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Distributional basis of aggregate consumption

A shibboleth of modern macroeconomics, irrespective of ideological persuasion, is that consumption differs according to the time period considered. Evidence for this belief seems compelling.[1] Uniformly, studies of short-run or cross-sectional household spending have found that the average propensity to consume declines as income increases. Household data similar to those shown in Table 1 have never been contradicted, regardless of place or time period.[2] Although separated by nearly sixty years and by sharply different economic circumstances, households in the lowest income quintiles in both 1935 and 1993 spent more than their incomes, while those in the highest quintiles spent less than their incomes. On the other hand, the aggregate average propensity to consume, reflecting the spending behavior of all households, has remained nearly constant between 1935 and 1993, despite a nearly twentyfold increase in income. How can this be? How can, as income increases, the cross-sectional spending ratio decline while, at the same time, the time series ratio remains unchanged?

With the luxury of hindsight, the obvious explanation is that the aggregate average propensity simply is an income-weighted average of the individual household propensities; that is

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[1] Thomas (1989) provides a historical perspective; Smyth (1993) has a recent review; Friedman (1957) has a comprehensive review of the basic problem and related empirical literature; Borghese and Lund (1997) review from a history of ideas perspective.

[2] Quintile data for 1935 compiled from National Resources Planning Board (1941); quintile data from 1993 from BLS (1995).

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Table 1
Quintile and total average consumption and income

	1935			1993		
Quintile	*c*	*y*	*b*	*c*	*y*	*b*
1	$453	$343	1.32	$13,643	$6,285	2.17
2	786	729	1.08	18,843	14,606	1.29
3	1,073	1,048	1.02	24,462	24,290	1.01
4	1,486	1,543	0.96	33,098	38,432	0.86
5	2,841	3,733	0.76	50,707	75,707	0.67
Total	$6,639	$7,396	0.90	$140,753	$159,320	0.88

$$b_t = \frac{C_t}{Y_t} = \frac{\Sigma c_{it}}{Y_t} = \frac{\Sigma b_{it} y_{it}}{Y_t},$$

where C_t and Y_t, representing aggregate consumption and income in year t, summarize household consumption (c_{it}) and income (y_{it}) and where b_t and b_{it} represent aggregate and household average propensities to consume. As Table 1 illustrates, the aggregate spending ratio is stable despite a declining cross-sectional ratio because households with high spending ratios have a relatively slight influence on the aggregate ratio as a consequence of their relatively small income share, while households with low ratios have a relatively large influence because of their relatively large income share. In this context, cross-sectional and time-series differences in consumption are irrelevant; household and aggregate consumption are directly related through the size distribution of household income.

Despite some early work by Theil (1954) on macroeconomic variables as weighted averages, researchers in the late 1940s and early 1950s considered differences in short- and long-run consumption as competing rather than complementary descriptions of aggregate spending behavior. Reinforced by econometric studies that produced cross-sectional marginal propensities significantly smaller than those found with time-series data, these differences seemed paradoxical. While Keynes' (1936, p. 96) restatement of the law of declining marginal utility as a "fundamental psychological law" that "men are disposed, as a rule and on average, to increase their consumption as their income increases, but not as much as the increase in their income" remained an accurate description of household spending, it offered no ready explanation for the stable long-run behavior that implied constant marginal utility from consumption.

Rather than closely looking into the consumption data and paying careful attention to subscripts, researchers sought a theoretical resolution of the inconsistency. Two fictions were developed. First, conflicting empirical studies of spending behavior were treated as if they were studies of single individuals rather than of households or nations. This "representative person" fiction clearly established an insufficiency in the prevailing Keynesian theory, for obviously a person represented by household data could not have a different marginal propensity to consume than the same person represented by aggregate time-series data.[3] Second, current income as used in the Keynesian theory was replaced by a fictional lifetime or permanent income. This neatly resolved the consumption function puzzle. Since cross-sectional marginal propensities reflected spending from current income, which could be more or less than permanent income or the expected annual return from lifetime income, they should be disregarded in favor of long-run propensities, which reflected permanent spending behavior, undisturbed by unanticipated variations in annual income.

With little controversy, representative behavior and permanent income were incorporated into modern macroeconomics and institutionalized as truths. Keynes' "men . . . disposed, as a rule and on average" were replaced by representative agents who sought to maximize lifetime utility from consumption given the present value of lifetime income. The orientation of consumption theory shifted from a Keynesian world of short-run responses to current income to a neoclassical one of long-run decisions regarding lifetime income. While this shift captured the fancy of most researchers, it remains uncertain if it accurately captures the behavior of most households. Even if consumption decisions are based on expected lifetime income, households cannot ignore the necessity of surviving from one time period to the next. The neoclassical reformation ignores the practical constraint that consumption must always at least equal some subsistence level of spending to avoid death. For most households, this "Iron Law" of consumption is more relevant than the additional constraint that the present value of their consumption equals the present value of their income. As Table 1 shows, most households spend about what they earn or more, implying, irrespective of any long-run considerations, that consumption is determined by current rather than permanent income.

The shift from short- to long-run considerations regarding spending

[3] For a review of representative behavior in economic theory, see Bunting (1997).

also had important policy implications. Differences in consumption caused by differences in income, that is, differences between the rich and the poor, came to be ignored because with a single representative agent there can be no distributional effects, the rich and poor are one. The shift also created a strong noninterventionist bias so as to preserve the integrity of lifetime decisions. Temporary expansionary fiscal policies to relieve cyclic distress were opposed on the grounds that temporary expedients could not alter long-run behavior.

Long ago Friedman (1957, p. 231) argued for simplicity in theory. He vigorously attacked complex intellectual fabrications that placed endless epicycles within epicycles when simpler explanations were available: "complexity is frequently pointed to with pride by workers in the field as evidence of the subtlety of their analysis. . . . In fact, the necessity of introducing many variables is a sign of defeat and not of success; it means that the analyst has not found a truly fruitful way of interpreting or understanding his subject matter; for the essence of such a fruitful theory is that it is simple." The fictions of representative behavior and permanent income are simply unnecessary to explain the behavior for which they were developed. There is a simpler, in fact, an exact mathematical, explanation for differences in the cross-sectional and long-run marginal propensities. While this might be unpleasant news for theories deduced from the fictions, it reaffirms the Keynesian view that consumption depends on immediate rather than distant considerations.

The theme of the paper is that long-run measures of spending behavior are interesting but essentially useless social statistics similar to average life expectancy, average IQ, or average weight. Stable long propensities imply stable cross-sectional behavior. In every instance, the long-run or time-series measure depends on, and can be developed from, cross-sectional measures of spending behavior. The paper begins by showing that alleged transitory influences on spending behavior are actually sociological and demographic influences that determine household earning capabilities. An income share elasticity is developed to show the effects of distribution on consumption. This elasticity, which measures the relative change in the share of consumption from a relative change in the share of income, is shown to be identical to the income elasticity of consumption, Friedman's measure of permanent income. It is then shown that the cross-sectional and long-run marginal propensities to consume are exactly related by their respective share elasticities. Next some interpretations of economic behavior that have passed into the

folklore of macroeconomics are considered. Spending behavior of rural farmers and rural southern blacks and whites as well as life-cycle spending are more simply explained by distributional rather than conjectural factors. Finally, long-run consumption functions are derived from cross-sectional data to show the artifactual nature of long-run spending estimates. The paper concludes with a few remarks on the dynamics of change in science.

Transitory influences

In the context of a representative agent, conflicting cross-sectional and time-series measures of the same spending behavior implied that one of the measures was erroneous or explainable by special circumstances. Researchers concentrated on the latter alternative. Friedman (1957, pp. 22–23) developed the idea of transitory and permanent consumption and income. Normally, consumption is a constant ratio of permanent income, but accidental or chance occurrences can cause current income to deviate from permanent income, thereby creating a transitory component to income. When positive, transitory income will cause the average propensity to fall; when negative, the propensity to rise. The result is that transitory or temporary factors produce a cross-sectional consumption function with a smaller slope than the time-series function. Modigliani and Brumberg (1954) developed a similar argument based on spending behavior over a household's life cycle. Young households have relatively high spending ratios as they undertake the initial expenses of household and family formation, while old households also have high ratios as their income but not their consumption declines in retirement. In either case, cross-sectional spending reflects behavior distorted by unusual factors, implying that the behavior and theories related to it, primarily the Keynesian consumption model, are irrelevant.

With regard to individuals, the idea of transitory influences is a reasonable concept. Everyone experiences income fluctuations that cause their current spending ratio to differ from their long-run ratio. Similarly, everyone experiences different expenses over their life cycles. But these experiences do not imply that everyone has the same long-run spending ratio. It is entirely possible for the average propensities of lower-income households to be permanently larger than those of higher-income households. Similarly, it is possible for young or old low-income households to have larger ratios than those of young and old high-income households. However, surveys of cross-sectional spending do not

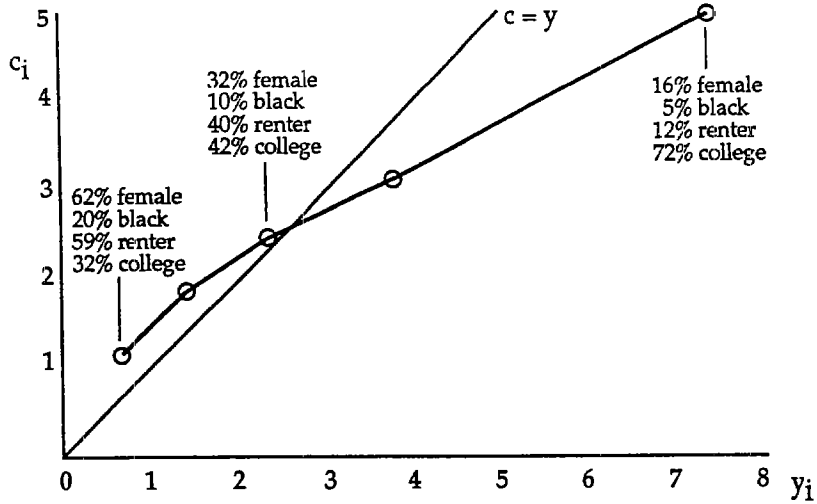
measure the spending of individuals; instead they summarize the behavior of many thousands of spending units. For example, each of the quintiles for the 1993 expenditure survey found in Table 1 represents about 17 million households.

Differences between these quintiles are explained by sociological and demographic factors rather than by transitory or lifecycle influences. Figure 1, plotting 1993 data, shows the standard cross-sectional consumption/income relationship as well as the sociological and demographic qualities of some of the observations. The fraction of women respondents declines from the lowest to the highest income quintile, as does the fraction of renters and blacks while the fraction who have attended college increases. This pattern is exactly what would be expected from any labor force income survey: Women and blacks receive relatively lower incomes, wealth as indicated by renter status rises with income, and finally, income and education are strongly related. In effect, the cross-sectional consumption function is a sociological function where current income is a proxy for the determinants of income. If $c_i = f(y_i)$ and, if spending depends on sociological/demographic characteristics as well as, following Keynes' view, the level of income, then $c_i = g$(sex, race, wealth, education, income level, . . .). However, this specification has little meaning in the context of representative behavior because qualities such as sex, race, or income level disappear in aggregation, while wealth and education have limited meaning.

The quintile sociological characteristics shown in figure 1 are not unusual. Table 2 summarizes the same characteristics found in various annual BLS *Consumer Expenditure Surveys* from 1972 to 1993.[4] Percentages of female, black, renter, and college in the lowest, middle, and highest quintiles were divided by the survey average to calculate the ratios shown in the table. When the ratios are less than one, the quintile percentages are less than the survey average; when greater than one, the percentages are larger. For example, in 1993 the percentages of females, renters, and blacks found in the lowest quintile were greater than the survey average while the percentages found in the middle quintile were about equal to the average, and the percentages in the highest quintile were less than the overall average. Similarly, the percentage who attended college rose from the lowest to the highest quintile. The pattern

[4] See "Appendix A Glossary" in any recent BLS *Bulletin* reporting *Consumer Expenditure Survey* results. Sex, race, and education are that of the survey "reference person" while renter status is that of the household.

Figure 1 Demographic and sociological characteristics, household consumption and income, 1993



is consistent over the last twenty years. The reason for differences in cross-sectional income now seems obvious: The lowest quintiles contain the lowest-income earners while the highest quintiles contain the highest earners. The reason for differences in consumption is also obvious: The marginal utility of consumption declines as income rises.

Distributional influences

Keynesian and neoclassical theories of aggregate consumption essentially differ on how changes in income affect spending behavior. In the Keynesian model, the effect is direct: Income changes lead to spending changes. In the neoclassical formulation, the effect is indirect: Income changes have uncertain effects because spending decisions, initially determined given lifetime or permanent income, must be recalculated. While these views are usually considered competing and great efforts have been made to establish the superiority of one or the other, they are largely different perspectives on how distributional factors influence spending behavior. In the Keynesian model, low-income households, implicitly those with smaller income shares, spend differently than high-income households, those with larger income shares. On the other hand, in the neoclassical model, household behavior is captured by a

Table 2
Quintile sociological characteristics as fraction of survey average

	Female			Renter			Black			College		
Year	Q1	Q3	Q5	Q1	Q3	Q5	Q1	Q3	Q5	Q1	Q3	Q5
1972	na	na	na	1.45	1.07	0.45	1.73	0.91	0.45	0.44	0.93	1.89
1980	na	na	na	1.59	1.13	0.31	1.50	1.17	0.42	0.73	0.95	1.51
1981	na	na	na	1.63	1.08	0.30	1.58	0.83	0.50	0.70	0.95	1.47
1982	na	na	na	1.56	1.07	0.32	1.73	0.91	0.45	0.66	0.89	1.55
1983	na	na	na	1.59	1.10	0.32	1.73	1.00	0.45	0.75	0.89	1.55
1984	na	na	na	1.55	1.10	0.33	1.80	1.00	0.50	0.72	0.93	1.54
i1984	1.74	0.94	0.39	1.50	1.13	0.34	1.70	1.00	0.50	0.70	0.89	1.57
i1985	1.74	0.94	0.42	1.55	1.16	0.34	1.64	0.82	0.55	0.68	0.93	1.52
i1986	1.73	0.91	0.45	1.55	1.16	0.34	1.64	0.91	0.45	0.67	0.95	1.58
1987	1.82	0.94	0.35	1.58	1.08	0.37	1.90	0.90	0.40	0.65	0.93	1.58
1988	1.76	0.91	0.41	1.51	1.08	0.33	1.91	0.91	0.45	0.64	0.95	1.57
1989	1.74	0.94	0.47	1.55	1.05	0.32	1.70	1.00	0.50	0.65	0.91	1.57
1990	1.67	0.89	0.47	1.53	1.08	0.34	1.82	0.91	0.55	0.65	0.93	1.61
1991	1.71	0.89	0.49	1.55	1.08	0.34	1.64	0.82	0.45	0.66	0.96	1.55
1992	1.61	0.89	0.53	1.64	1.05	0.36	1.82	0.91	0.45	0.64	0.91	1.53
1993	1.68	0.89	0.49	1.55	1.03	0.34	1.82	1.09	0.55	0.67	0.94	1.52

single representative agent, implying distributional influences have no effect on spending behavior.

The real difference between these two theoretical perspectives is a disagreement over the value of the income-share elasticity, the effect of a change in the relative share of income on the relative share of consumption. If the elasticity is less than one, then a change in income will produce a less than proportionate change in consumption, the Keynesian case; if the elasticity is unity, then an income change will result in a proportionate consumption change, the neoclassical case. The income share elasticity is based on the fact that all aggregate variables are weighted averages, with the weights determined by the relative shares of all m households, consumer units, or agents in the economy. In any year, aggregate consumption and aggregate income simply summarize individual consumption and income,

$$C_t = c_1 + c_2 + \ldots + c_m$$

and

$$Y_t = y_1 + y_2 + \ldots + y_m.$$

Dividing and multiplying the right hand side by C_t or Y_t, the aggregates become weighted averages,

$$C_t = w_1 C_t + w_2 C_t + \ldots + w_m C_t$$

and

$$Y_t = v_1 Y_t + v_2 Y_t + \ldots + v_m Y_t.$$

where $c_i = w_i C_t$, $y_i = v_i Y_t$ and $\Sigma w_i = \Sigma v_i = 1$ with the weights reflecting household shares.

The income share elasticity, e_s, is equal to the slope coefficient from regressing w_i on v_i because $\bar{v} = \bar{w} = 1/m$,

$$e_s = (dw/dv)\,(\bar{v}/\bar{w}) = \mathrm{Cov}(w_i, v_i)/\mathrm{Var}(v_i).$$

This elasticity measures the effects of income distribution on consumption. When unity, the relative shares of income and consumption are equal in the economy. That is, a person with 20 percent of personal income will account for 20 percent of personal consumption, while a person with 0.00002 percent of income will account for 0.00002 percent of consumption. If the utility from consumption is a function of income, this implies constant marginal utility of consumption. When the elasticity is less than unity, increases in the relative share of income produce a smaller relative increase in the share of consumption. For example, a person with 20 percent of income might only account for 14 percent of consumption while a person with 0.00002 percent of income might account for 0.00004 percent of consumption. This implies a declining marginal utility of consumption.

Friedman's (1957) elaborate effort to dismiss cross-sectional spending as reflecting transitory behavior is largely an extended essay on the value of the income share elasticity. He hypothesized that spending is determined by permanent or long-run income. But since permanent income is a fiction, it can only be established by inference. He divided the current or measured consumption and income of consumer units into transitory and permanent components, $c_i = c_{it} + c_{ip}$ and $y_i = y_{it} + y_{ip}$. He argued that permanent consumption is a constant fraction of permanent income, $c_{ip} = k y_{ip}$ where k is marginal propensity to consume out of permanent income and that measured consumption is a linear function of measured income, $c_i = a + b y_i$ where b is the marginal propensity to consume out of measured income. The least square estimate of b, found by regressing

of c_i on y_i, is

$$b = \text{Cov}(c_i, y_i)/\text{Var}(y_t).$$

Substituting for transitory and permanent values and assuming that $\text{Cov}(y_{it}, y_{ip}) = \text{Cov}(c_{it}, c_{ip}) = \text{Cov}(y_{it}, c_{it}) = 0$, this becomes

$$b = k\text{Var}(y_{ip})/\text{Var}(y_i),$$

or, letting $P_y = \text{Var}(y_{ip})/\text{Var}(y_i)$,

$$b = kP_y.$$

The income elasticity of consumption is defined as

$$n_{cy} = (dc/dy)\,(\bar{y}/\bar{c}) = b(\bar{y}/\bar{c}) = kP_y(\bar{y}/\bar{c}).$$

Friedman assumed that mean transitory consumption and income were zero, so that $\bar{c} = k\bar{y}$, implying

$$n_{cy} = P_y.$$

This allowed Friedman (1957, p. 52) to infer the effects of permanent income. When the income elasticity of consumption is unity, consumption is entirely out of permanent income; when the elasticity is less than unity, consumption is from both permanent and transitory income.

> On our hypothesis, this elasticity measures the fraction of the variance of measured income attributable to variation in the permanent component: the higher the elasticity, the smaller the importance of transitory factors relative to permanent factors in producing income differences in the group considered, and, conversely.

The marginal propensity, estimated by least squares, also measures the effects of income distribution on consumption,

$$b = \text{Cov}(c_i, y_i)/\text{Var}(y_i).$$

Substituting, noting that $c_i = w_i C_t$ and $y_t = v_t Y_t$ and $e_s = \text{Cov}(w_i, v_t)/\text{Var}(v_i)$,

$$= [C_t/Y_t][\text{Cov}(w_i, v_t)/\text{Var}(v_t)],$$

$$= (C_t/Y_t)\, e_s$$

$$= (\bar{c}/\bar{y})\, e_s.$$

Table 3
Average consumption and income, quintile shares, 1993

Quintile	c	y	w	v
1	$13,643	$6,285	0.09693	0.03945
2	18,843	14,606	0.13387	0.09168
3	24,462	24,290	0.17379	0.15246
4	33,098	38,432	0.23515	0.24123
5	50,707	75,707	0.36026	0.47519
Total	$140,753	$159,320	1.00000	1.00000

The income elasticity of consumption, Friedman's measure of the existence of permanent income, is equivalent to the income share elasticity. Substituting for the income share elasticity,

$$n_{cy} = (dc/dy)\,(\bar{y}/\bar{c}) = b(\bar{y}/\bar{c}) = e_s.$$

In effect, Friedman's inferential measure of permanent income actually measures the influence of the income distribution on consumption.

Quintile data found in Table 3, derived from the 1993 BLS *Consumer Expenditure Survey* (BLS, 1995) illustrates this point. Regression of consumption on income produces a marginal propensity to consume (b) of 0.53149. With an average propensity of 0.88346, the income elasticity of consumption is 0.60160. Friedman would interpret this elasticity as indicating the influence of transitory income on consumption. However, the regression of the consumption share (w) on income share (v) produces an income share elasticity identical to the income elasticity of consumption, indicating a decline in the relative share of consumption as the relative share of income increases. In other words, transitory income as measured by Friedman exists because households with different income shares have different spending propensities; in effect, the income distribution produces the spending differences Friedman identifies as transitory.

It should be noticed that, regardless of time period considered, the income elasticity of consumption will never equal one as long as the consumption and income shares of consumer units differ. No society has ever been egalitarian, free from the rich and the poor. The quality of being poor is having a smaller income while that of being rich is having a larger income. Since the utility derived from consumption probably declines with income increases, the poor have always spent a larger fraction of their income than the rich. As Table 3 shows, the lowest

income quintile accounts for 4 percent of income and 10 percent of income while the highest quintile accounts for 48 percent of income and 36 percent of consumption. This pattern, found in every cross-sectional survey, clearly indicates the distributional basis of aggregate consumption.

Spending differences

Representative behavior and permanent income were fictions developed to resolve differences between estimates of cross-sectional and time-series marginal propensities to consume. Unfortunately, rather than resolving differences, the fictions became institutionalized as truths and incorporated as the intellectual basis of neoclassical consumption theories. Meanwhile, the original problem was ignored. In fact, the different types of marginal propensities are directly related. In the same manner that trees compose a forest or ducks a flock, short-term household behavior determines long-run spending. Cross-sectional and time-marginal propensities differ depending on the respective household and aggregate (also known as representative) income share elasticities. When equal, the propensities are equal; when different, the propensities differ.

As previously shown, every consumption function also measures the relationship between consumption and income shares. The cross-sectional marginal propensity is related to the income elasticity:

$$b = (C_t/Y_t)e_s.$$

The long-run propensity is related in the same way. Since Kuznets (1946), the long-run function has been

$$C_t = \beta Y_t.$$

Letting with $C_{tt} = \Sigma C_t$ and $Y_{tt} = \Sigma Y_t$ where $tt = 1,\ldots t$ years, then the relationship between the long-run marginal propensity and E_s, long-run income share elasticity, is

$$\beta = (C_{tt}/Y_{tt})E_s,$$

with $C_t = W_t C_{tt}$ and $Y_t = V_t Y_{tt}$.

Resolution of spending differences is exact. The different marginal propensities are related in that aggregate cross-sectional consumption (C_t) and income (Y_t) constitute a point on the long-run function implying

that

$$b = \beta e_s.$$

When the cross-sectional average propensity (*apc*) long-run propensity (*APC*) are equal, it is also true that

$$b = \beta e_s / E_s.$$

The values of the respective share elasticities can be easily deduced from the relationship between the marginal and average propensities. In the long run, $\beta = APC$, implying that $E_s = 1$ while in the cross-section, $b < apc$, implying that $e_s < 1$. Tables 4 and 5 summarize some common consumption function estimates. The long-run results for the United States shown in Table 4 using real NIPA data (BEA, 1993) are familiar and similar to those for other long time periods. Regardless of income measure, the marginal and average propensities are nearly identical, producing an income share elasticity near unity.[5]

Results from selected cross-sectional surveys are found in Table 5. From 1890 to 1972, the Bureau of Labor Statistics conducted consumer expenditure surveys on roughly a ten-year basis; since 1980 surveys have been conducted annually. With greater detail found in the appendix, each survey was organized by income level with the number of levels varying from six to fifteen. Income, net of taxes, includes home production while consumption, net of contributions for personal insurance and pensions, includes all expenditures and gifts.[6] The consumption functions were estimated using grouped average data (group total divided by group respondents). Although the average propensities are similar to the long-run values, the cross-sectional marginal propensities are much less, implying income share elasticities less than one.

The long-run and cross-sectional marginal propensities are not equal because their respective share elasticities are not equal. Previous efforts to resolve spending differences utilizing representative behavior implicitly set these elasticities equal. With only one economic actor, consumption

[5] Friedman (1957) collected many standard studies. Differences in total, per-capita, and per-household growth rates are explained by differences in the growth rates of the income divisors as compared with that of income itself.

[6] Early surveys tabulated data by income level rather than quintile. Since each income level represented a different number of households, aggregate measures as well as consumption and income shares must be adjusted to reflect respondent differences. Throughout the paper quintile data are utilized when available.

Table 4
Long-run coefficients, 1929–87

Period	Income definition	β	C/Y	E_s
1929–87	Total	0.9375	0.9290	1.0092
	Per capita	0.9276	0.9281	0.9994
	Per household	0.9022	0.9279	0.9722
1958–1987	Total	0.9534	0.9313	1.0238
	Per capita	0.9537	0.9308	1.0246
	Per household	0.9398	0.9303	1.0102

Table 5
Cross-sectional coefficients, selected surveys, 1888–90 to 1991

Survey year	b	C_t/Y_t	e_s
1888–90	0.5127	0.8959	0.5717
1901	0.7354	0.9406	0.7822
1917–19	0.7903	0.9121	0.8665
1935–36	0.4872	0.8990	0.5421
1941	0.7133	0.9334	0.7644
1950	0.7462	1.0033	0.7438
1960–61	0.7471	0.9455	0.7770
1972–73	0.6495	0.8810	0.7371
1980	0.4640	0.8662	0.5356
1985	0.5574	0.9512	0.5860
1991	0.5442	0.8920	0.6100

and income shares are irrelevant. But, in fact, distributional factors entirely determine spending behavior: Given consumption and income shares and the average propensity to consume, the marginal propensities are exactly determined, fictions of any sort are simply unnecessary.

The constancy of the long-run average propensity to consume has been used as evidence for the existence of permanent income, that is, $APC = \beta$ with no intercept while a declining cross-sectional average propensity ($apc = a/y_i + b$) has been used to suggest transitory income or wealth effects. The intercept of the consumption function is found by

$$a = \bar{c} - b\bar{y}.$$

After substitution as above, this becomes

$$a = (C_t/m)(1 - e_s).$$

This intercept varies from zero depending on the share elasticity. When the elasticity is unity as in the long run, it is zero; when the elasticity is less than unity, it is determined by average consumption and the relative distribution of consumption and income shares. Again, explanation of aggregate consumption behavior requires no information or conjectures beyond the data determining the consumption function itself.

Folklore

While initially controversial, the fictions of representative behavior and permanent income have long since become part of the conventional wisdom of macroeconomics. This was accomplished primarily through the reinterpretation of studies of spending behavior. In *A Theory of the Consumption Function*, Friedman (1957) collected many different consumption studies, interpreting their results as supporting his hypothesis. His conjectures proved so compelling that they are now accepted without question. For example, Abel and Bernanke (1995, pp. 261–262) repeat Friedman's explanation for spending differences between farm and nonfarm families: "as farm incomes depend heavily on weather and crop prices, both of which are volatile, changes in farm incomes are much more likely to be temporary than are changes in nonfarm incomes. Current changes in farm incomes have a smaller effect on (permanent income) and therefore have a smaller effect on current consumption."

Although Friedman (1957, pp. 58–69) did not publish the data he analyzed, the average consumption and income figures for 1935–36 nonrelief farm families found in Table 6 are drawn from the same sources he utilized and produce similar spending coefficients[7]:

$$c_i = 883 + 0.2841 y_i,$$

with an income elasticity (n_{cy}) of 0.3394 using an *apc* calculated by C_i/Y_i of 0.8369. The table also shows the distribution of families and consumption and income shares by income level. Families are concentrated near the bottom of the eight income levels, with 52 percent in the lowest two levels and 75 percent in the lowest three. On the other hand, the highest level, representing 1.4 percent of the families, accounts for 25 percent of

[7] Data were taken from National Resources Planning Board (1941), Tables 372 and 385; income includes taxes and gifts to others; because of extreme differences between poor and rich farmers, the $10,000+ income level was blended into the $5,000+ income level.

Table 6
Average consumption and income with distribution of families and average shares, 1935–36 nonrelief farm families

	Average			Average shares	
Income level ($)	Con. ($)	Inc. ($)	Families (%)	Con.	Inc.
< 500	475	308	17.7	0.0347	0.0124
500–1,000	808	756	34.6	0.0590	0.0305
1,000–1,500	1,172	1,251	22.6	0.0856	0.0506
1,500–2,000	1,453	1,756	11.9	0.1061	0.0710
2,000–3,000	1,772	2,449	8.4	0.1294	0.0990
3,000–4,000	2,160	3,468	2.6	0.1578	0.1402
4,000–5,000	2,375	4,460	0.8	0.1734	0.1803
5,000+	3,477	10,293	1.4	0.2539	0.4160
Aver./total	1.712	3,093	6,624	1.0000	1.0000

average consumption and 42 percent of average income. The highest three income levels dominate nonfarm family spending, accounting for 59 percent of all consumption and 74 percent of all income. However, despite these sharp differences in the fraction of families represented, each income level is given equal weight when consumption coefficients are estimated.

Because families are unequally distributed by income group, the data must be first transformed into group totals before weighted consumption and income shares can be determined to calculate an income share elasticity. This elasticity of 0.3394, identical to the income elasticity of consumption, indicates that farm family consumption responds weakly to changes in income shares. This has nothing to do with uncertain weather and volatile prices, but is rather explained by the distribution of farm income. More than half of the families were poor, spending more than their income, while a few were rich, saving nearly half their income.

Friedman (1957, pp. 79–85) also considered studies of black and white family spending, noting that, while the consumption coefficients were similar, the intercept for blacks was smaller, implying that at "the same measured income, [they] will spend less on consumption than whites." Friedman observed that on average white incomes were larger than black incomes, implying larger permanent incomes and therefore higher levels of consumption. Romer (1996, pp. 313–316) expanded on this by showing that the intercept is related to permanent income, concluding that "the permanent income hypothesis attributes the differences in consumption patterns . . . to different average incomes of the two groups,

and not to any differences in tastes or culture."

Drawing from the same sources analyzed by Friedman, Table 7 shows average consumption and income by income level for similar groups of 1935–36 Southern rural black and white families.[8] Estimated consumption functions differ only by their intercepts. The function for blacks is

$$c_i = 153 + 0.7265y_i,$$

with $n_{cy} = e_s = 0.7577$ and $C_t/Y_t = 0.9589$; and for whites,

$$c_i = 243 + 0.7406y_i$$

with $n_{cy} = e_s = 0.8000$ and $C_t/Y_t = 0.9256$. The table also shows the distribution of families by income level. This, rather than some conjectures on permanent income, explains the difference in intercepts. Blacks were simply much poorer than whites. More than three times more black families than white families were in the lowest income group, 47 percent as opposed to 14 percent. On the other hand, 17 percent of the white families were in the highest income group, as compared with 1.2 percent of the black families. As previously shown, the intercept of the consumption function is determined by the income share elasticity and average consumption.[9] Since on average blacks were poorer than whites, the black intercept was lower than the white one. If black families had enjoyed the same income distribution as white families, then the intercepts would have been virtually identical. In other words, it is the relative shares of consumption and income rather than permanent income that explains the observed differences in racial consumption behavior.

While permanent income is associated with Friedman, Modigliani (1986) alone, and with Brumberg (1954), and with Ando (1963) developed a model of life-cycle behavior based on expected lifetime income and smooth or constant consumption. Mankiw (1995, p. 408) summarized this work: The model "implies that saving varies over a person's life in a predictable way. If a person begins adulthood with no wealth,

[8] Income and consumption data were calculated from National Resources Planning Board (1941), Tables 290 and 296. Income is net of taxes and gifts; because no black incomes above $2,000 were reported while white incomes went to $10,000, white incomes above $2,000 were blended into the $1,750+ income level. Sample size and group frequencies were found in National Resources Committee (1938), Tables 11A and 20B.

[9] Because the income levels represent unequal numbers of families, a weighted intercept has to be calculated.

Table 7
Percent distribution, average consumption and income by income level, 1935–36 southern rural black and white families

	Black			White		
Income level ($)	Percent families	Average con.	Average inc.	Percent families	Average con.	Average inc.
< 500	46.9	343	329	13.5	457	386
500–750	28.5	588	600	21.7	668	637
750–1,000	16.5	802	854	19.1	867	858
1,000–1,250	5.1	986	1,085	13.3	1,102	1,108
1,250–1,500	3.0	1,168	1,344	9.4	1,312	1,345
1,500–1,750	1.5	1,270	1,577	6.1	1,498	1,572
1,750+	1.2	1,442	1,824	16.9	2,345	2,939
Total/aver.	6,105	582	607	11,029	1,130	1,221

she will accumulate wealth during her working years and then run down her wealth during her retirement years. . . . A key implication is that the young who are working save, while the old who are retired dissave." This behavior produces the familiar "humped" diagram of life-cycle behavior where income rises from below consumption during middle age and declines again below with retirement.

Although the life-cycle model seems to fit the facts, in that households sometimes spend more and sometimes less than their annual incomes, it ignores the effect of distribution on spending behavior. Using data from the 1988–89 *Consumer Expenditure Survey*,[10] Table 8 shows the average propensity to consume of households by age and income level. As can be seen, average propensities vary with income, not age: Low-income households spend more than high-income ones but at each income level households spend at about the same rate regardless of their age.[11]

Table 8 also helps to explain how Friedman and Modigliani et al. came to their theories. Both were interested in the puzzling differences between

[10] The average propensities are similar to those found using 1980–81, 1982–83, 1986–87, or 1990–91 BLS survey data. Household income, net of taxes, includes money earned or received from all sources such as wages, pensions, sole proprietorships and social assistance while consumption includes all expenditures except personal insurance.

[11] The extremely large average propensities for low-income, middle-aged households reflects farm and solo proprietorship losses; neither the row or column totals are significantly affected by exclusion of business income (or losses); see Bunting (1991).

Table 8
Household average propensity to consume by age and income level, 1988–89 *Consumer Expenditure Survey*

	Income level ($000)							
Age	0–5	5–10	10–15	15–20	20–30	30–40	40+	Total
< 25	3.12	1.62	1.32	1.05	1.05	0.88	0.56	1.13
25–34	4.31	1.67	1.31	1.15	0.98	0.88	0.72	0.90
35–44	15.59	1.88	1.54	1.17	1.05	0.96	0.76	0.89
45–54	32.14	1.69	1.28	1.20	1.04	0.95	0.72	0.85
55–64	5.03	1.92	1.34	1.09	0.96	0.89	0.64	0.84
65+	2.74	1.59	1.34	1.12	1.00	0.91	0.72	1.00
Total	4.60	1.59	1.34	1.12	1.00	0.91	0.72	0.90

cross-sectional and long-run spending behavior; both knew that the overall total in Table 8 was consistent with the long-run values found by Kuznets. Friedman, in effect, concentrated on the column totals, noticing that the average propensity declined with income, and developed his permanent income theory to explain how it was possible for these values to be so much different than the overall total. Modigliani looked at the row totals, noticing that average propensities varied with age, and developed his life-cycle model to explain why these values were so different from the overall total. Neither researcher had the whole table; neither suspected his figures were connected to those of the other. If the table had existed, both would have been forced to consider the effects of income distribution on consumption, both would have had great difficulty in postulating representative behavior.

Table 9 shows the income distribution underlying Table 8. As can be seen, aggregate average consumption declines toward middle age, rising thereafter, because 42 percent of all income is earned by 25- to 54-year-olds in the highest income bracket. But this group is not "representative" because it represents less than 25.3 percent of all households. On the other hand, in calculations to determine a cross-sectional marginal propensity, the permanent income model assigns equal weight to an observation representing 54.1 percent of total income as to one representing 0.7 percent of income. However, this coefficient is not "representative" because one of the observations represents 25.3 percent of the households while the other represents only 7.7 percent.

The three examples reviewed all suggest that conventional explanations of documented spending behavior are unnecessarily complex.

Table 9
Percent distribution of household income by age and income level, 1988–89 *Consumer Expenditure Survey*

	Income level ($000)								
Age	0–5	5–10	10–15	15–20	20–30	30–40	40+	Total	% hds.
< 25	0.2	0.4	0.5	0.6	1.0	0.6	0.7	4.1	8.0
25–34	0.1	0.6	1.1	1.5	4.3	4.7	10.3	22.5	22.8
35–44	0.0	0.4	0.6	1.1	2.8	4.6	17.6	27.1	21.1
45–54	0.0	0.3	0.5	0.6	1.8	2.3	13.7	19.3	14.3
55–64	0.1	0.4	0.6	0.8	2.1	1.8	7.5	13.2	12.3
65 +	0.2	1.7	1.8	1.6	2.5	1.7	4.3	13.9	21.4
Total	0.7	3.8	5.2	6.2	14.5	15.7	54.1	100.0	
% hds.	7.7	14.0	11.9	10.3	17.2	13.6	25.3		100.0

While fictional agents spending fictional incomes might have intellectual appeal, such behavior is limited only by imagination. The result of this paradigm is the same today as when Friedman (1957, p. 231) observed it when proposing his theory. "The result has been the introduction of increasing complexity into the analysis in an effort to rationalize the data within the same general framework." Simpler explanations can be drawn from the data itself without complicating fictions. Every instance of spending behavior has its implicit distributions of consumption and income; it is these distributions that constitute the basis of aggregate consumption.

Long-run consumption

A major emphasis in research on aggregate consumption has been to focus on long-run results while ignoring cross-sectional surveys as contaminated by transitory elements and not truly reflecting life-cycle or permanent behavior. Since it is has been shown that the long-run and cross-sectional coefficients are directly related through the income share elasticity, for example, $b = \beta e_s$, this distinction seems no longer relevant. In fact, the entire relevancy of long-run functions seems questionable.

There are a few simple identities which are usually ignored when considering spending behavior. When aggregated, household consumption ($c_1 + c_2 + \ldots + c_m$) and income ($y_1 + y_2 + \ldots + y_m$) produce a pair of values which help map out the long-run relationship between aggregate consumption ($C_t = \Sigma c_i$) and aggregate income ($Y_t = \Sigma y_i$). One year

Table 10
Consumption and income, selected cross-sectional surveys, 1888–90 to 1991

		Per-capita ($)		Total ($M)	
Survey year	*C/Y*	Cons.	Inc.	Cons.	Inc.
1888–90	0.8959	8,606	9,606	58.6	65.4
1901	0.9406	9,364	9,955	104.5	111.1
1917–19	0.9121	9,857	10,807	119.2	130.7
1935–36	0.8990	12,364	13,754	363.5	404.4
1941	0.9334	19,457	20,845	397.3	425.6
1950	1.0033	19,545	19,482	211.1	210.5
1960–61	0.9455	19,418	20,538	911.0	963.6
1972–73	0.8810	27,124	30,786	1,829.4	2,076.4
1980	0.8662	20,217	23,339	1,154.1	1,332.3
1985	0.9512	23,383	24,583	1,899.2	1,996.7
1991	0.8920	22,843	25,608	1,919.3	2,151.5
Aver.	0.9182	17,471	19,027	815.2	897.1

follows the next. Occasional cross-sectional surveys also have been undertaken. These produced the coefficients collected in Table 5 as well as the real aggregate consumption (C_t) and aggregate income (Y_t) figures shown in Table 10.[12] Also found in the table are corresponding consumption and income per household figures, e.g., C_t/H_t and Y_t/H_t where H_t is the number of households. The data in Table 10 were used to estimate two long-run consumption functions (with t statistics in brackets). The first measures aggregate behavior:

$$C_t = 7.57 + 0.9003 Y_t,$$

$$(0.40) \quad (57)$$

with $APC = 0.9087$ and $E_s = 0.9908$, while the second measures per household behavior:

$$C_t/H_t = 547 + 0.8894(Y_t/H_t),$$

$$(0.70) \quad (23)$$

with $APC = 0.9182$ and $E_s = 0.9686$.

[12] A consistent deflator for the entire time period was created by linking the Kendrick NBER series, Series B64, (BEA, 1973) with the NIPA series, Table 7.1, line 16, (BEA, 1993).

Both functions are truly long run in the sense that they measure the relationship between consumption and income over a very long period, from 1890 to 1991. The results of both are consistent with those found by Kuznets (1946) or summarized by Friedman (1957). Most important, both were derived entirely from cross-sectional data. These results indicate, when compared with the coefficients found in Table 5, that both long-run and cross-sectional marginal propensities can be derived from the same data without any intervening fictions. Particular estimates depend entirely on how the data are organized: Cross-sectional coefficients are found when the data are organized by households; long-run coefficients are found when the data are aggregated by year.

Cross-sectional marginal propensities can assume any value but will not effect the long-run propensity as long as the annual ratios of consumption and income remain unchanged. However, the reverse is not true. The long-run marginal propensity cannot change unless cross-sectional behavior as shown by the income share elasticity changes. Changes in this elasticity reflect changes in household consumption which, through all households, alters aggregate consumption and therefore the relationship with aggregate income. In effect, long-run consumption is exactly determined by cross-sectional consumption. If households alter their behavior and consume differently, this will be reflected in the annual aggregate value of consumption and ultimately in the estimates of long-run spending behavior. The reverse cannot arise: Long-run consumption cannot change cross-sectional consumption because cross-sectional spending is the result of spending behavior, not the cause of it. Since long-run consumption is an artifact of cross-sectional spending, its usefulness is questionable. While perhaps an interesting social statistic, the long-run marginal propensity does not represent household spending behavior in any representative sense: It is too small for the majority of households that are poor and too large for the few households that are rich.

Conclusions

Underlying every consumption function are two implicit share elasticities, one for cross-sectional and the other for long-run behavior. When these elasticities differ, the cross-sectional and long-run regression coefficients will differ. Any other explanation for differences in the coefficients is simply incomplete. The fictions of representative behavior and lifetime or permanent income were developed in ignorance of

these share elasticities. While these fictions seemed reasonable and facilitated intellectual activity, they obscured rather than clarified understanding of aggregate spending behavior. On the one hand, cross-sectional spending was ignored as contaminated by transitory influences, while on the other hand cross-sectional and long-run spending were treated as separate and unrelated activities. In fact, transitory elements are irrelevant and cross-sectional and long-run spending are just different perspectives on the same behavior.

Periodically new concepts are developed that not only neatly resolve puzzling questions but also seem to have great explanatory power. In astronomy, epicycles seemed to explain the movement of the planets, while in medicine bleeding seemed to relieve the distress of fever. In economics, Mill's wage fund and Marshall's representative firm initially seemed useful concepts. But all these were abandoned in the face of new information and alternatives. So, too, with the study of aggregate consumption. While the fictions of representative behavior and permanent income both resolved and explained, they also precluded consideration of distributional influences on aggregate consumption. As has been shown, it is these influences that determine aggregate spending, and so the fictions are no longer useful.

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Appendix: Consumer Expenditure Surveys

The following briefly summarizes the cross-sectional data and sources cited in the paper; Brady (1956) and Friedman (1957) are general sources for surveys before 1950.

1888–90: Twelve income levels; selected wage earner families; Brady (1956, pp. 182, 206–207).

1901: Twelve income levels; average consumption and income from Brady (1956, p. 182); group frequencies from U.S. Bureau Census (1975, pp. 1, 321).

1917–19: seven income levels; average consumption and income from Brady (1956, p. 182); group frequencies from BLS (1924).

1935–36: Fifteen income levels; all families; consumption includes gifts, taxes and nonmonetary items; National Resources Planning Board (1941), Table 1.

1941: Nine income levels; urban families; income includes nonmonetary items; consumption includes gifts, taxes and nonmonetary items; BLS (1945), Tables 10 and 19.

1950: Nine income levels; urban families; income includes other income; consumption includes gifts and taxes; Wharton School Finance and Commerce (1957), Table 1–1.

1960–61: Ten income levels; urban and rural families; consumption includes gifts and taxes; BLS (1966) Supplement 3, pt. A, Table 29c.

1972–73: Twelve income levels; consumption includes gifts and taxes; BLS (1978).

1980: Six income levels; BLS (1985), Table 2.

1985: Eight income levels; BLS (1989), Table 2.

1991: Eight income levels; BLS (1993), Table 2.

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