

## Consumption Smoothing Under Binding Borrowing Constraints: Still Observable?

Explain The Concept Of Consumption Smoothing And How Intertemporal Models Of Consumption Can Explain It. Will Consumption Smoothing Happen If Households Face Binding Borrowing Constraints?

### Principles of Macroeconomics (ECO-2A05)

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The first section of this essay will be dedicated to the explanation of consumption smoothing within the strict context of key intertemporal models, in particular Life Cycle Hypothesis and the Permanent Income Hypothesis, with short reference to the Irving Fisher model (1930) from which both are derived. The second section shall assess the plausibility of consumption smoothing under binding borrowing constraints, with the express conclusion that not only is smoothing viable, but it also frequently observable within much empirical research. Whilst it may not always be accurately represented by prevailing Permanent Income and Life Cycle models, and is not necessarily intertemporal in nature, consumption smoothing can still be recognized even when credit constraints are at their tightest.

Consumption smoothing is the preference of individuals to tread a relatively stable path of consumption over the course of their lifetimes, even if they experience volatile changes in their incomes. Today, the prevalence of some consumption smoothing in individual behaviour is very widely accepted, but prior to developed theories of intertemporal choice, it was generally assumed that consumption could be simply understood as a function of present disposable income ( $Y$ ), and that marginal propensity to consume is a fixed variable between 0 and 1 for a given consumer:

$$C = \bar{C} + cY \quad \text{where} \quad c = MPC$$

The simple Keynesian consumption function failed to explain why historical data indicated that whilst  $Y$  had risen dramatically in the long-term,  $C$  had remained relatively constant over the same period. Irving Fisher was the first to assert, in contrast to Keynes, that *present disposable income* is a highly one-dimensional conception of what consumers perceive to be their actual budget constraint. His model assumes instead that there are two time periods, present and future, each with their own separately estimable values for consumption ( $C_1$ ,  $C_2$ ) and income ( $Y_1$ ,  $Y_2$ ). Income is exogenously fixed in both periods, thus consumers must obey an intertemporal budget constraint, but have the luxury of substituting consumption in

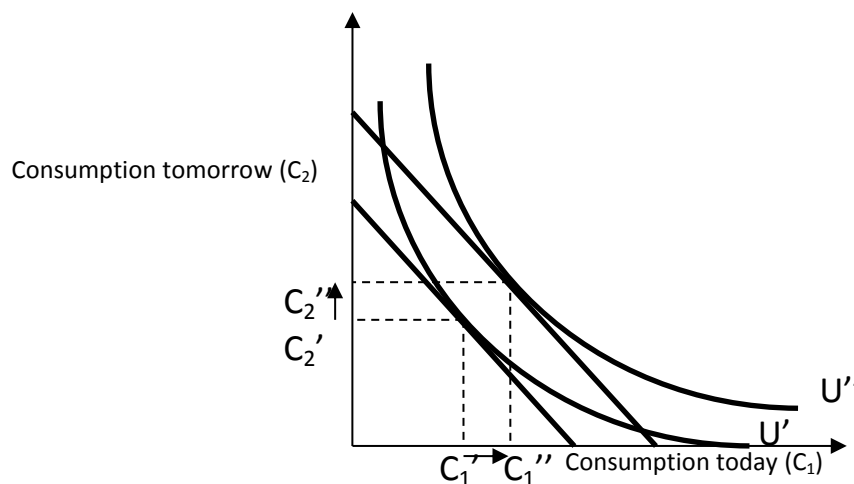
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one period for consumption in another – put simply, they may borrow out of future income or lend (save) out of current income, subject to transaction costs (the real interest rate):

$$\text{Fisher's Intertemporal Budget Constraint} \rightarrow C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$

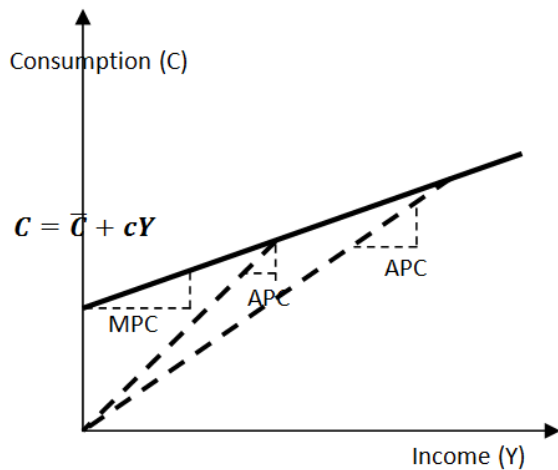
In Fisher's model, consumers attempt to maximize utility by choosing the highest feasible indifference curve subject to the budget constraint. By modelling the trade-off between immediate and future consumption, we can observe how increases in income in either period will affect consumption in both periods:



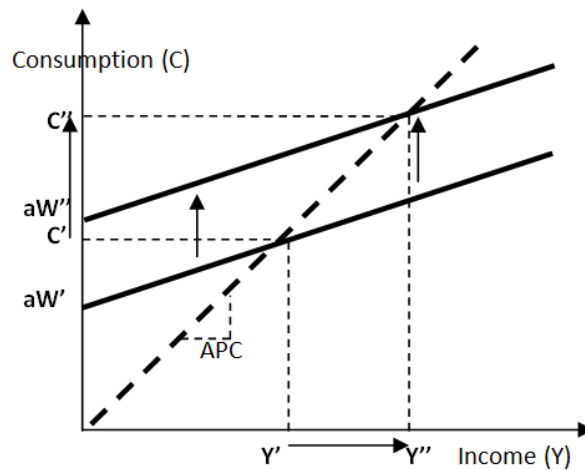
Under this model consumption is incredibly smooth, how much  $C_1$  and  $C_2$  will increase relative to one another is dependent on the individual utility function, but a smooth consumption path will always be observable. Unfortunately, though Fisher's incorporation of intertemporal choice demonstrates a consumption smoothing motive, like Keynes' function it is still too primitive to explain why there is a positive correlation between income and consumption in short-term data series, but consumption remains merely constant in the long-run. The primary limitation of both Keynes' and Fisher's model is that they still suppose consumption to be purely a function of income. Franco Modigliani's Life Cycle Hypothesis builds on Fisher's model, but includes two new assumptions: 1) that individuals consume out of both income *and* wealth; 2) the present discounted value of lifetime consumption is equal to the present discounted value of lifetime wealth:

$$C = aW + bY \quad \text{therefore} \quad APC = \frac{C}{Y} = a \frac{W}{Y} + b$$

Where  $(a)$  is the marginal propensity to consume out of wealth,  $(b)$  is the marginal propensity to consume out of income, and  $(T)$  is the number of years the individual expects to live.



Simple Keynesian Function



Modigliani's Life Cycle Function

The LCH consumption function resembles a Keynesian function, but because wealth is a function of consumption, as individuals accumulate wealth over time the function shifts upwards – the intercept ( $aW$ ) increases, but the slope of the function ( $bY$ ) is unchanged. It explains consumption in such a way that over the short term (left), the Keynesian function is satisfied;  $W$  does not correlate proportionately with  $Y$ , therefore higher  $Y$  causes higher  $C$  but with lower  $APC$  (Keynes asserted that higher earners have a higher  $MPS$ ). In the long run (right),  $W$  and  $Y$  do shift proportionally, thus as the function shifts upward and  $APC$  remains constant. With respect to consumption smoothing, when  $Y$  is rising and  $APC$  is falling the short run,  $C_1$  is being substituted for  $C_2$  – consumption is smoothed through individual saving. As for the long term, it is implicit in the concept of a smooth path of *lifetime* consumption that if *lifetime* wealth = *lifetime* consumption,  $APC$  remains constant.

Modigliani's LCH offers us a neat conception of consumption smoothing in which any shift in either wealth or income, today or tomorrow will affect consumption in  $C_1$  and  $C_2$ . It is often felt that this model is perhaps implausibly smooth, and not every stochastic fluctuation in income or wealth will change consumption over the course of a lifetime. Friedman's Permanent Income Hypothesis, by contrast, supposes that consumers view their measurable income as formed of two component parts – permanent ( $Y_p$ ) and transitory ( $Y_T$ ) income:

$$Y = Y_T + Y_p$$

Households consume primarily out of the portion of their incomes that they expect to endure in the future ( $Y_p$ ). Thus consumption is given as a function of permanent income, and the marginal propensity to consume from it:

$$C = aY_p$$

Nonetheless, individuals and households still experience random, stochastic fluctuations in their incomes, but are unlikely to consume out of such temporary phenomena, due to future uncertainty and what Friedman perceives to be a risk averse nature<sup>1</sup>. Instead, consumption smoothing irons out these transitory shocks; spikes in  $Y_T$  are carried over to  $C_2$  as precautionary savings, buffer-stocks against unexpected necessary expenditure.

The role of consumption smoothing under PIH is thus quite different to that of the LCH. The PIH explains consumption smoothing as a specific response to unanticipated phenomena, the direct product of risk-averse behaviour intended as insurance against an uncertain future. Transitory spikes in income are offset by precautionary savings that add to buffer-stocks in the form of pensions, insurance and other set-asides. Stocks such as these fund the opposite aspect of consumption smoothing, by allowing the individual to keep consuming at the desired rate when they experience transitory slumps in income. It could be said that for Friedman, these two smoothing effects work in much the same way as automatic fiscal stabilisers, only at a micro-level. Angus Deaton elaborates such reasoning beyond just transitory income, to include wealth and assets as well, reasoning that *“precautionary motives interact with liquidity constraints because the inability to borrow when times are bad provides an additional motive for accumulating assets when times are good”*<sup>2</sup>. Though his essay on the whole is not an explicit endorsement of the PIH, it is highly critical of various LCH models and their suppositions about consumption behaviour.

Whilst this essay stresses the importance of the precautionary motive’s relationship with the hypothesis, PIH has often found itself at odds with other theories with a more explicit emphasis on precautionary saving. James Morley claims strong empirical evidence that PIH cannot adequately explain why consumption is so smooth, and that other models of precautionary saving and habit formation are more persuasive. He contends that permanent income is in fact quite volatile, and consumption only adjusts to match it very slowly over the long term<sup>3</sup>. Under PIH, because consumption is a function of permanent income, if permanent income is volatile and not smooth, it follows that consumption would be likewise. Whilst Morley views this as part of a strong case against the PIH, Meghir accepts that *“A key restriction of the model [... is that] income appears to be more volatile than consumption”*, but is optimistic about the potential of forms of the PIH to overcome this limitation<sup>4</sup>.

It goes without saying that during periods of downturn or crisis, borrowing constraints at the micro level are likely to be at their worst. Yet even in scenarios as dire as the recent crash (2008-present), Dutt and Padmanabhan have managed to observe *“rich patterns of consumption smoothing”*<sup>5</sup> in household data, it merely manifests as intercategory or

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<sup>1</sup> (MEGHIR, Costas, 2004, p.15)

<sup>2</sup> (DEATON, Angus, 1991, p.1222)

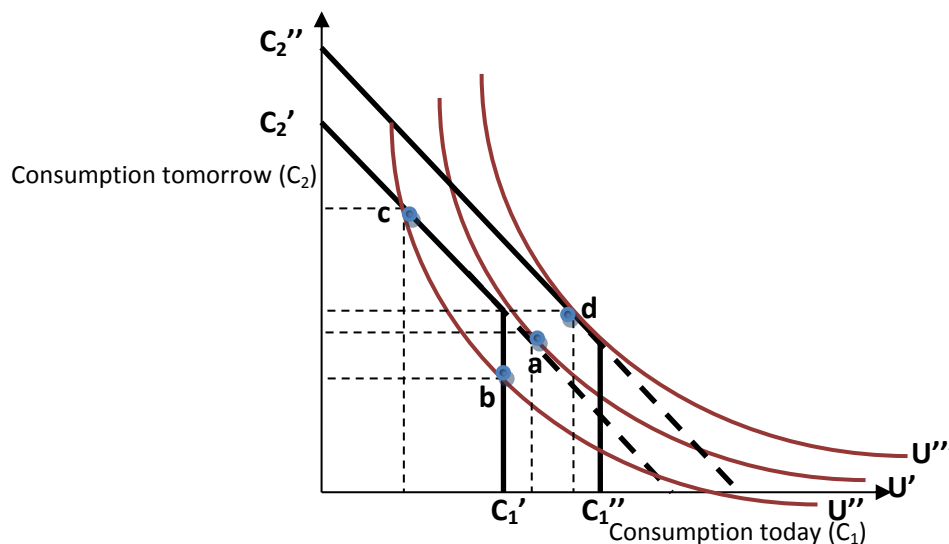
<sup>3</sup> (MORLEY, James C., 2007, p.626)

<sup>4</sup> (MEGHIR, Costas, 2004, p.20)

<sup>5</sup> (DUTT, Pushan and Padmanabhan, V, 2011, p.492)

intracategorical smoothing, more commonly than it does intertemporal. When credit constraints make it difficult to borrow out of future consumption, households exhibit a tendency to consume less durable goods and more services and nondurables. Their analysis unearths strong evidence that in developed countries, crises cause agents to consume comparatively more semidurables and services, whilst in developing countries nondurables are substituted in at the expense of durables and semidurables<sup>6</sup>. Consumption smoothing, it seems, is not by necessity an intertemporal process, and is therefore possible even in the tightest of financial conditions.

Divergent from the arguments observed thus far, Parker and Preston make the intriguing contention that far from consumption smoothing occurring *in spite of* binding borrowing constraints, they actually suppose that in specific instances, household consumption is increased by the introduction of a constraint, and as such consumption smoothing becomes more feasible than before<sup>7</sup>. They ask us to consider a household with relatively low-income:



A liquidity constraint comes into effect, rendering the current optimal consumption bundle **(a)** unachievable. However in response, the household increases the supply of labour (i.e. picks up extra work), and thus increases overall  $Y$ . As can be observed in the diagram above, not only does this make the previous consumption bundle **(a)** possible, but even makes feasible one on a formerly unreachable indifference curve **(d)**, instead having to regress to point **(c)** or **(d)**. This is not an isolated proposition, Costas Meghir also records how the findings of some PIH models “become insignificant when we allow for demographics and labour supply”<sup>8</sup>. Parker and Preston’s example is heavily reliant on a strongly flexible labour market, but nonetheless demonstrates how a binding constraint can in fact increase income and consumption, and thus make conditions more conducive to consumption smoothing.

<sup>6</sup> (DUTT, Pushan and Padmanabhan, V, 2011, p.502)

<sup>7</sup> (PARKER, Jonathan A. and Preston, Bruce, 2005, pp.1134-1135)

<sup>8</sup> (MEGHIR, Costas, 2004, p.21)

The cross-examination of different models of intertemporal models of consumption sheds much light on the potential for consumption smoothing to transcend the boundaries of binding liquidity constraints. Even in deep recession or crisis, consumption smoothing continues to be observed in an intercategory capacity, and when one considers the variable nature of household labour supply in response to constraints, there is even evidence that consumption smoothing actually increases. Whilst one has to concede that no single model of PIH or LCH fully justifies all smoothing patterns, we can at least find ourselves optimistic about the successes of certain models to explain or account for tricky factors such as precautionary saving and permanent income volatility.

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