

Habit Formation in Consumer Preferences: Evidence from Panel Data

By KAREN E. DYNAN*

This paper tests for the presence of habit formation using household data. A simple model of habit formation implies a condition relating the strength of habits to the evolution of consumption over time. When the condition is estimated with food consumption data from the Panel Study on Income Dynamics (PSID), the results yield no evidence of habit formation at the annual frequency. This finding is robust to a number of changes in the specification. It also holds for several proxies for nondurables and services consumption created by combining PSID variables with weights estimated from Consumer Expenditure Survey data. (JEL D12, D91, E21)

In the past two decades, many studies have used household panel data on consumption to examine behavior when preferences are assumed to be time separable.¹ More recently, there has been growing interest in the implications of preferences that are not time separable, and several papers (discussed below) have used aggregate consumption data to look for evidence of such preferences. This paper builds on previous work by testing the time separability of preferences with household panel data.

The paper focuses on a specific class of time-nonseparable preferences: those exhibiting habit formation. With habit formation, current utility depends not only on current expenditures, but also on a “habit stock” formed by lagged expenditures. For a given level of current expenditure, a larger habit stock lowers utility.

Among its potentially important empirical implications, habit formation causes consumers

to adjust slowly to shocks to permanent income. Thus, it can, in principle, explain the “excess” smoothness of aggregate consumption documented by John Y. Campbell and Angus S. Deaton (1989), as well as by Christopher D. Carroll and David N. Weil’s (1994) finding that periods of high aggregate income growth are followed by periods of high aggregate saving. In addition, because habits increase the disutility associated with large declines in consumption, they may provide a partial solution to the equity premium puzzle (Andrew B. Abel, 1990; George M. Constantinides, 1990; Campbell and John H. Cochrane, 1999).

Past studies of time-nonseparable preferences based on aggregate consumption data yield mixed conclusions about the strength of habit formation. Kenneth B. Dunn and Kenneth J. Singleton (1986), Martin S. Eichenbaum et al. (1988), and John Heaton (1993) find very little evidence of habit formation in U.S. aggregate monthly consumption data, and John Muellbauer (1988) produces similar results with U.S. quarterly consumption data. In contrast, Wayne E. Ferson and Constantinides (1991) find large and statistically significant amounts of habit formation in monthly, quarterly, and annual U.S. consumption data, and Phillip A. Braun et al. (1993) find some habit formation in aggregate Japanese consumption.² These widely varying conclusions stem

* Federal Reserve Board, Washington, DC 20551 (e-mail: kdynan@frb.gov). I thank Susanto Basu, Darrel Cohen, Greg Duffee, Doug Elmendorf, John Leahy, Greg Mankiw, Cecilia Rouse, Jonathan Skinner, Bill Wascher, Philippe Weil, the members of the Harvard macro lunch group, seminar participants at Brown University and Johns Hopkins University, and the anonymous referees for helpful comments and suggestions. The views expressed are those of the author and not necessarily those of the Board of Governors or its staff.

¹ Early examples include Robert E. Hall and Frederic S. Mishkin (1982), who test the permanent income hypothesis, Matthew D. Shapiro (1984), who estimates the intertemporal elasticity of substitution, and Stephen P. Zeldes (1989), who tests for the presence of liquidity constraints.

² Cross-sectional demand studies such as Dale Heien and Cathy Durham (1991) typically estimate a large habit-formation parameter, but Muellbauer explains that this is

from differences in the estimated first-order conditions, data, and instruments.

Moreover, all studies of time-nonseparable preferences based on aggregate data face a common problem: Their conclusions hinge on the serial correlation of aggregate consumption growth, which is appreciably influenced by a number of factors unrelated to preferences. For example, some studies overlook the positive serial correlation induced by the time averaging of aggregate data (Holbrook Working, 1960). Aggregation across individuals could also lead to positive serial correlation: Jordi Galí (1990) and Richard H. Clarida (1991) show that aggregate consumption will be smoother than individual consumption if agents have finite lives, and Marvin Goodfriend (1992) and Jörn-Steffen Pischke (1995) show that aggregate consumption will be smoothed when individuals have imperfect information about aggregate income shocks. Data construction methods may also smooth aggregate consumption growth. For example, housing services, which represent about 15 percent of total personal consumption expenditures (PCE) in the National Income and Product Accounts, are estimated using annual data on the housing stock that are converted to a quarterly frequency largely through interpolation. Further, David W. Wilcox (1992) shows that the rotating panels of retail sales data that were the basis of PCE for goods until 1997 lead to positively serially correlated sampling error.

This paper uses household data to examine a simple life-cycle consumption model with preferences that exhibit habit formation. The model demonstrates that the correlation between current and lagged consumption growth reflects the strength of habit formation. I estimate the model's first-order condition with annual observations of food expenditures from the *Panel Study*

on *Income Dynamics* (PSID). These data are probably far less influenced by the factors that distort the serial correlation of aggregate data.

Fumio Hayashi (1985) tests the time separability of preferences by looking for durability in a four-quarter panel of expenditures by Japanese households. His first-order condition is similar to one based on habit formation, except that durability has essentially the opposite effect on utility and the dynamics of consumption. Hayashi's focus on durability seems appropriate given the relatively high frequency of his panel and the durable nature of many of the categories of consumption studied. In contrast, the annual frequency of the PSID observations and the nondurability of food spending imply that these data better lend themselves to a study of habit formation.³

My estimation results yield no evidence of habit formation at the annual frequency. Indeed, they indicate that habit formation has at most an extremely limited influence on consumers' behavior. This finding is robust to a number of changes in the specification, and it holds for several proxies for nondurables and services consumption that are created by combining selected PSID variables related to consumption with weights estimated from *Consumer Expenditure Survey* (CEX) data.

I. The Model

Household i chooses current consumption expenditure, $c_{i,t}$, to maximize

$$(1) \quad E_t \left[\sum_{s=0}^T \beta^s u(\tilde{c}_{i,t+s}; \psi_{i,t+s}) \right],$$

where E_t represents the expectation conditional on all information at time t , $\tilde{c}_{i,t}$ is consumption services in period t , β is a time discount factor, and $\psi_{i,t}$ corresponds to "taste-shifters"—variables that move marginal utility—at time t . Consumption services in period t are positively related to current expenditure and negatively related to lagged expenditure:

not strong evidence of rational habit-forming consumers. The findings may well be due to "myopic" habit-forming consumers (Hendrik S. Houthakker and Lester D. Taylor, 1970), who receive disutility in the current period from past consumption, but are unaware that current consumption will yield reductions in future utility. While myopic habit formation produces large estimated habit effects in a cross-sectional context, it has almost no effect on the time-series behavior of consumption. This paper considers only "rational" habit formation under which consumers understand the full implications of their current consumption decisions (Frans Spinnewyn, 1981).

³ Food consumption is arguably durable in the sense that a meal at a good restaurant might yield lasting psychological benefits; however, such an effect seems unlikely to persist more than a few months.

$$(2) \quad \tilde{c}_{i,t} = c_{i,t} - \alpha c_{i,t-1}.$$

The parameter α measures the strength of habit formation; when α is larger, the consumer receives less lifetime utility from a given amount of expenditure.⁴

The first-order condition for the household's optimization problem is:

$$(3) \quad E_t[MU_{i,t} - \alpha \beta MU_{i,t+1}] \\ = E_t[(1 + r_{i,t+1}) \beta MU_{i,t+1} \\ - (1 + r_{i,t+1}) \alpha \beta^2 MU_{i,t+2}],$$

where $r_{i,t+1}$ is the rate of return to saving available to household i between periods t and $t + 1$, and $MU_{i,t}$ represents the partial derivative of current utility with respect to current consumption services: $MU_{i,t} = \partial u(\tilde{c}_{i,t}) / \partial \tilde{c}_{i,t}$. The left-hand side of condition (3) is the net marginal cost of forgoing one unit of consumption expenditure in period t . Utility in period t decreases (a positive cost) and utility in period $t + 1$ increases (a negative cost) because the habit stock in $t + 1$ is lower. The right-hand side represents the net marginal benefit of increasing consumption expenditure by $(1 + r_{i,t+1})$ units in period $t + 1$. Utility in period $t + 1$ increases, whereas utility in period $t + 2$ decreases because the habit stock is higher.

I simplify condition (3) for the purposes of estimation. One motivation for doing so is that measurement error requires the use of instrumental variables, and the limited number of instruments available in household data are unlikely to capture the nonlinearity in equation (3) well enough to produce convincing estimates of α .⁵ More important, a number of special problems arise when estimating consumption Euler equations with household data, and the solutions pro-

vided by the existing literature are designed for linear equations.

Hayashi (1985) provides a simplification of the first-order condition when preferences are time nonseparable. As shown in Appendix A, if T is large and interest rates are constant, condition (3) can be reduced to:

$$(4) \quad E_t \left[(1 + r) \beta \frac{MU_{i,t+1}}{MU_{i,t}} \right] = 1.$$

This equation implies:

$$(5) \quad (1 + r) \beta \frac{MU_{i,t}}{MU_{i,t-1}} = 1 + \varepsilon_{i,t},$$

where $\varepsilon_{i,t}$ is household i 's expectational error which reflects innovations to permanent income. If households have rational expectations, $E_{t-1}[\varepsilon_{i,t}] = 0$ and the $\varepsilon_{i,t}$'s are serially uncorrelated.

Now, assume that the utility function is of the following isoelastic form:

$$(6) \quad u(\tilde{c}_{i,t}; \psi_{i,t}) = \psi_{i,t} \frac{\tilde{c}_{i,t}^{1-\rho}}{1-\rho}.$$

In this case, the derivative of utility with respect to consumption services, $\tilde{c}$, is $MU_{i,t} = \psi_{i,t} \tilde{c}_{i,t}^{-\rho}$, so that condition (5) may be rearranged as:

$$(7) \quad (1 + r) \beta \frac{\psi_{i,t}}{\psi_{i,t-1}} \left(\frac{\tilde{c}_{i,t}}{\tilde{c}_{i,t-1}} \right)^{-\rho} = 1 + \varepsilon_{i,t}.$$

Taking the natural logarithm of (7) and using equation (2) to substitute for $\tilde{c}$ yields:

$$(8) \quad \Delta \ln(c_{i,t} - \alpha c_{i,t-1}) \\ = \frac{1}{\rho} [\ln(1 + r) + \ln(\beta)] \\ + \frac{1}{\rho} \Delta \ln(\psi_{i,t}) - \frac{1}{\rho} \ln(1 + \varepsilon_{i,t}).$$

If utility is time separable— α equals 0—equation (8) reduces to the familiar case where

⁴ Deaton (1992) shows that this formulation is a special case of a more elaborate model in which the habit stock depends on its own lagged values in addition to lagged consumption expenditure. With these added features, the coefficient on lagged expenditure reflects both the habit stock's influence on current utility and the rate at which the habit stock depreciates over time.

⁵ Ferson and Constantinides (1991) and Braun et al. (1993) estimate equations similar to (3), but these studies are based on aggregate data where a large set of financial variables are available as instruments.

the growth in consumption depends on the time discount factor, the real interest rate, taste shocks, and the forecast error.

Following Muellbauer (1988), I approximate $\Delta \ln(c_{i,t} - \alpha c_{i,t-1})$ with $(\Delta \ln c_{i,t} - \alpha \Delta \ln c_{i,t-1})$ and rewrite equation (8) as:

$$(9) \quad \Delta \ln(c_{i,t}) = \gamma_0 + \alpha \Delta \ln(c_{i,t-1}) \\ + \gamma_1 \Delta \ln(\psi_{i,t}) + e_{i,t},$$

where γ_0 and γ_1 are constants and $e_{i,t}$ is an error term with mean zero.⁶ The correlation between the exact expression and the approximation in my baseline sample of PSID food spending data is quite high for moderate values of α suggesting both that the approximation holds well for true consumption *and* that it is valid given the measurement error in the data. For observations where the exact expression is defined, the correlation is 0.98 when α equals 0.3, 0.92 when α equals 0.5, and 0.82 when α equals 0.9.⁷ Furthermore, the approximation and the exact expression appear to have similar serial correlation properties, with the gap between their respective first-order autocorrelation coefficients at most around 0.05.

The habit-formation model predicts $\alpha > 0$ in equation (9), with its magnitude reflecting the fraction of past expenditures that make up the habit stock and indicating the importance of habit formation in behavior.⁸ More intuitively, the equation shows that habit formation creates a positive link between current and lagged expenditure growth, which stems from consumers' gradual adjustment to permanent income shocks. In contrast to traditional models in

which consumption adjusts immediately to permanent income innovations, habits cause consumers to prefer a number of small consumption changes to one large consumption change. Because equation (9) captures this fundamental dynamic of habit formation, the estimation results in this paper will not only serve as a test of this particular model, but will also provide evidence regarding the general importance of habit formation.

II. The Data

I estimate the Euler equation (9) using data from the PSID, which contains annual information about the income, employment, and demographic characteristics of individual households beginning in 1968. The PSID has limited consumption data, and I follow a substantial body of literature in using food expenditures to explore consumer behavior [e.g., Hall and Mishkin (1982), Zeldes (1989), Emily C. Lawrance (1991), and David E. Runkle (1991)] under the assumption that utility is separable in food and other types of expenditures. The PSID food measure includes outlays at restaurants, which presumably share many traits with other categories of consumption, such as responsiveness to shocks to permanent income.⁹

To check the robustness of the basic results, I estimate equation (9) with several proxies for growth in nondurables and services consumption. Jonathan Skinner (1987) highlights a handful of PSID variables besides food expenditures that are related to household consumption: the market value of owned homes, rent payments, the number of automobiles, and utility payments. Building on Skinner's work, I estimate the relationship between growth in consumption of nondurables and services and growth of these variables (in various combinations) using data from the 1985 *Consumer Expenditure Survey*. I then apply the estimated coefficients to the relevant PSID variables to create proxies for nondurables and services spending growth. This procedure is described in more detail in Appendix B.

⁶ Although γ_0 is a function of the real interest rate, the time discount factor, and forecast error variance, most Euler equation analyses with household data have assumed these terms constant across households and time periods. The validity of these assumptions will be explored in the empirical section.

⁷ The exact expression is defined for all observations when α is 0.3 or smaller. However, sharp drops in measured consumption make it undefined for 5 percent of the sample when α equals 0.5, for 23 percent when α equals 0.7, and for 61 percent when α equals 0.9.

⁸ This assumes expenditures are completely nondurable at the annual frequency. Section V takes up the issue of durability.

⁹ On the other hand, John Shea (1994) presents evidence that the behavior of aggregate food consumption differs in certain aspects from that of aggregate consumption of other goods.

The baseline sample contains 3,153 households, each with as many as 13 observations on food expenditure growth. Although the PSID began in 1968 and continues today, the sample uses spending data only from the period 1974 through 1987 because of interpretation problems in the early years and the suspension of the food questions in 1987. As discussed in Appendix B, I eliminate certain households and observations because of data reliability problems and other issues.

III. Estimation Issues

A. Time Averaging

Some previous empirical studies of time-nonseparable utility have emphasized that positive first-order serial correlation of changes in consumption may reflect the time averaging of data rather than habit formation (Lawrence J. Christiano et al., 1991; Heaton, 1993). As shown first by Working (1960), the first difference of a time-averaged random walk will have a first-order autocorrelation coefficient that approaches 0.25 as the period of observation becomes large relative to the decision interval.

PSID food spending is likely less affected by time averaging than aggregate spending because it is closer to annual observations of food consumption over a short period than annual averages of food consumption. Data on food consumption at home are based on the question: "How much do you (or anyone else in your family) spend on food that you use at home in an average week?" Assuming that respondents answer on the basis of their typical consumption over a relatively recent time frame—say the past month—the time-series properties will be similar to those of a monthly average taken once per year. (The fact that respondents are asked to normalize spending to a one-week period is irrelevant.) If decisions are made every day (with variance σ^2), the first-order serial correlation of the first difference of a (30-day) monthly average x observed once per year will be:

$$(10) \quad \frac{E(\Delta x \Delta x_{-1})}{E(\Delta x^2)}$$

$$\begin{aligned} &= \left(\left(\sum_{i=1}^{29} (29 - i - 1) * i \right) \sigma^2 \right) \\ &\quad \div \left(\left((336 * 30^2) + 2 \sum_{i=1}^{29} i^2 \right) \sigma^2 \right) \\ &= 0.014. \end{aligned}$$

Of course, if respondents are literally reporting average expenditures for the past year, the autocorrelation coefficient will be in the range emphasized by Working (1960), and the estimates of habit formation will be biased substantially upward.¹⁰

B. Measurement Error

Food expenditures are notoriously poorly measured in the PSID, which induces a strong negative correlation in measured consumption changes. To allow for measurement error in the empirical model, let

$$(11) \quad \ln(c_{i,t}^*) = \ln(c_{i,t}) + \nu_{i,t},$$

where $c_{i,t}^*$ represents the observed value of consumption expenditure, $c_{i,t}$ is the true value of consumption expenditure, and $\nu_{i,t}$ is measurement error. Equation (9) then implies:

$$(12) \quad \begin{aligned} \Delta \ln(c_{i,t}^*) &= \gamma_0 + \alpha \Delta \ln(c_{i,t-1}^*) \\ &\quad + \gamma_1 \Delta \ln(\psi_{i,t}) + z_{i,t}, \end{aligned}$$

where

$$(13) \quad \begin{aligned} z_{i,t} &= e_{i,t} + \nu_{i,t} \\ &\quad - (1 + \alpha) \nu_{i,t-1} + \alpha \nu_{i,t-2}. \end{aligned}$$

¹⁰ Most of the additional series used to construct the proxies for nondurables and services spending growth also pertain to short time periods: current month's rent and snapshots of house value and vehicles at the time of the interview.

Since $\Delta \ln(c_{i,t-1}^*) = \Delta \ln(c_{i,t-1}) + \nu_{i,t-1} - \nu_{i,t-2}$, it is correlated with $z_{i,t}$ and ordinary least squares will produce inconsistent estimates of α . One can avoid the bias by estimating the Euler equation using instruments for lagged consumption growth. Because of the MA(2) error structure, I use Lars Peter Hansen's (1982) Generalized Method of Moments (GMM) to produce consistent and efficient estimates of α .¹¹

Good instruments will be correlated with lagged growth in true consumption but uncorrelated with $z_{i,t}$, which reflects a forecast error and shocks to preferences, as well as measurement error.¹² My baseline set of instruments includes three types of variables. First, I use dummy variables for ranges of lagged growth in real household money income. The dummies prevent extreme outliers from having undue influence on the regression results and allow for a nonlinear relationship between lagged income growth and lagged consumption growth. Second, I use dummy variables for ranges of lagged growth in total annual hours worked by family members. Third, I use a dummy for whether the head lost his or her job involuntarily during the previous period; Cochrane (1991) showed this variable to have a significant negative relationship with consumption growth. As a check on the robustness of the results, I include additional instruments in some specifications—lagged hours of work missed by the head and spouse because of illness (their own or that of family members), and the lagged ratio of lump-sum receipts to money income.¹³

¹¹ Gary Chamberlain (1984) shows that if the optimal weighting matrix [which takes the MA(2) error structure into account] is used, the GMM estimator is efficient within the class of estimators that uses only conditional moment restrictions.

¹² Although the second lag of consumption growth has a lot of predictive power for the first lag, Ferson and Constantinides (1991) point out that measurement error will lead it to be correlated with the error term.

¹³ As discussed in Appendix B, growth in food expenditures in year t represents the difference between spending in the spring of $t - 1$ and that in the spring of t . The period covered by growth in income in $t - 1$ overlaps this period, as it is the difference between the annual average in $t - 2$ and that in $t - 1$. As a result, the first lag of income growth is correlated with the error term in the first-order condition and is unsuitable as an instrument. Thus, I calculate the income dummies using growth in income in $t - 2$. The

TABLE 1—FIRST-STAGE RESULTS

Instrument	Coefficient	(Standard error)
Lagged money income		
growth rate		
$-50 < \Delta y \leq -25$	1.614	(1.056)
$-25 < \Delta y \leq -10$	1.419	(1.000)
$-10 < \Delta y \leq 0$	3.538	(0.971)
$0 < \Delta y \leq 10$	4.654	(0.975)
$10 < \Delta y \leq 25$	5.406	(1.002)
$25 < \Delta y \leq 50$	7.422	(1.084)
$50 < \Delta y$	9.648	(1.211)
Lagged hours growth rate		
$-50 < \Delta hours \leq -25$	1.798	(0.985)
$-25 < \Delta hours \leq -10$	0.525	(0.921)
$-10 < \Delta hours \leq 0$	2.347	(0.812)
$0 < \Delta hours \leq 10$	1.899	(0.898)
$10 < \Delta hours \leq 25$	1.794	(0.937)
$25 < \Delta hours \leq 50$	2.595	(1.016)
$50 < \Delta hours$	3.722	(1.060)
Lagged head involuntarily lost job	-7.170	(2.050)
Partial R^2	0.011	
F-test of excluded instruments (p -value)	15.07	(0.00)
Number of observations	27,188	

Notes: The dependent variable is lagged growth in food expenditure. The independent variables not shown are growth in family size, year dummies, and demographic dummies. The income dummies and the hours dummies are significant as groups at the 1-percent level or better.

Table 1 presents first-stage results for a typical specification.¹⁴ The estimated coefficients are significant (as groups) and not unreasonable: Larger changes in income and hours are generally associated with higher consumption growth, and involuntary loss of employment reduces consumption growth. The partial R^2 statistic—defined in this case as the R^2 from a regression of $\Delta c_{i,t-1}^*$ on the instruments after partialling out the taste-shifters, time dummies, and demographic variables—is 0.011, indicating that the excluded instruments explain only a small fraction of the variance in lagged expenditure growth. This result is not surprising given that

hours growth dummies, the illness variables, and the lump-sum receipt variables are all based on twice-lagged data for similar reasons.

¹⁴ This specification uses the baseline set of instruments and includes year dummies and demographic variables in both stages. The first-stage results are fairly similar across specifications.

much of the variation in reported spending growth stems from measurement error. The table also shows the F -statistic for a test of the hypothesis that the coefficients on the excluded instruments are zero. Douglas Staiger and James H. Stock (1997) stress the importance of examining this statistic, as conventional asymptotic results may break down when the partial correlation between the instruments and the endogenous regressor is weak.¹⁵ In this case, the F -statistic for the excluded instruments is 15—well outside of the problematic range. Low instrument relevance also does not appear to be a significant issue for any of the alternative specifications used in this paper; the tables that follow include the F -statistics for the excluded instruments in each case.

C. Additional Explanatory Variables

Following previous authors, I include as taste-shifters in the estimated Euler equation the age of head, age-squared, and growth in the number of adult male equivalents in the household. All specifications also include time dummies to ensure that aggregate shocks do not lead to inconsistent parameter estimates in the relatively short PSID panel (Chamberlain, 1984; Randall P. Mariger and Kathryn Shaw, 1993). In addition, I use extra demographic variables in some specifications to control for possible household-specific effects such as differences in time preference rates across socioeconomic groups (Lawrence, 1991).¹⁶

Finally, I include the real after-tax interest rate in one specification. Following Shapiro (1984), I construct a measure of the *ex post* return to saving that varies across households (owing to differences in marginal tax rates) and also over time. Because the variable is unknown in period t and thus likely to be correlated with the forecast error, I instrument for it with two of its lags. Equation (12) does not allow for a strict

interpretation of this coefficient because the derivation assumed a constant real interest rate, but the relationship between the real interest rate and consumption growth should be closely related to the intertemporal elasticity of substitution.¹⁷

IV. Findings

Table 2 presents the basic GMM results when the dependent variable is growth of food expenditure. All specifications in this table use the baseline set of instruments—the dummies for income growth, the dummies for hours growth, and the dummy for involuntary loss of employment.

When no other variables are added to the specification [column (1)], the point estimate of α is -0.039 , with a standard error of 0.069 . Thus, there is no evidence of significant habit formation in food consumption. The coefficient on growth in family size is positive, as expected, and highly significant. The significant negative coefficient on age and the positive (albeit insignificant) coefficient on age-squared are consistent with the “hump-shaped” age-consumption profile that has been documented in studies such as Carroll and Lawrence H. Summers (1991). The year dummies are highly significant; one can easily reject the hypothesis that aggregate shocks are not present. Finally, the p -value for the test of the overidentifying restriction is 0.45 , providing no evidence of a significant correlation between the instruments and the error term in the second stage.¹⁸

¹⁷ The coefficient on $\ln(1 + r)$ equals $(1 - \alpha + \alpha g)/(\rho(1 + \alpha g))$, where g is the average growth rate of consumption across households. This coefficient increases as the strength of habit formation declines, reaching $1/\rho$ (the intertemporal elasticity of substitution) with time-separable preferences.

¹⁸ This test is standard in the literature. As Hansen (1982) shows, under the null hypothesis that the instruments are orthogonal to the error term, the product of the minimized value of the objective function and the number of observations (often called the J -statistic) has a chi-squared distribution with degrees of freedom equal to the number of instruments minus the number of estimated parameters. A rejection of the null hypothesis indicates that one or more of the instruments is correlated with the forecast error (a violation of rational expectations) or with the measurement error.

¹⁵ A number of other recent studies also address this point, including Charles Nelson and Richard Startz (1990) and John Bound et al. (1995).

¹⁶ I repeated Runkle's (1991) tests for household-specific effects that are not associated with observable variables and confirmed his conclusion that they are unimportant.

TABLE 2—GROWTH OF FOOD EXPENDITURE: BASIC RESULTS

	(1)	(2)	(3)
First-stage results: ^a			
Partial R^2	0.012	0.011	0.010
F -test of excluded instruments ^b	15.40 (0.00)	15.07 (0.00)	10.57 (0.00)
Second-stage results: ^c			
Δc_{-1}	-0.039 (0.069)	-0.046 (0.070)	-0.038 (0.078)
$\Delta family\ size$	0.385 (0.017)	0.383 (0.017)	0.386 (0.019)
age	-0.187 (0.061)	-0.217 (0.063)	-0.205 (0.074)
$age^2/1000$	0.923 (0.565)	1.278 (0.588)	0.975 (0.707)
$white$	—	1.746 (0.558)	1.354 (0.618)
$female$	—	-1.447 (0.475)	-1.579 (0.542)
$\ln(1 + r)$	—	—	0.536 (0.190)
joint significance of year dummies (p -value)	0.00	0.00	0.00
Test of overidentifying restrictions (p -value)	0.45	0.47	0.22
Number of observations	27,188	27,188	22,899
95-percent confidence interval for habit-formation parameter	(-0.18, 0.10)	(-0.19, 0.09)	(-0.19, 0.12)

^a Excluded instruments are dummies for ranges of lagged money income growth, dummies for ranges of lagged hours growth, and a dummy for whether head lost job in previous period.

^b p -values are in parentheses.

^c Standard errors are in parentheses.

The remaining columns of the table examine variations in the specification. Column (2) adds race and sex variables. Consistent with Lawrance's (1991) findings, the estimates suggest that white households have significantly higher rates of consumption growth and that female-headed households have significantly lower rates of consumption growth. Column (3) includes the real after-tax interest rate. Its estimated coefficient is 0.536 with a standard error of 0.190. This estimate is fairly large compared with the values of the intertemporal elasticity of substitution generally produced by studies of aggregate data (e.g., Hall, 1988), but in line with the range found by many researchers who have used household data (Zeldes, 1989; Lawrance, 1991; Runkle, 1991).

These variations have no material effect on the findings regarding habit formation. The estimated coefficient on lagged consumption growth is small and negative in

each case, with a small standard error. As shown in the last row of the table, the upper end of the 95-percent confidence interval is around 0.1 in all cases, implying that habit formation in food consumption is quite weak at best.

Table 3 presents the results when the specification including year dummies and demographic variables (but not the interest rate) is estimated with different instrument sets. The first column repeats column (2) of Table 2, where α is estimated to be -0.046 with a standard error of 0.070. Instrumenting with the income dummies alone—column (2)—or the hours dummies alone—column (3)—has little effect on the results. The point estimate of α jumps up when the lost job dummy is used alone—column (4)—but remains insignificant because of a huge increase in the standard error. This loss of precision is unsurprising given that the partial R -squared statistic from the first-stage regression is only

TABLE 3—GROWTH OF FOOD EXPENDITURE: ALTERNATIVE INSTRUMENT SETS

	(1)	(2)	(3)	(4)	(5)	(6)
Instruments:						
Money income growth	x	x			x	x
Hours growth	x		x		x	x
Lost job involuntarily	x			x	x	x
Lump-sum receipts					x	x
Illness						x
First-stage results:						
Partial R^2	0.011	0.010	0.006	0.003	0.011	0.011
F -test of excluded instruments ^a	15.07 (0.00)	27.58 (0.00)	12.73 (0.00)	15.08 (0.00)	12.00 (0.00)	9.47 (0.00)
Second-stage results: ^b						
Δc_{-1}	-0.046 (0.070)	-0.085 (0.076)	-0.096 (0.109)	0.633 (0.380)	-0.058 (0.069)	-0.054 (0.070)
$\Delta family\ size$	0.383 (0.017)	0.382 (0.017)	0.382 (0.017)	0.387 (0.021)	0.384 (0.017)	0.385 (0.018)
age	-0.217 (0.063)	-0.233 (0.065)	-0.238 (0.072)	0.052 (0.165)	-0.221 (0.063)	-0.225 (0.064)
$age^2/1000$	1.278 (0.588)	1.399 (0.597)	1.433 (0.643)	-0.662 (1.263)	1.305 (0.588)	1.359 (0.602)
Test of overidentifying restrictions (p -value)	0.47	0.91	0.59	0.99	0.25	0.05
Number of observations	27,188	27,188	27,188	27,188	27,188	25,052
95-percent confidence interval for habit-formation parameter	(-0.19, 0.09)	(-0.24, 0.07)	(-0.31, 0.12)	(-0.13, 1.39)	(-0.20, 0.08)	(-0.19, 0.09)

^a p -values are in parentheses.

^b All specifications also include year dummies, a dummy for white head of household, and a dummy for female head of household. Standard errors are in parentheses.

one-quarter as large as the baseline case. Finally, columns (5) and (6) show little change in the results when the baseline instrument set is augmented with dummies for the ranges of the ratio of lump-sum receipts divided by total money income and variables indicating hours of work lost by the head and spouse because of illness. In sum, all of the variations except for column (3) bound the true value of α at a small positive value.

Table 4 presents results for consumption growth defined as the proxies for growth in nondurables and services. In general, the instruments have more predictive power for these proxies than for food consumption—the partial R -squared statistic is up to twice as large as in the preceding tables. The proxies have a smaller positive response to changes in family size than food, and the coefficients on the age variables indicate that the hump-

shaped pattern over the life cycle is less pronounced for the proxies. The estimated coefficients on the demographic variables (not shown) are qualitatively similar to those in the food regressions. Most important, the estimated coefficients on lagged expenditure growth remain small and precisely estimated—they again provide no evidence of habit formation having a significant influence on consumer behavior.¹⁹

¹⁹ Despite the aforementioned problems associated with estimating a nonlinear specification, I reestimated most specifications with the Euler equation in its nonlinear form (8) as a check on the validity of the approximation used to derive equation (9). The results were similar, yielding no evidence of habit formation at the annual frequency. For example, for the specification that was most comparable to that in the first column of Table 2, the estimate of α was -0.18 with a standard error of 0.07 .

TABLE 4—PROXIES FOR GROWTH OF NONDURABLES AND SERVICES

	(1)	(2)	(3)	(4)
Weighted average of:				
Percent Δ Food at home	x	x	x	x
Percent Δ Food away from home	x	x	x	x
Percent Δ Rent		x	x	x
Percent Δ House value		x	x	x
Δ Number of autos			x	x
Percent Δ Utility payments				x
First-stage results:				
Partial R^2	0.013	0.016	0.022	0.023
F -test of excluded instruments ^a	16.87 (0.00)	9.86 (0.00)	12.81 (0.00)	10.09 (0.00)
Second-stage results: ^b				
Δc_{-1}	-0.049 (0.064)	-0.024 (0.084)	-0.060 (0.074)	-0.025 (0.087)
Δ family size	0.119 (0.005)	0.133 (0.008)	0.193 (0.011)	0.204 (0.014)
age	-0.022 (0.019)	-0.033 (0.033)	-0.035 (0.040)	-0.109 (0.052)
age ² /1000	0.067 (0.177)	0.087 (0.299)	0.086 (0.361)	0.739 (0.472)
Test of overidentifying restrictions (p -value)	0.74	0.62	0.79	0.81
Number of observations	19,502	12,044	10,286	7,665
95-percent confidence interval for habit- formation parameter	(-0.18, 0.08)	(-0.19, 0.14)	(-0.21, 0.09)	(-0.20, 0.15)

^a Excluded instruments are dummies for ranges of lagged money income growth, dummies for ranges of lagged hours growth, and a dummy for whether head lost job in previous period. p -values are in parentheses.

^b All specifications also include year dummies, a dummy for white head of household, and a dummy for female head of household. Standard errors are in parentheses.

V. Conclusion

This paper estimates the first-order condition from a simple model of habit formation using household data on food expenditures. The results, which are consistent across a number of variations of the empirical specification, yield no evidence of habit formation. The findings also hold for several constructed proxies for growth in nondurables and services consumption. In most cases, the point estimates and standard errors imply 95-percent confidence intervals that exclude values of α that exceed 0.15.

These estimates fall well short of the range needed to explain the empirical regularities for which habit formation has been suggested as a solution. For example, Deaton (1987) shows that α must equal 0.78 to fully explain the “excess smoothness” of aggregate con-

sumption. Carroll and Weil (1994) calculate that α would have to exceed 0.95 to explain the observed relationship between high aggregate income growth and subsequent periods of high aggregate saving. Finally, Constantinides (1990) shows that α must be approximately 0.80 to explain the historical equity premium.

Some caveats apply in making these comparisons, however. First, any durability in these data could partially or even completely obscure habit formation. Durability tends to offset habit formation in behavior: It makes expenditure growth lumpy whereas habit formation smooths it out. N. Gregory Mankiw (1982) and Hayashi (1985) show that with durability alone, $\hat{\alpha}$ should be negative. Ferson and Constantinides (1991) show that when preferences exhibit habit formation and goods are durable, the sign of $\hat{\alpha}$ reflects the domi-

nant effect. Unfortunately, one cannot estimate separate habit formation and durability parameters with the PSID data: When even a simple model of durability is nested in a model of habit formation, the resulting first-order condition is too elaborate to be estimated with these data. The durability issue is most relevant for the constructed proxies for growth in nondurables and services consumption, some of which reflect behavior with regard to very durable goods like autos. While food is most likely completely nondurable at the annual frequency, one should keep in mind that the results hinge on the assumption that preferences are separable in food and other expenditures. If food were a complement to other expenditures, the durability of related goods might affect the dynamics of food spending.²⁰

Finally, even if the food results reflect habit formation alone, one cannot be completely confident that they would generalize to broader measures of consumption. The key question—whether the strength of habits in food is the same as that for the average consumption good—has no obvious answer, with only limited guidance provided by the existing literature. Some authors (e.g., Houthakker and Taylor, 1970) point to physically addictive goods like tobacco as examples of types of consumption that are strongly habit-forming. Tobacco is not included (at least in principle) in the PSID food measures, which correspond to outlays for “food that you use at home” and money spent “eating out,” but some expenditures on alcohol—another potentially addictive good—are likely captured in the latter component. On the other hand, Muellbauer (1988) speculates that “habits” might arise from adjustment costs associated with changing consumption abruptly in response to income shocks. Such an interpretation opens the possibility that habits are weaker in food than in other goods since food decisions are probably less complex and less interwoven with other aspects of people’s

lives than decisions about spending on many other types of goods.

APPENDIX A: SIMPLIFYING THE FIRST-ORDER CONDITION

This Appendix shows that, if r is constant and T is large, the first-order condition

$$(A1) \quad E_t[MU_{i,t} - \alpha \beta MU_{i,t+1}] \\ = E_t[(1+r) \beta MU_{i,t+1} \\ - (1+r) \alpha \beta^2 MU_{i,t+2}]$$

implies

$$(A2) \quad E_t \left[(1+r) \beta \frac{MU_{i,t+1}}{MU_{i,t}} \right] = 1.$$

The proof borrows heavily from Hayashi’s (1985) proof. An alternative derivation is proposed by Muellbauer (1988) and used by Deaton (1992).

Rewrite equation (A1) as:

$$(A3) \quad E_t[((1+r) \beta MU_{i,t+1} - MU_{i,t}) \\ - \alpha \beta ((1+r) \beta MU_{i,t+2} - MU_{i,t+1})] = 0.$$

Let

$$(A4) \quad {}_t y_{i,t+k} = E_t[(1+r) \beta MU_{i,t+k+1} \\ - MU_{i,t+k}],$$

so that (A3) becomes

$$(A5) \quad {}_t y_{i,t} - \alpha \beta {}_t y_{i,t+1} = 0.$$

Condition (A5) must hold throughout life, implying

$$(A6) \quad {}_s y_{i,s} - \alpha \beta {}_s y_{i,s+1} = 0 \\ s = t, t+1, \dots, t+T-1,$$

²⁰ For example, this might be the case if one ate in high-priced restaurants only if one had expensive clothing.

and ${}_s y_{i,t+T} = -E_s[MU_{i,t+T}]$. Applying the expectations operator at time t to (A6) yields:

$$(A7) \quad {}_t y_{i,s} - \alpha \beta {}_t y_{i,s+1} = 0$$

$$s = t, t+1, \dots, t+T-1.$$

Now substitute $x_{i,\tau} = {}_t y_{i,t+\tau}$ into equation (A7) to obtain:

$$(A8) \quad x_{i,s-t} - \alpha \beta x_{i,s-t+1} = 0.$$

(A8) is a first-order difference equation in x_i , with general solution $x_{i,t} = [(1/\alpha\beta)^t x_{i,0}]$. Under the reasonable assumptions $0 < \beta \leq 1$ and $-1 < \alpha < 1$, the equation is divergent and $x_{i,0}$ is small relative to the terminal value.²¹ If $T = \infty$, $x_{i,0} = 0$, implying that

$$(A9) \quad E_t \left[(1+r)\beta \frac{MU_{i,t+1}}{MU_{i,t}} \right] = 1.$$

APPENDIX B: DATA CONSTRUCTION METHODS

Proxies for Growth in Consumption of Nondurables and Services

As Skinner (1987) emphasized, the PSID has information not only about food expenditures, but also about several other variables that are related to household consumption: the market value of owned homes, rent payments, utility payments, and the number of automobiles owned by the household. To combine these variables into proxies for growth in nondurables and services consumption, I used *Consumer Expenditure Survey* data to estimate regressions of the form:

$$\Delta \ln c_{i,t} = \mathbf{X}_{i,t} \boldsymbol{\beta} + e_{i,t},$$

where $c_{i,t}$ is total consumption expenditure minus spending on house furnishings and equip-

ment, purchases of autos, motorcycles, boats, and mortgage payments, plus the imputed rental value of owned homes (which is assumed to be 6 percent of market value), all divided by the PCE deflator for nondurables and services. $\mathbf{X}_{i,t}$ represents some or all of the following variables: a constant term, the log difference of expenditures for meals at home deflated by the CPI for food at home, the log difference of expenditures for meals away from home deflated by the CPI for food away from home, the log difference of the market value of owned home divided by the PCE deflator for space rent on owner-occupied dwellings, the log difference of rental payments divided by the PCE deflator for space rent on tenant-occupied dwellings, the log difference of utility payments divided by the CPI for fuel and other utilities, and the difference in number of autos owned by the household (maximum autos per household equals two). The estimated coefficients from the regressions were then used as weights to add up the corresponding variables from the PSID, producing proxies for growth in nondurables and services.²²

I drew the data from the 1985 CEX panel, which contains information from the 1985:Q1 through 1986:Q1 interviews. Each household's expenditures are recorded in the survey for four consecutive quarters; that household then leaves the sample and is replaced by a new household. Thus, one cannot construct annual changes in expenditure variables, as in the PSID. Instead, I used three-quarter changes in the relevant variables, seasonally adjusting the levels using seasonal factors obtained by regressing the levels on quarterly dummies.²³ I also dropped households with extremely low (<\$2,000) and extremely high (>\$100,000) annualized consumption, households with food expenditures equal to zero, households with top-coded rent or house

²¹ The restriction on the rate of time preference, $0 < \beta \leq 1$, is standard in the literature. $\alpha \leq -1$ is implausible because it would imply that durable goods provide less utility in the period they were purchased (period t) than they do in the subsequent period (period $t+1$). Similarly, $\alpha \geq 1$ is implausible because it makes no sense for habit formation to be so strong that period t expenditures affect utility in period $t+1$ more than period $t+1$ expenditures do.

²² Skinner's (1987) original analysis related the *level* of consumption to the *levels* of the different components. The components explained about 80 percent of the total cross-sectional variance in CEX consumption. But, this does not imply that changes in the fitted value of the Skinner equation will capture changes in consumption well. Since the dynamics of consumption over time are the key determinant of the estimated strength of habit formation, I based my proxies on *changes* in the components.

²³ Very similar results were obtained using one-quarter and two-quarter changes.

value information, and households with heads younger than 19 years. The resulting sample contained 1,595 households.

The adjusted R^2 statistics for the proxy regressions ranged between 0.16 (for the regression that included only food variables) and 0.30 (for the regression that included all the variables). All of the independent variables were significant at better than the 1-percent level in all cases. More detailed results are available upon request.

One potential problem with the proxies is that I use data from only the 1985 CEX panel to estimate the weights. I thus assume that the relationship between changes in the components and changes in consumption of nondurables and services is fixed for the period from which the PSID data are drawn. Such an assumption would be violated if, for example, income elasticities for different goods changed over this period.²⁴ Unfortunately, we cannot explore how the relationship may have changed over the PSID period because the CEX is not available for much of it.²⁵ However, I did reestimate the above regressions with data from several CEX panels from the mid- and late 1980's and found fairly small changes in the coefficients over this period. More important, alternative proxies constructed with the coefficients from these other regressions yielded similar results concerning the strength of habit formation.

Other Constructed Variables

1. *Growth in Food Expenditures.*—The log difference of the sum of (1) expenditures for meals at home and the value of food stamps received deflated by the CPI for food at home, and (2) expenditures for meals away from home deflated by the CPI for food away from home. Following most previous authors, I interpreted

the food variables as corresponding to consumption during the month in which the PSID interview took place and constructed the deflators accordingly.

2. *Growth in Number of Adult Male Equivalents in the Household.*—The log difference of “annual food needs” divided by the cost of food needed to feed an adult.

3. *Dummies for Growth in Real Money Income.*—Growth in real money income equals the log difference of “family money income” deflated by the CPI. Eight dummy variables were defined, each taking the value 1 if growth in real money income fell in a particular range. (Table 1 shows the different ranges.)

4. *Dummies for Growth in Hours Worked by Family Members.*—Growth in family member hours equals the log difference of the sum of “annual hours working for money” for the head, spouse, and others. Eight dummy variables were defined, each taking the value 1 if growth in hours fell in a particular range. (Table 1 shows the different ranges.)

5. *Dummy for Head Losing Job Involuntarily.*—The variable equals 1 if the head has become unemployed since the previous period because (1) “company folded/changed hands/moved out of town; employer died/went out of business,” (2) “strike; lockout,” or (3) “laid off; fired.” A similar variable can be constructed for the spouse, but it is not available for the full estimation period. Regression results based on an instrument set including this variable and a shorter estimation period are not significantly different from those presented.

6. *Dummies for the Ratio of Lump-Sum Receipts to Money Income.*—The ratio equals the midpoint of the bracket of reported lump-sum receipts divided by “family money income.” Dummy variables were defined, indicating whether the ratio was less than 0.1, between 0.1 and 0.2, between 0.2 and 0.5, between 0.5 and 1, or greater than 1.

7. *Log of the Real After-Tax Interest Rate.*— $\ln(1 + r) = \ln(1 + i(1 - \tau) - \pi)$ for the first six months of the year. This timing was

²⁴ To the extent that changes in the relationship were related to factors that affect all households roughly equally, the analysis will likely be unaffected because the year dummies included in most specifications control for aggregate shocks.

²⁵ The ongoing CEX panels are available only since 1980, and there are data quality concerns about some of the panels in the early 1980's.

selected because most PSID interviews are conducted between January and June. π is the CPI inflation rate for this period. τ is the household's marginal tax rate for this period. i is the average 12-month Treasury bill rate for the first half of the preceding year.

Sample Selection

Most of the analysis uses data from 1974 through 1987. Although the PSID data set spans a much longer time range, the interpretation of some of the food variables is unclear prior to 1974, and the food questions were suspended for several years after 1987.

Various households were excluded from the sample: those that began the survey as part of the special poverty sample, those that had one or more "major assignments" to the relevant expenditure variables, and those that had one or more "outliers" during the sample period [defined, as in Zeldes (1989), as an observation for which consumption grows by more than 300 percent or falls by more than 66 percent].²⁶

The sample also excluded certain observations. To capture only households that were acting as a unit over time, I excluded observations for which either the head or spouse was different than in the preceding period. I also excluded observations for which the household head is retired because lagged changes in income and hours growth are good instruments for lagged consumption growth only if household heads are not retired.

The sample used for many of the estimated specifications contains 27,188 observations from 3,153 households with as many as 13 observations of growth in food expenditures each. The sample used in column (3) of Table 2 is smaller because the PSID marginal tax rate variable was not available for all years. The sample used in column (6) of Table 3 is smaller because the variables corresponding to work missed because of illness were not available in all years. Finally, some of the

samples used in Table 4 were smaller because the proxies were not defined in years in which the current or lagged value of one component took the value zero. (The exception here is when both current and lagged values were zero; in this case, I set the log difference to zero.) In addition, not all of the component series were available over the complete sample period: The number of automobiles owned was missing for 1974 and 1987, and previous year's utility payments were missing between 1974 and 1976.

REFERENCES

- Abel, Andrew B.** "Asset Prices under Habit Formation and Catching up with the Joneses." *American Economic Review*, May 1990 (*Papers and Proceedings*), 80(2), pp. 38–42.
- Bound, John; Jaeger, David A. and Baker, Regina M.** "Problems with Instrumental Variables Estimation When the Correlation Between the Instrument and the Endogenous Explanatory Variable Is Weak." *Journal of the American Statistical Association*, June 1995, 90(430), pp. 443–50.
- Braun, Phillip A.; Constantinides, George M. and Ferson, Wayne E.** "Time Nonseparability of Aggregate Consumption: International Evidence." *European Economic Review*, June 1993, 37(5), pp. 897–920.
- Campbell, John Y. and Cochrane, John H.** "By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior." *Journal of Political Economy*, April 1999, 107(2), pp. 205–51.
- Campbell, John Y. and Deaton, Angus S.** "Why Is Consumption So Smooth?" *Review of Economic Studies*, July 1989, 56(3), pp. 357–73.
- Carroll, Christopher D. and Summers, Lawrence H.** "Consumption Growth Parallels Income Growth: Some New Evidence," in B. Douglas Bernheim and John B. Shoven, eds., *National saving and economic performance*. Chicago: University of Chicago Press, 1991, pp. 305–43.
- Carroll, Christopher D. and Weil, David N.** "Saving and Growth: A Reinterpretation." *Carnegie-Rochester Conference Series on Public Policy*, June 1994, 40, pp. 133–92.
- Chamberlain, Gary.** "Panel Data," in Zvi Gril-

²⁶ A larger data set could have been constructed by excluding only the observations corresponding to major assignments and outliers, while retaining the other observations for these households. However, the outliers are likely indicative of other accuracy problems for these households.

- ches and Michael D. Intriligator, eds., *Handbook of econometrics*, Vol. II. Amsterdam: North-Holland, 1984, pp. 1248–318.
- Christiano, Lawrence J.; Eichenbaum, Martin and Marshall, David.** “The Permanent Income Hypothesis Revisited.” *Econometrica*, March 1991, 59(2), pp. 397–423.
- Clarida, Richard H.** “Aggregate Stochastic Implications of the Life-Cycle Hypothesis.” *Quarterly Journal of Economics*, August 1991, 106(3), pp. 851–67.
- Cochrane, John H.** “A Simple Test of Consumption Insurance.” *Journal of Political Economy*, October 1991, 99(5), pp. 957–76.
- Constantinides, George M.** “Habit Formation: A Resolution of the Equity Premium Puzzle.” *Journal of Political Economy*, June 1990, 98(3), pp. 519–43.
- Deaton, Angus S. .** “Life-Cycle Models of Consumption: Is the Evidence Consistent with the Theory?” in T. F. Bewley, ed., *Advances in econometrics, Fifth World Congress*, Vol. 2. Cambridge: Cambridge University Press, 1987, pp. 121–48.
- _____. *Understanding consumption*. Oxford: Clarendon Press, 1992.
- Dunn, Kenneth B. and Singleton, Kenneth J.** “Modeling the Term Structure of Interest Rates under Non-separable Utility and Durability of Goods.” *Journal of Financial Economics*, September 1986, 17(1), pp. 27–55.
- Eichenbaum, Martin S.; Hansen, Lars Peter and Singleton, Kenneth J.** “A Time Series Analysis of Representative Agent Models of Consumption and Leisure under Uncertainty.” *Quarterly Journal of Economics*, February 1988, 103(1), pp. 51–78.
- Ferson, Wayne E. and Constantinides, George M.** “Habit Persistence and Durability in Aggregate Consumption: Empirical Tests.” *Journal of Financial Economics*, October 1991, 29(2), pp. 199–240.
- Gali, Jordi.** “Finite Horizons, Life-Cycle Savings and Time-Series Evidence on Consumption.” *Journal of Monetary Economics*, December 1990, 26(3), pp. 433–52.
- Goodfriend, Marvin.** “Information-Aggregation Bias.” *American Economic Review*, June 1992, 82(3), pp. 508–19.
- Hall, Robert E.** “Intertemporal Substitution in Consumption.” *Journal of Political Economy*, April 1988, 96(2), pp. 339–57.
- Hall, Robert E. and Mishkin, Frederic S.** “The Sensitivity of Consumption to Transitory Income: Estimates from Panel Data on Households.” *Econometrica*, March 1982, 50(2), pp. 461–81.
- Hansen, Lars Peter.** “Large Sample Properties of Generalized Method of Moments Estimators.” *Econometrica*, July 1982, 50(4), pp. 1029–54.
- Hayashi, Fumio.** “The Permanent Income Hypothesis and Consumption Durability: Analysis Based on Japanese Panel Data.” *Quarterly Journal of Economics*, November 1985, 100(4), pp. 1083–113.
- Heaton, John.** “The Interaction Between Time-Nonseparable Preferences and Time Aggregation.” *Econometrica*, March 1993, 61(2), pp. 353–85.
- Heien, Dale and Durham, Cathy.** “A Test of the Habit Formation Hypothesis Using Household Data.” *Review of Economics and Statistics*, May 1991, 73(2), pp. 189–99.
- Houthakker, Hendrik S. and Taylor, Lester D.** *Consumer demand in the United States*. Cambridge: Harvard University Press, 1970.
- Lawrance, Emily C.** “Poverty and the Rate of Time Preference: Evidence from Panel Data.” *Journal of Political Economy*, February 1991, 99(1), pp. 54–77.
- Mankiw, N. Gregory.** “Hall’s Consumption Hypothesis and Durable Goods.” *Journal of Monetary Economics*, November 1982, 10(3), pp. 417–25.
- Mariger, Randall P. and Shaw, Kathryn.** “Unanticipated Aggregate Disturbances and Tests of the Life-Cycle Consumption Model Using Panel Data.” *Review of Economics and Statistics*, February 1993, 75(1), pp. 48–56.
- Muellbauer, John.** “Habits, Rationality and Myopia in the Life Cycle Consumption Function.” *Annales d’Economie et de Statistique*, January–March 1988, (9), pp. 47–70.
- Nelson, Charles and Startz, Richard.** “The Distribution of the Instrumental Variables Estimator and Its *t*-Ratio When the Instrument Is a Poor One.” *Journal of Business*, January 1990, Pt. 2, 63(1), pp. S125–40.
- Pischke, Jörn-Steffen.** “Individual Income, Incomplete Information, and Aggregate Consumption.” *Econometrica*, July 1995, 63(4), pp. 805–40.

- Runkle, David E.** "Liquidity Constraints and the Permanent-Income Hypothesis: Evidence from Panel Data." *Journal of Monetary Economics*, February 1991, 27(1), pp. 73–98.
- Shapiro, Matthew D.** "The Permanent Income Hypothesis and the Real Interest Rate: Some Evidence from Panel Data." *Economics Letters*, 1984, 14(1), pp. 93–100.
- Shea, John.** "Should We Test the Life Cycle-Permanent Income Hypothesis with Food Consumption Data?" *Economics Letters*, May 1994, 45(1), pp. 63–68.
- Skinner, Jonathan.** "A Superior Measure of Consumption from the Panel Study of Income Dynamics." *Economics Letters*, 1987, 23(2), pp. 213–16.
- Spinnewyn, Frans.** "Rational Habit Formation." *European Economic Review*, January 1981, 15(1), pp. 91–109.
- Staiger, Douglas and Stock, James H.** "Instrumental Variables Regression with Weak Instruments." *Econometrica*, May 1997, 65(3), pp. 557–86.
- Wilcox, David W.** "The Construction of U.S. Consumption Data: Some Facts and Their Implications for Empirical Work." *American Economic Review*, September 1992, 82(4), pp. 922–41.
- Working, Holbrook.** "Note on the Correlation of First Differences of Averages in a Random Chain." *Econometrica*, October 1960, 28(4), pp. 916–18.
- Zeldes, Stephen P.** "Consumption and Liquidity Constraints: An Empirical Investigation." *Journal of Political Economy*, April 1989, 97(2), pp. 305–46.

This article has been cited by:

1. Karolina Safarzyńska. 2018. Integrating behavioural economics into climate-economy models: some policy lessons. *Climate Policy* **18**:4, 485-498. [[Crossref](#)]
2. MUNECHIKA KATAYAMA, KWANG HWAN KIM. 2018. Intersectoral Labor Immobility, Sectoral Comovement, and News Shocks. *Journal of Money, Credit and Banking* **50**:1, 77-114. [[Crossref](#)]
3. Shaheer Burney. 2018. In-kind benefits and household behavior: The impact of SNAP on food-away-from-home consumption. *Food Policy* **75**, 134-146. [[Crossref](#)]
4. Jawad M. Addoum. 2017. Household Portfolio Choice and Retirement. *The Review of Economics and Statistics* **99**:5, 870-883. [[Crossref](#)]
5. Francesco Nucci, Marianna Riggi. 2017. Labor Force Participation, Wage Rigidities, and Inflation. *Journal of Macroeconomics* . [[Crossref](#)]
6. Johannes Emmerling, Salmai Qari. 2017. Car ownership and hedonic adaptation. *Journal of Economic Psychology* **61**, 29-38. [[Crossref](#)]
7. Leif Andreassen, Maria Laura Di Tommaso, Steinar Strøm. 2017. Nurses and physicians: a longitudinal analysis of mobility between jobs and labor supply. *Empirical Economics* **52**:4, 1235-1269. [[Crossref](#)]
8. Tomas Havranek, Marek Rusnak, Anna Sokolova. 2017. Habit formation in consumption: A meta-analysis. *European Economic Review* **95**, 142-167. [[Crossref](#)]
9. Fernando Perera-Tallo. 2017. Growing income inequality due to biased technological change. *Journal of Macroeconomics* **52**, 23-38. [[Crossref](#)]
10. Gerdie Everaert, Lorenzo Pozzi, Ruben Schoonackers. 2017. On the Stability of the Excess Sensitivity of Aggregate Consumption Growth in the USA. *Journal of Applied Econometrics* **32**:4, 819-840. [[Crossref](#)]
11. KimSeiWan, ###. 2017. Comparison of Addictions Using Habit Formation Utility Function: With a Focus on Smoking and Drinking. *Health and Social Welfare Review* **37**:2, 477-497. [[Crossref](#)]
12. Wayne-Roy Gayle, Natalia Khorunzhina. 2017. Micro-Level Estimation of Optimal Consumption Choice With Intertemporal Nonseparability in Preferences and Measurement Errors. *Journal of Business & Economic Statistics* **80**, 1-12. [[Crossref](#)]
13. Julian Thimme. 2017. INTERTEMPORAL SUBSTITUTION IN CONSUMPTION: A LITERATURE REVIEW. *Journal of Economic Surveys* **31**:1, 226-257. [[Crossref](#)]
14. Seung C. Ahn, H. Youn Kim, Tong Hee Kang. 2017. Life-cycle consumption, precautionary saving, and risk sharing: an integrated analysis using household panel data. *The B.E. Journal of Macroeconomics* **17**:2. . [[Crossref](#)]
15. Karolina Safarzyńska, Jeroen C.J.M. van den Bergh. 2017. Integrated crisis-energy policy: Macro-evolutionary modelling of technology, finance and energy interactions. *Technological Forecasting and Social Change* **114**, 119-137. [[Crossref](#)]
16. Davide Dragone, Nicolas R. Ziebarth. 2017. Non-separable time preferences, novelty consumption and body weight: Theory and evidence from the East German transition to capitalism. *Journal of Health Economics* **51**, 41-65. [[Crossref](#)]
17. Emilio Barucci, Claudio Fontana. Uncertainty, Rationality and Heterogeneity 479-581. [[Crossref](#)]
18. Andres Silva, Senarath Dharmasena. 2016. Considering seasonal unit root in a demand system: an empirical approach. *Empirical Economics* **51**:4, 1443-1463. [[Crossref](#)]

19. Milan Zafirovski. 2016. Rational Choice Theory at the Origin? Forms and Social Factors of “Irrational Choice”. *Social Epistemology* 30:5-6, 728-763. [[Crossref](#)]
20. Thomas H. Jørgensen. 2016. Euler equation estimation: Children and credit constraints. *Quantitative Economics* 7:3, 935-968. [[Crossref](#)]
21. Climent Quintana-Domeque, Johannes Wohlfart. 2016. “Relative concerns for consumption at the top”: An intertemporal analysis for the UK. *Journal of Economic Behavior & Organization* 129, 172-194. [[Crossref](#)]
22. Lin Zhang, Shinsuke Ikeda. 2016. Welfare-enhancing parental altruism and children’s habit formation. *International Review of Economics* 63:3, 281-303. [[Crossref](#)]
23. Goncalo Monteiro, Stephen J. Turnovsky. 2016. Anticipated consumption and its impact on capital accumulation and growth: “Forward-looking” versus “backward-looking” consumption reference. *International Journal of Economic Theory* 12:3, 203-232. [[Crossref](#)]
24. Ivan Paya, Peng Wang. 2016. Wealth fluctuations and investment in risky assets: The UK micro evidence on households asset allocation. *Journal of Empirical Finance* 38, 221-235. [[Crossref](#)]
25. Francisco Alvarez-Cuadrado, Jose Maria Casado, Jose Maria Labeaga. 2016. Envy and Habits: Panel Data Estimates of Interdependent Preferences. *Oxford Bulletin of Economics and Statistics* 78:4, 443-469. [[Crossref](#)]
26. Xuan Liu, Fang Yang, Zongwu Cai. 2016. Does relative risk aversion vary with wealth? Evidence from households# portfolio choice data. *Journal of Economic Dynamics and Control* 69, 229-248. [[Crossref](#)]
27. Peter Benczur, Istvan Konya. 2016. Interest Premium, Sudden Stop, and Adjustment in a Small Open Economy. *Eastern European Economics* 54:4, 271-295. [[Crossref](#)]
28. X. GUO, G. D. H. CLAASSEN, A. G. J. M. OUDE LANSINK, H. W. SAATKAMP. 2016. A conceptual framework for economic optimization of an animal health surveillance portfolio. *Epidemiology and Infection* 144:05, 1084-1095. [[Crossref](#)]
29. Liesbeth Colen, Johan Swinnen. 2016. Economic Growth, Globalisation and Beer Consumption. *Journal of Agricultural Economics* 67:1, 186-207. [[Crossref](#)]
30. Martin Jacobs. 2016. Accounting for Changing Tastes: Approaches to Explaining Unstable Individual Preferences. *Review of Economics* 67:2. . [[Crossref](#)]
31. . 149. [[Crossref](#)]
32. Tomáš Havránek. 2015. MEASURING INTERTEMPORAL SUBSTITUTION: THE IMPORTANCE OF METHOD CHOICES AND SELECTIVE REPORTING. *Journal of the European Economic Association* 13:6, 1180-1204. [[Crossref](#)]
33. Yulei Luo, Jun Nie, Eric R. Young. 2015. SLOW INFORMATION DIFFUSION AND THE INERTIAL BEHAVIOR OF DURABLE CONSUMPTION. *Journal of the European Economic Association* 13:5, 805-840. [[Crossref](#)]
34. Milan Zafirovski. 2015. Toward Economic Sociology/Socio-Economics? Sociological Components in Contemporary Economics and Implications for Sociology. *The American Sociologist* . [[Crossref](#)]
35. Winifred Huang-Meier, Mark C. Freeman, Khelifa Mazouz. 2015. Why are aggregate equity payouts pro-cyclical?. *Journal of Macroeconomics* 44, 98-108. [[Crossref](#)]
36. Kwang Hwan Kim. 2015. Explaining the Delayed Effect of Monetary Policy: The Role of Inventories and Factor-hoarding. *International Economic Journal* 29:1, 37-55. [[Crossref](#)]
37. Charles Camic. Habit: History of the Concept 475-479. [[Crossref](#)]
38. Moritz Drechsel-Grau, Kai D. Schmid. 2014. Consumption–savings decisions under upward-looking comparisons. *Journal of Economic Behavior & Organization* 106, 254-268. [[Crossref](#)]

39. John C. Driscoll, Steinar Holden. 2014. Behavioral economics and macroeconomic models. *Journal of Macroeconomics* **41**, 133-147. [[Crossref](#)]
40. Damiano Sandri. 2014. Growth and Capital Flows with Risky Entrepreneurship. *American Economic Journal: Macroeconomics* **6**:3, 102-123. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
41. Phuong V. Ngo. 2014. Habit formation in state-dependent pricing models: Implications for the dynamics of output and prices. *Economics Letters* **123**:3, 336-340. [[Crossref](#)]
42. Francisco Blasques. 2014. TRANSFORMED POLYNOMIALS FOR NONLINEAR AUTOREGRESSIVE MODELS OF THE CONDITIONAL MEAN. *Journal of Time Series Analysis* **35**:3, 218-238. [[Crossref](#)]
43. Wei Zhou, Selwyn Piramuthu. 2014. Consumer preference and service quality management with RFID. *Annals of Operations Research* **216**:1, 35-51. [[Crossref](#)]
44. Shawn Ni, Youn Seol. 2014. New evidence on excess sensitivity of household consumption. *Journal of Monetary Economics* **63**, 80-94. [[Crossref](#)]
45. Hamilton B. Fout, Neville R. Francis. 2014. IMPERFECT TRANSMISSION OF TECHNOLOGY SHOCKS AND THE BUSINESS CYCLE CONSEQUENCES. *Macroeconomic Dynamics* **18**:02, 418-437. [[Crossref](#)]
46. Peyton Ferrier, Chen Zhen. 2014. The producer welfare effects of trade liberalization when goods are perishable and habit-forming: the case of asparagus. *Agricultural Economics* **45**:2, 129-141. [[Crossref](#)]
47. Peng Liu, Yu Ren. 2013. Specification tests of habit formation. *Applied Economics Letters* **20**:17, 1596-1601. [[Crossref](#)]
48. JONATHAN MEER. 2013. THE HABIT OF GIVING. *Economic Inquiry* **51**:4, 2002-2017. [[Crossref](#)]
49. Goncalo Monteiro, Adam Cook, Sanjoy Dey. 2013. Optimal tax policy under habit formation and capital utilization. *Journal of Macroeconomics* **37**, 230-248. [[Crossref](#)]
50. Michael A. Thornton. 2013. The aggregation of dynamic relationships caused by incomplete information. *Journal of Econometrics* . [[Crossref](#)]
51. Asiye Aydilek. 2013. Habit formation and housing over the life cycle. *Economic Modelling* **33**, 858-866. [[Crossref](#)]
52. K.G. Grunert, R. Shepherd, W.B. Traill, B. Wold. 2012. Food choice, energy balance and its determinants: Views of human behaviour in economics and psychology. *Trends in Food Science & Technology* **28**:2, 132-142. [[Crossref](#)]
53. Bianca De Paoli, Pawel Zabczyk. 2012. WHY DO RISK PREMIA VARY OVER TIME? A THEORETICAL INVESTIGATION UNDER HABIT FORMATION. *Macroeconomic Dynamics* **16**:S2, 252-266. [[Crossref](#)]
54. Fabio Milani. The Modeling of Expectations in Empirical DSGE Models: A Survey 3-38. [[Crossref](#)]
55. Fabio Milani, Ashish Rajbhandari. Expectation Formation and Monetary DSGE Models: Beyond the Rational Expectations Paradigm 253-288. [[Crossref](#)]
56. Xiaohong Chen,, Han Hong,, Denis Nekipelov. 2011. Nonlinear Models of Measurement Errors. *Journal of Economic Literature* **49**:4, 901-937. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
57. Waseem Ahmad, Sven Anders. 2011. The Value of Brand and Convenience Attributes in Highly Processed Food Products. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie* no-no. [[Crossref](#)]
58. Wilfredo L. Maldonado, Augusto M. de C. Oliveira. 2011. Consumption habits and interest rate rigidity. *Estudos Econômicos (São Paulo)* **41**:3, 537-550. [[Crossref](#)]

59. Mercedes Burguillo-Cuesta, Marta Jorge García-Inés, Desiderio Romero-Jordan. 2011. Does Dieselization Favour a Cleaner Transport? Evidence from EU-15. *Transport Reviews* 1-21. [[Crossref](#)]
60. Justin van de Ven. 2011. A structural dynamic microsimulation model of household savings and labour supply. *Economic Modelling* 28:4, 2054-2070. [[Crossref](#)]
61. Marc Anthony Fusaro, Donald H. Dutkowsky. 2011. What explains consumption in the very short-run? Evidence from checking account data. *Journal of Macroeconomics* . [[Crossref](#)]
62. Eswar S. Prasad. 2011. Rebalancing Growth in Asia*. *International Finance* no-no. [[Crossref](#)]
63. Harvey S. Rosen, Stephen T. Sims. 2011. Altruistic behavior and habit formation. *Nonprofit Management and Leadership* 21:3, 235-253. [[Crossref](#)]
64. CHRISTOPHER D. CARROLL, MISUZU OTSUKA, JIRI SLACALEK. 2011. How Large Are Housing and Financial Wealth Effects? A New Approach. *Journal of Money, Credit and Banking* 43:1, 55-79. [[Crossref](#)]
65. Yulian Ding, Michele M. Veeman, Wiktor L. Adamowicz. 2010. Habit, BSE, and the Dynamics of Beef Consumption. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie* no-no. [[Crossref](#)]
66. Christopher D. Carroll, Jiri Slacalek, Martin Sommer. 2010. International Evidence on Sticky Consumption Growth. *Review of Economics and Statistics* 110823094915005. [[Crossref](#)]
67. Orazio P. Attanasio,, Guglielmo Weber. 2010. Consumption and Saving: Models of Intertemporal Allocation and Their Implications for Public Policy. *Journal of Economic Literature* 48:3, 693-751. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
68. Desiderio Romero-Jordán, Pablo del Río, Marta Jorge-García, Mercedes Burguillo. 2010. Price and income elasticities of demand for passenger transport fuels in Spain. Implications for public policies. *Energy Policy* 38:8, 3898-3909. [[Crossref](#)]
69. Michael T Kiley. 2010. Habit Persistence, Nonseparability between Consumption and Leisure, or Rule-of-Thumb Consumers: Which Accounts for the Predictability of Consumption Growth?. *Review of Economics and Statistics* 92:3, 679-683. [[Crossref](#)]
70. Matthew D. Rablen. 2010. The Saving Gateway: Implications for Optimal Saving*. *Fiscal Studies* 31:2, 203-225. [[Crossref](#)]
71. Rob Alessie, Federica Teppa. 2010. Saving and habit formation: evidence from Dutch panel data. *Empirical Economics* 38:2, 385-407. [[Crossref](#)]
72. Linda Thunström. 2010. Preference Heterogeneity and Habit Persistence: The Case of Breakfast Cereal Consumption. *Journal of Agricultural Economics* 61:1, 76-96. [[Crossref](#)]
73. Chamon Marcos D., Prasad Eswar S.. 2010. Why Are Saving Rates of Urban Households in China Rising?. *American Economic Journal: Macroeconomics* 2:1, 93-130. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
74. George M. Korniotis. 2010. Estimating Panel Models With Internal and External Habit Formation. *Journal of Business and Economic Statistics* 28:1, 145-158. [[Crossref](#)]
75. Damiano Sandri. 2010. Growth and Capital Flows with Risky Entrepreneurship. *IMF Working Papers* 10:37, 1. [[Crossref](#)]
76. CHRISTOPHER J. MALLOY, TOBIAS J. MOSKOWITZ, ANNETTE VISSING-JØRGENSEN. 2009. Long-Run Stockholder Consumption Risk and Asset Returns. *The Journal of Finance* 64:6, 2427-2479. [[Crossref](#)]
77. Xiaohong Chen, Sydney C. Ludvigson. 2009. Land of addicts? an empirical investigation of habit-based asset pricing models. *Journal of Applied Econometrics* 24:7, 1057-1093. [[Crossref](#)]

78. Kenneth J. Arrow, Partha S. Dasgupta. 2009. Conspicuous Consumption, Inconspicuous Leisure. *The Economic Journal* **119**:541, F497-F516. [[Crossref](#)]
79. Joaquín Alegre, Sara Mateo, Llorenç Pou. 2009. Participation in Tourism Consumption and the Intensity of Participation: An Analysis of Their Socio-Demographic and Economic Determinants. *Tourism Economics* **15**:3, 531-546. [[Crossref](#)]
80. Takashi Kano. 2009. Habit formation and the present-value model of the current account: Yet another suspect. *Journal of International Economics* **78**:1, 72-85. [[Crossref](#)]
81. Sule Alan, Orazio Attanasio, Martin Browning. 2009. Estimating Euler equations with noisy data: two exact GMM estimators. *Journal of Applied Econometrics* **24**:2, 309-324. [[Crossref](#)]
82. Stéphane Auray. 2009. Consommation, effet de substitution intertemporelle et formation des habitudes. *L'Actualité économique* **85**:4, 437. [[Crossref](#)]
83. Dong C. Won, Young H. Lee. 2008. Optimal dynamic pricing for sports games with habitual attendance. *Managerial and Decision Economics* **29**:8, 639-655. [[Crossref](#)]
84. Thea Dam, Jørgen Deigaard Jensen, Niels Kærgård. 2008. Obesity, social inequality and economic rationality: An overview. *Acta Agriculturae Scandinavica, Section C — Food Economics* **5**:3-4, 124-137. [[Crossref](#)]
85. David P. Chitakunye, Pauline Maclaran. 2008. The everyday practices surrounding young people's food consumption. *Young Consumers* **9**:3, 215-227. [[Crossref](#)]
86. Carlos Arnade, Munisamy Gopinath, Daniel Pick. 2008. Brand Inertia in U.S. Household Cheese Consumption. *American Journal of Agricultural Economics* **90**:3, 813-826. [[Crossref](#)]
87. Markus K. Brunnermeier, Stefan Nagel,. 2008. Do Wealth Fluctuations Generate Time-Varying Risk Aversion? Micro-Evidence on Individuals' Asset Allocation. *American Economic Review* **98**:3, 713-736. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
88. Jürgen Maurer, André Meier. 2008. Smooth it Like the 'Joneses'? Estimating Peer-Group Effects in Intertemporal Consumption Choice. *The Economic Journal* **118**:527, 454-476. [[Crossref](#)]
89. Marjorie Flavin, Shinobu Nakagawa. 2008. A Model of Housing in the Presence of Adjustment Costs: A Structural Interpretation of Habit Persistence. *American Economic Review* **98**:1, 474-495. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
90. María José Luengo-Prado, Bent E. Sørensen. 2008. What Can Explain Excess Smoothness and Sensitivity of State-Level Consumption?. *Review of Economics and Statistics* **90**:1, 65-80. [[Crossref](#)]
91. YOUNG H. LEE, TRENTON G. SMITH. 2008. WHY ARE AMERICANS ADDICTED TO BASEBALL? AN EMPIRICAL ANALYSIS OF FANDOM IN KOREA AND THE UNITED STATES. *Contemporary Economic Policy* **26**:1, 32-48. [[Crossref](#)]
92. F GOMES. Discussion: Equity Premia with Benchmark Levels of ConsumptionClosed-Form Results 158-166. [[Crossref](#)]
93. Orazio P. Attanasio, Guglielmo Weber. Consumer Expenditure (New Developments and the State of Research) 1-16. [[Crossref](#)]
94. Marcos Chamon, Eswar Prasad. 2008. Why Are Saving Rates of Urban Households in China Rising?. *IMF Working Papers* **08**:145, 1. [[Crossref](#)]
95. ANDREA BURASCHI, ALEXEI JILTISOV. 2007. Habit Formation and Macroeconomic Models of the Term Structure of Interest Rates. *The Journal of Finance* **62**:6, 3009-3063. [[Crossref](#)]
96. F MILANI. 2007. Expectations, learning and macroeconomic persistence#. *Journal of Monetary Economics* **54**:7, 2065-2082. [[Crossref](#)]
97. Christian Dreger, Jirka Slacalek. 2007. Wie stark wird der Konsum vom Vermögen bestimmt?. *Vierteljahrshefte zur Wirtschaftsforschung* **76**:4, 77-84. [[Crossref](#)]

98. Josep Pijoan-Mas. 2007. Pricing Risk in Economies with Heterogeneous Agents and Incomplete Markets. *Journal of the European Economic Association* 5:5, 987-1015. [[Crossref](#)]
99. Soren Leth-Petersen. 2007. Habit Formation and Consumption of Energy for Heating: Evidence from a Panel of Danish Households. *The Energy Journal* 28:2. . [[Crossref](#)]
100. Martin Browning, M. Dolores Collado. 2007. Habits and heterogeneity in demands: a panel data analysis. *Journal of Applied Econometrics* 22:3, 625-640. [[Crossref](#)]
101. JAMES C. MORLEY. 2007. The Slow Adjustment of Aggregate Consumption to Permanent Income. *Journal of Money, Credit and Banking* 39:2-3, 615-638. [[Crossref](#)]
102. Chen Zhen, Michael K. Wohlgenant. 2006. Meat Demand under Rational Habit Persistence. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie* 54:4, 477-495. [[Crossref](#)]
103. Raj Chetty. 2006. A New Method of Estimating Risk Aversion. *American Economic Review* 96:5, 1821-1834. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
104. R REIS. 2006. Inattentive consumers#. *Journal of Monetary Economics* 53:8, 1761-1800. [[Crossref](#)]
105. A OKUNADE, C SURARATDECHA. 2006. The pervasiveness of pharmaceutical expenditure inertia in the OECD countries. *Social Science & Medicine* 63:1, 225-238. [[Crossref](#)]
106. Antoine Bommier, Jean-Charles Rochet. 2006. Risk Aversion and Planning Horizons. *Journal of the European Economic Association* 4:4, 708-734. [[Crossref](#)]
107. Alessandra Guariglia, Byung-Yeon Kim. 2006. The dynamics of moonlighting in Russia1. What is happening in the Russian informal economy?. *The Economics of Transition* 14:1, 1-45. [[Crossref](#)]
108. D MEYER, J MEYER. 2005. Risk preferences in multi-period consumption models, the equity premium puzzle, and habit formation utility. *Journal of Monetary Economics* 52:8, 1497-1515. [[Crossref](#)]
109. Raquel Carrasco, Jose M. Labeaga, J. David Lopez-Salido. 2005. Consumption and Habits: Evidence from Panel Data*. *The Economic Journal* 115:500, 144-165. [[Crossref](#)]
110. J GRUBER. 2004. A present value test of habits and the current account. *Journal of Monetary Economics* 51:7, 1495-1507. [[Crossref](#)]
111. Jaime Alonso-Carrera, Jordi Caballe, Xavier Raurich. 2004. Consumption Externalities, Habit Formation and Equilibrium Efficiency*. *Scandinavian Journal of Economics* 106:2, 231-251. [[Crossref](#)]
112. A Díaz. 2003. Precautionary savings and wealth distribution under habit formation preferences. *Journal of Monetary Economics* 50:6, 1257-1291. [[Crossref](#)]
113. Axel Börsch-Supan, Anette Reil-Held, Reinhold Schnabel. Household Saving in Germany 57-99. [[Crossref](#)]
114. Bruce E Hansen, Kenneth D West. 2002. Generalized Method of Moments and Macroeconomics. *Journal of Business and Economic Statistics* 20:4, 460-469. [[Crossref](#)]
115. A Levy. 2002. Rational eating: can it lead to overweightness or underweightness?. *Journal of Health Economics* 21:5, 887-899. [[Crossref](#)]
116. Axel Börsch-Supan, Anette Reil-Held, Ralf Rodepeter, Reinhold Schnabel, Joachim Winter. 2001. The German Savings Puzzle. *Research in Economics* 55:1, 15-38. [[Crossref](#)]
117. Jeffrey C. Fuhrer. 2000. Habit Formation in Consumption and Its Implications for Monetary-Policy Models. *American Economic Review* 90:3, 367-390. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
118. Christopher D. Carroll,, Jody Overland,, David N. Weil. 2000. Saving and Growth with Habit Formation. *American Economic Review* 90:3, 341-355. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
119. Samuel Rabino, Dana Rafiee, Steve Onufrey, Howard Moskowitz. Retention and Customer Share Building 511-529. [[Crossref](#)]