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Myopia, Liquidity Constraints, and Aggregate Consumption: A Simple Test

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ABSTRACT

This note conducts a simple test for myopia and liquidity constraints in aggregate US consumption. The test exploits the implications of myopia and liquidity constraints for asymmetry in consumption. Under myopia, the relation between consumption and predictable income does not depend on the sign or magnitude of expected income change. Under liquidity constraints, however, consumption should be correlated with predictable income only when income is expected to rise. Using quarterly postwar data, I show that consumption is far more sensitive to predictable income when expected income growth is low than when expected income growth is high. This "perverse asymmetry" is inconsistent with both myopia and liquidity constraints.

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I. INTRODUCTION

The neoclassical life cycle-permanent income hypothesis predicts that, to a first approximation, predictable movements in income should not cause consumption to change. Recent tests of the LCH/PIH in aggregate time-series data consistently reject this prediction.[1] Campbell and Mankiw (1990), for instance, present significant point estimates of the elasticity of aggregate consumption with respect to predictable income ranging from 0.351 to 0.713.

While the failure of the LCH/PIH in aggregate data is well-established, the reason for this failure is not. Two alternative hypotheses that have received considerable attention in the literature are myopia and liquidity constraints. This note conducts a simple test of these two alternatives using aggregate time series data.[2] The test exploits the fact that myopia and liquidity constraints have different implications for asymmetry in consumption behavior. Under myopia, consumption simply tracks disposable income. Thus, the failure of the LCH/PIH should be symmetric: consumption growth should be strongly correlated with predictable income growth, regardless of whether expected income growth is above average or below average. Under liquidity constraints, however, the LCH/PIH fails only because agents cannot borrow to smooth consumption when income is temporarily low. In this case, consumption should be correlated with predictable income increases, but not with predictable income declines; liquidity constraints impede borrowing but do not inhibit saving.[3] This suggests that under liquidity constraints the LCH/PIH should fail more strongly when expected income growth is above average than when expected income growth is below average.

The empirical evidence suggests that neither myopia or liquidity constraints is an adequate characterization of US aggregate consumption behavior. Using quarterly data from 1956-1988 and a slight extension of Campbell and Mankiw's (1990) methodology, I show that the LCH/PIH is soundly rejected when expected income growth is below average, but cannot be rejected when expected income growth is above average. I also show that consumption is more sensitive to predictable income declines than to predictable income increases. These results are robust to different measures of expected income, to different measures of consumption, and to different specifications of the estimating equation. Taken seriously, the evidence suggests the need for consumption theory to incorporate some cost to adjusting consumption downwards in the face of bad news about future income.

II. SPECIFICATION, DATA AND RESULTS

Campbell and Mankiw (1990) and others test the LCH/PIH using the following equation:[4]

$$(1) \qquad \Delta c_t = \mu + \lambda \, \Delta y_t + \varepsilon,$$

where Δc is the growth rate of consumption, Δy is the growth rate of income, and ε is a disturbance term. Under the LCH/PIH, predictable movements in income should be orthogonal to consumption changes; econometrically, this means that λ should equal zero when (1) is estimated with IV, provided one instruments for Δy using variables in the information set at time t-1. Equivalently, if $\hat{\Delta y}$ denotes the projection of Δy on the instrument vector Z_{t-1}, the LCH/PIH implies that λ should be zero in the OLS regression

$$(2) \qquad \Delta c_t = \mu + \lambda \, \hat{\Delta y}_t + \varepsilon_t.$$

Under myopia, consumption simply tracks disposable income.

Consumption should be correlated with predictable income in all periods, regardless of the value of $\Delta\hat{y}$. If there are liquidity constraints, however, consumption will be correlated with predictable income in only some periods. Assuming that aggregate income accrues to a representative consumer, liquidity constraints may bind in periods when income is expected to rise, but will not bind when income is expected to fall; liquidity constraints inhibit borrowing but do not restrict saving.[5] Thus, assuming a representative consumer, the correlation between $\Delta\hat{y}$ and Δc will be positive when $\Delta\hat{y}$ is positive, and zero when $\Delta\hat{y}$ is negative. In principle, then, the LCH/PIH can be tested against the alternatives of myopia and liquidity constraints by running the following OLS regression:

$$(3) \qquad \Delta c_t = \mu + \lambda_1 (POS_t)(\Delta\hat{y}_t) + \lambda_2 (NEG_t)(\Delta\hat{y}_t) + \varepsilon_t,$$

where POS is a dummy variable for periods in which $\Delta\hat{y} > 0$, and NEG is a dummy variable for periods in which $\Delta\hat{y} < 0$. Under the LCH/PIH, both λ_1 and λ_2 should be zero. Under myopia, the λ's should be positive, significant, and equal. With liquidity constraints, λ_1 should be significantly positive, while λ_2 should equal zero.

While clean, the test outlined in (3) is difficult to implement for postwar US aggregate data, because the projections of income growth on the various sets of instruments used below are rarely negative in my sample. However, if one abandons the fiction of a representative agent, a test of the LCH/PIH against myopia and liquidity constraints can still be implemented. Suppose that agents are heterogeneous, and that predicted income growth for each agent in any period is a random variable with mean equal to the aggregate $\Delta\hat{y}_t$. If the cross-section variance of expected income growth is roughly constant over time, then the fraction of agents expecting income declines will be higher when aggregate $\Delta\hat{y}_t$ is low than when aggregate $\Delta\hat{y}_t$ is high. Conversely, the fraction of agents facing binding liquidity constraints will be highest when aggregate $\Delta\hat{y}_t$ is high.[6] Provided one accepts this premise, we can test the LCH/PIH against liquidity constraints and myopia with the following OLS regression:

$$(4) \qquad \Delta c_t = \mu + \lambda_1 (HIGH_t)(\Delta\hat{y}_t) + \lambda_2 (LOW_t)(\Delta\hat{y}_t) + \varepsilon_t,$$

where HIGH is a dummy variable for periods in which $\Delta\hat{y}_t$ is above its sample mean, and LOW is a dummy variable for periods in which $\Delta\hat{y}_t$ is below its sample mean. In this case, the LCH/PIH implies $\lambda_1 = \lambda_2 = 0$; myopia implies $\lambda_1 = \lambda_2 > 0$; and liquidity constraints imply $\lambda_1 > \lambda_2 \geq 0$.

I now describe the data used to estimate equations (2), (3) and (4). Consumption equals seasonally adjusted per-capita NIPA Personal Consumption Expenditures on nondurables and services. Income equals seasonally adjusted per-capita real disposable income. All data is quarterly, and the sample period is 1956:4 through 1988:4. To form $\Delta\hat{y}_t$, I experiment with ten different lists of instruments, shown in Table 1. These lists include lags of income growth, consumption growth and interest rates, and are similar to the instruments used in Campbell and Mankiw (1990).[7] The interest rate employed in lists 7 through 10 is the quarterly average secondary market three-month nominal T-bill yield.

Results are shown in Table 2. The first column shows the corrected R^2 from the first-stage regression of income growth on the instrument lists shown in Table 1. Following Nelson and Startz (1990), estimates of equations (2), (3) and (4) may be imprecise (at best) or spurious (at worst) if the instrument vector Z has low predictive power for income growth. This suggests that the estimates reported in rows 1, 2 and 7 should be regarded with relative suspicion.

Column (2) reports estimates of the parameter λ from equation (2).

T-statistics are in parentheses and are not corrected for heteroscedasticity or serial correlation; using similar data, Campbell and Mankiw (1990) report that such correction has little effect on their results. As in Campbell and Mankiw (1990), the LCH/PIH is rejected. The estimated elasticity of consumption with respect to predictable income ranges from 0.372 to 0.694; this range is similar to that reported in Campbell and Mankiw, who use a different sample period.

Columns (3) and (4) report estimates of λ_1 and λ_2 in equation (4). These estimates tell a clear story: the LCH/PIH is not rejected for periods in which expected income growth is above average, but is strongly rejected for periods in which expected income growth is below average, with point estimates of λ_2 typically close to or greater than one.[8] This asymmetry is clearly inconsistent with myopia, and is also inconsistent with liquidity constraints, provided one believes that the fraction of agents facing binding liquidity constraints should increase with expected aggregate income growth.

Columns (5) and (6) present estimates of λ_1 and λ_2 from equation (3). Column (7) presents, for each instrument list, the number of sample quarters (out of 129) in which expected income growth is negative (NEG = 1). Note that (3) cannot be estimated for lists 1, 2 and 7, because $\Delta\hat{y}$ is either never negative or negative only once for these lists. By splitting the sample into periods of positive and negative expected income growth, rather than periods of above- and below-average income growth, equation (3) provides a cleaner test of liquidity constraints than equation (4). The results are, again, unfavorable to both myopia and liquidity constraints. While the LCH/PIH can be rejected for periods when income is expected to rise, the estimated sensitivity of consumption to predictable income is much higher when income is expected to fall. And although the estimates of λ_2 are imprecise (presumably due to the rarity of expected income declines), λ_2 still has a higher t-statistic than λ_1 in 6 of 7 cases. In effect, the aggregate consumer in the postwar US has behaved as if she has little trouble borrowing against rising income, but cannot bring herself to cut consumption today in anticipation of falling income.[9]

III. CONCLUSION

The standard neoclassical life cycle-permanent income hypothesis is not consistent with postwar US aggregate consumption data. This note shows that this rejection of the LCH/PIH is not symmetric: aggregate consumption is far more sensitive to predictable income when expected income growth is below average than when aggregate income growth is above average. This finding is not consistent with myopia, which predicts symmetric rejection of the LCH/PIH. This result is also inconsistent with liquidity constraints, provided one believes that liquidity constraints are most likely to bind when expected income growth is high. I also find that aggregate consumption is more sensitive to predictable income declines than to predictable income increases, a cleaner rejection of liquidity constraints.

One mild alternative to the LCH/PIH which is potentially consistent with this note's findings is that households are near-rational, or that small costs of information acquisition prevent households from instantly responding to news about income (Cochrane (1989)). Under near-rationality, households are more likely to violate the LCH/PIH for small absolute predictable income movements than for large absolute movements. In my sample, most periods in which $\hat{\Delta y}$ is below the sample mean are also periods in which $\hat{\Delta y}$ is small in an absolute sense, since predicted income growth is almost always positive in the postwar US for the instruments employed in this paper. Future work should try to find countries in which expected income declines are frequent enough to distinguish below-average expected income growth from absolutely small expected income growth.[10]

Another possible explanation for my findings is that households face unusual costs of adjusting consumption downwards. For instance, if households face a nonconvex "fixed" utility cost (possibly psychic) of reductions in their standard of living, and if income is stochastic, households expecting an income decline might optimally wait until uncertainty is resolved to reduce consumption; intuitively, the expected utility loss incurred by temporary failure to smooth could be outweighed by the expected utility gain from not paying the fixed cost in the event that income does not fall ex-post. Alternatively, lagged adjustment of consumption to bad news might simply reflect the psychological phenomenon of denial (Kubler-Ross (1969)): households learning bad news about the future do not "accept" their new status immediately, but rather cling for a while to the unrealistic hope that things will turn out for the best. Formulating consumption models incorporating costs of downward adjustment, and testing their implications beyond asymmetric rejection of the LCH/PIH, appear to be interesting projects for future resesearch.

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FOOTNOTES

[1]Hall (1978) was the first to test the dynamic stochastic implications of the LCH/PIH in aggregate data. Other recent aggregate time-series tests include Campbell and Mankiw (1989) and Beaudry and Van Wincoop (1992).

[2]Most existing tests of liquidity constraints have been carried out with household data, with mixed results. Zeldes (1989) and Altonji and Siow (1987) find some evidence in support of liquidity constraints, while Runkle (1989), Flavin (1992) and Shea (1993) do not support liquidity constraints. Most of these papers test for liquidity constraints by comparing the response of consumption to predictable income for poor and rich households. This test exploits the fact that rich households can dissave when income is temporarily low, while poor households cannot. As Shea (1993) points out, however, these tests cannot discriminate liquidity constraints from myopia if poverty is correlated with myopic behavior. Chah, Ramey and Starr (1991) test for liquidity constraints in aggregate data by exploiting the predictions of liquidity constraints for the comovements of durables and nondurables purchases; they conclude that liquidity constraints are present.

[3]A similar test has been performed in household data by Altonji and Siow (1987) and by Shea (1993).

[4]An alternative (and, theoretically, more correct) specification employed by Campbell and Mankiw includes the expected real interest rate as an additional regressor in (1). Including the expected real rate

made no qualitative difference to the results reported below.

[5]Deaton (1991) investigates optimal consumption by a liquidity constrained consumer under various income processes. His findings confirm my heuristic conjecture that liquidity constraints imply an asymmetric failure of the LCH/PIH. For instance, when income is stationary, Deaton finds that high income draws are smoothed by saving, while low income draws are not smoothed unless wealth is high.

[6]Whether or not an agent is liquidity constrained depends both on whether expected income growth is positive or negative, and on whether the agent has liquid assets to dissave when income is temporarily low. My assertion that fewer agents face binding liquidity constraints when aggregate $\Delta\hat{y}$ is low thus assumes that the fraction of agents with liquid wealth is not especially low when aggregate $\Delta\hat{y}$ is low. If short-run fluctuations in income are dominated by a stationary business cycle component, then aggregate $\Delta\hat{y}$ will tend to be below average during booms. If wealth is procyclical, then the fraction of agents with liquid wealth will be highest when aggregate $\Delta\hat{y}$ is low, providing another reason to expect $\lambda_1 > \lambda_2$ in equation (4) under liquidity constraints. One could, presumably, construct a liquidity constraints model in which wealth is low when expected income growth is below average. While such a model might soften the assertion that liquidity constraints imply $\lambda_1 > \lambda_2$, it would be difficult for such a model to explain the empirical finding that $\lambda_2 > \lambda_1$ in equation (4). Furthermore, estimates of equation (3) below also find $\lambda_2 > \lambda_1$; this result is inconsistent with any representative agent model of liquidity constraints, regardless of how wealth moves cyclically.

[7] All instruments are dated t-2 or earlier. I avoid t-1 instruments to avoid misspecification due to time-averaging, information-aggregation bias, and durability. See Campbell and Mankiw (1990) for details.

[8] Results are qualitatively similar when the constant term μ is also allowed to interact with HIGH and LOW; results are also similar when nondurables and services consumption are considered separately.

[9] Shea (1993) has data for a group of households linked to particular long-term union contracts. He finds that the LCH/PIH is violated for households expecting real wage declines within a contract, but not for households expecting real wage increases within a contract. This evidence is consistent with the "perverse asymmetry" found here in aggregate data.

[10] On the other hand, Shea (1993) finds that households expecting large absolute wage changes reject the LCH/PIH more strongly than households expecting small absolute wage changes. Furthermore, Shea's test of liquidity constraints is based on equation (3) rather than equation (4), because his sample includes many households expecting real wage declines. Shea's perverse asymmetry results thus cannot be attributed to near-rationality.

TABLE 1

Instrument Lists Used in Empirical Work

LIST 1: $\Delta y_{t-2},\ldots,\Delta y_{t-4}$

LIST 2: $\Delta y_{t-2},\ldots,\Delta y_{t-6}$

LIST 3: $\Delta c_{t-2},\ldots,\Delta c_{t-4}$

LIST 4: $\Delta c_{t-2},\ldots,\Delta c_{t-6}$

LIST 5: $\Delta y_{t-2},\ldots,\Delta y_{t-4}$; $\Delta c_{t-2},\ldots,\Delta c_{t-4}$; s_{t-2}

LIST 6: $\Delta y_{t-2},\ldots,\Delta y_{t-6}$; $\Delta c_{t-2},\ldots,\Delta c_{t-6}$; s_{t-2}

LIST 7: $\Delta i_{t-2},\ldots,\Delta i_{t-4}$

LIST 8: $\Delta i_{t-2},\ldots,\Delta i_{t-6}$

LIST 9: list 5 plus list 7

LIST 10: list 6 plus list 8

NOTES: This table presents 10 sets of instruments used for estimation of equations (2), (3) and (4). The symbol Δc denotes the growth rate of per-capita real consumption of nondurables and services; Δy denotes the growth rate of per-capita real personal disposable income; s denotes the log of the ratio of consumption to income; and Δi denotes the change in the nominal average secondary market three-month Treasury bill yield. All instrument lists also include a constant.

TABLE 2

Estimates of Equations (2), (3) and (4)

(2) $$\Delta c_t = \mu + \lambda \Delta \hat{y}_t + \varepsilon_t$$

(3) $$\Delta c_t = \mu + \lambda_1 (POS_t)(\Delta \hat{y}_t) + \lambda_2 (NEG_t)(\Delta \hat{y}_t) + \varepsilon_t$$

(4) $$\Delta c_t = \mu + \lambda_1 (HIGH_t)(\Delta \hat{y}_t) + \lambda_2 (LOW_t)(\Delta \hat{y}_t) + \varepsilon_t$$

List	First-Stage Corrected R-Squared	λ	Equation (4) λ_1	Equation (4) λ_2	Equation (3) λ_1	Equation (3) λ_2	NEG = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	0.009	0.433	0.361	0.509	---	---	0
		(1.639)	(0.804)	(1.095)			
2	0.021	0.517	0.451	0.599	---	---	1
		*(2.712)	(1.370)	(1.540)			
3	0.063	0.451	-0.044	0.893	0.364	1.614	5
		*(2.845)	(0.143)	*(3.125)	*(2.059)	(1.494)	
4	0.083	0.515	0.117	0.917	0.362	2.108	6
		*(3.953)	(0.472)	*(3.699)	*(2.438)	*(2.716)	
5	0.080	0.372	-0.118	0.791	0.264	1.359	7
		*(2.915)	(0.453)	*(3.410)	(1.816)	*(2.050)	
6	0.093	0.430	0.171	0.660	0.309	1.290	11
		*(3.953)	(0.787)	*(3.308)	*(2.452)	*(2.728)	
7	0.019	0.694	-0.059	1.449	---	---	1
		*(3.106)	(0.157)	*(3.877)			
8	0.071	0.543	-0.119	1.297	0.377	3.629	8
		*(3.965)	(0.510)	*(5.079)	*(2.450)	*(2.630)	
9	0.099	0.477	-0.002	0.813	0.294	1.374	12
		*(4.425)	(0.007)	*(4.517)	*(2.185)	*(3.294)	
10	0.128	0.485	0.156	0.757	0.335	1.116	16
		*(5.511)	(0.838)	*(5.060)	*(3.016)	*(3.655)	

NOTES: This table presents 10 sets of IV estimates of the parameter λ in equation (2) and of the parameters λ_1 and λ_2 in equations (3) and (4). The instrument lists are presented in Table 1. Regressions also include a constant. T-statistics are in parentheses. A (*) denotes significance at the 5 percent level. See the text for further details on data and specification.

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