Appendix 1

Theories of Income Distribution

Any attempt to consider the role of pensions and social security in the income and wealth distribution of the United States is hampered by the fact that there exists no consensus on an appropriate theory of either of these related distributions. Though the current work on the subject attempts to establish more general models, most of the existing theories are piecemeal and partial despite claims of generality. Divergence of theories is as wide as the underlying political ideologies and social philosophies. Proponents of each theory base their analyses on their particular "view of the world."

It is important to note that scarcely any theory denies the validity of the others on the basis of logic or rationality. Many of the theories are nonconflicting in that they concentrate on different issues and could at some point be merged into a more general theory. Others are directly conflicting in their approaches as to how the world functions and empirical tests are needed to determine which is most appropriate. Each theory attempts to explain income distribution based on a certain view of both the functioning of the economy and the behavior of individuals which emphasizes certain factors and ignores others. Despite differences in emphasis, there exists widespread recognition of the need for endogenizing all or most of the variables in the analysis of income and wealth differences which involve behavioral choices, showing how they interact with the structural variables defining the economy. These variables include those that are potentially, directly or indirectly affected by various retirement schemes. Such variables include education and training, savings, work effort and intergenerational and intragenerational private wealth transfers.

Besides endogenizing behavioral variables, more global variables describing the functioning of the economy must also be endogenized. These include the level of investment and employment that affect the return to capital and the distribution of wages, job mobility, labor-management relations, welfare and other government intervention. All of these variables are directly or indirectly affected by retirement schemes.

Given this state of the art of income distribution theory, it is most appropriately used as a framework in which to insure that all of the possible income distributional effects of various pension policies that the Commission may adopt are considered. This can be accomplished by utilizing a given theory in the analysis of all potential effects for which it is appropriate. Such a strategy will provide a framework that insures a consideration of all potential effects and will result in a range of possibilities each of which is dependent on the view of the world on which it is based.

In order to follow such a strategy, it is necessary to first describe the theories that are appropriate for this approach, highlighting the specific aspects of the theories that are particularly applicable to

pension policy analysis. For the purpose of utilizing such theories as a framework for the analysis of the income distributional effects of pension policy, it is important to describe the theories in enough detail to understand the roles and interactions of the variables that are potentially affected by pension policy. Only with this detail will the theories be useful in discussing the income distributional effects of the specific policies to be analyzed in the following sections.

Stochastic Theory

In discussing the theory of income distribution, it is useful to begin with the old (and still popular) stochastic theory if only to dismiss it as inappropriate for our purposes in that it is, with the exception of one specific application, devoid of economic content. Theories, in general, regard systematic forces as the basic cause of income differences and nonsystematic occurrences as unobserved variance components. Paradoxically, stochastic theory relies on the skewed shape of income distribution mainly or solely on chance, luck and random occurrences. With regard to any meaningful economic analysis, such an approach is useless.

The theory is based on the statistical law of probability. It states that even if a generation started from a state of strict equality of income and wealth, inequalities of the degree of the Pareto distribution could emerge due to stochastic forces. The theory thus provides a stamp of scientific respectability for the age-old myths that fortune is blind, poverty hits at random, no one is destined to abjection from birth, and the sons of poor families have the same chance for success as anyone else.

Given its basis, the stochastic model contributes very little to an economist's understanding of income distribution. Assuming a stochastic mechanism, no matter how complex, to be the sole determinant of income inequality is antithetical to the mainstream of economic theory which seeks to explain complex phenomena as the end result of deliberate choices by decision-makers. If one thinks of the deterministic part of any model as "what we think we know" and the stochastic disturbance as the measure of our ignorance, the probabilistic approach to distribution theory allocates the entire variance in income to the latter and is therefore totally useless in terms of policy analysis.

Various papers by Friedman (1953), Sargan (1957) and Wold-Whittle (1957) have attempted to add economic interpretation to the stochastic process theories of size distribution of income by using them to analyze the accumulation of risky capital. In Friedman's model, the income distribution generated is stochastic in that it draws from a random process. Unlike other stochastic models, individual choices by persons differing in risk aversion help determine the shape of the distribution. Friedman views every person as having a certain income and an opportunity to participate in a lottery if he so desires. Each person consults his utility function and the less risk averse enter the lottery while the more risk averse do not. The resulting income distribution is a composite of three distributions, each one of which could be symmetrical: 1) nonparticipants; 2) lottery losers, whose distribution has a slightly lower mean; and 3) lottery winners,

whose distribution has a much higher mean. If the lottery has only a few winners of very large prizes, the resulting overall distribution is positively skewed with an elongated upper tail. In this theory random elements are likely to predominate although there are still economic considerations in choosing an optimal portfolio. This may help to explain why the upper tails of almost all distributions, where returns to capital dominate and earnings play a minor role, exhibit a striking resemblance to the Pareto distribution.

Thus, the stochastic theory (or the Friedman version of it) is applicable to pension policy analysis only in the sense of the policy effect on the number of holders and level of risk of various portfolios. If policy changes the relative weights of the three distributions or the level of risk aversion inherent in the various portfolios, this stochastic view of income distribution provides a means of analyzing the income distributional consequences.

Theories of the Functional Distribution of Income

Classical writing on the subject of the distribution of income was primarily concerned with the distribution among classes. Ricardo (1821), for example, described "the principal problem in political economy" as being to determine how "the produce of the earth ... is divided among three classes of the community, namely, the proprietor of the land, the owner of the stock or capital necessary for its cultivation and the laborers by whose industry it is cultivated." At the time, it may have been reasonable to suppose that these three classes corresponded to different positions on the income scale. Today, the relationship between the shares of factors of production and the distribution of income among persons is more complicated — pensions and social security being one of the complicating factors. Because of the potential effect of retirement schemes on factor shares, the various theories of the functional distribution of income provide some important considerations which must be addressed in analyzing the effect of pension policy on income distribution. They are more global than the behavioral theories of personal income distribution being based on certain viewpoints as to how the economy functions and the constraints which the economy places on individuals. They provide a useful framework for the analysis of the income distributional implications of pension policy in that they deal with major variables which that policy may effect — wages, return to capital and capital ownership. We will note later that certain of the behavioral theories of income distribution have one or another of the theories of the functional distribution of income as their base.

ORTHODOX THEORY - In the "neoclassical" theory or Walrasian competitive equilibrium, the distribution of physical endowment is a given datum and the distribution of income is an outcome of the competitive mechanism depending on prices and marginal productivities. The theory is usually introduced as part of a general equilibrium analysis of the economy, the factor shares being determined as part of an overall explanation of the prices of factors and products. Thus, to build a theory of distribution, a theory of factor prices and quantities is essential. To this end, three assumptions are made:

- Output is determined by an aggregate function of total capital and labor.* This production function allows smooth substitutability between capital and labor with diminishing marginal returns to each factor, and exhibits constant returns to scale.

- All firms and consumers act as perfect competitors, that is they take prices, wages and the cost of capital as given (they cannot exercise any bargaining power) and all firms aim to maximize profits.

- The supplies of aggregate capital and labor are given, a condition which may, for example, be secured by the full employment of a fixed stock of factors.

Given these assumptions, the theory then describes the equilibrium of the economy. If firms maximize profits at given product and factor prices, they hire labor up to the point where the value marginal product of labor is equal to the cost of capital. (The total paid out to the factors is guaranteed to add up to the total value of output by the assumption of constant returns of scale.) Writing w for the wage rate, and r for the return to capital, we have the conditions: w = value marginal product of labor; r = value marginal product of capital.

This gives a relationship between the relative shares of capital and labor and the supply of these two factors (since the marginal products depend on the factor supplies):**

$$\frac{\text{Total profits}}{\text{Total wages}} = \frac{\text{Capital} \times r}{\text{Labor} \times w} = \frac{\text{Capital} \times \text{Marginal product of capital}}{\text{Labor} \times \text{Marginal product of labor}}$$

In general, therefore, to provide a long-run theory of factor shares we need to explain how the factor supplies change over time.*** This necessity may be represented in terms of the elasticity of substitution (denoted by σ), defined as the proportionate change in the ratio of capital to labor associated with a proportionate change in the relative factor rewards (r/w). It measures the ease of substitution, so that if the elasticity

---

* In this formulation, land is for simplicity ignored, so that the factor shares considered are those of labor and "property." The assumption of constant returns to scale means that if both capital and labor are increased by a given percentage, output will increase by the same amount.

** Since the value marginal product = price x marginal product, the price term drops out (appearing on both top and bottom) in the substitution to obtain the final expression.

*** It should be noted that where the aggregate production function is a Cobb-Douglas function, the shares of labor and capital are independent of the factor supplies.

is low a change in "r/w" is associated with a small change in the capital intensity of production (by assumption the capital-labor ratio falls as "r/w" rises).

The relevance of the elasticity of substitution may be seen from the fact that the relative shares of capital and labor may be written:

$$\frac{\text{Total profits}}{\text{Total wages}} = \left(\frac{r}{w}\right) \times \frac{\text{capital}}{\text{labor}}$$

If the capital/labor ratio rises by "y" percent, then the relative share of capital rises or falls, depending on whether the associated fall in "r/w" is less than or greater than "y" percent, and this depends in turn on the value of the elasticity of substitution (o). If o is less than 1, then the associated change in "r/w" is more than "y" percent and the share of capital falls; if o is greater than 1, then the share of capital rises; and if o = 1, the relative shares are unchanged (this is the Cobb-Douglas case). The proportionate change in the share of capital can in fact be shown to be:

(1-share of capital) x (1-1/o) x (y percent)*

From the above description, it can be seen that this theory provides a broad framework that can be used in the analysis of the effect of various pension policies on income distribution. Pensions can alter the supply of labor, the relative price of labor and capital including the wage rate and the marginal product of labor that is partly dependent on the capital labor ratio. Pension policy can also alter the ownership of capital and affect capital investment. These applications will be discussed in the following sections of this appendix with regard to specific policy alternatives.

---

* This orthodox theory has been the subject of considerable criticism. The criticism, among other things, concerns the assumptions of perfect competition and the aggregate production function. The assumption of perfect competition is one of analytical convenience, but it does not accord with the market imperfections which appear to characterize most advanced economies. A variation of the orthodox theory, in fact, relaxes the assumption of perfect completion by introducing a degree of monopoly power in which a firm hires labor to the point where the wage equals the marginal revenue product rather than the value marginal product.

In terms of assuming an aggregate production function, the main predictions of the theory concerned the relationship between the factor shares and the supply of factors and the link between the increase in the capital-labor ratio and the fall in the ratio (r/w), via the elasticity of substitution. This assumed that r/w fell as the capital-labor ratio rose, but in fact there is no need why this should necessarily happen in a more general model of production. Thus, there is little foundation theoretically for the aggregate production function.

BARGAINING POWER THEORIES - The bargaining power theories may be divided into those concerned with the monopoly power of firms and those concerned with collective bargaining and union power. The former are represented by the work of Kalecki (1939), who argued that the share of labor depends inversely on the degree of monopoly. As Kalecki described it, the analysis begins at the level of the individual enterprise, where prices are set by equating marginal revenue and marginal cost. Marginal cost is assumed constant and taken here to include only wage costs. Aggregating across enterprises, Kalecki concluded that the share of labor is equal to (1-m) where m is the average degree of monopoly.

The theories concerned with collective bargaining have been less precisely formulated, but in general lead to the not unexpected prediction that the share of wages increases with trade union strength.

These bargaining theories provide an interesting framework for pension policy analysis in that pensions have become a major bargaining element in labor-management negotiations. Given the standard competitive view of labor management relations and wage negotiations, it is somewhat surprising that the private sector has established the complex system of private pension plans that exist today. The standard view would embody pensions in competitive theory by what can be represented as the "compensating differences" hypothesis which implies that lower wages compensate for greater pension rights.

Because of the role of pension plan provisions in the compensation package and the debate over the "compensating differences hypothesis," the bargaining framework is important in analyzing the income distributional effects of various pension policies. The criteria for selecting a labor-management bargaining strategy involve a complex mixture of both ethical considerations and corporate interests and thus are not clear cut. A pension plan's provisions regarding eligibility, vesting, portability, and benefits formula should be viewed in terms of these interests because their potential effect on labor supply, labor mobility and in the end real wages in a bargaining framework has income distributional consequences. Because market prices are influenced by any restrictions placed on the participants in the market or by any mechanism that alters their incentive structure, each of the provisions of the pension system may cause an alteration of behavior that will induce a change of the market wage rate. Thus, given a bargaining framework, any policy with regard to these provisions will affect income distribution. Specific hypotheses as to how this occurs will be considered in the following sections.

THEORY OF ACCUMULATION - This theory, associated with Nicholas Kaldor and other Cambridge (U.K.) economists makes the following strong assumptions that permit both aggregation and decomposition of the economic system, in such a way as to allow a straightforward explanation of relative shares. The main assumptions of this model as set out in Kaldor (1955) are:

- Aggregate production relationship may be summarized by a constant ratio of investment to incremental output denoted by v.

- Planned savings are a constant fraction (s_p) of profits and a constant fraction (s_w) of wages, where s_p is greater than s_w.
- The economy is on a long-run growth path with an exogenous rate of growth of output fixed in proportional terms.

In the extreme case where s_w is zero, planned savings are s_p times profits. If they are equal to planned investment, we have

S_p x Profits = Investment = v x (Increase in output) so that the share of profits is given by:

$$\frac{\text{Profits}}{\text{Output}} = \frac{v}{s_p} \times (\text{Proportional growth rate of output})$$

According to these assumptions, the share of profits is determined by the propensity to save out of profits, the exogenous rate of growth and the investment-incremental output ratio. (Where workers save, the share of profits is given by the slightly more complicated relationship $(nv - s_w)(s_p - s_w)$ where n is the rate of growth of output.)

This theory allows the factor shares to be determined from the equilibrium of planned savings and investment, without regard to the rest of the economic system. Thus, according to the framework, pension policy would affect income distribution through these two variables. Two elements, the assumption that the ratio v is constant and the assumption of given savings propensities are, however, questionable for many reasons, one of which is the fact that pension policy may cause them to vary. Besides this influence, in terms of the ratio of investment to incremental output, a weakness in the assumption is that it is not to be influenced by the rate of profit. In terms of the savings assumption, the issue arises as to how far corporate behavior can be viewed independently of personal savings decisions. Where corporate savings leads to a rise in share values of an equal amount, and where capital gain is regarded by shareholders as fully equivalent to personal savings, the higher corporate savings is exactly offset by a corresponding reduction of personal savings. The firms are simply saving on behalf of the shareholders. This takes a rather extreme view of the behavior of shareholders and the stock market, but it may not be inappropriate in a long-run context and points to an important difficulty with the Kaldorian model. It may be important to distinguish between differential savings propensities according to source and type of current and future income.

Thus, the Kaldor model and the criticisms of its assumptions serve as a useful framework for analyzing the income distributional effects of pension policy. The effect of pensions on both corporate and private savings and investment need clearly be addressed.

MARXIAN AND RADICAL THEORIES - Radical economists have tended to emphasize the role of economic and political power and the exploitation of labor by capital. There is not sufficient space to thoroughly analyze this body of theory except to note that the radical interpretations of profit and wages emphasize the sociological facts that the capitalist

class owns all the productive facilities and resources, while the working class owns only its own labor power. The capitalists receive a large share of national income while putting forth no effort by "exploiting" this profit from the workers' product. Because there is no straightforward way to relate the concept of exploitation to actual changes in money profits and wages, the application by modern radical economists has tended not to work within the formal theoretical framework but to take over qualitative elements stressed by Marx, in particular the relative bargaining power of capital and labor. Thus, utilizing the radical framework, the income distributional effects of pension policy can be considered in terms of relative bargaining power.

Aumann-Kurz Theory of Income Distribution

This theory is rather unorthodox because it can be considered a part of either the functional or the behavioral or personal theory of income distribution in that it involves the political behavior of individuals. Aumann and Kurz view it as a theory of redistribution though its elements can be considered in terms of having caused the existing distribution. In their theory, Aumann and Kurz (1977) assume the existence of a democratic process and a basic constitution which defines individual rights, including property rights. As they describe it, each individual is endowed with certain resources which can be used for consumption and production but in addition, the individual has his vote and the right to his own property. In a free market economy where prices are endogenously determined, the distribution of income will be an automatic outcome of the endowment of each person and the prevailing prices. A redistribution is achieved by individuals acting via the political mechanism. They form pressure groups, political parties and other associations, all of which are called coalitions. Such coalitions aim to reach the minimum size that is sufficient to allow the group to enact whatever redistributive laws they wish to make in accordance with the voting rules laid down in the constitution. The power to pass redistributive laws, however, is not irreversible; any politically dominant coalition may find itself displaced by a differently composed majority coalition with correspondingly different legislative proposals. Thus, in the process of social bargaining, the formation of alternative coalitions is always a threat of potential alternative actions which may be taken by other groups. Aumann-Kurz assume that every majority coalition may pass redistributive proposals it may wish to enact, and these represent sets of alternative threats that it has against its opponents. Aumann-Kurz assume, however, that the minority may refuse to cooperate with the majority and call for a general strike of its members against the majority. Thus, the idea of "property rights" is translated into the right of a potentially oppressed minority to refuse to work or make its capital or other resources available to the system as a whole.

As political-economic tactics, strikes are familiar from labor-management relations. The Aumann-Kurz theory accepts the view that such strategies are at the bottom of most economic threats and, combined with the democratic process, they constitute the essential reasons for a social compromise. When formalized into a game of conflict, the solution

is an income distribution which emerges as an endogenous outcome of the game. One may think of other threats and counterthreats which are commonly employed that may influence the final distribution as well.

Thus, the theory combines aspects of competition, bargaining and property rights to provide an explanation of income redistribution. Such a framework is useful in analyzing the possible income distributional effects of pension policy since such policy may potentially have considerable influence on property rights and therefore power. Rather than influencing factor shares directly, pension policy in this context can influence the power position of various coalitions of employees and employers and change the composition of the various coalitions. It may, therefore, influence the bargaining outcomes among coalitions. By changing the relative property rights among groups policy could also influence the coalitions that form.

Human Capital Theory

The modern vintage of the human capital theory was conceived and developed largely but not exclusively by the Chicago School, starting around the turn of the decade of the 1950s under the intellectual inspiration of Theodore W. Schultz. Since then it has grown into a colossus, enriching all branches of economic analysis: microeconomics, labor economics, capital theory, growth theory, and income distribution theories. Research has been focused on two complementary fronts: On one front, researchers used the human capital framework to analyze the sources of productivity and growth. On the other front, Becker (1962, 1964), Mincer (1958) and their followers focused on the general theory and the earnings distribution theory of human capital. They clarified the relevant costs of the human investment process (including the cost of time); analyzed school and postschool investment; spelled out the optimizing decision rules for such investment; and derived implications for earnings differences among skill categories across occupations and over age categories. The basis of this theory is its postulate of optimizing behavior on the part of individuals; investment in oneself is the result of rational optimizing decisions (by individuals or their parents) made on the basis of estimates of the probable present value of alternative life-cycle income streams, discounted at some appropriate rate. In more general terms, it is a theory of permanent earnings.

Since the inception of the modern human capital theory, human investment analysis has been addressed to any spending on persons that enhances their future earnings capacity, human migration, human health, schooling, on-the-job training, job search, information evaluation and more recently, preschool investment in the nurture of children, family and population, etc. Education has emerged as a key to several other forms of human investment and therefore the hard core of human capital theory has turned out to be education.

In its simplest form, the human-capital approach consists of a series of definitions and the hypothesis of lifetime income maximization. First, there is an identity relating potential earnings X_t at age t, to the potential

earnings X_{Ot} of an untrained individual and the returns on past human investments:

$$X_t = X_{Ot} + r_t H_t$$

where H_t is the amount of human capital and r_t is the average rate of return. Actual earnings E_t are derived from potential earnings by deducting the current investment in human capital formation (foregone earnings) I_t:

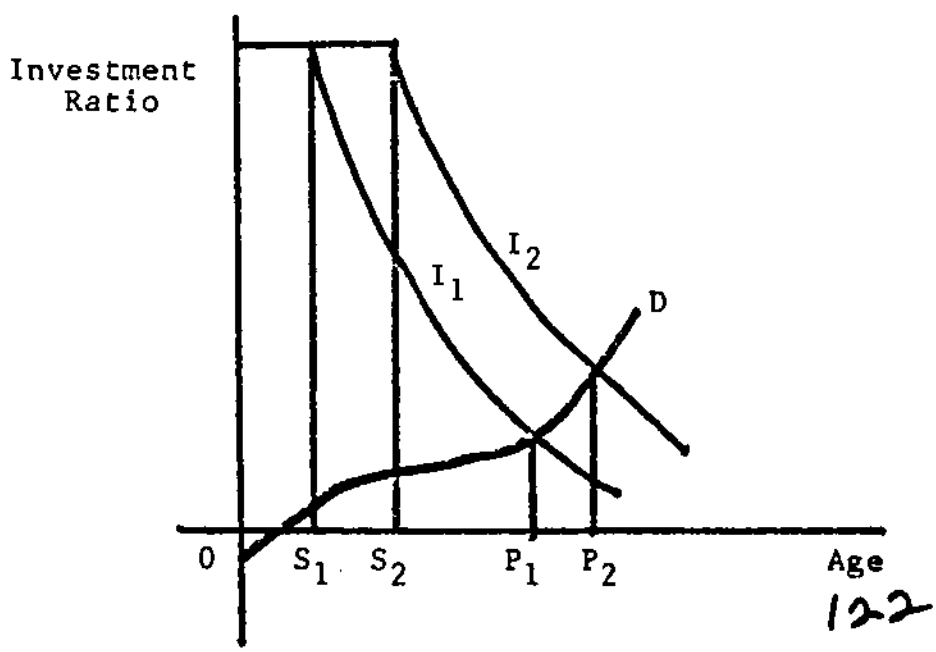
$$E_t = X_t - I_t.$$

And finally, the stock of human capital is derived in the obvious way from past investments:

$$H_t = I_{t-i}$$

where this formula can be modified to allow human capital to depreciate if desired it is assumed that each individual selects the lifetime pattern of I_t which maximizes his lifetime discounted earnings. The implications of depreciation are particularly important in the consideration of pension policy and retirement and are seen in Figure 1.1 (Mincer 1970).

Figure 1.1



In the above figure, I is gross investment in human capital measured as a fraction of obtainable earnings, and D is the fraction by which such earnings are diminished as a result of depreciation. The net investment fraction is k = I-D, at each age. If retirement were compulsory and investment had no effect on non-market productivities, gross investment would terminate at retirement age. Otherwise, as is assumed in the diagram, gross investment remains positive throughout the expected life span. Retirement here can be viewed as endogenous, its timing being related to the decline in earning power, that is to the time at which depreciation outstrips gross investment.

Depreciation is portrayed as a function of age, initially negative (appreciation), rising slowly, and accelerating at later ages. The diagram shows age profiles of investment of two individuals: Assuming the same life span, it is plausible that I_2 is greater than I_1 at each age. Consequently, net investment k_2 is greater than k_1 at each age. The empirical implication is that earnings of the larger investor grow faster, relatively and absolutely, at given ages. An additional implication shown by the diagram is that earnings of the larger investor decline later in life: the more educated retire at a somewhat older age, though they do not necessarily have a longer working life, since it begins after a longer schooling period.

In the diagram, the schooling period S_2 is greater than S_1, and this is an indication that total "time" invested of individual (2) is larger. It does not follow, however, that individuals who have more schooling also spend more "time" in post-school investment. In the special case of parallel investment profiles illustrated in the diagram, the larger investor spends no more "time" in post-school investment than the smaller investor. If the investment ratio of the larger investor declines faster, the smaller investor may experience faster growing earnings in the age interval S_1P_1 before which the post-school investment period P ends, than the larger investor does in the corresponding age interval S_2P_2. But so long as the age-investment profile I_2 is above I_1, dollar investments are larger at each year of experience, hence the dollar experience profile of earnings of the large investor must be steeper.

Empirical evidence does show that earnings of the more educated peak later, grow faster in dollar terms at given years of age as well as at given years of labor force experience, grow also relatively faster (in logs) at given ages, but no faster at given years of experience.

Though the intention of this section is to present the basic income distribution theories and not to evaluate them, it is important to touch on the major criticisms of the human capital model because some of them highlight qualifications of the theory that are useful in using it as a framework for pension policy analysis.

Three objections can be noted: 1) The discounted value maximization behavior is too far fetched. Do individuals really maximize the present value of lifetime earnings at a uniform discount rate? If so, what role do pensions play in this behavior? 2) Human capital theory is a partial and piecemeal theory. The human capital theory has, until very recently, been a supply theory. The demand side has not received due analytical

treatment. Even as a supply theory, it has neglected the labor-leisure choice. Blinder (1974) has developed a model that he considers complimentary to the human capital approach. His model is derived from explicit utility maximization by households in which labor-leisure choices play an important role. Therefore, it treats separately the wage rate and hours of work, rather than dealing with their product, earnings. It also integrates labor incomes and property incomes into a single model of the size distributions of both income and wealth. Blinder's approach fails however to consider educational choices and the distribution of wage rates. Briefly, households maximize the present value of lifetime incomes, which consists of inherited property and life cycle earned (wage) income. Education and material wealth that are theirs at the time individuals start making their own choices are categorized as inherited, under the assumption that up to that time decisions are made by parents. Earned incomes are determined by inherited human wealth, innate abilities, and tastes — all given exogenously. Tastes enter labor-leisure choices, consumption-savings (and bequeathing) decisions, and occupational preferences. As in other conventional human-capital models, the author abstracts from the demand side altogether. The only endogenous variables are the supply of labor hours and savings. All of the following variables of the model are exogenous (and are known to the individual with certainty at the beginning of his or her economic life): the rate of interest, the length of economic life, inherited material wealth and education up to about age 18, implying an exogenously given wage rate at that age, the trend rate of growth of real wage rates, and tastes which are related to neither wealth nor income. There are seven taste parameters assumed as given: subjective time discount, relative weights attached to consumption, leisure and bequests, and the speed of decline of the marginal utilities of consumption, leisure and bequests. The model includes two policy variables, namely, estate taxes and income taxes. The labor-leisure choice variable is important in that it is potentially influenced by pension policy and this version or addition to the human capital model should be considered in any income distributional analysis.

3) Schooling is merely a screening device. Two classes of these theories should be noted. First are the theories that attack mainly schooling. According to these theories, education serves merely as a signaling device for prospective employers, a filter that identifies persons with pertinent attributes labeling some as more productive. Thus, education plays an important role in reinforcing the class structure and income inequalities. Second are the theories that emphasize demand side and are more critical of the on-the-job training aspect than the formal schooling aspect of human capital theory. These are known as dual or segmented labor-market theories. Generalized education may influence the potential productivity of workers, but actual productivity depends on on-the-job experience, which it is alleged is not open to the underdog even with credentials. Many explanations or interpretations of these theories exist including the socialistic version of the theory of "noncompeting groups," according to which high-salaried managers are closed groups and are paid arbitrarily in relation to each other and unrelated to their productivity. A general implication of these kindred theories is that segmented markets weaken competitive constraints and perpetuate inequalities. Pension policy has very different income distributional consequences in the context of a segmented labor market.

Human capital theory and its opposing models and extensions provide a fruitful framework from which to analyze the income distributional components of pension policy. They include measures of many phenomena that are potentially affected by pensions. These include earnings, a measure of labor supply decisions, investment in human capital as opposed to material capital, and returns to such investments taking account of depreciation which is affected by retirement. Analyzing the income distributional implications of pension policy from a human capital point of view would provide entirely different considerations than would analyzing it from a bargaining point of view or power-conflict premise, for example.

Life Cycle Theory

The life cycle theory of income distribution is based on a view of the world that explains earnings inequalities at any point in time as resulting from the fact that life cycle earnings of individuals rise with age and then decline near the retirement age.* Because of inequalities, individuals attempt to smooth consumption over their lifetime by saving for retirement during their working years. Thus, an individual's total wealth increases with age until he begins living off his capital. In this model individuals allocate their consumption over their own lifetime and do not consider other generations.

According to this theory, there is a consumption function of the form:

$$C = a\frac{W}{P} + cY_d$$

Where W/P is real wealth, "a" is the marginal propensity to consume out of wealth, and "c" is the marginal propensity to consume out of disposable income. Consider an individual who expects to live for L years, work and earn income for N years and be in retirement for (L-N) years. Uncertainty about life expectancy or the length of working life is ignored. Also it is assumed that no interest is earned on savings so that current savings translates dollar for dollar into future consumption possibilities. The model can be used to determine individuals' lifetime consumption possibilities and the way the individual will choose to distribute her consumption over her lifetime.

Considering the consumption possibilities, ignore property income and focus attention on labor income. Denote the annual real labor income by Z. Given N years of working, lifetime income (from labor) is ZN, income per working years times the number of working years. Consumption over the individual's lifetime cannot exceed this lifetime income unless he or she is born with wealth which we assume is not the case.

---

* In terms of explaining life cycle income inequalities there are two schools of thought. One is the human capital school, according to which schooling and on-the-job training, rather than age or sheer experience, account for the observed life cycle inequalities. The rival school consists of family-environmentalists, according to whom materation and automatic on-the-job learning explain much of the variations of incomes during one's life, and ultra-conservative economists, according to whom such factors as abilities and the propensities to saving and work interact multiplicatively over age to cause the inequalities.

Assume that the individuals will want to distribute their consumption over their lifetime so that they have a flat or even flow of consumption. Rather than consuming a large quantity in one period and very little in another, the preferred profile is to consume exactly equal amounts in each period. Thus, consumption is geared to lifetime income.

Lifetime consumption equals lifetime income. This means that the planned level of consumption C, which is the same in every period, times the number of years in life L equals lifetime income:

$$CL = ZN$$

Dividing through by L we have planned consumption per year, C, that is proportional to labor income:

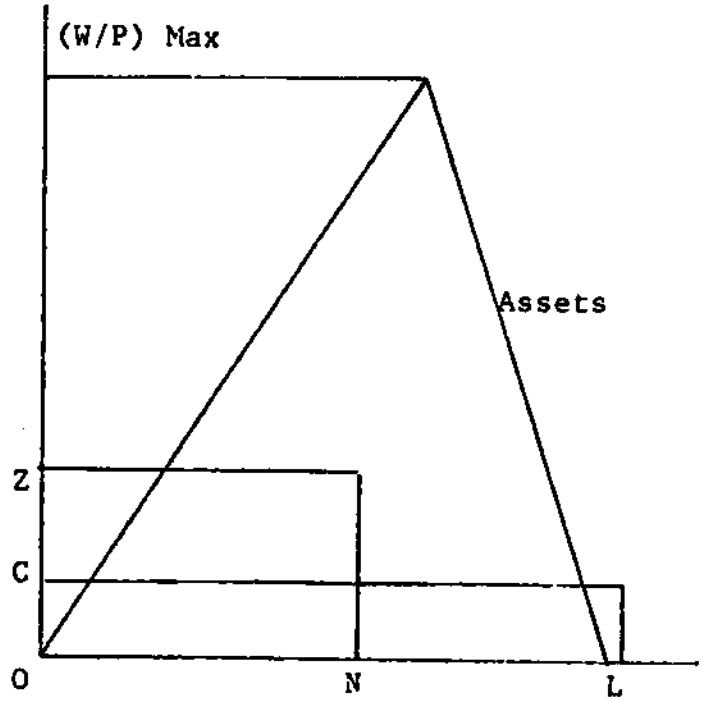
$$C = \frac{N}{L} Z$$

Given that N/L is the fraction of lifetime spent working, each year of life a fraction of labor income is consumed, where that fraction is equal to the proportion of working life in total life. The counterpart of the above equation is the saving function. Since saving is equal to income less consumption, we have

$$S = Z - C = \frac{Z\,(L-N)}{L}$$

This states that saving during the period in which the individual works is equal to a fraction of labor income, where that fraction is equal to the proportion of life spent in retirement. This can be seen in Figure 1.2 developed by Modigliani (1966) which describes the pattern of consumption, saving and dissaving.

Figure 1.2



Over the whole lifetime, there is an even flow of consumption at the rate of C amounting to CL. That consumption spending is financed during working life out of current income. During retirement the consumption is financed by drawing down the savings that have been accumulated during working life. Therefore, the shaded areas (Z-C)N and C(L-N) are equal, or equivalently savings during working years finances dissaving during retirement. The important idea of lifetime consumption theory is apparent from the figure. It is that consumption plans are made so as to achieve a smooth or even level of consumption by savings during periods of high income and dissaving during periods of low income.

Thus, during the working years the individual saves to finance consumption during retirement. The savings build up assets, the figure accordingly shows how the individual's wealth or assets increase over working life and reach a maximum at retirement age. From that time on assets decline because we assume the individual sells assets to pay for current consumption. Consumption during retirement is equal to C(L-N). Further, since consumption is equal to C = ZN/L, the maximum stock of assets is (W/P) max = ZN(L-N)L, which is reached exactly at the point of retirement. From then on assets decline until they reach precisely zero at the end of life. Wealth and earnings from wealth can be incorporated into this basic model in a straight-forward way, basically using them as a source of finance for lifetime consumption. The income distributional impact of pension policy with regard to the timing of lifetime consumption given this framework must definitely be considered.

A model developed by Feldstein (1976) extends the life cycle theory by making the period of retirement endogenous. A general formulation of this model has the individual choose both labor supply and consumption in each year of his life. A restricted specification, more in the spirit of the original life cycle model, would define a preretirement period during which the individual's labor supply is fixed and a "retirement period" during which the individual can vary his labor supply. The individual's preretirement consumption and savings and his "retirement period" labor supply would then be optimized together. In this extended life cycle model, the change in any endogenous variable has two separate effects on saving: first, it changes savings directly as it would in the traditional life cycle model and second, by changing retirement, it alters savings indirectly.

Thus, given that pensions and pension policy potentially affect savings behavior and work effort, the life cycle framework is important to consider in evaluating the income distributional effects of pension policy.

Intergenerational Transfer Theory

This theory is based on the existence of implicit support agreements across different generations of the same family. According to the "rational expectations" school that subscribes to the intergenerational dependence theory, the behavior of each family member is based on an implicit contract between himself and all future, nonexistent members of the same family. These contracts include transfers in the form of parental expenditures on children's education, bequests, etc. They also include

transfers in the opposite direction, either cash or in-kind, from children to parents — that is, the use of children's earnings to finance retirement consumption. This view of the world is particularly relevant to the analysis of the income distributional effects of pension policy in that the introduction of social security could result in offsetting adjustments to private transfers (i.e., reductions in transfers from children to parents or increases in bequests). This effect is not a consideration in the life cycle model advocated by Feldstein.

The basic conceptual framework of this theory is similar to the consumption loan model of Samuelson (1958), with some of its assumptions modified. Each family member of every generation has a working period and a retirement period. A member of generation t earns Y_t during his working years and 0 during retirement. His consumption vector is (C_{Wt}, C_{Rt}) where C_{Wt} is consumption during the working years and C_{Rt} is the consumption during retirement.

Let B_t be the bequest that a member of generation t receives. Although it may look as if the member has "consumable" wealth of (Y_t+B^*_t), this is not the case. This conclusion follows from the underlying assumption that, although a member of t can allocate his consumption between (C_{Wt}, C_{Rt}) as he may wish, he follows an intergenerational contract according to which he will pass a bequest B^*_t+1 to the next generation. Thus, a member of t selects (C_{Wt}, C_{Rt}) which maximizes his utility function

$$U\,(C_{Wt},\, C_{Rt})$$

subject to the budget constraint

$$Y_t + B_t^* - \frac{1}{1-r} B^*_{ttl} = C_{wt} + \frac{1}{1+r} C_{Rt}$$

$$Y_t + B^*_t \; \overline{1}\frac{-1}{1-r} B^*_t + 1 = C_w t + \overline{1}\frac{+1}{1+r} C_{Rt}$$

Y_t = Income of generation t

B^*_t = The bequest which a member of generation t receives.

The variables B^*_t and B^*_{t+1} are denoted with the (*) to indicate that these are equilibrium functions (strategies) in an unspecified intergenerational game.

A complete model of intergenerational transfer is needed to determine the functions B^*_t as is a household decision model. Without going into these models it should be noted that at time t-1, the future is not known and thus both Y_t and all future Y_t and ^{T} t, are random variables. Thus, without specifying the complete model, the basic hypothesis of this theory is:

B^*_{t+1} depends upon B^*_t, Y_t, and the stream of all expected

future values of $(Y_{T+1}, Y_{t+2}, \ldots)$

This hypothesis means that B^*_{t+1} may be positive or negative. If $B^*_{t+1} < 0$, then during his retirement age, the member of generation t is supported by his children who are working at that time. If $B^*_{t+1} > 0$ then the member of t will leave a positive bequest to his children. However, note that in making this choice he will consider the expectation of the entire stream $(Y_{t+1}, Y_{t+2}, \ldots)$.

At any moment of time t there are many families with different values of B_{tj}, J=1, 2, ..., N where N is the number of families at t. The distribution of B^*_{tj} is interesting. Clearly, since private capital is transferred forward from generation to generation, the mean value of B^*_{tj} is positive. However, due to the underlying random process determining its distribution, B_{tj} contains a few large positive values, while the bulk of the values of B^*_{tj} are negative. This is particularly true when the expected value of Y_t rises with time.

Thus, in an economic environment in which the expected value of Y_t rises with time, one would expect that a private structure of intergenerational transfers will induce an outcome in which a large fraction of older people will be supported by their children, while a small fraction will have large enough assets to leave positive bequests. Moreover, it appears that the distribution of private wealth is so skewed that most of it is transferred forward within a small number of families, while the vast majority would have exhibited no bequest or negative bequests in the absence of public intergenerational transfer payments. This intergenerational transfer view of the world has strong implications with regard to the income distributional impact of pension policy. Such policy has a potentially large impact on these transfers.

The intergenerational theory is complimentary to the theory that inheritance is a major cause of income inequality. This theory should be considered in the historical context of the Cambridge (U.K.) theory of functional distribution. Empirical results using this analytic framework show that factor shares do not necessarily correspond with rich and poor classes, investment is not entirely financed out of capitalists' savings, a significant interclass mobility is in evidence and property ownership of homes, cars, household durables, pension and other social security funds and similar assets. Yet, inherited wealth remains a significant factor of income inequalities. Mead (1976 pp. 175-76) states: "The greater ability of the rich to save a higher proportion of their income and to obtain a high yield on what property they do save ... causes great inequalities in capital accumulation. There can be little doubt that these two factors are important contributory causes of the phenomenon of the much greater inequalities in property and incomes from property than in earnings." Support for the importance of inheritance is found in the random-walk model of the distribution of wealth of Thurow (1975). According to this model, most large fortunes are built up, not by a patient process of earning and investing, but by instantaneous fortunes due to chance and luck. Persistent disequilibria in the real capital markets are capitalized into

equilibrium in the financial markets, which is subject to a lottery-like process. But once fortunes are created in the random-walk they are subject to a kind of ratchet effect, so that they are managed by diversification, etc., to earn at least the market rate of return, resulting in highly skewed distributions.

Because property income is a significant component of personal income and because it is more unequally distributed than earnings, inheritance factors deserve a place in any generalized theory of distribution. They provide a useful framework in which to consider the effects of pension policy on income distribution for many reasons including the possibility that it decreases the inequality in income due to capital ownership by expanding that ownership. It could also influence the distribution of capital bequests and individuals' behavior with regard to intergenerational transfers of wealth.

More Complete Theories

The individual theories presented above are all piecemeal in that they consider only certain factors and aspects of behavior. They do, however, serve to highlight all of the variables that must be considered in analyzing the income distributional effects of any pension policy. The advocates of all schools agree on the need for endogenizing variables of the others into their theories.

A few studies have appeared that combine two or more of the existing piecemeal theories of personal income distribution in a single synthetic model. These include Becker's (1967) supply-demand model of human investment that relies fundamentally upon the twin analytical techniques of economic theory: an optimizing behavior and the determination of equilibrium. The model is formalized to incorporate various forces determining the distribution, the shapes, and the elasticities of the supply and demand curves of human investment. The interdependence of supply and demand schedules is aptly brought out as one of the crucial sources of earnings inequalities.

Also, major work in simultaneous-equations modeling of income inequalities and in the endogenization of education, ability and earnings in a human-capital framework is being done by Griliches (1977).

Among the most comprehensive of the existing synthetic models that do not use the human capital approach, is that by Stiglitz (1969), who integrates the distribution of income among factors with that among individuals. By dividing income into its major source, wages and profits, Stiglitz examines the distributional impacts of nonlinear saving functions, heterogeneity of labor supply, material-capital inheritance policies, variable reproduction rates of different income classes, tax policies, and the stochastic elements in the accumulation process. However he ignores human capital for all practical purposes, does not analyze why and how labor productivity becomes heterogeneous, and does not include intergenerational patterns of the transmission of wealth.

As theories of income distribution become more complete, they will combine a larger number of the elements of the individual theories. Until a complete theory is developed and supported empirically, we must accept the piecemeal approach to distribution theory and use it accordingly. This involves acknowledging the point of view from which each theory derives when using it analytically and showing alternative analyses derived from other theories.

The above description of the theories that attempt to explain the economic and behavioral factors that interact to distribute the income in our society is intended to establish a framework for considering the distributional consequences of pension policy. Though no one theory is empirically proven to be more accurate than any other, regarding all of them together as a joint framework insures that all of the potential consequences are considered.

An analysis of the potential effects of pension policy in this broad framework allows the distributional implications of policy to be considered in the static and dynamic sense and in the short run and long run. The analysis of the distributional impacts of various pension policies depends on the analyst's view of the world as to which variables are important to consider and the mechanisms by which they work. Given a certain viewpoint, however, only the potential effects of policy can be determined. This is because in most cases the effect of policy on the behavioral and economic variables which the theories incorporate has not been determined.