Altruism, Morality, and Economic Theory

Edited by Edmund S. Phelps

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Comment

Karl Shell

The static general equilibrium model has left us with a fundamental proposition in welfare economics: If "external effects" are absent from consumption and production, then a competitive equilibrium allocation is also a Pareto optimal allocation. Much of social policy may be thought of as an attempt to cope with or exploit these externalities. Phelps's paper on game-equilibrium growth focuses on a *dynamic* economy with consumption externalities. Individuals are neither perfectly selfish nor perfectly altruistic. The utility function of a generation depends upon its own consumption and upon the consumption of each of the future generations.

Since Phelps's generations are not "hard atoms" (they are not perfectly selfish), equilibrium growth may not be Pareto optimal. Even if the generations are hard atoms—as in Hammond's paper—the equilibrium allocation may not be Pareto optimal. The fundamental theorem of welfare economics fails to apply because of two basic differences between the dynamic models and the essentially static Arrow-Debreu model. (1) In continuous-time models with infinite futurity, the set of agents (or generations) can be identified with the open half-time-line (running from today or time zero into the indefinite future). In discrete-time models with infinite futurity, the set of agents can be identified with the nonnegative integers. There are a finite number of agents in the basic Arrow-Debreu model. (2) In the Arrow-Debreu model, trades can be thought of as taking place in a single Walrasian market which includes all individuals under consideration. In the dynamic model, however, some generations do not meet and hence cannot trade or make agreements. As Hammond's Pension Game illustrates, there is even a special problem for overlapping generations. While they can participate in some exchange, there may be limited ability to enforce agreement.

I would like to illustrate the importance of these two qualities of the models—the infinity of traders and the nonsimultaneity of generations—in the context of a simple economy based on Paul Samuelson's famous consumption-loan model. Individuals live for two periods. There is no population growth. The representative of the tth generation has a simple utility function of the form $u^t(c_t^t, c_{t+1}^t) = c_t^t + c_{t+1}^t$, where c_s^t is consumption of generation t in period s. The hard atoms of generation t care only for their own consumptions during the periods in which they are alive, namely periods t and t+1. Assume no production or storage possibilities and assume that each representative individual is endowed with one consumption unit for each of the two periods of his life.

Individual \ Period	1	2	3	4	5	·
0	1	0	0	0	0	·
1	1	1	0	0	0	·
2	0	1	1	0	0	·
3	0	0	1	1	0	·
4	0	0	0	1	1	·
·					·	·
·						·

Figure 1. Endowment Matrix

Notice that if the interest rate is zero (i.e. $p_s = p_t$ for $s = 1, 2, \ldots$ and $t = 1, 2, \ldots$, where p_t is the price of consumption in the tth period), then autarchy (no trade) is a competitive equilibrium. An allocation which is superior to this equilibrium allocation can be found. For example, require man one to give man zero a unit of consumption good in period one. Man zero is better off. Compensate man one by requiring man two to give man one a unit of consumption good in period two, and so forth, making the *ur*-father better off and no one worse off.

Period

Individual	1	2	3	4	5	·
0	2	0	0	0	0	·
1	0	2	0	0	0	·
2	0	0	2	0	0	·
3	0	0	0	2	0	·
·					·	
·						·

Figure 2. Pareto Superior Allocation

While the most natural interpretation of the consumption-loan model is in the dynamic setting, we could consider a *Gedankenexperiment* in which all traders meet in a single market. Nonetheless, we have exhibited a competitive equilibrium which is not Pareto optimal. The fundamental theorem of welfare economics does not hold because of infinity—infinity of traders and infinity of dated commodities.

What is the "cure" for this inefficient competitive economy? Let the *ur*-father (man zero) invent money, declaring it to be worth one unit of consumption in any period. Man zero trades money for consumption in period one. Consumption is passed backward while the money "hot potato" is passed forward. Consumption is Pareto optimal; the money economy duplicates the allocation shown in Figure 2.

In a truly dynamic world as opposed to a game in normal form, some future generation may refuse to catch the "hot potato." In doing so, the preceding generation is harmed and its expectations have been disappointed. After refusing the money of its parents, a generation might print its own currency (monetary reform!), thus aggrandizing themselves at the expense of their parents. This then is the Hobbes-Phelps-Hammond problem which depends on the true dynamic nature of society—not merely on the finiteness or infiniteness of horizons. Such economies may benefit from the acceptance of an ethic or taboo: for example, "Thou shalt not repudiate thy father's legal tender." In the Hobbes-Phelps-Hammond world, ethics and taboos may (by constraining the actions of hard or somewhat hard atoms) serve to improve intertemporal allocation.

In Phelps's model, generations do not overlap. Each generation bequeaths capital to the succeeding generation, fully aware that the saving-consumption decisions of future generations are outside its control. In the particular model he presents, growth is determinate only after specification of the "transversality" (or infinite end-point) condition, $\tilde{k}$. Since game-equilibrium does not provide $\tilde{k}$, Phelps looks for an ethic, myth, or taboo to "close the model." It is my opinion that many of our most interesting and important social arrangements either reflect the fact or are made possible by the fact that there is no date known with perfect certainty for the end of the world or for the breakdown of human society. I applaud Phelps's turning to philosophy and our sister social sciences for an understanding of social arrangements that exploit the "free-endpoint" property of infinite horizons. Such arrangements may appear to be mythical or even magical in the eyes of the classically trained economist, but this is only because the intuition of classical economics is almost entirely formed from the study of finite-horizon models.

Of course, not all indeterminacy is because of the infinite-time horizon. It should be noted that if the Phelps model is somewhat generalized, indeterminacy can be a problem even in a finite-horizon, period model. Let the utility of generation t be $u_t(c_t, u_{t+1}, u_{t+2}, \ldots u_T)$, $t=1,2,\ldots,T$, and c_t be the consumption of generation t. Given the anticipated actions of subsequent generations, the tth generation's choice problem can be rewritten as that of maximizing $\phi_t(c_t,k_{t+1})$, where k_{t+1} is capital bequeathed to generation $t+1$ and $\phi_t(\cdot)$ is a "derived utility function," subject to inheritance of capital k_t. In Phelps's special separable-utility-function case, derived utility $\phi_t(\cdot)$ satisfies the Weak Axion of Revealed Preference (in c_t-k_{t+1} space). That is, the indifference curve defined by $\phi_t(c_t, k_{t+1}) = \beta$ (a constant) is strictly convex to the origin.

In both the general and particular cases, the last generation (T) consumes all the resources it inherits. In the Phelps case, generation $T-1$ knowing the behavior of generation T adopts a unique consumption-bequeath strategy, and so on back to the first generation. Thus, for the *finite* case with Phelps-like utility functions, full development is uniquely determined. In the more general finite-period case, however, there may be a generation, t^*, that is indifferent between two points on the frontier of its feasible consumption-bequeath set. It may also be the case that the welfare of generation t^*-1 is not independent of which of these two points is chosen by generation t^*. Within the calculus of Phelps's paper, no criterion of choice is given for generation t^*-1. Should generation t^*-1 assign probabilities to its children's choices—then maximize expected utility? Perhaps an ethic would be helpful: if indifferent between two points, choose the point your parents would have preferred. (But, of course, this would not necessarily be the point your grandparents would have preferred you to choose.)

We have seen that even though the finite-time model has a natural transversality (or end-point) condition, a generalized version of that model may not be determinate. Something is needed to "close" the model. We may call this something "constitution," "ethic," "myth," "taboo," or whatever, but as social scientists and social philosophers we will want to study in detail what stands behind the word. In such a study, we should not lose sight of the rich pattern of generational overlap in the real world. I conjecture that the "richness" of generational overlap substantially contributes to the viability of arrangements—such as constitutions, generation-skipping wills, trusteeships, etc.—that permit those alive today to influence future resource allocation.

Edward McClennen has commented at length on the Buchanan paper; therefore, my remarks should be brief. Buchanan presents examples of repeated games with threats or potential threats. In these games, the degrees of "strategic courage" (or, more tamely, the rates of time preference) of the players can be important to the outcome of the game.

Turning to the particular game of Figure 1, it might be useful to analyze the game from the viewpoint of each player. (Somehow, after having dubbed Player *A* the "potential samaritan," the author begins to empathize with him.) Cells III and IV are the Pareto optimal outcomes. A long-run conflict-free solution might "average out" to $(4-x, 3+x)$ where $x \in [0,1]$ would depend on the players' relative strategic courage and their relative capabilities for inflicting punishment in case of conflict. If $(3\frac{1}{2}, 3\frac{1}{2})$ were "the solution" (i.e., $x = \frac{1}{2}$), it could be "approximated" in repeated play if *A* plays row 2 each time and *B* alternates between column 1 and column 2. *A* might threaten *B*: If you ever play column 2 twice in succession, I will then choose row 1 for the succeeding twenty plays.

Analysis of the game described in Figure 2 is a bit more complicated and I have promised to be brief. As before, I see no special reason to empathize with *A* rather than *B*. Indeed, now that neither player has a single-play dominant strategy, it is hard to see why *A* is any more the "potential samaritan" than *B*. Buchanan's observations on the current social setting are often keen and can be profitably understood without full acceptance of his analysis and interpretation of the Figure 1 and Figure 2 games.

In closing, I offer a technical comment on the question about the effect of a change in the interest rate on parents' decisions about child-rearing. Even if we think of spanking as an investment good, it does not necessarily follow that spanking should be increased when the rate of return on alternative investment falls. This direct relationship between the rate of interest and the rate of permissiveness is probably deducible from a model with perfect markets for buying, selling, renting and renting out children. Without these markets it would seem that this relationship need not necessarily hold.