Social Time Preference and the Consumption-Growth Trade-off

INTRODUCTION

"What ever happened to saving?" (Economist, 1990). It is indeed a pertinent question. Over the past three decades, saving has fallen sharply in almost every rich country. Yet the answers offered to this question are often couched in vague terms such as "asset explosion" and "consumption boom".

This essay seeks to develop an analytical framework which can be used to explore in a more rigorous fashion the reasons behind the impact of such a savings slump. The point of departure is the general equilibrium assumption that markets exist for all goods in all time periods. This assumption is obviously unrealistic, at least in its purest sense. Yet every day, individuals and indeed societies make decisions about how their scarce resources should be allocated across different time periods. This discussion employs the mechanism of social time preference (STP) to examine how these decisions are made.

The analysis is divided into five sections. The first of these defines STP, and analyses its various components. Its relationship with the market rate of interest is briefly examined in section two. Section three derives a simple condition under which society will optimise its welfare over two periods. Section four amplifies this analysis to take account of all periods. Finally, section five looks briefly at the policy implications to which the analysis gives rise.

WHAT IS SOCIAL TIME PREFERENCE?

How does society decide between consuming now and consuming at some date in the future? Essintially, the sacrifice of consumption now is rational if the subsequent gains in future consumption excess, or are expected to exceed, the cost of the current sacrifice. Crucial to this rationale is the definition of gains in future consumption.

That part of income not consumes is invested, and hence it yields a growth in output. This implies that by postponing consumption to some future period, society will ultimately be able to consume more goods, and hence will enjoy a greater overall level of utility.(1) The logic of the above rationale would therefore indicate that the optimal course of action is the extreme of reducing current consumption to zero.

However, such a decision would be founded upon the aggregation of all consumption benefits, regardless of when they occur. This procedure ignores social time preference, which simply stated, involves the preference of society for present benefits over future benefits.

According to Dasgupta and Pearce, social time preference arises principally for two reasons (1978:137):

(i) Society simply does prefer the present to the future- there is pure myopia.

(ii) Future generations are likely to have higher levels of consumption. If the principal of diminishing marginal utility of consumption (DMUC) operates, then the marginal utility of current consumption exceeds that of future consumption. Future consumption should therefore be discounted.

The first of these, pure myopia, stems from the fact that there are two elements of risk involved in choosing to consume goods at a future date. Firstly, the goods themselves might not materialise. Secondly, the individual, being mortal, may not be around to receive the goods. In his analysis of this risk of death, Eckstein (1961) calculated rational individual time preference rates for the U.S. and his results show rates with a range of 0.04% (5 - 9 age group) to 7.45% (80 - 84 age group).

The second reason, which assumes that DMUC is an observable fact, can be

interpreted as an objective reason why people prefer the present to the future, or as a normative statement about why people should discount the future.

We can thus express the STPR more formally as follows:

$$STPR = s + I + d = r \quad (1)$$

where: s = the DMUC rate of discount
I = the pure myopia rate of discount
d = the risk-of-death rate of discount

The existence of STPR precludes the extreme situation posited above of zero consumption.

THE MARKET RATE OF INTEREST AS A PROXY TO THE STPR

At this point, it is instructive to examine the relation between the rate of interest and STP. If no alowance is made for risk, it can be argued that the market rate of interest will reflect on society's willingness to sacrifice current consumption for future consumption.

However, Haveman(1970) contends that there is little reason to suppose that market rates actually do reflect time preference rates. Firstly, individuals cannot borrow since the more that is extended on credit, the greater the risk of default. Secondly, individuals may not express all their preferences concerning the future in the market place. Thirdly, as Marglin (1963) notes, the preferences people manifest in an individual capacity may differ significantly those they express as a collective community.

Hence, it is implicit in the remainder of this discussion that unquestioning acceptance of the market rate of interest as an appropriate rate of discount is unjustified.

THE TWO-PERIOD CONSUMPTION DECISION

It was established in section one that society would, in the extreme, defer consumption indefinitely, were it not for the fact that people prefer current consumption to future consumption. The question that must now be asked is how do these opposing motives interact to determine the actual level of consumption and investment in the economy. This section seeks to answer this question using a simple two-period model.

Two-period analysis

Assume that all individuals have identical utility functions. Assume furthermore that the corresponding marginal utility function deriving from this function has constant elasticity, and is of the form

$$dU/dC = aC^{-e} \quad (2)$$

There is nothing sacred about this function, but it is a reasonable approximation to reality, and it is convenient for computation purposes.

On a theoretical level, it can then be shown that[1]

$$r = \frac{(1+k)^e(1+I+d)}{(1+n)^e} - 1 \quad (3)$$

where: r = STPR
k = rate of growth of total consumption
e = the constant elasticity of the marginal utility fuction
I = the pure myopia rate of discount
d = the risk of death rate of discount
n = the rate of growth of population

Now consider how society's consumption choice is made. The curve PP in Figure 1 (see over) represents a transformation function between two periods. It

shows the rate at which consumption in period t can be converted into consumption in period $t + 1$ via the medium of investment. Its slope is approximated by C_{t+1}/I, where $C_t=1$ is the level of consumption in period $t + 1$, and I_t is the level of investment in period t. Since the marginal net productivity of capital (MNP_k) in the economy is definitionally the amount by which Ct+1 exceeds I_t, this slope can be rewritten as $MNP_k + 1$.

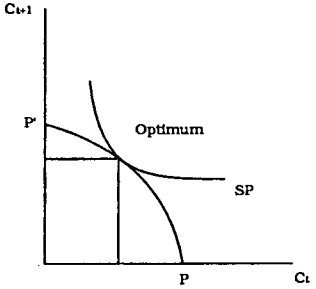

Figure 1

The curve SP is a social indifference curve, reflecting the various elements of society's time prefernces. Its slope will show the marginal rate of substitution between present and future consumption. However, this marginal rate if substitution will, by definition, equal societies rate of time preference. Hence the slope of SP is the STPR.

In order to optimise its welfare, society will endeavour to attain the highest indifference curve possible. It can easily be seen that this will be achieved when the slope of SP equals the slope of P'P. Hence, by using simple indifference analysis, the condition under which society's welfare is maximised can be identified. This condition is:

$$(1 + K)^e = \frac{(1 + MNPk)(1 + n)^e}{(1 + 1 + d)} \qquad (4)$$

In other words, if society's welfare over two periods is to be maximised, consumption in period two should be k times that in period one.

Qualifications to the two-period model

This model was used to good effect by both Feldstein (1964) and Hirschleifer (1970). However, there are a number of qualifications which must be noted. Firstly, the assumption of an omnipresent utility function with a constant elasticity derivative is strong, yet the expression for the STPR depends on it. Secondly, an apparent oddity of the approach is that the STPR is seen to depend on the rate of growth of consumption over the two periods, which in turn is itself dependent on the STPR: the direction of causality is unclear. However, it could be argued that the projects determined by the STPR are marginal, and therefore they do not have a significant effect on the overall rate of growth (Dasgupta and Pearce, 1978:144). Thirdly, investment in periods before t will have "throw-offs" in period t +1, and investment in period t will not all accrue in t + 1. These factors are ignored.

EXTENSION OVER ALL PERIODS

Given the above critisims, and the fact that the analysis so far has been restricted to two periods, it is clear that a more realistic intertemporal framework is needed if any worthwhile policy prescriptions are to be offered. This section seeks to develop such an alternative framework.

Multi-period analysis

Three essential assumptions underpin the following analysis:

(i) The welfare of the individuals in society can be aggregated using a simple social welfare function of the Bergson-Samuelson form. More formally:

$$SW_t = SW_t(U_1, U_2 \ldots\ldots, U_n)$$

where: SW_t denotes aggregate social welfare in period t.

(ii)Welfare in the society is growing at a continuous rate,q. This implies that, if SWo os aggregate social in period 0, aggrtgate social welfare in period t is given by SW_0e^{qt}.

(iii)Total social welfare in period t = 0 (TSWo) is the sum of individual welfares in that period, plus the sum of all future social welfares, discounted at the STPR.

If SW_t is given by the expression SW_0e^{qt}, then analogously, the rate of discount to be applied to this welfare will be ert. Hence the present value of SWt is given by:

$$\frac{SW_t}{e^{rt}} = \frac{SWoc^{qt}}{e^{rt}} = SWoe^{(q-r)t}$$

The sum of all these future social welfares can be obtained by integrating across all values of *t*. However, this course is an improper integral - it is intuitively obvious that, Armageddon excepted, the sum of all future welfares is infinite. Hence equation 7 can only be integrated across all values from 0 to an arbitrary but unspecified value of *t*.

Integrating:

$$TSW_t = \int_o^t SWoe^{(q-r)t} = SWo(e^{(q-r)t}-1)/(q-r)$$

(q - r) is itself the denominator of this expression, but it is an exponent in the numerator. Hence, it is clear by inspection that in order to maximise the expression, (q - r) must be maximised. This holds for all values of *t*.

Qualifications to the multi-period model

It is first important to note that, as in the case of the two-period model, r = r(q). This function can be incorporated in the integral above, and from this an optimal rate of consumption growth can be derived. However, the nature of the relationship between r and q is both dynamic and extremely difficult to establish.

Some contributors to the debate, notably Sen (1970) and Baumol (1965), have challenged the efficacy of the Bergson-Samuelson utility function, arguing that it neglects the interdependence of individual utility functions. Furthermore, the assumption that social welfare grows at a steady rate can also be questioned. Finally, the issue of uncertainty must be addresses, particularly if the analysis extends over a large number of periods.

AND POLICY?

Not withstanding these qualifications, the conclusion reached above does offer a policy prescriotion. To maximise welfare over all periods, (q - r) must be maximised. Hence attention should be directed towards both q and r.

Emphasis on the first of these has never been found to be lacking. Indeed, it could have been stated without reference to the analysis above that consumption growth is desirable. This is because it has a significant part to play in other aspects of the economy, such as the intratemporal allocation of resources. For example, growth is a necessary condition for a Pareto-efficient redistribution of wealth.

However, and this is the crucial point resulting from the analysis above, emphasis on consumption growth without reference to social time preference is misplaces. If more commodities are to be produced, the economy must grow. This in turn involves the postponement of consumption. Hence q falls in the short term. If too many resources are devoted to investment by government, people become impatient and myopic, asking why future generations should enjoy higher living standards at their expense, and r rises. Hence the overall effect is to reduce (q.-.r) and total welfare falls. From this perspective, policy-makers

endeavouring to maximise intertemporal welfare are wrong to concentrate exclusively on maximisation of growth.

An alternative danger reverses the direction of causality. If policy-makers artifically inflate the STPR, consumption growth will inevitably rise, yet only in the short run. A sustained high rate of consumption growth is incompatible with low investment. To illustrate, one has to look no further than the recent experience in Britain and the US. In both of these countries, policy-makers introduced ill-timed and overgenerous tax cuts. The STPR was artificially raised (people were induced to consume now rather than in the future), savings rates tumbles, and consumption boomed. The *Economist* article referred to in the introduction notes that, in America, public and private sectors together saved (net of depreciation) about 9% of national income in the 1960s, 8% in the 1970s and 3% in the 1980s. Ultimately, however, q must fall as there is no investment to sustain it at its high level. Once again (q - r) falls and future welfare is damaged. Indeed, Hale was recently prompted to write:

"[America] must develop a new policy mix for bolstering its rate of saving and investment, before public frustration with stagnant living-standards encourages even more destructive political flirtations with fiscal populism....." (1989: 42)

This essay has indicated that such a new policy mix would have to replace blinkered concentration on consumption growth with a more balanced perspective taking appropriate account of intertemporal resource allocation. One suggestion is tax reform. At present, taxes on personal and corporate income artificially inflate time preference rates, and discourage saving. Savings inventives, such as they do exist, are often distortionary in their impact. These policies should be reformulated to create conditions in which people and firms can make uninhibited, intelligent choices about how they can best allocate their resources over time.

CONCLUSION

Little and Mirrlees write that one must be able to quantify the relation between the rate of growth of consumption per head and the decline of the importance of further increases in such consumption (1974). This essay employed the mechanism of social time preference to offer one possible, albeit seminal, approach to this quantification. It must be remembered, however, that the issues involved are complex, and necessarily demand more complete attention than is possible in a single short essay.

It is not only policy-makers who can be accused of myopic concentration on single period analyses. Some eminent economists, notably Ramsey and Harrod (see Jones, 1975), have disputed whether future consumption should be discounted at all. This view is indefensible. As Solow writes: "many people save voluntarily to buy riskless assets paying 4 to 5 percent." Presumably, then, large classes of people have a marginal rate of time preferences of 4 to 5 per cent (96:1963). In sum, because consumption now and next year are competitive with each other, we have not one but two objectives. Policy-makers and economists alike must not lose sight of this.

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