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Does Income Distribution Matter for Effective Demand? Evidence from the United States

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ABSTRACT *This article examines the influence of income distribution in the determination of effective demand in the US. A simple model is developed to simulate the effects of changing income inequality on the aggregate propensity to consume. The simulation results illustrate that income inequality has a substantial negative impact on consumption when household spending is assumed to be income-constrained. Econometric evidence is presented that rising private sector wage inequality had a dampening effect on the time path of consumption in the United States between 1978 and 2000. The methodology entails time series estimation of consumption specifications with a measure of income inequality (the Theil index) included among the explanatory variables. The argument is made that, ceteris paribus, rising income inequality creates a need for greater reliance on debt to sustain a given level of household spending.*

1. Introduction

The problem of income distribution—its measurement and underlying causes, as well as its economic and social ramifications—is the subject of a vast literature.[1] Yet surprisingly little attention has been paid to the question of the macroeconomic implications of income distribution. The basic issue is straightforward enough: does the *shape* of the income distribution function matter for effective demand? This article endeavours to shed light on the following aspects of this question:

(1) Why, in theory, should a change in income distribution impinge on aggregate expenditure?
(2) Is it possible to demonstrate formally a non-trivial 'income distribution' effect based on plausible assumptions about household spending behaviour?

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[1] For a recent description of cross-national trends in income inequality, see Gottschalk & Smeeding (1997). See Acemoglu (2002) for a review of the literature on the question of technical change and income inequality.

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(3) Does the post-1978 evidence from the United States support the hypothesis that income distribution matters for consumption expenditure?
(4) Does rising income inequality create the need for greater reliance on debt to sustain aggregate consumption expenditure?

The article is organized in six sections. Section 2 examines the distribution–effective demand nexus at the level of theory. In Section 3, a simulation is performed to measure the effects of change in income distribution in an artificial economy. Empirical evidence from time series econometrics using United States data is presented in Section 4. Section 5 analyzes the role of consumer credit in supporting aggregate expenditure in economies characterized by high income inequality. Concluding remarks are contained in Section 6.

2. Distribution and Effective Demand: Theoretical Linkages

It may seem peculiar to some that income distribution is discussed in the context of the theory of effective demand. After all, Keynes made little more than a passing comment on the subject in Chapter 8 ('The Propensity to Consume: I') of the *General Theory*: ' If fiscal policy is used as a deliberate instrument for the more equal distribution of incomes, its effect in increasing the propensity to consume is, of course, all the greater' (Keynes, 1936, p. 95). Seminal contributions by Friedman (1957) and Modigliani (1966), which provide the basis for modern consumption theory, attribute *no* importance to income distribution. A survey of widely used macroeconomics texts uncovered just a single instance in which income distribution is mentioned as a determinant of consumption.[2]

Income distribution *does* play a role in theories of consumption authored by economists affiliated the Cambridge or Post Keynesian school.[3] Pressman (1997) notes that the dependence of aggregate consumption on the *functional* distribution of income is the distinctive feature of the Cambridge approach. For example, Kalecki divided total income between income of workers (W) and profit or income of capitalists (Π). Let α_1 denote the propensity to consume out of wage income and α_2 the propensity to consume out of profits. Thus, aggregate consumption expenditure (C) is given by:

$$C = \alpha_1 W + \alpha_2 \Pi \tag{1}$$

If α_1 is greater than α_2, then a change in functional shares in favour of labour income will boost consumption.

The Cambridge approach is well suited to a situation in which individual or household incomes are restricted to a single functional category—e.g. people receive wages *or* profits, but not both. The methodological approach taken here follows more closely along Keynesian lines. Income distribution matters for

[2] Peterson & Estenson (1992) are an exception. They include a section on income distribution in Chapter 7 of their text under the heading 'Other Influences on Consumption.'
[3] The leading contributor is Kalecki (1943, 1954), but the group also includes Robinson (1954) and Kaldor (1960). See Pressman (1997) for a detailed discussion. Also see Trigg (1994).

effective demand if, *ceteris paribus*, a change in the shape of the income distribution function, or the *personal* distribution of income, causes a change in the aggregate propensity to consume.[4] Keynes stated the essential principle as follows in a 1939 comment:

> Since I regard the propensity to consume as being (normally) as such to have a wider gap between income and consumption as income increases, it naturally follows that the collective propensity for the community as a whole may depend … on the distribution of incomes within it. (Keynes, 1939, p. 129)

Individuals confronting true uncertainty often wish to defer economic decision making, and this is accomplished by the accumulation of wealth, or what is the same thing, the purchase of stores of value.[5] But since agents generally prefer to hold wealth in *intangible* assets—that is, assets characterized by high liquidity, the demand for stores of value does not necessarily mean a corresponding demand for tangible, reproducible assets.[6]

Although the desire to accumulate wealth is not specific to any income group or social class, the power to defer spending decisions is clearly connected to income level. The freedom to purchase stores of value expands in proportion to the difference between income and the cost of maintaining a material standard of living that is minimally satisfactory to the household. The effect of an upward redistribution of income is to place a greater share of total income under the control of households with the power to defer spending. The net result for the average propensity to consume would be even more pronounced if the marginal propensity to purchase intangible stores of value were a *geometric* function of income.

The theoretical vinculum of income distribution to consumption explicated above is a *direct* link. By contrast, any mechanism that connects distribution to *investment* must operate indirectly through output, profits (or expected profits), or capacity utilization. The pure Keynesian theory explains investment fluctuations by the state of business confidence as conditioned by animal spirits. There is no explicit link between the 'prospective yield of investment' (Keynes, 1936, p. 135) and the *current* level of output, profits, or yield of investment in Keynes's work. Minsky's extension of Keynes's theory *does* establish such a link.

Minsky argues that the prospective yield of investment is affected by the ratio of current cash flows to 'liability structures' (Minsky, 1986, p. 182) or the stock of previously issued debt and equity.[7] A substantial increase in the pace of

[4] Keynes defined the 'propensity to consume' as the 'functional relationship … between … a given level of income … [and] the expenditure on consumption out of that level of income' (Keynes, 1936, p. 90).

[5] The term 'true uncertainty' is used to differentiate from 'probabilistic' uncertainty.

[6] Davidson writes that '[T]he demand for a store of value, in an uncertain world, does not generate the demand to commit resources. Thus, the virtuous interaction between the supply of resources and the demand for resources which is succinctly expressed by Say's law is broken' (Davidson, 1978, p. 145).

[7] Minsky (1986, p. 177) writes that 'In an economy in which debt financing of positions in capital and financial assets is possible, there is an irreducible speculative element, for the extent of debt-financing of positions and the instruments used in such financing reflect the willingness of

investment generally requires that firms be willing to layer balance sheets with additional debt and equity. Firms are normally reticent to do this unless pre-existing contractual debt obligations are 'validated' by current expenditure streams and cash flows. If greater income equality is capable of stimulating consumption, it may also have the potential to jump start investment by raising the cash flow to firms in relation to their liability structures.

There are other Post Keynesian linkages between income distribution and investment. The accelerator principle (Harrod, 1966) makes current net investment a function of the rate of change of output. Harrod's model takes the capital-to-output ratio as a fixed technical coefficient; hence the scale of output cannot expand without an increase in net investment.[8] A change in distribution therefore induces a change in investment via its effect on consumption and output.

3. Measuring the Effects of Income Inequality on Consumption: a Simulation

In this section, a model is constructed for the purpose of simulating the effects of changing income inequality on consumption expenditure. The simulation yields an estimate of the maximum increase in consumption expenditure that could result if, *ceteris paribus*, income inequality were eliminated completely. The likelihood of producing estimates that are meaningful in a practical sense is greater if the model is a reasonably close facsimile of an actual economy in terms of population, GDP, income inequality, and spending behaviour. Towards that end, the key parameters of the model described below have been selected so that they correlate as closely as possible to the US economy in the year 2001. Specifically, the model assumes the following:

(1) The 15 and older population is 216 million.
(2) Mean total income for persons is equal to $33,419. Median income is equal to $25,434.[9]
(3) The initial distribution of income between persons approximates the actual distribution of income in the US for the year 2001.
(4) The population is divided into deciles, each consisting of 21.6 million persons. The distribution of income among individuals *within* deciles is perfectly equal.

Footnote continued
businessmen and bankers to speculate of future cash flows and financial market conditions. Whenever full employment is achieved and sustained, businessmen and bankers, heartened by success, tend to accept larger doses of debt financing.'

[8] For an example of Kalecki-type model that incorporates the accelerator, see Sawyer (1985). Trigg argues that the accelerator principle does not fit a system wherein excess capacity is the norm: 'The existence of excess capacity means that investment does *not* respond to output' (Trigg, 1994, p. 100, italics added).

[9] The assumptions about population and income are based on data contained in the March Supplement of the *Current Population Survey* (CPS) for 2001. These data can be found in Persons Income Table 01 (PINC-01) of *CPS* March Supplement and can be viewed at ferret.bls.census.gov/macro/032001/perinc/new01_001.htm.

(5) The spending patterns of individuals at *all* income levels conform exactly to those of a 'representative' agent.

The consumption function specification for a representative agent incorporates the Marxian idea of a 'socially necessary minimum' level of consumption. More precisely, we assume that that there is some level of planned or notional consumption expenditure that can be classified as exogenous in the sense of its being independent of current income. It is useful to think of the exogenous component of spending (denoted by the symbol φ) as the absolute minimum level of consumption necessary to maintain participation in the mainstream of economic and social life.[10] The term 'notional' is used to describe it because there is no guarantee that the agent will have the purchasing power to achieve the social necessary minimum level of spending.

Cross-sectional variations in the consumption to income ratio are explained by a variety of factors. These include variations in household size, differences in wealth or liquidity of assets held, as well as age and health factors. However, it is very likely that the single most important factor in explaining cross-sectional differences in the average propensity to consume is unevenness in the distribution of income among persons.

The consumption function of a single 'representative' agent (agent i) is described by the following equation:

$$C_i = \phi_i + Y_i^a \tag{2}$$

where φ_i is the exogenous component of consumption and Y_i is income of individual i. Equation (2) obeys Keynes's fundamental psychological law so long as the following restriction holds: $0 < a < 1$. The nonlinear specification given by equation (2) makes the propensity to consume out the marginal increment of income a *diminishing* function of disposable income.

Computing aggregate consumption expenditure for the hypothetical economy is a matter of summing consumption functions across 216 million persons (i.e. $n = 216$ million). That is:

$$C = \sum_{i=1}^{n} (\phi_i + Y_i^a) \tag{3}$$

Attempting to specify, within the context of contemporary US society, an expenditure level equivalent to a socially necessary minimum unavoidably entails some degree of arbitrariness. One might argue that the Social Security Administration (SSA) official poverty line furnishes a reasonable measure of the

[10] The reader will notice that the concept of the 'socially necessary minimum', although it has largely the same meaning that Marx gave it, is used for a wholly different purpose here. Marx argued that compensation of labour could not fall below the minimum means of subsistence, or 'natural price of labor', or else 'the labor-power withdrawn from the market by wear and tear, and by death, that must be continually replaced, at the very least, by an equal amount of labor power, [will not be replaced]'(Marx, 1977, p. 275). Marx relied on Torrens to define the natural price of labour: '[It] consists in such a quantity of necessaries and comforts of life, as, from the nature of the climate, and the habits of the country, are necessary to support the laborer, and enable him to rear such a family as may preserve, in the market, and undiminished supply of labor' (Torrens, 1815, quoted in Marx, 1977, p. 275).

socially necessary minimum.[11] But the SSA poverty index is an absolute standard—it makes no adjustments for a general increase in living standards. As Veblen (1899) and others have observed, people's feelings about the satisfactoriness of their own material living standards are influenced by the consumption habits displayed by others.[12] Hence the desideratum for a poverty threshold that is *relative* in the sense of positioning the individual in unchanging (economic) proximity to the typical individual. Moreover, the most widely used relative poverty definition in cross-national studies is 50% of median household income, adjusted for differences in household size.[13] This relative poverty definition is taken as the best available proxy for the socially necessary minimum level of income. The socially necessary minimum (φ_i) is thus defined as 50% median income for an individual in the year 2001, or $12,717.[14]

The final problem for the simulation is to select a value of a (that is, the power to which disposable income is raised in the consumption function) which makes equation (2) a reasonably close approximation of actual spending behaviour in the US. Data prepared by the Bureau of Economic Analysis for 2001 show that the ratio of aggregate consumption to disposable income was 0.945. Thus, the value of a satisfies the following equation, *when the fraction of total income accruing to persons within each decile in the model corresponds to the actual distribution of income between deciles for 2001*:[15]

[11] The poverty threshold for a non-farm family of four in 2001 was $17,960. The Social Security Administration poverty threshold is determined by measuring the cost of a market basket of food items that provide three minimally adequate meals per day and multiplying by three to obtain a 'daily' threshold. The poverty line is then determined by multiplying the daily figure times 365. The poverty threshold is adjusted for differences in family size. For a detailed description, see Schiller (2001, Chapter 2).

[12] The reader will recall the importance of this principle in the work of Duesenberry (1949). More recently, Vaughan has written that people make judgements about the adequacy of their incomes based 'on the general level of material offerings available in their society at a given time. Thus in 1850, an urban New Yorker would hardly have felt deprived by not being able to afford a telephone, radio or television; as such goods did not exist, they were not part of the choice set of New York 140 years ago. For the same reason, the individual would hardly have felt diminished as a breadwinner because of an inability to acquire such items for his or her family. As a more relevant example of our own era, color television was not a part of the typical choice set … in the 1950s, but it most definitely is … in 1993. And simply because such consumption expectations exist, a consistent inability to meet them … is likely to take a heavy toll on individuals who see themselves as family providers' (Vaughan, 1993, p. 23).

[13] For a discussion of relative poverty measures, and the 50% standard, see Ruggles (1990, Chapter 3). For recent examples of the use of the 50% of median household income poverty measure in cross-national studies, see Pressman (2002) and Jean-Marc Burniax *et al*. (1998).

[14] The Gallup polling organization conducts an annual 'get along' survey in which individuals are asked the minimum amount of income that a family of four needs to 'get along'. The average amount, expressed as a percentage of median income, was 68.3% for the period 1984–89. The estimate presented here appears conservative judged against the Gallup 'get along' standard. See Vaughan (1993, pp. 27–28).

[15] This was determined from microdata taken from the 2001 March Supplement of the *CPS*. The author's calculation shows the division of total income (in percent) from the highest to the lowest decile (for persons 15 and older) was, respectively: 32.3, 17.0, 13.8, 10.3, 8.0, 6.5, 4.7, 3.9, 1.9, 1.6.

$$\frac{\sum_{i=1}^{n}(\$12{,}717 + Y_i^a)}{Y_T} = 0.945 \tag{4}$$

where Y_T is total or aggregate income (equal to approximately \$7.2 trillion).[16] The value of a which satisfies the condition described by equation (4) subject to the condition described above is 0.9467. Thus we have:

$$C_i = \$12{,}717 + Y_i^{0.9467} \tag{5}$$

To examine the relationship between income inequality and the APC more closely, it is helpful to select a specific measure of inequality. For the purpose of the following illustration we use the well-known Theil Index (Theil, 1967).

$$T = \frac{1}{n}\sum_{i=1}^{n} r_i \cdot \log r_i \tag{6}$$

where r_i is the ratio between individual income (Y_i) and average income (μ_Y):

$$r_i = \frac{Y_i}{\mu_Y},\ \mu_Y = \frac{\sum_{i=1}^{n}}{n}$$

The Theil index (T) is a monotonically increasing measure of inequality, bounded by [0, log n].[17] The value of the Theil index for persons 15 and older in the US in the year 2001 was 0.1466.[18]

Table 1 illustrates the implications for aggregate consumption expenditure when $T = 0.1466$. Thus, we see that inequality in the distribution of income is capable of producing cross-sectional differences in the APC. The aggregate APC is equal to 0.945, for this example. Income distribution matters for effective demand *if* changes in income distribution impinge on the aggregate propensity to consume.

We are now positioned to compute the effect of a change in the distribution of income, which reduces the T index from 0.1466 to zero. The results are displayed in Table 2.

The results do not support the argument that income inequality imposes a significant drag on aggregate expenditure. Based on the assumptions of the model, a hypothetical shift from a comparatively high degree of income inequality ($T = 0.1466$) to a perfectly equal distribution of income among individuals ($T = 0$) would boost total consumption expenditure by about 1%, or \$70.5 billion. However, the results displayed in Table 1 are based on the assumption that spending is *not* constrained by current income. The figures in column 2 represent *notional* spending for all persons in deciles 5 through 10; i.e. the spending agents plan to carry out if current income does not impose a binding constraint.

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[16] Y_T is found by multiplying average income (\$33,419) times the number of persons 15 and older (216 million). This figure is very close to total disposable income (current dollars) for the US in 2001.

[17] For an excellent description of the Theil index and instructions on how to compute it using widely available data sources, see Conceição & Galbraith (2000).

[18] For the purpose of this simulation, the T index was cumulated by deciles using March *CPS* microdata. See note 15.

Table 1. Theil Index = 0.1466

Decile Number	[1] Average Income (Dollars)	[2] Average Consumption (Dollars)	[3] Total Income (Billions of Dollars)	[4] Total Consumption (Billions of Dollars)	[5] = [4] ÷ [3] APC
1	$107,943	$70,917	$2,331.6	$1,531.8	0.657
2	56,812	44,415	1,227.1	959.4	0.782
3	46,118	38,736	996.2	836.7	0.840
4	34,422	32,442	743.5	700.7	0.942
5	26,735	28,245	577.5	610.1	1.056
6	21,722	25,474	469.2	550.2	1.173
7	15,707	22,102	339.3	477.4	1.407
8	13,033	20,582	281.5	444.6	1.579
9	6,350	16,699	137.2	360.7	2.629
10	5,347	16,101	115.5	347.8	3.011
			$\Sigma \cong \$7{,}218.6$	$\Sigma \cong 6{,}819.4$	$\Sigma \cong 0.945$

Notes: Column [3] was computed by multiplying average income by the number of households within the decile (5 million). Column [4] was computed by multiplying column [2] times 5 million.

Would the results differ significantly if we impose the constraint that, for individuals, consumption cannot exceed income? The available evidence indicates that, while most low-income persons in the US borrow to finance consumption, their level of borrowing falls well short of what would be required for their spending profiles to be reasonably well approximated by equation (5). For example, according to the Federal Reserve *Survey of Consumer Finances*, combined median instalment and credit card debt owed by families with incomes less than $10,000 (1998 dollars) was $3,200 in 1998.[19] An individual with an income of $9,517 would need to borrow $3,200 *in a year* merely to reach the socially necessary level of expenditure as defined above. The profile depicted in equation (5) moves to closer correspondence with reality as household income increases, and the need for credit to maintain the notional level of spending diminishes.

Table 3 displays results for an income constrained model based on the assumption that consumption is described by equation (3) above, the Theil Index is equal to 0.1466, and household spending is subject to the constrain that $C \leq Y$.

The results illustrate that, if income imposes a hard constraint on spending, income distribution can have very significant implications for effective demand. See, for example, that the income-constrained model ('hard' budget constraint)

[19] See Kennickell *et al.* (2000, Table 11). Median debt holdings for families (credit card and instalment only) for families with incomes between $25,000 and $50,000 was $9,900 in 1998.

Table 2. Thiel Index = 0

Decile Number	[1] Average Income (Dollars)	[2] Average Consumption (Dollars)	[3] Total Income (Billions of Dollars)	[4] Total Consumption (Billions of Dollars)	[5] = [4] ÷ [3] APC
1	$33,419	$31,898	$721.85	$688.99	0.954
2	33,419	31,898	721.85	688.99	0.954
3	33,419	31,898	721.85	688.99	0.954
4	33,419	31,898	721.85	688.99	0.954
5	33,419	31,898	721.85	688.99	0.954
6	33,419	31,898	721.85	688.99	0.954
7	33,419	31,898	721.85	688.99	0.954
8	33,419	31,898	721.85	688.99	0.954
9	33,419	31,898	721.85	688.99	0.954
10	33,419	31,898	721.85	688.99	0.954
			$\Sigma \cong \$7{,}218.6$	$\Sigma \cong \$6{,}889.9$	$\Sigma \cong 0.954$

predicts that the consumption-to-income ratio would increase from 0.824 to 0.954 if the Theil index decreased from 0.1466 to zero. Assuming that income is $7.2 trillion, this translates to a spending differential of $951.2 billion, or nearly 16%.

Table 3. 'Hard' budget constraint (Theil Index = 0.1466)

Decile Number	[1] Average Income (Dollars)	[2] Average Consumption (Dollars)	[3] Total Income (Billions of Dollars)	[4] Total Consumption (Billions of Dollars)	[5] = [4] ÷ [3] APC
1	$107,943	$70,917	$2,331.6	$1,531.8	0.657
2	56,812	44,415	1,227.1	959.4	0.782
3	46,118	38,736	996.2	836.7	0.840
4	34,422	32,442	743.5	700.7	0.942
5	6,735	26,735	577.5	577.5	1.000
6	21,722	21,722	469.2	469.2	1.000
7	15,707	15,707	339.3	339.3	1.000
8	13,033	13,033	281.5	281.5	1.000
9	6,350	6,350	137.2	137.2	1.000
10	5,347	5,347	115.5	115.5	1.000
			$\Sigma \cong \$7{,}218.6$	$\Sigma \cong \$5{,}948.7$	$\Sigma \cong 0.824$

The model might be criticized for a lack of realism for the proportion o households (i.e. all households in deciles 5 through 10) that would practice deficit spending if budget constraints were 'soft'. Income distribution is a significant factor if, for a non-trivial proportion of households, inequality opens up a sizeable gap between notional and actual spending. Equations (3) and (5) are implicitly based on the assumption that a representative agent would willingly engage in deficit spending if income falls below the 'break-even' level of $30,076. The results are also sensitive to assumptions made about the value of φ_i or the exogenous component of consumption.

4. Evidence from the United States

The purpose of this section is to determine if there is empirical support for the hypothesis that changes in the shape of the income distribution function have influenced the time path of consumption in the United States since 1967. The methodology entails time series estimation of consumption specifications with a measure of income inequality included among the explanatory variables.

The specific measure of income inequality selected is the Theil index. A monthly Thiel index was computed according to the instructions of Conceição & Galbraith (2000). The data used to compute the index are taken from the Bureau of Labor Statistics monthly 'B' tables on national employment, hours, and earnings. The sample includes only non-supervisory employees on private, non-farm payrolls. The Theil index reported above is, more accurately, of *private sector wage and salary inequality*. Public sector and supervisory employees are omitted from the sample. Even so, the sample covers approximately 63% of the total labour force in an average month.

It should also be pointed out that the Theil index computed for the purpose of this study measures inequality *between* industries but not within industries. Thus, to interpret the reported Theil statistics as an accurate measure of changes in wage inequality during the period, one must assume no changes in 'within industry' inequality.[20] Private sector employment is disaggregated into 27 industries (see Appendix A). Figure 1 displays the time path of the seasonally-adjusted Theil index.

4.1 Specification 1

The model described by equations (7) and (8) is 'specification 1' for the purposes of reporting results. Specifications 2, 3 and 4 are described in Appendix

[20] To what extent can total inequality (T), which is the sum of inequality between industries (T') and inequality with industries (T'), be accurately estimated by T' alone? Conceição & Galbraith (2000, p. 11) write: '[C]onsider that "industries" are in fact collections of similar factories, which operate from one year to the next with labor forces, internal wage structures, managerial hierarchies and technologies that change very little. It seems that while within group inequalities are likely to be very large relative to differences between group averages, internal rigidity of industrial structure tends to assure that changes in within group inequalities in an industrial classification will be small relative to changes between groups. Therefore a measure of the change in T′ is likely to be a robust estimate of the change in T, so long as changes in employment structures and the distribution of the workforce across categories is not too large.'

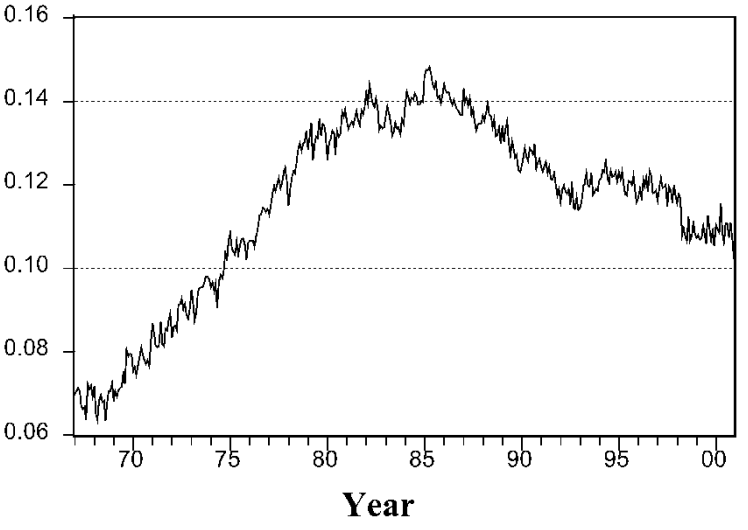

Figure 1. The Theil Index.

B. The following first-order autoregressive model was estimated using nonlinear least squares:

$$\log C_t = \beta_1 + \beta_2 \log YD_{t-1} + \beta_3 \log Mood_{t-1} + \beta_4 \log Theil_{t-1} + \mu_t \tag{7}$$

$$\mu_t = \rho \mu_{t-1} + \varepsilon_t \tag{8}$$

where C_t is consumption expenditure in month t and *YD* is personal disposable income (both seasonally-adjusted annual rates measured in billions of 1998 dollars). *Mood* is the value of the Michigan Index of Consumer Sentiment, a measure of consumer confidence prepared by the University of Michigan Institute for Social Research.[21] The Theil index is seasonally adjusted. The residuals obtained from ordinary least squares estimation of the model described by equation (7) revealed the presence of first-order serial correlation.[22] The linear model described by equation (7) can be transformed to a first-order autoregressive model by the addition of equation (8). The accuracy of the equation for in-sample forecasting is improved by adding the lagged error term as an explanatory variable.

Substitution of equation (8) for the period t error term also converts the specification into a nonlinear one and therefore makes it possible to estimate the model using nonlinear least squares. The technique used here is Marquart's iterative algorithm (Marquart, 1962), which yields regression estimates that are asymptotically equivalent to maximum likelihood estimates and are asymptoti-

[21] A technical description of the survey instrument, as well as a time series archive, is available at www.sca.isr.umich.edu/main.php.

[22] A correlogram and Q-statistics revealed the likely presence of serial correlation with the residuals. The Breusch–Godfrey test rejects the hypothesis of no serial correlation up to order 4.

Table 4. Least squares estimates

	Specification			
Parameter	(1)	(2)	(3)	(4)
β_2	1.057	0.202	1.053	1.028
	(59.63)	(3.93)	(54.49)	(44.37)
β_3	0.030	0.012	0.027	0.032
	(2.617)	(2.722)	(2.38)	(2.761)
β_4	− 0.091	− 0.045	− 0.897	− 1.354
	(− 3.662)	(− 2.73)	(− 3.448)	(− 4.08)
R^2	0.998	0.836	0.998	0.998
Inverted AR Roots	0.77	0.87	0.78	0.77

Dependent Variable: log Consumption (see notes below)Period: 1978:1 to 2000:12Observations: 270Notes: t-ratios in parenthesis. The dependent variable for specification 2 is the year-over-year percentage change in consumption in month *t*.

cally efficient. The model was estimated using monthly US data for 1978–2000. The results are displayed in Table 4.

Income distribution would matter for effective demand in the purely econometric sense if the estimate of the Theil coefficient (β_4) was statistically significant. The Kalecki–Keynes interpretation of causality would be validated if the estimate of the β_4 parameter had a negative sign. The estimate of β_4 for specification 1 is -0.091, which is significant at the 1% level as indicated by the *t*-ratio. This result can be interpreted as follows—a 1% change in the lagged monthly value of the Theil index caused a 0.091% change (in the opposite direction) on average in monthly consumption expenditure for the period covered, *ceteris paribus*. This would seem at first glance to be a quantitatively trivial result. However, consider that the Theil index increased by more than *130%* between 1967 and 1986. The model indicates that, controlling for changes in real income and consumer confidence, consumption expenditure (measured in chained 1996 dollars) would have been 11.83% higher than it actually was in 1986 if there had been no change in the Theil index since 1967.

The results are robust across specifications. Specification 3 reveals that a 3-month prior moving average of the Theil index is statistically significant at the 1% level. Specification 4 makes a 6-month prior moving average of the Theil index an explanatory variable, and the results displayed in Table 4 are not at variance with the hypothesis that inequality exerts a drag on spending.

5. Income Inequality and Household Debt

Much has been written on the social or interdependent character of household spending behaviour. Veblen (1899) theorized that consumption in the age of mass production is not so much a matter of furnishing oneself with the necessaries of life as it is a public display of prowess or the emulation of more

successful households. J. K. Galbraith (1958) emphasized the power of modern advertising in shaping consumer preferences.[23] Whatever the truth of these views, it is hard to dispute the assertion that the market basket of goods and services that many individuals come to regard as 'normal' or appropriate to their income level and social position is subject to incessant reconfiguration. Pasinetti (1993, p. 39f.) stressed the role of innovation in driving this process:

> [A]s per-capita income increases (whatever the price structure), a marked tendency emerges, for each consumer, not to increase proportionally the demand for the various goods, but rather to follow, in satisfying the various needs, a certain hierarchical order, by first satisfying the essential needs and moving on gradually on to the satisfaction of needs that are less and less essential; the variation in the composition of consumption may well occur independently of the increase in income and of the changes in prices, as a consequence of the appearance of newly invented goods and services.

Today, many households of comparatively modest incomes would not classify items such as home computers, cellular phone service, DVD players, sport utility vehicles, pleasure boats, and trips to exotic destinations as extravagances. It is important to note that the stunning degree of market penetration achieved by high-end consumer goods in the past 20 years would not have been possible were it not for the 'softening' of the budget constraint facing many households as well as a more liberal attitude about credit use.

The term 'widened credit availability' means a general increase in the accessibility of installment loans, student loans, credit cards, home equity loans, or other types of credit. The range of borrowing opportunities for those previously deemed creditworthy expand, as do maximum amounts that lenders are willing to lend. More importantly for our purposes, widened credit availability means an augmentation of the spending power of moderate and low-income groups—that is, those groups which cross-sectional data reveal have comparatively high APCs. A softening of the income constraint for those in the middle and lower echelons of the income hierarchy has the potential to raise spending and the propensity to consume. Thus, widened credit availability is comparable to a decrease in income inequality in terms of its effects on the aggregate propensity to consume. It follows that the aggregate propensity to consume can remain stable, or even increase, amidst a sharp increase in income inequality—given a sufficient surge in borrowing.

A key issue pertains to the *sustainability* of an increase in the spending-to-income ratio achieved by an increase in debt-financed expenditure. The decision to borrow means that subsequent borrowing decisions are conditioned by the knowledge that future income streams will be partly claimed by liabilities already incurred, leaving less future income to service new debt obligations.

[23] Redmond (2001) claims that modern consumers (who face a bewildering array of choices) are subject to external influences due to a lack of 'craft knowledge'—i.e. 'an intimate familiarity with the materials, ingredients, and techniques which compose them. Consumers' knowledge base is thus relatively superficial and informed in large measure by advertising and social display' (Redmond, 2001, p. 578).

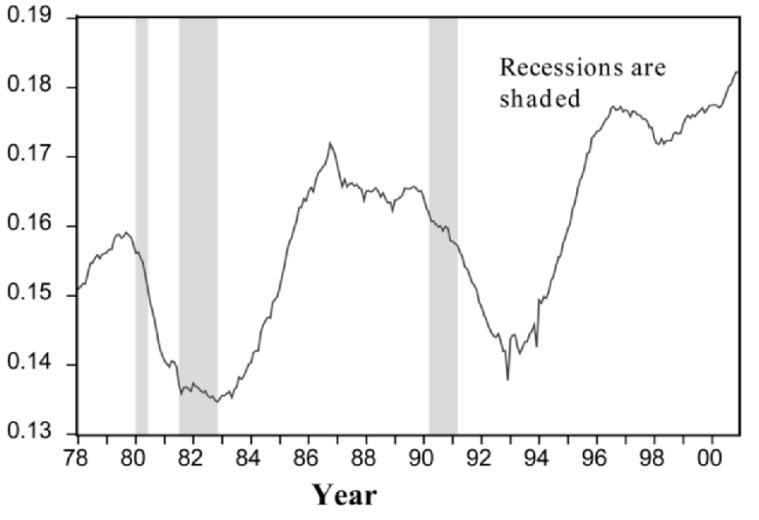

Figure 2. Ratio of consumer debt to personal income[1]

Moreover, individuals move nearer to their credit limits and generally lose creditworthiness as they pile up debt on their balance sheets.[24]

The US record reveals that households have borrowed heavily during business cycle expansions. The debt-to-income ratio peaks near the terminal point of expansions and then falls off sharply during the recessionary phase of the business cycle (see Figure 2). The unsustainable quality of a debt-financed spending boom may be manifest in the procyclical movement of the debt-to-income ratio.

The results of the simulation carried out in an earlier section of this paper suggest that the macroeconomic implications of income inequality are fairly benign so long as budget constraints are 'soft'—i.e. if credit is readily obtainable even by households of limited means. However, the analysis above ignores the fact that the spending out of current income is something different from debt-financed spending in terms of balance sheet effects. The simulation fails to take account for the cumulative effect of borrowing decisions on balance sheets, credit ratings, or continued willingness to borrow. Turning points in the time path of the debt-to-income ratio may coincide with, or indeed be evidence of, episodic shifts in the average attitude toward borrowing.

6. Concluding Remarks

The evidence presented in this article suggests that income inequality can exert a significant drag on effective demand. The findings reported above reinforce the Keynesian view that fiscal policy measures that make the after-tax distribution of income more equal (e.g. progressive taxes) are desirable from the standpoint

[24] Most consumer lenders in the US now employ proprietary software to evaluate credit risk. It is likely that the credit scoring algorithms weigh factors such as recent borrowing history, debt outstanding relative to income, and the difference between credit card balances and limits.

of maintaining strong effective demand. Thus, the heavy reliance of many states on regressive sales taxes is made all the more regrettable. Lotteries exist to transfer spending power from the many to the few, so they are deserving of criticism as well. George W. Bush's tax reform legislation (enacted by Congress in 2001) signals a weakening commitment to a progressive federal tax code. Although the tax cuts included in the bill may have a modest stimulatory effect, one could predict a far more substantial economic impact if the bulk of the tax cuts accrued to middle and lower income households.[25]

It is no coincidence that the appearance of a giant consumer credit industry in the US was coterminous with the emergence of high fixed-cost, mass-production industries such as automobiles and refrigerators. The development of markets for big-ticket consumer items extending across several social strata would not have been feasible in the 1920s, given the high degree of inequality during the era, if not for the easy payment plan.[26]

Looking at the contemporary situation, it is difficult to overstate the importance of the consumer lending industry in sustaining the demand for consumer goods. This fact gives rise to concerns both human and economic. Most economists place a premium on growth. But as things stand, growth may not be possible unless a significant segment of the population continues to be willing to borrow on a scale that creates or intensifies budgetary pressure on the household. To the extent that reduced income inequality means diminished macro-dependence on credit, there is yet another factor why nations should pursue it.

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[25] According to the Institute on Taxation and Economic Policy Tax Model, households in the bottom 60% based on taxable income (less than $44,000 at 2001 levels) can count on an average tax cut of $256 per year assuming all provisions of the bill are in place by 2008 (including repeal of the estate tax). By contrast, the top 10% ($104,000 or more) will receive an average tax cut of $7,300 and the top 1% (above $373,000) will see total taxes reduced by an average of $54,480. A report released by the Citizens for Tax Justice in 2002 states that by 2010, 52% of tax cuts will go to the richest 1%, who are projected to have an average annual income of $1.5 million—again assuming all provisions of the Bush tax bill are put into effect. See the Citizens for Tax Justice Report 'Year-by-Year Analysis of the Bush Tax Cuts Shows Growing Tilt to the Very Rich', 12 June 2000, available at www.ctj.org/html/gw0602.

[26] For a more thorough treatment of this issue, see Brown (1997).

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Appendix A

The following list describes the private sector industry-level disaggregation selected for computing the monthly Theil index for the period 1967–2000. These data were retrieved from the Bureau of Labor Statistics Employment Situation News Release monthly 'B' tables at www.bls.gov/ces/ces-tabs.htm.

Mining
Construction
Lumber and wood products
Furniture and fixtures
Stone, clay, and glass products
Primary metal industries
Fabricated metal products
Industrial machinery and equipment
Electronic and other electrical equipment
Transportation equipment
Instruments and related products
Miscellaneous manufacturing
Food and kindred products
Tobacco products
Textile mill products
Apparel and other textile products
Paper and allied products
Printing and publishing
Chemical and allied products
Petroleum and coal products
Rubber and miscellaneous plastic products
Leather and leather products
Transportation and public utilities
Wholesale trade
Retail trade
Finance, insurance, and real estate
Services

Appendix B

Description of model specifications 2, 3, and 4

Specification 2

$$\%\Delta C_t = \beta_1 + \beta_2 \%\Delta YD_t + \beta_3 \%\Delta Mood_t + \beta_4 \%\Delta Theil_t + \mu_t^{a}$$
$$\mu_t = \rho \mu_{t-1} + \varepsilon_t$$

Specification 3

$$\log C_t = \beta_1 + \beta_2 \log YD_{t-1} + \beta_3 \log Mood_{t-1} + \beta_4 Theil(MA,3) + \mu_t^{b}$$
$$\mu_t = \rho \mu_{t-1} + \varepsilon_t$$

Specification 4

$$\log C_t = \beta_1 + \beta_2 \log YD_{t-1} + \beta_3 \log Mood_{t-1} + \beta_4 Theil(MA,6) + \mu_t^{c}$$
$$\mu_t = \rho \mu_{t-1} + \varepsilon_t$$

Notes:
[a] $\%\Delta$ means the year-over-year percentage change in the variable for month t.
[b] 3-month prior moving average of the Theil index.
[c] 6-month prior moving average of the Theil index.