

VIII. LACK OF BORROWING AS A SOURCE OF INEFFICIENCY

Let x_t be the amount of output carried over by society from period t into period $t+1$. If we restrict our attention to stationary states, then it is clear that a necessary and sufficient condition for efficiency is $x_t=0$ for all t . However, if we wish to consider the nonstationary cases as well, the condition for efficiency becomes somewhat more complicated. For it is possible, for instance, for generation t to underconsume and for generation $t+1$ to overconsume, with the result that x_t will be positive and yet the economy will remain efficient. More generally, the building up of inventories does not destroy efficiency so long as these inventories are eventually consumed. The exact statement in this respect is as follows: *A necessary and sufficient condition for the economy to be efficient is that there exist a subsequence $\{x_{t_k}\}$ of the sequence $\{x_t\}$ such that*

$$\lim_{k \rightarrow \infty} x_{t_k} = 0$$

The proof of this assertion will be given in the Appendix. Roughly speaking, efficiency requires that inventories return periodically to a level which is "practically zero."

From the point of view of balance sheets, x_t is clearly *net assets* (total assets minus total liabilities) in the economy at the end of period t . If we concentrate our attention at the time periods t_k , we find that efficiency requires net assets at the end of these periods to be (practically) zero.⁷ In other words, in order to have efficiency, it must be the case that for each outstanding asset in the economy at the end of period t_k there exists a corresponding liability outstanding at the end of period t_k . But, now let us recall the time structure of our model. People live for two periods, they consume in both periods but earn income only in the first. This forces individuals to become net lenders (and never net borrowers) no matter what rate of interest prevails.⁸ In particular, members of generation t_k will want to be net lenders, that is, to have an end-of-period balance sheet which shows just assets and net worth and no liabilities. But efficiency requires that aggregate net worth in the economy be zero, so there must exist someone in the economy holding liabilities in excess of assets, that is, having a negative net worth at the end of period t_k . This puts the unfavorable net worth position of the financial intermediary of section VII in perspective. By the same token, the decentralized economy of section VI is inefficient precisely because no one can be a net borrower while everyone wishes to be a net lender.

It is of some interest to investigate Samuelson's discussion concerning "the contrivance of money" in the light of the foregoing remarks. Clearly, if efficiency is to be attained, people must be dissuaded from holding output as a store of value and persuaded to hold another asset instead. If this other asset bears a positive rate of interest, then people will in fact make the desired shift. As Samuelson points out, the role of this other asset can very well be fulfilled by money. Peo-

⁷ The word "practically" is intended to convey the notion that, strictly speaking, net assets at the end of period t_k might be given by some $\epsilon > 0$, but by taking k large enough, this ϵ may be taken as small as we wish. From here on, we shall neglect to remind the reader of this qualification.

⁸ As long as this rate of interest exceeds -1 .