is 2010, for the United Kingdom it is 2009, and for Canada it is 2005. For the sake of comparability, we use only the 2010 wave of the SCF for the United States.

Figure 9, upper panel, shows the fraction of poor and wealthy HtM households in each country. There is a striking similarity among the United States, Canada, and the United Kingdom in their overall fraction of HtM households as well as the breakdown between poor and wealthy HtM. These three countries have a large share of HtM households, exceeding 30 percent. Australia is an outlier among the Anglo-Saxon countries in two ways: first, its total fraction of HtM households is roughly half the fraction in the other three countries (the United States, the United Kingdom, and Canada); and second, 90 percent of its HtM households are wealthy. Among the euro area countries, France, Italy, and Spain have smaller shares of HtM households than the United States, the United Kingdom, and Canada—at around 20 percent—whereas in Germany this share is closer to 30 percent. For all eight countries, there are more wealthy than poor HtM households; even for the euro area countries, the fraction of wealthy among the HtM households exceeds two-thirds. Thus, a widespread feature of household portfolios

**Figure 9.** Fraction of Poor and Wealthy HtM Households, Sample Countries<sup>a</sup>



Source: Authors' calculations based on data from national and euro area survey series. See text for full description.

a. Data for the United States are from the 2010 SCF; for Canada from the 2005 SFS; for Australia from the 2010 HILDA; for the United Kingdom from the 2010 WAS; and for euro area countries from the 2008–10 HFCS. See text for more details.

across countries is that a complete characterization of the fraction of the population that is likely to exhibit HtM behavior requires going beyond an examination based simply on low net worth.

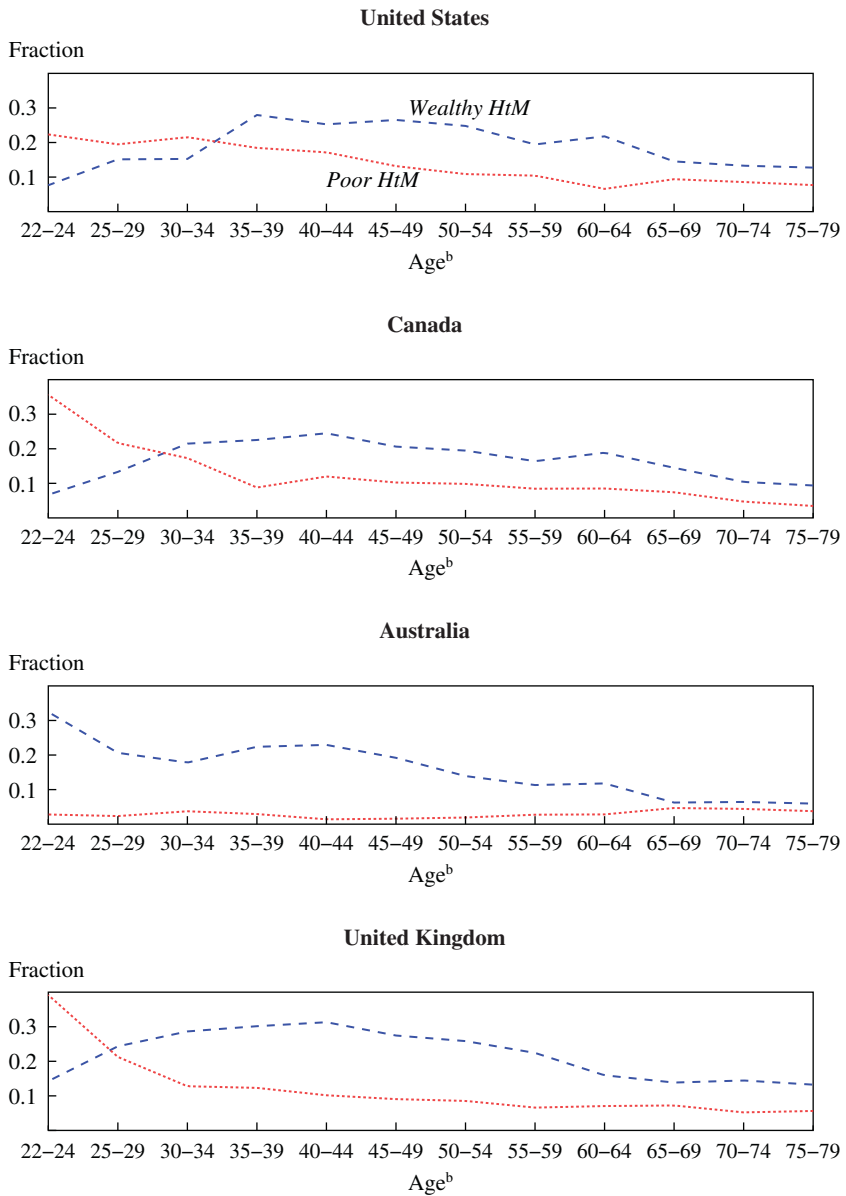
The lower panel of figure 9 reveals that there are significant differences in the portfolio composition of wealthy HtM households across countries. In Italy and Spain, virtually all the wealthy HtM own some housing wealth. Homeowners are also dominant among the wealthy HtM in the United States and Canada. In contrast, around half of the wealthy HtM in Australia, Germany, and Canada have no housing wealth; rather, the majority of their illiquid assets are held in private retirement accounts. Table D1 in the online appendix provides more information on the cross-country portfolio composition.

What explains the fact that the euro area countries have a smaller fraction of HtM households than the United States? In the euro area countries, households hold more liquid wealth relative to their income than is the case in the United States. As is clear from figure 2, this fact can be partly attributed to differences in liquid debt. The fraction of poor HtM households in the euro area countries with negative liquid wealth is two to four times smaller than in the Anglo-Saxon countries (see online appendix table D1). Presumably, lower access to unsecured credit in Europe implies that households have more incentives to hold large balances of liquid wealth for transaction and precautionary reasons. For example, Daniela Vandone (2009) documents that, in 2006, the total value of consumer credit amounted to 25 percent of disposable income in the United Kingdom, as compared with 15 percent in Germany and Spain, 12 percent in France, and only 10 percent in Italy.

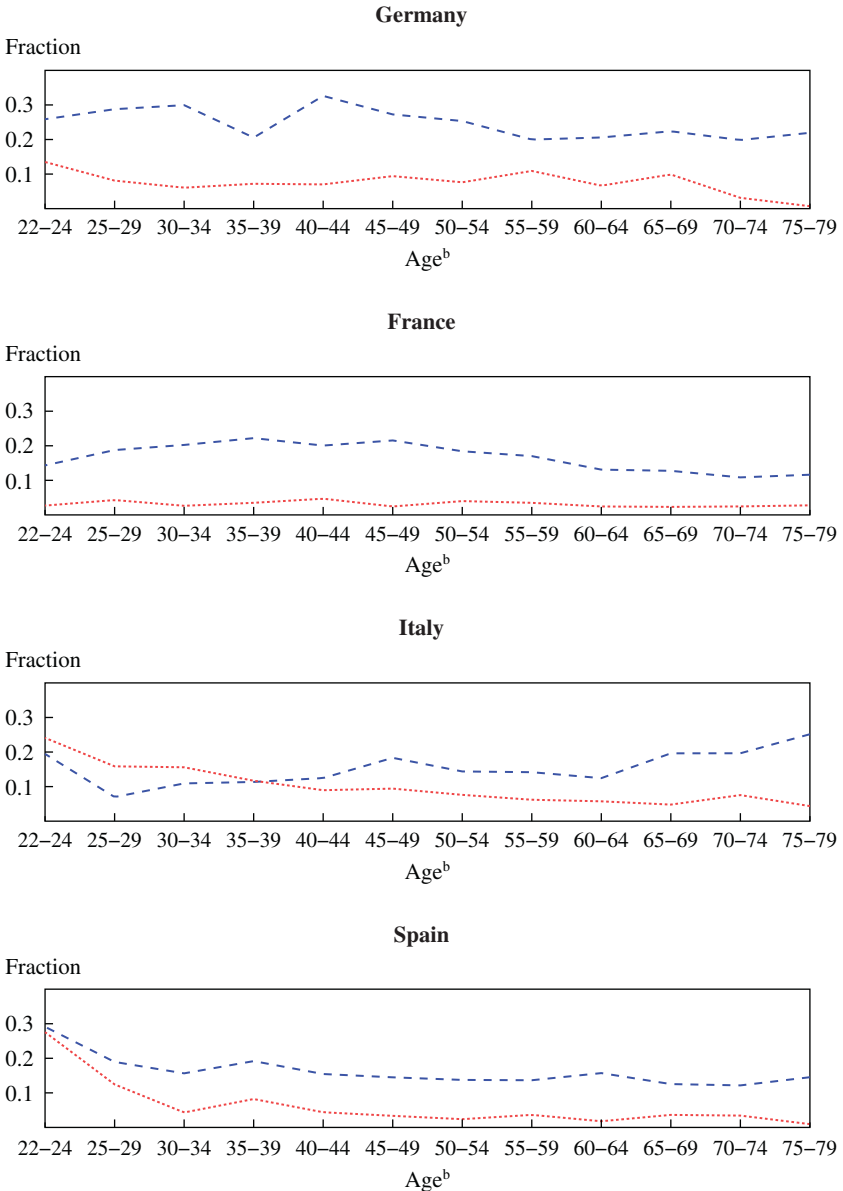
Australia is the country with the largest share of wealthy HtM among its HtM households. Online appendix table D1 shows that this can be traced to the very high share of the country's population that owns private retirement wealth. As explained in section III, the high ownership rate of retirement accounts in Australia is largely due to the country's superannuation regulations. When we exclude superannuation accounts as a component of wealth, the fraction of poor HtM in Australia rises from 3 to 9 percent and the fraction of wealthy HtM drops accordingly.

**AGE PROFILES** Age profiles of the fraction of poor and wealthy HtM households in each country are shown in figure 10. For most countries, the fraction of poor HtM households declines monotonically with age. The exceptions are Australia and France, where the age profiles of the poor HtM are flat. There are some marked differences in the age profiles of the wealthy HtM that can be explained by differences in portfolio holdings across countries. In countries where housing wealth is a substantial part of

**Figure 10.** Age Profile of Fraction of HtM Households, Sample Countries<sup>a</sup>





**Figure 10.** Age Profile of Fraction of HtM Households, Sample Countries<sup>a</sup> (Continued)

Source: Authors' calculations based on data from national and euro area survey series. See text for full description.

a. Data for the United States are from the 2010 SCF; for Canada from the 2005 SFS; for Australia from the 2010 HILDA; for the United Kingdom from 2010 WAS; and for euro area countries from the 2008–10 HFCS. See text for more details.

b. Age refers to that of the head of the household.

household portfolios, such as the United States, Canada, and the United Kingdom, the age profile is hump-shaped, peaking in the early 40s. In contrast, in Australia and Germany, where a high fraction of wealthy HtM households hold retirement accounts, the share of wealthy HtM decreases with age.

An important caveat to these results is that because we infer age profiles from a single cross-section, we necessarily confound age, cohort, and time effects. This could explain, for example, why in Spain the share of wealthy HtM falls steadily with age. This pattern may reflect time effects, since recent 25- to 35-year-olds have faced much harsher economic conditions upon entry into the labor market than earlier cohorts.<sup>25</sup>

### *V.A. Robustness*

Table 5 contains an extensive sensitivity analysis of our definitions of poor HtM and wealthy HtM households that parallels Table 3.

Questions on whether household spending exceeded income in the past year are present in all surveys. As we found in the United States, in the other seven countries we find larger shares of both poor HtM and wealthy HtM households when we use these direct spending vs. income questions to measure the incidence of HtM behavior. The difference is especially marked for Italy and Spain where, according to this criterion, more than 60 percent of households—and hence three times the baseline estimate—are HtM. Extending the credit limit from one month of income to one year of income has a substantial effect for the Anglo-Saxon countries, but virtually no impact for the euro area countries. This finding is in line with the empirical distribution of liquid assets documented in figure 2, which showed that households with negative net liquid wealth are extremely rare in the euro area countries.<sup>26</sup>

The fraction of “financially fragile” households (those with liquid balances lower than the threshold plus 2,000 local currency units<sup>27</sup>) is only 10 to 15 percentage points larger than the share of HtM households in the Anglo-Saxon countries, but in most of the euro area countries it is

25. Figure D1 in the online appendix shows age-income profiles for each country by HtM status and confirms our findings from section IV.B. The age-income profile for wealthy HtM households is much more similar to the profile of the non-HtM than to the profile of the poor HtM. The only two exceptions are Italy and Spain, where the age-income paths for all three groups are very similar.

26. Recall that, based on the definitions in section II, changing the credit limit affects HtM status only for households with negative liquid debt.

27. That is, for example, US\$2,000 for the United States, 2,000 euros for the euro area countries, and so forth.

**Table 5. Robustness Results for Fraction Poor HtM and Wealthy HtM, Sample Countries**

	<i>P-HtM</i>							
	<i>United States</i>	<i>Canada</i>	<i>Australia</i>	<i>United Kingdom</i>	<i>Germany</i>	<i>France</i>	<i>Italy</i>	<i>Spain</i>
Baseline	0.138	0.121	0.027	0.103	0.074	0.032	0.083	0.044
In past year, $c > y$	0.157	0.181	0.020	0.092	0.090	—	0.156	0.091
Financially fragile households <sup>a</sup>	0.198	0.190	0.042	0.139	0.110	0.070	0.117	0.092
1-year income credit limit	0.116	0.090	0.024	0.078	0.070	0.030	0.083	0.040
Weekly pay period	0.119	0.105	0.022	0.098	0.058	0.021	0.080	0.036
Monthly pay period	0.165	0.149	0.033	0.111	0.086	0.048	0.091	0.061
Vehicles as illiquid assets <sup>c</sup>	0.060	0.081	0.012	0.065	0.052	0.002	0.028	0.024
Retirement account as liquid for 60+ <sup>b</sup>	0.138	0.122	0.027	0.103	0.074	0.032	0.083	0.044
Businesses as illiquid assets <sup>d</sup>	0.132	0.115	0.027	0.102	0.071	0.031	0.076	0.043
Direct as illiquid assets <sup>e</sup>	0.137	0.120	0.027	0.102	0.074	0.032	0.083	0.045
Other valuables as illiquid assets	0.134	0.008	0.025	0.099	0.071	—	0.034	0.044
Excludes cc puzzle households	0.174	0.146	0.034	0.124	0.078	0.032	0.086	0.046
HELOCs as liquid debt	0.135	0.127	—	0.103	0.074	0.032	0.083	0.044
Disposable income <sup>f</sup>	0.137	—	—	0.103	—	—	0.080	—
Committed consumption, beginning of period <sup>g</sup>	0.116	—	—	—	0.066	0.025	0.076	0.036
Committed consumption, end of period <sup>g</sup>	0.175	—	—	—	0.092	0.050	0.090	0.064

(continued)

**Table 5. Robustness Results for Fraction Poor HtM and Wealthy HtM, Sample Countries (Continued)**

	<i>W-HtM</i>							
	<i>United States</i>	<i>Canada</i>	<i>Australia</i>	<i>United Kingdom</i>	<i>Germany</i>	<i>France</i>	<i>Italy</i>	<i>Spain</i>
Baseline	0.202	0.182	0.165	0.232	0.248	0.173	0.155	0.152
In past year, $c > y$	0.327	0.409	0.189	0.250	0.392	—	0.474	0.596
Financially fragile households <sup>a</sup>	0.337	0.305	0.261	0.363	0.523	0.585	0.257	0.404
1-year income credit limit	0.130	0.098	0.117	0.135	0.229	0.157	0.147	0.141
Weekly pay period	0.155	0.147	0.116	0.211	0.161	0.087	0.142	0.119
Monthly pay period	0.273	0.247	0.231	0.276	0.370	0.354	0.188	0.220
Vehicles as illiquid assets <sup>c</sup>	0.281	0.223	0.180	0.269	0.270	0.204	0.211	0.173
Retirement account as liquid for 60+ <sup>b</sup>	0.187	0.161	0.153	0.196	0.245	0.173	0.154	0.152
Businesses as illiquid assets <sup>d</sup>	0.206	0.188	0.166	0.232	0.251	0.173	0.158	0.154
Direct as illiquid assets assets <sup>e</sup>	0.220	0.215	0.195	0.246	0.303	0.198	0.165	0.162
Other valuables as illiquid assets	0.207	0.295	0.167	0.235	0.252	—	0.204	0.153
Excludes cc puzzle households	0.192	0.179	0.151	0.247	0.236	0.166	0.157	0.148
HELOCs as liquid debt	0.192	0.107	—	0.154	0.238	0.166	0.147	0.140
Disposable income <sup>f</sup>	0.200	—	—	0.237	—	—	0.149	—
Committed consumption, beginning of period <sup>g</sup>	0.173	—	—	—	0.219	0.127	0.148	0.138
Committed consumption, end of period <sup>g</sup>	0.284	—	—	—	0.344	0.336	0.173	0.199

Source: Authors' calculations based on data from national and euro area survey series. See text for full description.

- a. Includes those households within 2,000 local currency units in liquid assets of their income threshold as HtM.
- b. Puts retirement accounts into liquid wealth for households above age 60.
- c. Vehicles as illiquid assets includes the value of other valuables for France as the survey question combines the value of vehicles with other valuables.
- d. Drops the self-employment income sample selection and adds business assets to illiquid wealth and self-employment income to labor income.
- e. Classifies directly held mutual funds, stocks, corporate and government bonds as illiquid assets.
- f. Removes taxes from gross income. Taxes for the U.S. are estimated from NBER's TAXSIM assuming all households file as single with no dependents.
- g. Committed consumption, beginning (end) of period assumes households incur consumption commitments at the beginning (end) of the pay period.

30 percentage points larger. This result is consistent with the distributions of liquid wealth reported in figure 2, which show that in euro area countries there is a large mass of households just to the right of the threshold.

Shortening the pay period from the biweekly baseline to one week (or extending it to a month) has a small impact on the fraction of poor HtM households, but it decreases (or increases, respectively) the fraction of wealthy HtM households by 5 percentage points on average. Including vehicles as illiquid wealth shifts HtM households from poor to wealthy in every country, although to a lesser extent than it does in the United States. In two countries, Canada and Italy, including other nonfinancial assets (such as valuables and collectibles) in the definition of illiquid wealth shifts 12 percent (Canada) and 5 percent (Italy) of households from poor to wealthy HtM.<sup>28</sup> Including HELOCs among liquid debt has no effect, except in Canada, where the share of HtM increases by 8 percentage points.

Our baseline measure of income is income after transfers but before taxes, except for Canada, where it is disposable income. For three countries—the United States, the United Kingdom, and Italy—we can analyze the effect of netting taxes at the source for every household, and find that the effect of this correction is minor.<sup>29</sup>

## **VI. Consumption Response of the Wealthy HtM to Transitory Income Shocks**

In the previous sections we documented a sizable presence of wealthy HtM households across a number of countries, but our survey data did not allow us to investigate the consumption behavior of this group of households. In this section we show evidence that, as predicted by the theory presented in section I, these households have a large marginal propensity to consume out of transitory income shocks. We use data from the Panel Study of Income Dynamics (PSID) to estimate the consumption response to transitory changes in income, using the methodology proposed by Blundell, Pistaferri, and Preston (2008) and further examined in Kaplan and Violante (2010). The novelty of our empirical analysis, relative to that of Blundell and colleagues, is that we use a more recent sample period with enriched data and, most

28. There are differences in this question across surveys. The U.S. SCF and the euro area HFCS ask about the single most valuable asset not previously mentioned. In the Australian HILDA, they ask about collectibles. In the Canadian SFS, valuables are meant to include also the content of the principal residence. In light of this, the result for Canada is not surprising.

29. For the United States, we resort to an imputation based on TAXSIM as explained in section 5.1.1. The U.K. and Italian surveys ask households about their tax liabilities.

importantly, estimate the transmission coefficients of income shocks to consumption separately for different types of HtM households.

### *VI.A. Data Source and Sample Selection*

Estimating the consumption response to income shocks for households with different types of HtM status requires a longitudinal data set with information on income, consumption, and wealth at the household level. Starting from the 1999 wave, the PSID contains the necessary data. The PSID started collecting information on a sample of roughly 5,000 households in 1968. Thereafter, both the original families and their split-offs (children of the original household forming households of their own) have been followed. The survey was annual until 1996 and became biennial starting in 1997. In 1999 the survey augmented the consumption information available to researchers, so that it now covers more than 70 percent of all consumption items available in the Consumer Expenditure Survey (CEX), and since 1999 it has included additional questions on the household balance sheet in every wave.<sup>30</sup>

We start with the PSID Core Sample and drop households with missing information on race, education, or state of residence, and those whose income grows more than 500 percent, falls by more than 80 percent, or is below \$100. We drop households that have top-coded income or consumption. We also drop households that appear in the sample fewer than three consecutive times, because identification of the coefficients of interest requires a minimum of three periods. In our baseline calculations, we keep households where the head is 25 to 55 years old. Our final sample has 39,772 observations over the pooled years 1999–2011 (seven sample years).

### *VI.B. Definitions and Methodology*

The construction of our consumption measure follows Blundell, Pistaferri, and Saporta-Eksten (2014). We include food at home and food away from home, utilities, gasoline, car maintenance, public transportation, childcare, health expenditures, and education. Our definition of household income is the labor earnings of a household plus government transfers. Liquid assets in the PSID include the value of checking and savings accounts, money market funds, certificates of deposit, savings bonds, and Treasury bills,

30. Until 1999, the Wealth Files supplemented the annual survey every five years. Starting in 1999, these files became biannual, like the survey itself. In 2009 and 2011, the wealth questions were enriched further with the Housing, Mortgage Distress, and Wealth Data Supplements.

together with directly held shares of stock in publicly held corporations, mutual funds, or investment trusts. Before 2011, liquid debt is the value of debts other than mortgages, such as credit cards, student loans, medical or legal bills, and personal loans. For 2011, liquid debt includes only credit card debt. Net liquid wealth is liquid assets minus liquid debt.

Net illiquid wealth is the value of home equity plus the net value of other real estate plus the value of private annuities or IRAs; it also includes the value of other investments in trusts or estates, bond funds, and life insurance policies.<sup>31</sup> Net worth is the sum of net illiquid and net liquid wealth. Given these definitions of income and wealth, the HtM status indicators are constructed exactly as outlined in section II, where the pay period is assumed to be two weeks and the credit limit is one month of income. In our PSID sample, 25 percent of households are wealthy HtM, roughly in line with the U.S. SCF estimates, but the share of the poor HtM is 21 percent, which is almost twice as large as its counterpart in the U.S. SCF.

**METHODOLOGY** We refer the reader to Blundell, Pistaferri, and Preston (2008) and to Kaplan and Violante (2010) for a thorough description of the methodology. Here, we only sketch the key steps. As in the work of Blundell and colleagues, we first regress log income and log consumption expenditures on year and cohort dummies, education, race, family structure, employment, geographic variables, and interactions of year dummies with education, race, employment, and region. We then construct the first-differenced residuals of log consumption  $\Delta c_{it}$  and log income  $\Delta y_{it}$ . Recall that, since the survey is biannual, a period is two years. The income process  $y_{it}$  is represented as an error component model which comprises orthogonal permanent and i.i.d. components. Hence, income growth is given by

$$(13) \quad \Delta y_{it} = \eta_{it} + \Delta \varepsilon_{it},$$

where  $\eta_{it}$  is the permanent shock and  $\varepsilon_{it}$  is the transitory shock. This is a common income process in the empirical labor literature, at least since Thomas MaCurdy (1982) and John Abowd and David Card (1989), who showed that this specification is parsimonious and fits income data well.

31. The two main discrepancies with the SCF definitions are that we do not attempt a cash imputation, and both CDs and saving bonds are in liquid, instead of illiquid, wealth. Since these two saving instruments are not common, we do not expect this discrepancy to affect our results. For example, if we classify CDs and saving bonds as liquid wealth in the 2010 SCF, the fraction of HtM drops by only 1 percentage point.

The Blundell, Pistaferri, and Preston (2008) estimator of the transmission coefficient of transitory income shocks to consumption, the marginal propensity to consume (MPC), is given by

$$(14) \quad \widehat{\text{MPC}}_t = \frac{\text{cov}(\Delta c_{it}, \Delta y_{i,t+1})}{\text{cov}(\Delta y_{it}, \Delta y_{i,t+1})}.$$

The true marginal propensity to consume out of a transitory shock is defined as

$$(15) \quad \text{MPC}_t = \frac{\text{cov}(\Delta c_{it}, \varepsilon_{it})}{\text{var}(\varepsilon_{it})}.$$

The estimator in equation 14 is a consistent estimator of equation 15 if the household has no foresight, or no advance information, about future shocks, that is:

$$(16) \quad \text{cov}(\Delta c_{it}, \eta_{i,t+1}) = \text{cov}(\Delta c_{it}, \varepsilon_{i,t+1}) = 0.$$

The estimator is implemented by an IV regression of  $\Delta c_{it}$  on  $\Delta y_{it}$ , instrumented by  $\Delta y_{i,t+1}$ . Note that  $\Delta y_{i,t+1}$  is correlated with the transitory shock at  $t$ , but not with the permanent one. Kaplan and Violante (2010) show that the presence of tight borrowing constraints does not bias the estimate of the transmission coefficient for transitory shocks—an important finding since we are interested in the differential response of HtM households, which may be close to a constraint, and non-HtM households.

### *VI.C. Results*

Table 6 summarizes our results. In our baseline specification, the marginal propensity to consume of the wealthy HtM group is the highest, around 30 percent. In other words, in the first two years, the wealthy HtM households consume 30 percent of an unexpected change in income whose effect entirely dissipates within the period. The point estimate of the marginal propensity to consume for the poor HtM is 24 percent, and for the non-HtM it is less than 13 percent. Given the well known measurement error present in survey data, especially for consumption expenditures, and given the small sample size, it is not surprising that these estimates are somewhat imprecise.



**Table 6.** Marginal Propensity to Consume out of Transitory Income Shocks for Different Types of HtM Households, United States<sup>a</sup>

	<i>P-HtM</i>	<i>W-HtM</i>	<i>N-HtM</i>	<i>HtM-NW</i>	<i>N-HtM-NW</i>
Baseline	0.243*** (0.065)	0.301*** (0.048)	0.127*** (0.036)	0.229*** (0.054)	0.201*** (0.030)
Pre-tax earnings <sup>b</sup>	0.131*** (0.043)	0.223*** (0.035)	0.122*** (0.027)	0.143*** (0.036)	0.164*** (0.023)
Include food stamps <sup>c</sup>	0.217*** (0.059)	0.264*** (0.045)	0.105*** (0.035)	0.203*** (0.050)	0.171*** (0.029)
Continuously married households <sup>d</sup>	0.095 (0.194)	0.193** (0.079)	0.079* (0.043)	-0.048 (0.129)	0.157*** (0.042)
Stable marital status <sup>e</sup>	0.239*** (0.085)	0.282*** (0.054)	0.110*** (0.038)	0.190*** (0.070)	0.195*** (0.033)
Households with male heads <sup>f</sup>	0.186** (0.080)	0.193*** (0.058)	0.073* (0.040)	0.150** (0.064)	0.129*** (0.035)
Monthly income <sup>g</sup>	0.229*** (0.068)	0.288*** (0.053)	0.159*** (0.034)	0.236*** (0.057)	0.199*** (0.030)

Source: Authors' calculations, based on United States PSID. See text for full description.

a. Boot-strapped standard errors based on 250 replications in parentheses. Statistical significance indicated at the \*\*\*1 percent; \*\*5 percent; and \*10 percent levels.

b. Transfers are excluded.

c. Food stamps are included among transfers.

d. Restricted to continuously married households.

e. Restricted to households with no change in marital status.

f. Households with female heads (mostly single) are excluded.

g. Pay period is set to one month instead of two weeks.

However, the difference between the wealthy HtM and the non-HtM in the marginal propensity to consume is statistically significant.

When the sample is split between HtM and non-HtM households based on net worth, the estimated transmission coefficients are very similar across the two groups. The group of net-worth-defined HtM is essentially the same as the poor HtM, and in fact their estimated marginal propensity to consume is similar. However, among the net-worth-defined non-HtM there are also many wealthy HtM households that artificially inflate the estimate of the marginal propensity to consume. Based on this household classification, there is no evidence that the response of consumption to income shocks differs among households with different HtM status. By contrast, a classification based on liquid and illiquid wealth finds economically significant differences.

The remaining rows in table 6 offer a robustness analysis with respect to the definition of income and consumption, household composition, and the assumed pay period. The ranking of marginal propensity to consume

among wealthy HtM, poor HtM, and non-HtM is always as in the baseline specification; moreover, as predicted by the theory, the gap between HtM households based on the net worth criterion is always very small or is not statistically significant.

Our key finding that the consumption of the wealthy HtM displays excess sensitivity to transitory income shocks is in line with some recent findings. Kanishka Misra and Paolo Surico (2013) expand on the research of Johnson, Parker, and Souleles (2006) and Parker and others (2013) on the 2001 and 2008 fiscal stimulus payment episodes in the United States. They conclude that, for both stimulus programs, the largest propensity to consume out of the tax rebate is found among households that own real estate but have high levels of mortgage debt. James Cloyne and Surico (2013) exploit a long span of expenditure survey data for the United Kingdom and a narrative measure of exogenous income tax changes, and they also find that homeowners with high leverage ratios exhibit large and persistent consumption responses to tax shocks. Scott Baker (2013) combines several novel sources of household data on consumption expenditures, income, and household balance sheets to investigate the co-movement of income and consumption at the micro level around the Great Recession. He finds that expenditures of highly indebted households with illiquid assets are especially sensitive to income fluctuations. Overall, this body of work confirms our finding in figure 4 that highly leveraged homeowners are likely to be wealthy HtM and, hence, to have a large marginal propensity to consume out of income shocks.

## **VII. Implications for Fiscal Policy**

What does the existence of wealthy HtM households, together with their large propensity to consume out of transitory income shocks, imply for how one should think about fiscal policy? In this section we use a series of policy simulations from three alternative models to argue that wealthy HtM households should be modeled as a separate group: ignoring them leads to a distorted view of the effects of fiscal stimulus policies on aggregate consumption.

The first model that we use is the two-asset incomplete-markets model from Kaplan and Violante (2014a, 2014b). We label this model SIM-2, since it extends the standard incomplete-markets (SIM) life-cycle economy by adding a second illiquid asset that pays a higher return—through both a financial component and a housing services component—but is subject to a transaction cost. For the reasons explained in section I, the illiquidity due to

the transaction cost means that the model generates households of all three HtM types. The version of the model we use here does not allow borrowing and has a transaction cost of \$1,000.<sup>32</sup>

The second model, which we label SIM-1, is a standard one-asset incomplete-markets life-cycle model. The version that we adopt is the same as in Kaplan and Violante (2014a, 2014b), but with the transaction cost set to zero and recalibrated to data on net worth alone, rather than data on illiquid and liquid assets separately. Since this is a one-asset model, it generates only poor HtM and non-HtM households and has no wealthy HtM households.

The third model, which we label SP-S, is a spender-saver model in the spirit of Campbell and Mankiw (1989) and, more recently, Gali, Lopez-Salido, and Valles (2007), Eggertsson and Krugman (2012), and Justiniano, Primiceri, and Tambalotti (2013). In the SP-S model, some households (the savers) act as forward-looking optimizing consumers who can save in a single risk-free asset. The remaining households (the spenders) follow the rule-of-thumb consumption policy of consuming all their income in every period. This class of models is typically calibrated so that the distinction between the spenders and savers is based on their holdings of liquid wealth rather than net worth. Thus, in the SP-S model, the wealthy HtM and the poor HtM households are lumped together and considered to be the spenders, while the non-HtM households are considered to be the savers.

To summarize, SIM-2 is a *two-asset economy*, in which the wealthy HtM households are explicitly modeled as a distinct group. SIM-1 is a *net-worth economy*, in which the wealthy HtM households are treated as if they were non-HtM households. Compared to SIM-2, SIM-1 greatly understates the fraction of HtM households. SP-S is a *liquid-wealth economy*, in which both the wealthy HtM and the poor HtM are treated identically as HtM households that have a marginal propensity to consume always equal to one. Thus, compared to SIM2, SP-S has the correct number of HtM households, but it greatly overstates their marginal propensity to consume.

From each of these three models, we simulate a cohort of households. For each household, we compute the quarterly consumption response to a one-time unexpected cash windfall, or cash loss, of different amounts (\$50, \$500, \$2,000). We then divide the simulated cohort into 27 bins, based on three income terciles, three age classes (ages 22 to 40, 41 to 60, and

32. We refer the reader to Kaplan and Violante (2014a, 2014b) for a full description of the model, its calibration, and a comparison of the predictions of the model with life-cycle data, and with the aggregate consumption response to the 2001 and 2008 fiscal stimulus payments as estimated by Johnson, Parker, and Souleles (2006), and Parker and others (2013), respectively.

**Table 7.** Quarterly Marginal Propensity to Consume out of an Unexpected Transfer for the Aggregate Economy, Following Three Models, United States<sup>a</sup>

	SIM-2 <sup>b</sup>			SIM-1 <sup>c</sup>		SP-S <sup>d</sup>	
	<i>P-HtM</i>	<i>W-HtM</i>	<i>N-HtM</i>	<i>HtM</i>	<i>N-HtM</i>	<i>HtM</i>	<i>N-HtM</i>
Average	0.35	0.44	0.06	0.14	0.02	1.00	0.02
Low income	0.34	0.37	0.16	0.15	0.04	1.00	0.04
Middle income	0.38	0.44	0.09	0.11	0.02	1.00	0.02
High income	0.31	0.52	-0.02	0.12	0.01	1.00	0.01
Age ≤40	0.38	0.42	0.08	0.16	0.02	1.00	0.02
Age 40–60	0.30	0.42	0.01	0.11	0.01	1.00	0.01
Age >60	0.39	0.51	0.13	0.04	0.04	1.00	0.04

Source: Authors' calculations. Population shares from national and euro area survey series. See text for full description.

a. Quarterly marginal propensity to consume out of an unexpected \$500 transfer for the aggregate economy, and for various subgroups of the population, using group composition from the 2010 SCF.

b. SIM-2 = Two-asset, life-cycle, incomplete-market model.

c. SIM-1 = One-asset, life-cycle, incomplete-market model.

d. SP-S = Spender-saver model.

over 60) and the three HtM groups. For each of these bins we compute the average consumption response from the model. To obtain an aggregate response of the economy as a whole, we need to know the shares of the population in each of these 27 groups. For this last step, we use our cross-sectional survey data discussed in sections IV and V.

Table 7 reports the quarterly average marginal propensity to consume out of a \$500 windfall in the three models, both for the HtM groups and for some subgroups defined by income and age, using group shares from the 2010 U.S. SCF. In the SIM-2 model, marginal propensity to consume is very small for all non-HtM households, except for those who are income-poor or old. For high-income households that are non-HtM, the average marginal propensity to consume is slightly negative. The intuition for this finding is discussed in detail in Kaplan and Violante (2014a, 2014b). It arises because for a household that has already accumulated substantial liquid wealth and is close to its planned date of deposit, the receipt of a \$500 windfall may trigger a decision to pay the transaction cost and make an earlier deposit into the illiquid account. Since such a household can effectively save at the rate of return on the illiquid asset, it chooses to consume less and save more than it would have in the absence of the income windfall. This example illustrates how explicitly modeling wealthy HtM behavior through transaction costs can alter the marginal propensity to consume even for non-HtM households. The marginal propensity to consume for

**Table 8.** Quarterly Aggregate Consumption Responses under Three Models, United States<sup>a</sup>

	<i>Model<sup>b</sup></i>		
	<i>SIM-2</i>	<i>SIM-1</i>	<i>SP-S</i>
\$500 transfer	0.18	0.04	0.35
<i>Size asymmetry</i>			
\$50 transfer	0.29	0.05	0.35
\$2,000 transfer	0.05	0.03	0.35
<i>Sign asymmetry</i>			
\$500 tax	0.42	0.14	0.36
<i>Income targeting</i>			
\$500 transfer, bottom tercile	0.26	0.07	0.50
\$500 transfer, top tercile	0.20	0.03	0.34

Source: Authors' calculations. Population shares from United States 2010 SCF. See text for full description.

a. Quarterly aggregate consumption responses for the United States using group composition from the 2010 SCF. All taxes and transfers are lump-sum, one-time, and unexpected.

b. See notes to table 7 for model definitions.

both wealthy HtM and poor HtM households in the SIM-2 economy is substantial, though it is slightly larger for the wealthy HtM than the poor HtM, particularly for households with a high level of income. As explained in section I, since wealthy HtM households have higher lifetime incomes than poor HtM households, they have higher target consumption and hence spend more out of an unexpected moderately sized payment.

In the SIM-1 model, the marginal propensity to consume for HtM households is almost identical to that for poor HtM households in the SIM-2 model, and the marginal propensity to consume for non-HtM households is, in general, even smaller than that for non-HtM households in the SIM-2 model. In the SP-S model, by construction, the marginal propensity to consume for the non-HtM households is the same as in the SIM-1 model and is equal to one for HtM households.

### *VII.A. Policy Simulations for the United States*

We now show that the three models yield very different predictions for the aggregate marginal propensity to consume out of unexpected, one-time, lump-sum transfers or taxes of different amounts. Table 8 reports the policy-experiments results (that is, the aggregate quarterly consumption responses) for the United States using the SCF data from 2010 to estimate the group shares.

We begin by analyzing a policy experiment where every household receives a \$500 transfer, for example a stimulus payment. The aggregate marginal propensity to consume according to the SIM-2 model is 0.18. This value is substantially larger than it is according to the SIM-1 model (0.04), because the SIM-1 economy, by treating the wealthy HtM households as non-HtM, misses a large fraction of the population that has a high marginal propensity to consume. The aggregate marginal propensity to consume is highest according to the SP-S model (0.35), because this model implicitly assumes that all poor HtM and wealthy HtM households spend the entire \$500. However, our earlier discussion of table 7 suggests that this assumption is extreme: in the SIM-2 economy, HtM households spend on average only 35 to 45 percent of their payments during the quarter when they are received.

Table 8 also shows that the degree of size asymmetry in the aggregate marginal propensity to consume differs remarkably across the three models. In the SIM-2 model, the consumption response to a \$50 windfall is 0.29, while the response to a \$2,000 windfall is only 0.05. The reason for this large asymmetry is the availability of an illiquid savings instrument subject to a transaction cost. For large enough windfalls, many HtM households in a SIM-2 economy may find it optimal to pay the transaction cost and make a deposit into the illiquid asset. However, for small windfalls, it is never optimal to adjust the illiquid asset: households thus face an intertemporal trade-off governed by the (low) return on the liquid asset, and thus have a large incentive to consume. This size asymmetry is absent from both the SP-S and SIM-1 models. In the SP-S model it is absent because of the assumed rule-of-thumb behavior: the HtM households in the SP-S model always consume their entire transfer, regardless of its size. In the SIM-1 model there is only a modest decline in the marginal propensity to consume as the size of the payment increases, because households always face the same intertemporal trade-off when making their consumption decisions.

The degree of sign asymmetry also differs across the three models. In the SIM-1 and SIM-2 models, the response to a lump-sum tax of \$500 is substantially larger than the response to a \$500 transfer. Even HtM households, which are at a kink in their budget constraints, desire to save some part of a positive windfall if it is large enough to push them off the kink. Negative income changes, however, cannot be smoothed for households at the constraint, and withdrawing from the illiquid account is too expensive to be optimal—recall that in the calibrated SIM-2 model, the transaction cost is \$1,000. In the SP-S model, the responses to positive and negative income

shocks are essentially the same, since the HtM households have a marginal propensity to consume of one regardless of the sign of the shock.

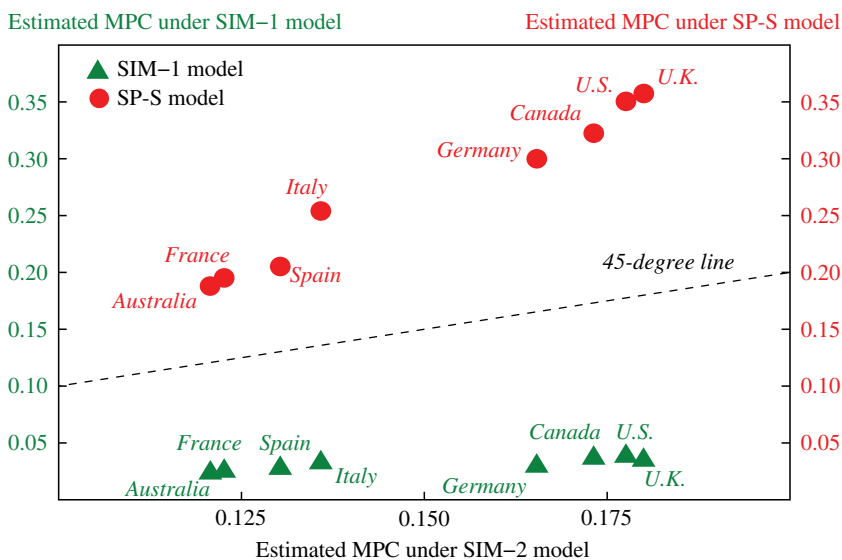
Table 8 reveals that the models have different implications for the optimal degree of income targeting in the use of fiscal stimulus transfers to maximize the aggregate consumption response. A widely held view is that the aggregate consumption response to a fiscal stimulus policy, per dollar paid out, is strongest when the transfers are targeted to households with the lowest income, that is, stimulus payments should be phased out for middle- and high-income households for maximum effect. This view, which is based on the conjecture that HtM households are income-poor, ignores the wealthy HtM, a group with significantly higher income, as we showed in sections IV.B and V. In line with this observation, the SIM-2 model generates only a very modest decline (0.26 to 0.20) in the marginal propensity to consume out of a \$500 transfer between households in the lowest income tercile and those in the middle-income tercile. The corresponding relative declines across income terciles are much larger under the SIM-1 and SP-S models. In the SIM-1 model, the only high-marginal propensity to consume households are the low-income poor HtM; in the SP-S model, all HtM households are assumed to have the same marginal propensity to consume, while under the SIM-2 model, as we saw in table 7, among wealthy HtM households the marginal propensity to consume increases with income.

### *VI.B. Implied Cross-Country Variation in Effects of Policy*

We now explore what the three models predict for the aggregate response to a \$500 fiscal stimulus check (or its equivalent as a fraction of average income) in each of the eight countries in our sample. To do this, we use our survey data to estimate the fraction of households in each country that fall into each of the 27 bins, and then apply these country-specific group weightings to the model-generated marginal propensity to consume. To illustrate the differences in model predictions, figure 11 plots the estimated aggregate marginal propensity to consume under the SIM-2 model against the corresponding marginal propensity to consume under the SIM-1 model (triangles) and the SP-S model (circles).

The figure shows striking differences in the amount of cross-country dispersion in the aggregate marginal propensity to consume predicted by the three models. There is much less dispersion in the SIM-1 model compared to the SIM-2 model because, by treating the wealthy HtM as non-HtM, the SIM-1 model misses most of the cross-country variation in HtM behavior. In contrast, there is more dispersion in the SP-S model than in the SIM-2 model. This is because, by assigning a marginal propensity to consume of

**Figure 11.** Estimated Aggregate Consumption Response, Sample Countries, under Three Models



Source: Authors' calculations. Population shares from national and euro area surveys. See text for full description.

1.0 to all the wealthy HtM households, compared to a marginal propensity to consume of 0.44 in the SIM-2 model, the SP-S model exaggerates existing cross-country heterogeneity in the fraction of HtM households.

These experiments clearly illustrate why it is important to think deeply about the behavior of wealthy HtM households when considering the design of fiscal policies. In contrast to the traditional views based on SIM-1 or SP-S models, our model leads to three lessons: (i) there is limited scope for stimulating aggregate consumption by increasing the transfer size; (ii) the aggregate consumption response to a lump-sum tax is much stronger, in absolute value, than the response to an equal-size transfer; and (iii) targeting stimulus payments exclusively toward low-income families will miss a substantial fraction of liquidity-constrained households.

## VIII. Concluding Remarks

We set out to investigate, theoretically and empirically, the behavior of wealthy hand-to-mouth households—an often overlooked but highly relevant part of the population—and to reflect on its implications for macroeconomic



modeling and fiscal policy design. We conclude by taking stock of what we have learnt.

Theoretically, we show that wealthy hand-to-mouth behavior can occur when households face a trade-off between the long-run gain from investing in illiquid assets (assets that require the payment of a transaction cost for making unplanned deposits or withdrawals) and the short-run cost of having fewer liquid assets available to smooth consumption.

Empirically, we document that 30 percent of households in the United States are living hand-to-mouth, and that this fraction has been relatively constant over the past two decades. The share of hand-to-mouth households varies somewhat across the eight countries in our study, from less than 20 percent in Australia and Spain to over 30 percent in the United Kingdom and Germany. Given our identification strategy, these estimates are likely to be a lower bound. The key finding is that in all countries, the vast majority of hand-to-mouth households—at least two-thirds of them—are wealthy hand-to-mouth, not poor hand-to-mouth.

Who are the wealthy hand-to-mouth? We highlight three features. First, unlike poor hand-to-mouth households, the wealthy hand-to-mouth are not predominantly young households with low incomes. Rather, the frequency of wealthy hand-to-mouth status has a hump-shaped age profile that peaks in the early 40s and an income profile that strongly mirrors that of the non-hand-to-mouth. Second, the wealthy hand-to-mouth are not simply poor hand-to-mouth households with very small holdings of illiquid assets. Rather, they hold substantial wealth in housing and retirement accounts, in the same proportions as non-hand-to-mouth households. Finally, their hand-to-mouth status is somewhat more transient than that of the poor hand-to-mouth.

Why does this group of households deserve the attention of economists and policymakers? Wealthy hand-to-mouth households are important because they have large consumption responses to transitory income shocks—a crucial determinant of the efficacy of many types of fiscal interventions, such as the fiscal stimulus payments that were implemented in the last two recessions. To demonstrate this, we use PSID data to show that the transmission coefficient of transitory income shocks into consumption is significantly larger for wealthy (and poor) hand-to-mouth households than for non-hand-to-mouth households.

The wealthy hand-to-mouth thus have consumption responses that, in many ways, are similar to those of the poor hand-to-mouth, yet they have demographic characteristics and portfolio compositions that resemble those of the non-hand-to-mouth. This suggests that for these three types

of hand-to-mouth households, each needs to have its own unique place in frameworks that are to be used for analyzing and forecasting the effects of fiscal policy. Macroeconomists need to move beyond one-asset models, such as those in the spirit of Aiyagari (1994), Huggett (1996), and Ríos-Rull (1995), since these models assume that wealthy hand-to-mouth households are as unconstrained as non-hand-to-mouth ones. They also need to move beyond spender-saver models, such as those in the spirit of Campbell and Mankiw (1989), and Eggertsson and Krugman (2012), since these models treat all hand-to-mouth households identically and thus assume that wealthy hand-to-mouth households are as constrained as the poor hand-to-mouth. In particular, by ignoring the fact that the wealthy hand-to-mouth can use illiquid assets to buffer large negative shocks, the latter models exaggerate the financial fragility of this group. We run several fiscal policy experiments to illustrate where misleading inferences would be obtained by using either of these two simpler models of hand-to-mouth behavior.

**ACKNOWLEDGMENTS** We thank Yu Zhang for outstanding research assistance, and Mark Aguiar, Karen Pence, Rob Shimer, David Weil, and the editors for comments. This research is supported by grant no. 1127632 from the National Science Foundation. Greg Kaplan, on leave from Princeton University, is currently a research advisor at the Reserve Bank of Australia. He has received grant support from the Reserve Bank of Australia and the National Science Foundation. Giovanni Violante and Justin Weidner have no relevant material or financial interests to declare regarding the content of this paper.

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## *Comments and Discussion*

### COMMENT BY

**MARK AGUIAR** This paper by Greg Kaplan, Giovanni Violante, and Justin Weidner tackles a classic question: What is the marginal propensity to consume? At least since Keynes, the marginal propensity to consume has been an object of interest in macroeconomics. One reason it has remained so prominent is the important role it plays in stabilization policy. Policies designed to boost household demand through transfers or tax cuts are intermediated through households' consumption-savings decisions. An important consideration in enhancing the cost-effectiveness of these policies, therefore, is targeting households with a high marginal propensity to consume. The conventional wisdom is that relatively wealthy households, as a rule, have a low marginal propensity. The paper argues that this wisdom is false.

The modern theory of consumption builds on the permanent income theory of Milton Friedman (and its close cousin, the life-cycle model of Franco Modigliani). One key implication of the model is that consumers smooth transitory fluctuations in their income, saving part of windfalls and then borrowing in times of scarcity. This theory works well for large fluctuations in income. For example, Chang-Tai Hsieh (2003) documents that consumers in Alaska smooth the large, anticipated payments from Alaska's Permanent Fund. Similarly, Spanish workers who receive anticipated, periodic bonuses also smooth these large income fluctuations (Browning and Collado 2001).

The relevant question for realistic policy, however, is how consumers respond to small fluctuations, such as the one-off tax rebates of \$500 to \$1,000 that were paid out in the last two recessions. The permanent income theory suggests that these should have a minimal impact on aggregate demand, since recipients will save a large fraction of the checks, but household surveys

(Kaplan and Violante, forthcoming) suggest that consumers spend a fairly large fraction of these transfers (spending roughly 25 percent of them on nondurables in the quarter of receipt). A common critique of the permanent income model is that households cannot borrow easily, and those agents that are credit-constrained have a higher marginal propensity to consume. If policies are to have a widespread impact on aggregate demand, this requires that relatively wealthy households behave as if they were credit-constrained. The paper makes the case that this is true for a significant fraction of wealthy households.

Why might wealthy households behave as if they were credit-constrained? The authors argue that much of that wealth may be held in illiquid assets, primarily housing and tax-protected pension accounts, which yield a relatively high return. But wealthy households do hold liquid wealth as well. To sort this out, it is useful to consider a simple two-period consumption problem. Suppose agents live for three periods,  $t = 0, 1,$  and  $2$ . In period 0, they start with wealth  $x$  and have the option to invest in an illiquid asset  $a$  with two-period return  $R^a > 1$  and cash  $m$  with gross return 1. They can save between periods 1 and 2 in the liquid asset only (one could relax this by allowing deposits into the illiquid asset, as long as the one-period return is less than the two-period return). In period 1, they can also borrow at a gross rate  $R^b > R^a$ . Let  $b$  denote the amount borrowed in period 1. Income is  $y_1$  and  $y_2$  in periods 1 and 2, respectively, which is known at time 0. The agent's period 0 problem is:

$$\max_{\{m, m', a\}} u(c_1) + u(c_2)$$

subject to

$$a + m = x$$

$$c_1 = y_1 + m - m'$$

$$c_2 = y_2 + R^a a - R^b b + m'$$

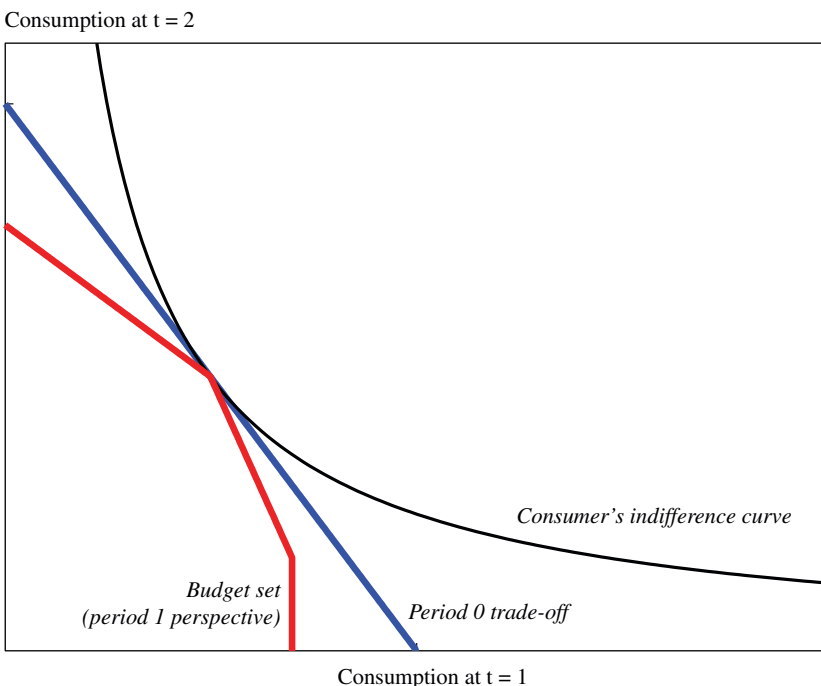
$$m, m', b, a \geq 0$$

$$b \leq \bar{b}.$$

The second-to-last line represents the fact that agents can only borrow using  $b$ , and cannot save at  $R^b$ . The last line is the borrowing constraint.



**Figure 1. Two-Period Consumption/Saving Decision**



Note: The curved line is the consumer's indifference curve between  $c_2$  (vertical axis) and  $c_1$  (horizontal axis). The straight line has slope  $-R^a$  and represents the period 0 trade-off between consumption in periods 1 and 2. The piecewise linear line is the budget set from the perspective of period 1, conditional on the portfolio allocation chosen in period 0. The left-most segment has slope  $-1$ , which steepens at the optimal allocation to slope  $-R^b$ . The vertical segment of the budget set represents the borrowing limit.

This problem is depicted graphically using a Fisher diagram in figure 1. The vertical axis measures  $c_2$  and the horizontal axis  $c_1$ . The curved line represents an indifference curve between consumption in period 1 and consumption in period 2. The straight line is the inter-temporal terms of trade priced by the illiquid asset. The figure assumes that  $a$  and  $m$  are interior. The relevant terms-of-trade at time zero is then  $R^a$ , which is the slope of the straight line tangent to the indifference curve. The agent plans to consume at the point of tangency, using cash and period 1 income for  $c_1$ , and period 2 income and  $R^a a$  for  $c_2$ . The optimality conditions imply that  $m' = 0$  in this case. There is no reason to shift consumption from period 1 to 2 at a gross return of 1 when the illiquid asset pays more. The interiority of  $m$  and  $a$  also implies  $b = 0$ . There is no reason to borrow at  $R^b > R^a$  in period 1. This is dominated by investing less in the illiquid asset and holding cash.

The piecewise linear line is the budget set from the perspective of period 1. Of course, the period 0 plan is feasible in period 1, and so the budget set includes the planned  $c_1$  and  $c_2$ .

However, if the consumer altered the plan in period 1 and were to reduce  $c_1$  and save, he does so at the gross return  $1 < R^a$ . This is the shallow line extending to the left of the optimal allocation. If the consumer were to increase  $c_1$ , he must do so by borrowing at  $R^b$ . This is the steeper line extending to the right. There is a limit to borrowing, which is the vertical segment of the period 1 budget set.

The important point is that the agent is at a kink in his budget set in period 1. A small (unexpected) transfer in period 1 will be consumed. Conversely, a small, unexpected decrease in  $y_1$  will be taken entirely out of period 1 consumption. Even though this agent may have a fair amount of assets in period 1 (both cash and illiquid assets), he will nevertheless have a large marginal propensity to consume. Specifically,  $c_1 = y_1 + m$  in period 1, which is what the measure used by Greg Kaplan, Giovanni Violante, and Justin Weidner approximates.

In this simple example, the consumer optimally places himself at a point of (ex post) high marginal propensity to consume, and will operate in a hand-to-mouth manner for subsequent small changes in disposable income. While this is intuitively correct, it is also a highly stylized environment. A large omission in the example is risk; perhaps agents will hold excess liquidity and therefore will not find themselves forced to operate hand-to-mouth for small changes in income. The relevant empirical question is whether agents do find themselves constrained in this way. The authors answer this question quite convincingly. They find that the majority (roughly two-thirds) of hand-to-mouth consumers are relatively wealthy.

If a policymaker wished to target transfers to households with a relatively high marginal propensity to consume, the data offer only limited guidance. The poor are clearly prone to be hand-to-mouth, which accords with the traditional view. On the other hand, the wealthy hand-to-mouth look similar to agents with low marginal propensity to consume along many dimensions, such as number of children, presence of unemployed within the household, median income, marital status, and the fraction of income from government benefits. An interesting fact revealed by the paper is that older consumers are not disproportionately hand-to-mouth. This suggests that at least a significant fraction of households save enough that they are not forced into living hand-to-mouth at the time of retirement.

One distinguishing characteristic that does jump out is the loan-to-value ratio in housing. Households with a loan-to-value ratio above one are

disproportionately hand-to-mouth. This is intuitive in the sense that households that are committing a large fraction of disposable income to servicing a mortgage will likely be hand-to-mouth. In terms of policy, this suggests that a temporary suspension or reduction in mortgage payments may have a relatively large impact on expenditures, although the political and legal feasibility of such a policy is questionable.

Another policy suggested by the analysis is to let households tap into illiquid wealth during recessions. For example, reducing or removing penalties for early withdrawal from tax-sheltered retirement accounts may allow the hand-to-mouth to increase spending. In this case, the constrained agents would self-identify, so there need be no concern over accidentally targeting agents with low marginal propensity to consume. However, such a policy must be placed in the context of why retirement accounts are tax preferred in the first place. One motivation frequently put forth is that households have self-control problems and desire a commitment mechanism to force savings. Allowing early withdrawals could then raise the temptation to overspend, leaving retirees without sufficient resources.

In fact, the kink in the budget set in figure 1 can also be motivated by a kink in inter-temporal preferences, as in the quasi-hyperbolic consumers described by David Laibson (1997). For example, suppose at period 0 consumers discount between period 1 and 2 at the rate  $1/R^a$ . However, the period 1 consumer discounts between  $t = 1$  and 2 at the rate  $1 < 1/R^a$ . This leads to a desire to invest in the illiquid asset at time 0 not because of the higher return, but to prevent the period 1 “self” from overconsuming. Both models lead to hand-to-mouth behavior in period 1, but with different welfare implications for policy. Given that the self-control paradigm plausibly suggests markedly different consumption and savings patterns around retirement, I am inclined to agree with the authors that illiquidity is attractive due to the high returns (whether the enjoyment of housing services from home ownership or the reduction in tax burden from tax-deferred accounts) rather than primarily as a commitment device. Nevertheless, even if we subscribe to the self-control view, there seems to be a case for a cyclical adjustment to the liquid-illiquid portfolio mix that favors allowing some early withdrawals in a downturn.

To sum up, this paper argues convincingly that a large fraction of households both are wealthy and have a high marginal propensity to consume. This is a striking fact, and one that is important to guide policies that expand beyond traditional insurance payments. It also opens the door for creative policies that allow the hand-to-mouth consumers to self-select into higher consumption by temporarily opening access to illiquid assets.

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## COMMENT BY

**KAREN PENCE**<sup>1</sup> An extraordinary share of households in the United States and, indeed, in many other advanced economies have very little liquid wealth beyond that necessary to cover day-to-day expenses. The authors of this paper, Greg Kaplan, Giovanni Violante, and Justin Weidner, document this fact by calculating the share of households whose liquid wealth—defined as checking accounts, savings accounts, money market accounts, mutual funds, stocks, and bonds, minus credit card debt—is quite low relative to their monthly incomes. About 30 percent of households in the United States, Canada, the United Kingdom, and Germany, and around 20 percent in Australia, France, Italy, and Spain, have low liquid wealth by this measure.

Perhaps even more surprisingly, around two-thirds of these liquidity-poor or "hand-to-mouth" households have assets. The authors term such households "wealthy hand-to-mouth" (or wealthy HtM). About half of these wealthy HtM households have both home equity and retirement accounts; the other half generally have one or the other. The high prevalence of wealthy HtM households is quite consistent across countries, although differences in public pension systems across countries affect the share with retirement accounts.

The authors suggest that characterizing households by both their wealth and their liquidity might yield a richer and more complete understanding of consumption dynamics. Using data from the Panel Study of Income Dynamics, they show that wealthy HtM households have a high marginal

1. I am grateful to my Federal Reserve colleagues Wendy Dunn, Laura Feiveson, and Claudia Sahm for helpful conversations that shaped my thinking about this paper.

propensity to consume from transitory income shocks. This marginal propensity, in fact, is somewhat higher than that of hand-to-mouth households that are without wealth (labeled “poor HtM”), and it is considerably higher than that of households with both liquidity and wealth (labeled “not hand-to-mouth,” or non-HtM).

The authors also compare the predicted consumption response to an unexpected, one-time lump-sum transfer from three different models: their preferred model, which characterizes households by both liquidity and wealth; a model that characterizes households based only on their wealth; and a model that considers only liquidity. Relative to a model that considers only wealth, their preferred model suggests a much larger consumption response to such transfers, as many households with wealth have little liquidity. Relative to a model that considers only liquidity, their preferred model suggests a smaller consumption response, at least in the case when the transfer payment is large. In such a situation, the wealthy HtM households will prefer to invest some of the payments in their illiquid assets rather than consume them.

To my mind, this paper convincingly demonstrates the existence and empirical importance of the wealthy HtM households. I might quibble with a couple of details regarding the authors’ definition of wealthy HtM—for example, I would subtract required minimum credit card payments rather than credit card debt from the liquid asset measure, and I would count savings bonds as a liquid rather than an illiquid asset. I also wonder how the authors’ findings might change if they included self-employed households in the sample. However, the authors subject their results to an exhaustive battery of robustness tests, and I have no doubt that their conclusions and their data work are correct.

The more interesting questions center on why these wealthy HtM households exist in the first place. The authors sketch out a model in which households have the option to invest in either liquid or illiquid assets. Liquid assets are available for consumption in all periods. Illiquid assets pay higher returns, but cannot be tapped for consumption purposes in some periods (or, if so, only at a high fixed cost). Households that are willing to tolerate larger fluctuations in their consumption are more likely to invest in illiquid assets. Households with a flatter income path are also more interested in illiquid assets, since they place greater value on higher consumption in the future.

Broadly speaking, I can think of three sets of reasons why a strong correlation might exist between wealthy HtM status and high marginal propensities to consume. First, along the lines of the authors’ model, households

might have chosen this portfolio and consumption bundle. An easy case to understand is that of a first-time home purchase. A first-home purchase may require a significant upfront down payment or other expense; a household might prefer to make that investment and curtail its consumption in the short run in order to access the housing consumption services that come with homeownership. Starting a small business might be another such example.

Second, a household might have experienced a large shock, such as job loss or a health emergency, and spent down its liquid financial resources in order to address the shock. In such a case, the relationship between wealthy HtM status and high marginal propensity to consume might stem from the underlying shock rather than the household's portfolio. A third explanation might be that both the wealthy HtM status and the high marginal propensity to consume stem from an underlying characteristic of the household, such as impatience, a lack of financial literacy, or an inability to plan.

All three cases can likely be encompassed in the authors' model with some extensions and a rich-enough parameterization; indeed, a more detailed model presented by Greg Kaplan and Giovanni Violante (2014) allows for shocks. However, assuming that volatile consumption is considered undesirable, the policy implications are different. In the first case, the household is on its optimal consumption path, and there is no rationale for policy intervention, except perhaps to reduce the fixed upfront costs of some types of investments. In the second case, policy attention should focus on ameliorating the underlying shocks rather than addressing the household's portfolio. The third case suggests drawing on some of the lessons of behavioral economics to encourage households to make better saving and spending decisions.

The authors present some characteristics of poor HtM, wealthy HtM, and non-HtM households that provide some clues as to which explanation best describes wealthy HtM status. Not surprisingly, the biggest correlates of wealth—income, education, and age—increase monotonically as one moves from the poor HtM to the wealthy HtM to non-HtM groups, which suggests that the authors have identified three distinct groups. The age-income profile is about the same for both wealthy HtM and non-HtM households, and it is substantially steeper than the profile for poor HtM households. This fact is a bit of a challenge for the “optimal portfolio” explanation, since the authors' model predicts that wealthy HtM households will have flatter income paths. The fraction of households with at least one unemployed member is elevated for wealthy HtM households, with heads older than 45, which I take as evidence of the “shocks” explanation.

**Table 1.** Selected Characteristics of Wealthy and Poor Hand-to-Mouth Households Relative to Non-Hand-to-Mouth Households<sup>a</sup>

<i>Dependent variable</i>	<i>Wealthy hand-to-mouth</i>	<i>Poor hand-to-mouth</i>
Purchased a first home in the previous 2 or 3 years	0.03 (0.01)	-0.07 (0.01)
Has ever declared bankruptcy	0.08 (0.012)	0.06 (0.015)
Considers self “unlucky” in financial affairs	0.10 (0.014)	0.20 (0.02)
Has a short time horizon for financial planning	0.12 (0.015)	0.15 (0.019)
Is unwilling to take any risks with investments	0.08 (0.015)	0.20 (0.018)

a. Each row represents a separate regression. The second and third columns show the coefficients on the wealthy HtM and poor HtM dummy variables. The regression also includes the log of income, dummy variables for 6 age groups, and dummy variables for four levels of educational attainment. The regressions are estimated on pooled data from the 2007 and 2010 Surveys of Consumer Finances.

To enrich this picture further, I used the 2007 and 2010 Survey of Consumer Finances data to relate each household’s hand-to-mouth status to some additional variables: whether the household purchased its first home in the previous 2 or 3 years; has ever declared bankruptcy; has a short-term horizon (several months or less) for financial planning; is unwilling to take any risk with investments; and considers itself unlucky in financial affairs.<sup>2</sup> I estimate these relationships with regressions in which non-HtM household is the omitted category for the variable that describes the household’s HtM status. The regressions include controls for age, education, and income. The standard errors take into account the five replicates provided for each Survey of Consumer Finances observation in order to measure the uncertainty associated with the imputations.

My table 1 shows the results. Wealthy HtM households are 3 percentage points more likely than non-HtM households to have become first-time homebuyers in the previous few years; in contrast, poor HtM households are quite unlikely to be first-time homebuyers (since, by definition, they do not have positive home equity). This finding is consistent with the “optimal portfolio” explanation for wealthy HtM households. However, since first-time homebuyers represent only 6.5 percent of wealthy HtM households, other factors must also be at play for this group.

2. I thank the authors for providing me with their hand-to-mouth variables.

Wealthy HtM households appear to have experienced more negative financial shocks than non-HtM households. Both wealthy and poor HtM households are around 7 percentage points more likely than non-HtM households to have ever declared bankruptcy. Both types of households are also more likely than non-HtM households to describe themselves as “unlucky” in their financial affairs, although poor HtM households perceive themselves to be particularly unlucky. These findings are consistent with the “shocks” explanation.

Finally, both wealthy and poor HtM households are around 13 percentage points more likely than non-HtM households to consider the “next few months” as the most salient time period for planning their household saving and spending decisions. This finding seems inconsistent with the “optimal portfolio” explanation, for under that model wealthy HtM households are willing to forgo consumption in the short run in order to access higher returns in the longer run. However, based on another possible gauge of time horizon—whether households are willing to take any risks with their investments—the groups line up a bit better. Although both wealthy and poor HtM households are less willing than non-HtM households to take any risk with their financial investments, wealthy HtM households appear a bit more willing than poor HtM households to take on some risk.

On net, these findings and the authors’ results suggest to me that negative shocks or the underlying characteristics of the wealthy HtM households are a more likely explanation for their high marginal propensities to consume, rather than these propensities being the outgrowth of a deliberate portfolio choice. However, these are clearly broad-brush findings that raise as many questions as they answer.

In some ways, that is one of the most important contributions of this paper, which thereby furthers a dialogue between two literatures that do not often speak much to each other. Many papers in macroeconomics have established the fact that household consumption responds more strongly to transitory income shocks than the canonical life-cycle model would suggest. Many papers in the household finance literature have established that households appear to make suboptimal decisions with their personal finances. This paper raises the prospect of bridging these two literatures in a way that may lead to a richer understanding of household behavior.

#### REFERENCES FOR THE PENCE COMMENT

Kaplan, Greg, and Giovanni Violante. 2014. “A Model of the Consumption Response to Fiscal Stimulus Payments.” *Econometrica* (forthcoming).



**GENERAL DISCUSSION** Benjamin Friedman mildly objected to the paper's title, specifically to the term "wealthy" as applied to many of the households in the analysis. He pointed to the example, from the paper, of a family with \$50,000 of illiquid wealth, of which \$30,000 was their housing equity and another \$15,000 was in retirement accounts, leaving just \$5,000 for all their other illiquid wealth. Although such households are not living right on the line, it seemed a stretch to speak of them as wealthy.

Justin Wolfers said that he was fine with the authors calling wealthy people wealthy, but not so happy about calling them hand-to-mouth. He noted that they estimated the marginal propensity to consume for the wealthy hand-to-mouth at about 0.3 and for the non-hand-to-mouth at about 0.12, and wondered why the first number was not actually 1.0 if their situation was truly one of living hand-to-mouth.

Gregory Mankiw thought one of the asset categories that the authors describe as liquid might better be described as illiquid, namely direct ownership of stock. Since selling stock that has significant unrealized capital gains involves sizable tax costs, it is like taking money out of a 401(k) and paying the penalties. He also noted that when the authors recalculated to include direct stock as illiquid assets it raised the number of hand-to-mouth households by about 10 percent, which is substantial.

Susan Collins suggested another way to think about wealthy hand-to-mouth households. When people anticipate that their income is likely to grow over time, many will act on the advice that it is best to invest in as much house as they can "now." Initially, they will be overinvested in the house and therefore acting hand-to-mouth, spending all their income, but over time they will transition out of that stage, even though they remain living in the same house. And that might explain the observed pattern of people transitioning in and out of hand-to-mouth status. But other people will not be so lucky—perhaps their income does not grow—and so they become stuck.

Christopher Carroll said he was impressed by the paper. Commenting on the modeling it employed, he argued that it is nearly impossible to construct a quantitative model that uniquely maps from observable variables to how people are distributed across categories of wealth, income, and liquid and illiquid assets, because there are very important kinds of heterogeneity involved that are unmeasured in current data sources. This heterogeneity can be in expected growth rates in income, for example, or in beliefs about future rates of return. People who believe they are going to get a high rate of return on their house are the ones who theory says *should* behave in a hand-to-mouth way with respect to nonhousing assets. Once one permits heterogeneity—even limiting it to the simplest kind, which is heterogeneity

in time preference rates—standard models already generate a substantial amount of heterogeneity in marginal propensities to consume. So working out how to get the distributions right seems to be the next thing that ought to be tackled. Carroll added that the best measure of a household's position might be a ratio of liquid assets to permanent income (as defined by Friedman in 1957).

Katharine Abraham was puzzled by the apparently very high rates of wealthy households transitioning out of hand-to-mouth status. While the discussion about these groups often focuses on their investments in illiquid assets, she noted that they might also have a lot of flexibility to adjust on the margin of what they are spending. They might decide to adjust by cutting back on discretionary consumption expenditures, which allows them to move back out of the hand-to-mouth state.

William Brainard too remarked on what seemed like a serious problem with the authors' transition matrix. He added that the rate of those living *non*-hand-to-mouth—measured by the authors as 70 percent—seemed much too high. He had done his own tabulation of the SCF data and found that the fraction of people with no liquid assets and no debt is roughly half the survey sample, so the authors' criteria, which make it 70 percent, are somehow putting way too many people into the “non” category.

He found discussant Mark Aguiar's comment more persuasive, specifically Aguiar's fissure diagram, which showed a cutoff point at no borrowing and no lending. This means that choices depend on whether returns for illiquid assets are high or low. What is key is that the cost of borrowing is higher than the returns from any investment people are making, so a large number of people will be piled up at the zero borrowing/zero lending point, despite heterogeneous preferences, and they will no longer be on an Euler equation.

It also struck Brainard that the authors' transition rates for wealthy people moving out of hand-to-mouth status were implausible. In his own work he has found many people earning close to \$200,000 a year who seemed to have always been living hand-to-mouth.

Ethan Kaplan was concerned that outliers among households were driving up the average income, skewing the distribution to the right in the data but not in marginal propensities to consume, which are bound on the lower end by zero. Such high-income households would have very low marginal propensities to consume, but that would not be reflected in the results because the distribution does not skew to the left. He thought it would therefore be interesting to see semi-parametric plots broken down by marginal propensity to consume, by income, for both wealthy and non-wealthy households. He also wondered if there might have been some

differential measurement error in the two groups, potentially due to differences in education between them, which could have attenuated the estimated MPCs for the low wealth group.

Michael Klein raised a political issue. He observed that stimulus efforts targeted at the wealthy hand-to-mouth might come up against the same public resentment one sees in discussions of mortgage relief, based on the notion that individuals who purchased homes too big for their incomes got themselves in trouble. Whether those problems were actually homebuyers' own fault or not, the government response will stir up a lot of political resentment, even though the wealthy hand-to-mouth population the authors examine is not "wealthy" in the vernacular sense. He added that an important policy answer in stimulus efforts is the extension of unemployment insurance, which he felt is much more effective in achieving a high marginal propensity to consume than trying to identify and then targeting the wealthy hand-to-mouth.

Alan Blinder was skeptical about the empirical basis of the authors' argument, which he felt rested too heavily on the assumption that the rate of return on illiquid assets was substantially higher than on liquid assets, especially once they are risk-adjusted. Noting that most of the illiquid investment in the authors' data is in housing, he reminded everyone of Robert Shiller's view that housing is not a particularly stellar long-term investment. He also had a question for the authors: What was their rationale for excluding capital income, such as interest in dividends, given that such an approach selects for people who have previously saved versus those who have not.

Responding to Blinder's remarks, Kaplan pointed out that they did try to measure all the returns on housing, and found that the vast majority of them came from an imputed service flow. Violante added that the calibrated financial return on housing was about 2 percent per year.

Blinder then raised an additional point that Mark Aguilar's comment had led him to consider, namely that hyperbolic discounting might provide an alternative hypothesis that would lead to the same outcomes. He mentioned a recent lecture by David Laibson summarizing experiments in which actual money was at stake and which demonstrated that people are willing to pay gigantic amounts to constrain themselves, to create illiquidity in their portfolios rather than liquidity, because they are dealing with the challenge of self-control.

William Brainard spoke up a second time to point out that the definition of when one is liquidity-constrained comes from the Baumol-Tobin within-payment-period calculation, and that is not going to be an iron rule. In fact, it is easier to have a model with a small buffer stop, even for people in this general category. Although the authors report that most of their results do

not depend on moving that boundary, he said he is not convinced by the number they arrive at and would like to know whether the persistence is very sensitive to size. He also noted that it takes time and cost to convert illiquid assets into liquid assets, so restoring one's buffer stock with assets that one originally expected to hold for the future is a consideration.

David Romer noted first that he found the paper very impressive, echoing discussant Karen Pence's comment that the amount of data and work invested in it were remarkable. Nevertheless, he found himself less than fully convinced, for two reasons. First, he felt it is much too difficult to identify what margins people have simply by looking at their portfolios. He offered some introspective examples of how people judge margins in ways that might not have been picked up by the authors' model: people will hold a bill in their desk drawer for a month if it does not have a penalty on it, or they will borrow from a supply of cash in their child's piggy bank or from their parents, or they will run up their credit card debt and pay it off at the end of the month.

The second reason he was not completely convinced, he said, was that the paper viewed everything through the lens of beautiful intra-temporal optimization—but that is not how people behave in the real world. People follow rules of thumb. As Pence put it in her comment, people do very stupid things. In short, while Romer believed there were wealthy hand-to-mouth people, he was not sure this model was the right one, and his suggestion for the authors' next paper on the subject was for them to talk to regular people, something that Annamaria Lusardi and her coauthors have done. Specifically, one could find people whose profiles matched the model and ask them something like, "If you got hit with an extra expense of \$500, what would you actually do?" And then one could follow up with the question, "What if you got a windfall of \$500—what would you do?" He suspected there are many people who would find a way to deal with a \$500 cost without too much trouble but would still spend all of the \$500 on something fun because they follow the rules of thumb.

Giovanni Violante responded first to discussant Mark Aguiar's point about the hyperbolic discount. He noted that the paper employs a model based on rational and consistent behavior, and observed portfolios do bear this out. But he and his coauthors did not exclude the possibility of other reasons leading to the same portfolio configuration. Considering hyperbolic discounting would actually make it easier to obtain wealthy hand-to-mouth agents in the model, because illiquidity clearly protects hyperbolic agents from indulging in consumption splurges and offers an additional reason why households may want to hold wealth in illiquid form. In response to Romer's suggestion about exploring what people might do with an unexpected \$500,

he mentioned the survey work of Matthew Shapiro and Joel Slemrod, who already found that the fraction of people who spent their tax rebates and fiscal stimulus payments lined up well with the estimates of David Johnson, Jonathan Parker, and Nicholas Souleles in their studies of the 2001 tax rebate and the 2008 fiscal stimulus payment.

Turning to discussant Karen Pence's question whether the portfolio configurations were due to choice or "luck," he observed that the model is deterministic, and so the portfolios are determined by choice. However, he added that the more general model that he and Greg Kaplan developed is a stochastic life-cycle model with income shocks, so it therefore models a combination of optimal choices and luck. He added that if households were facing very frequent transitory shocks, they would probably hold a lot of liquid wealth. A more likely scenario, instead, is that they may be more worried about rare unemployment shocks, which tend to have long-term, persistent implications for earnings, and elect to use illiquid assets as a way to smooth them, basically making them liquid by paying a transaction cost when hit by the shock. Concerning a question about excluding directly held stock from liquid wealth, he said the reason the number of poor hand-to-mouth falls so quickly is that they get switched into the wealthy hand-to-mouth category when stock dividends begin to rise again, even though they remain hand-to-mouth.

Violante agreed strongly with Carroll's point that a stochastic life-cycle model, to be accurate, requires good matching of the joint distribution of liquid wealth, illiquid wealth and income. The key challenge is replicating the upper tail of the wealth distribution, and in that respect he agreed that one needs heterogeneity, such as heterogeneity in impatience. But he also felt that the upper tail is not as crucial to model well as the lower tail, given the issues they are seeking to understand, and in that area he remains satisfied with the paper's success.

Regarding the transition matrix, Violante admitted that the implied recorded distribution from the transition did not match what he and the coauthors had estimated, and they were still exploring the reasons. He found Abraham's suggestion that the wealthy hand-to-mouth might transition quickly by forgoing some of their discretionary spending to be a worthwhile hypothesis.

Referring to Brainard's doubts that the paper's estimate of the portion of the population living hand-to-mouth as 30 percent was high enough, Violante clarified that this was only a lower bound. In his view, even if 50 percent of households are at a kink in the budget constraint, the vast majority of them could still smooth their consumption in the face of a large shock by liquidating their illiquid wealth in some manner or another.

