Utility maximization over time in regard to durable and consumable goods

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Abstract:

Utility maximization in the long run is a question that every economist contemplates sooner or later in the purchase of a good. What is the worth of the good to you, and how would you allocate the available resources so as to derive the greatest utility? This question of utility maximization in the long run is observed through a student's perspective regarding their limited weekly budget allocation between two different types of goods: durable and consumable goods.

This paper considers the theory of inter-temporal choices in regard to consumer preferences using the scenario of a student's fixed budget constraint in a timeframe of no more than two periods. The relevant diagrams depict how the consumer (student) could manage its limited budget between period one and period two, vis-à-vis the student's spending on consumable goods in one period to another. The ultimate goal is to allocate the income in such a manner on consumable goods, that at the end of the second period, the student is able to afford the more expensive durable good without the need of repaying a loan.

It was noted that, in the case of a student's weekly budget of sixty pounds, many variables of the theory of inter-temporal choices had to be omitted, such as the bank's interest rates on the money saved within the first period.

Durable goods are assets, as well as a source of utility. If it took the student two periods (weeks) to allocate their resources in such a manner so as to be able to purchase a durable good, then by definition that student has maximized his overall utility.

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This essay will observe the fundamental question of scarce resource allocation by contemplating the long run utility maximization in regard to two different types of goods: durable and consumable goods. The theory of consumer behaviour will be applied, with respect to the theory of inter-temporal choices, budget constraints and indifference curves.

The modern theory of consumer behaviour is considered in terms of the *consumer preferences*, while *utility* is regarded solely as a 'way to describe preferences' (Varian, 2010, p.54)

In economics, durable goods are defined as items which have a rather long lifespan, and can be classified into two distinct categories. Perfectly durable goods (such as diamonds, gold and silver) which are goods that never wear out, and highly durable goods which are regarded as objects with a lifespan of on average 3 years, and which include clothing items, cars and electronic material. Consumable goods on the other hand include goods such as toiletries, food, beverages and non-renewable energy sources (Business Pundit, 2011). The contrast between consumable goods and durable goods is that the latter is often considered as a source of investment and/or even as a way of storing money, as is the case with the purchase of gold and silver bars.

Consumers are regarded as being 'rational' beings, and therefore aim at getting the greatest utility out of a purchased good. For the sake of this essay, the provided scenario will be in terms of students and their utility maximization.

It is well known that the average student has a very limited weekly expenditure budget, and as such always faces the question of where and how to allocate their income. That is to say: from which consumption bundle will he/she derive the greatest utility? In this scenario, the natures of the two consumption bundles are durable and consumable goods. If a student has, say, sixty pounds to spend per week (after deduction of a monthly bus card and monthly telephone bill), then that student will have to divide those sixty pounds between the consumable goods (e.g.: food and beverages) and between the durable goods (such as a new pair of shoes or a warmer winter coat). The problem, however, is that the durable good is most likely to be more expensive than the consumable good. A new winter coat that should, in theory, last for a few years will hardly be under two hundred if not three hundred pounds, while a loaf of bread or a two litre bottle of Pepsi Max will not cost above a pound or two, but will also be consumed after only a few days. To be able to afford such a durable good, the student will have to allocate their money in such a way as to be able to save weekly a bit of money on consumable goods, ultimately being able to purchase that durable good without the burden of having to repay a debt. Allocation of resources in relation to choice over two or more periods is essentially known as the Theory of Inter-temporal Choice, which Varian (2010, p.182) defines as 'the choices involved in saving and consuming over time'.

The inter-temporal choice scenario can be depicted through a simple case involving two time periods and composite goods. The consumption per period is represented via (c_1, c_2) while the fixed budget expenditure per period is noted as (m_1, m_2) (ibid).

Assuming that the student does not intend on taking a loan, and with interest rates non-existent or equal to zero ($r = 0$), then the inter-temporal choice of budget allocation can be represented in **Figure 1**[1]:
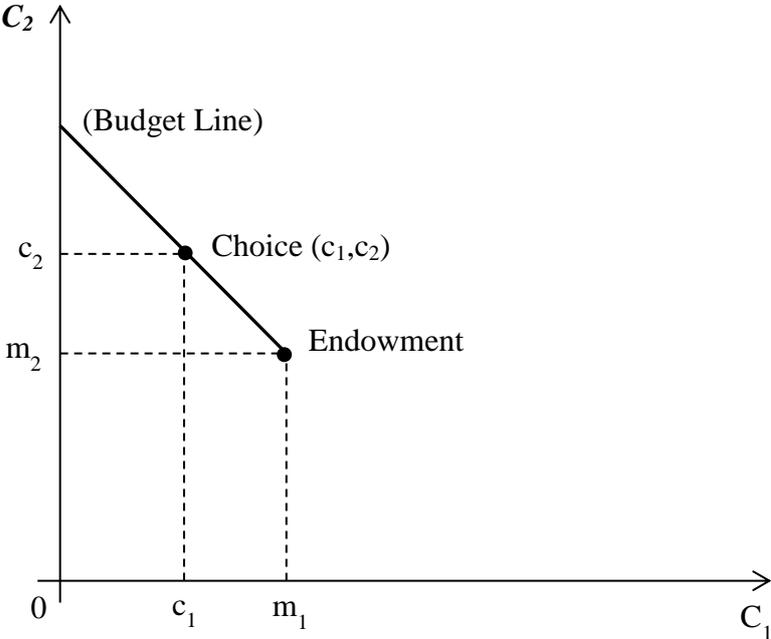

<p style="text-align:center">Figure 1: Consumer Budget Constraint</p>

In **Figure 1**, (m_1, m_2) can be consumed. However, assuming the only possibility the consumer (student) has of transferring capital from period one (C_1) to period two (C_2) would be by saving, then the less the consumer spends in period C_1, the more he/she will be able to consume in period C_2.

A variable to consider, however, is that if the consumer stores his money in a bank (which would be the rational thing to do) then the money which is saved would accumulate interest rates r.

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[1] Graph drawn by author

If the consumer is saving in period C_1 in order to be able to purchase a more expensive good in period C_2, then the amount saved will increase in the bank by interest 'r'. In arithmetic terms, the amount of money saved can be represented as $(m_1 - c_1)$, and thus the effect of interest as $r(m_1 - c_1)$. This can be represented by the inter-temporal choice diagram below:
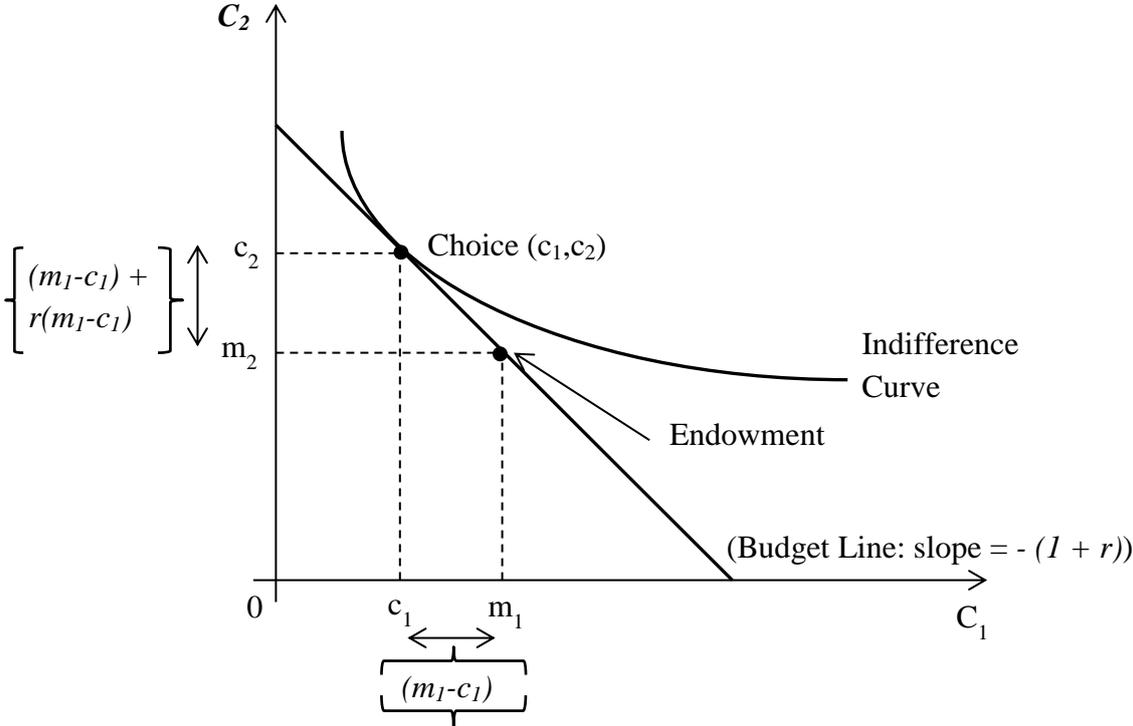

Figure 2: Consumer Budget Constraint – 'Lender'

As can be observed from **Figure 2**[2], the available budget the consumer can spend in period C_2 can be represented by the function (Varian, 2010, p.183):

$$C_2 = m_2 + (m_1 - c_1) + r(m_1 - c_1)$$

Where: C_2 = period two;

m_2 = budget in period two;

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[2] Graph drawn by author

(m₁ - c₁) = money saved in period one;

r(m₁ - c₁) = interest earned on money saved in period one.

The budget line will always cut through the endowment point (m_1, m_2) as this is the consumption bundle which is always affordable. The budget line is always downward sloping with a slope of -1, but because it also takes into consideration the level of interest *r*, the degree of the slope is noted as *-(1 + r)* (Varian, 2010, p.185).

In the scenario with the student: a seven day period will hardly be affected by the interest rates *r* from whichever bank holds that student's money. The interest earned would be so little that it might as well be omitted from the calculations. If we assume the weekly fixed budget of that student is £60, and that the student's overall consumption in period one (C_1) is £40, then the expenditure function for the second period would be:

$C_2 = m_2 + (m_1 - c_1)$

$C_2 = £60 + (£60 - £40)$

$C_2 = £80$

Assuming that the consumption pattern does not change in period two (C_2), then the student would have a total of £40 pounds at the end of the second period that he/she could spend on a durable good, such as a pair of gloves. These gloves, if handled with care, are most likely going to last for a few years, and as such can be classified as a highly durable good. Durable goods are assets, as well as a source of utility. If it took the student two weeks

to allocate his/her resources in such a manner as to be able to purchase a durable good, then by definition that student has maximised their overall utility.

There are, however, more variables to consider than those mentioned above, such as the consumer's uncertainty when choosing between two different consumption bundles; the effect of inflation on the indifference curve; and the consumer's choice of borrowing rather than saving money. Another interesting variable would be that of *time* when interest rate r increases, therefore making waiting another period and having the interest compounded rather than purchasing that good straight away a more efficient decision. Also, the consumer can purchase an expensive durable asset under monthly instalment loans, in cases where the durable asset is required straight away (e.g.: a new fridge).

To summarise: by waiting another period before purchasing the durable good and therefore being able to afford that asset without incurring the risk of debt and the involved interest rates, the student in the above scenario has indeed maximised utility in the long run as the choice (c_1, c_2) is both affordable and lies upon the indifference curve.

Reference list:

Business Pundit (2011) *Durable Goods* [online]. Available from: http://www.businesspundit.com/?s=durable+goods (Accessed 29 October 2012)

Varian, H. R. (2010) *Intermediate Microeconomics, A Modern Approach*, New York: W.W. Norton & Company