AN ECONOMIST'S APPROACH TO

# REFORMING THE UNIFORM METHODOLOGY

By Gary T. Barnes

I. INTRODUCTION

In Spring 1975, the publication of The Draft Final Report of the National Task Force on Student Aid Problems [4, 1975] marked the formal adoption of a standardized approach to estimating the expected parental contribution for dependent students. The standardized approach, formerly known as the Uniform Methodology (UM), was a compromise version of the need analysis models formerly used by the American College Testing Program and the College Scholarship Service. While the new approach is not yet carved in stone, it comes quite close to being a genuine consensus approach.

The purpose of this paper is to evaluate the UM model from an economist's perspective. It is shown that the UM model, like earlier models, fails to treat assets and income in a consistent manner. As a consequence, the current UM model contains hidden inequities that undermine its effectiveness. The UM model as it now stands favors parents who are homeowners, well educated, widowed or divorced and who own wealth in forms other than stocks, bonds, bank accounts or real estate.

To support this claim, and to justify the recommendation of a new approach to need analysis (called an annuity income approach), it is necessary to review the theoretical link between income and wealth. The paper begins with this undertaking. It concludes with four recommendations for improving the UM model. All four recommendations can be implemented immediately and do not require the collection or analysis of additional data. The paper is a condensation of a more comprehensive review of the UM approach conducted for the American College Testing Program [1, 1976, forthcoming].
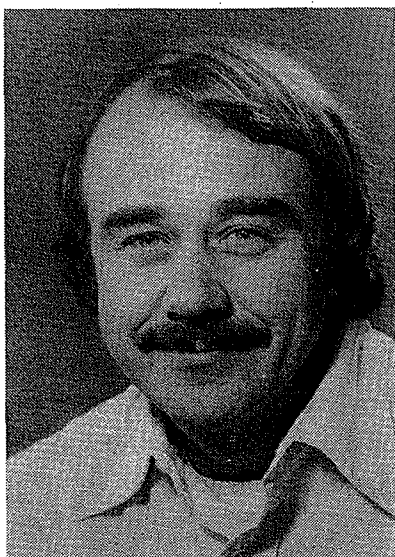
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Stocks vs. Flows

Economists generally use one of two alternative approaches when measuring ability to pay. One approach is to determine the market value of an individual's wealth. This value represents the individual's total command over goods and services in the market place at a particular point in time. Such a measure is called a stock.

Another approach to measuring ability to pay is to sum all sources of income for an individual over a period of time. This value represents the change in the individual's total command over goods and services in the marketplace over that same period of time. Such a measure is called a flow.

The approaches are not mutually exclusive because the flow of income during a particular time period is equal to the change in the value of one's wealth (the stock) over that same period. The change in value may take the form of a capital gain (or loss) or of direct cash payments to the owner(s) of wealth or both. Income is increased even when capital gains are not actually realized through the sale of assets because the purchasing power of the wealth-holder is increased by the amount of the capital gain. Thus, an individual's total income during a particular time period is equal to the sum of capital gain (or losses) and direct payments earned on assets in his portfolio.

The relationship between income and wealth is subject to two important generalizations. First, all income payments — whether in the form of wages and salaries, interest, dividends, rents, profits, alimony, insurance payments, or transfer payments from government — can be viewed as a return to some form of wealth. Conversely, all wealth — whether in the form of tangible or intangible assets — yields income. Second, in the long run, the amount of income yielded per dollar of wealth will tend to be the same regardless of the form in which wealth is held.

The First Generalization

The validity of the first generalization may be demonstrated by referring to Table 1. In this table a list of 14 types of income received by households is presented in the first column. Opposite each income item (in the second column) is the wealth item which yielded the type of income described in the first column. The list of income and assets is more exhaustive than that used on the UM's current measure of ability to pay. A brief discussion of the income and asset items in Table 1 may be helpful to readers who are unfamiliar with this approach.

Item 1 refers to all labor income, whether it is in the form of wages, salaries, overtime payments, fringe benefits or tips. All labor income may be viewed as a return to a form of wealth which economists call human capital. Human capital is the value of an individual's past investments in his education, health care, job search, on-the-job training, and in any other activities that affect labor productivity. The value of human capital must be estimated because no market for its exchange exists. (Such a market would require resurrecting the institution of slavery.) The estimated value of human capital is given by the dis-

counted present value of an individual's expected earnings over his working life.[1] Conceptually, the present value of lifetime earnings is equal to the amount that an individual could receive now if he sold to another an entitlement to receive all of his future labor income.

TABLE 1

Flow and Stock Measures of Total Resources

FLOW (Income)	STOCK (Assets)
1. Wages, salaries, tips, other employee compensation	1. Present value of lifetime earnings
2. Interest income plus capital gains	2. Market value of credit instruments such as savings accounts, notes, bonds, CD's, mortgages, etc.
3. Dividends plus capital gains	3. Market value of stocks, mutual funds, warrants, options, futures, etc.
4. Profits from farm or business plus capital gains	4. Equity in farm or business
5. Net rental income from real estate holdings plus capital gains	5. Market value of real estate holdings
6. Royalties plus capital gains	6. Market value of patents, copyrights, oil leases, etc.
7. Income from life insurance, annuities, and estates	7. Present value of income from life insurance, annuities, and estates
8. Alimony and child support	8. Present value of current and future alimony and child support payments
9. Transfer payments from government, business, private sector	9. Present value of transfer payments from government, business, private sector
10. Interest and dividends paid on the cash value of whole life insurance, endowment, and retirement policies, pension funds, and annuities	10. Cash value on whole life insurance, endowment, and retirement policies, pension funds, and annuities
11. Earnings on trust fund assets plus capital gains	11. Market value of trust fund assets
12. Income and capital gains from other assets	12. Market value of jewels, gold, silver, other precious metals, gems, rare collections, works of art, club membership stocks, antiques, etc.
13. Imputed value of owner-occupied housing	13. Home equity
14. Imputed value of services from consumer durables	14. Equity value of consumer durable goods

Items 2, 3, 4, 5, and 6 are famiiar to financial aid administrators. Capital gains on these assets represent the yearly change in their value whether or not these gains (or losses) are actually realized.

The assets which provide income under items 7, 8, and 9 are not actually traded on any organized market yet they are forms of wealth with unique present values. For example, consider a widow who is entitled to receive $1,000/year until her 18 year old child reaches the age of 22 and then a lump sum payment of $10,000. These payments could be the combined result of life insurance and social security benefits. The stream of payments which the widow

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1 The method and rationale for estimating lifetime earnings and calculating their discounted present value is discussed fully in [2, 1971]. The procedure is too involved to be reviewed in this paper.

receives represents her legal entitlement to such funds under the terms set forth in the life insurance policy of the deceased husband and in the existing social security regulations and statutes. The market value of her entitlement to the stream of payments in question is the same as the market value of a riskless bond paying $1000 per year for four years and then $10,000 at the end of the fourth year when it matures.

An entitlement to receive payments in the future from sources such as life insurance, an annuity, an estate, a divorce agreement providing for the payment of alimony and child support, or from some government program is a form of wealth which is similar to a bond. Both forms of wealth are contractual entitlements with a finite life. There are, however, important differences between these two forms of wealth.

Bonds have clearly stated maturities; the time when income payments from sources 7, 8, and 9 will stop is not always known. Bonds generally pay a fixed amount over the life of the bond; income payments from sources 7, 8, and 9 may vary in frequency and amount. Bonds may be legally traded; entitlements providing income in the form of 7, 8, and 9 may not be traded.

Despite these differences, any entitlement to future income payments can be converted to a single value in exactly the same way that future labor income can be converted to a single value. This value represents the payment that one would receive if he or she were able to transfer title to the stream of income payments in items 7, 8, and 9. These values are given by asset items 7, 8, and 9.

Income and asset items 10, 11, and 12 are self-explanatory. In the case of items 11 and 12, unrealized capital gains are often important.

Houses, cars, appliances, furnishings and other consumer durables are assets (items 13 and 14) which yield a flow of services to their owners. If these consumer durables were rented out by the owners to other users, their services would command a dollar payment in the marketplace. The rental value of these services from consumer durables is used to impute a value to income from wealth held in the form of consumer durables. In cases where some indebtedness against consumer durables is outstanding, the imputed income is given by the rental value of the equity in the consumer durables. Therefore, in the case of asset items 13 and 14, the income flows are given by imputed values based on the owner's equity in his house and other consumer durables.

The purpose of the preceding discussion of the income and asset items in Table 1 has been to establish the validity of the first generalization about the relationship between income and wealth; namely, that all income may be viewed as a return to some form of wealth, and all wealth may be viewed as the source of some type of income. We now turn to a discussion of the second generalization about the relationship between income and wealth; namely, that in the long run the amount of income yielded per dollar of wealth tends to be the same regardless of the form in which wealth is held.

The Second Generalization

To establish the validity of this generalization it is useful to ask why an individual would choose to hold wealth in a form which did not carry the highest possible yield. The answer is that he would do so only if he were compensated for accepting a lower yield or penalized for claiming the higher yield. For ex-

ample, an individual will choose a municipal bond yielding 5 percent over a corporate bond (of equal maturity and risk) yielding 9 percent if the value of the tax exemption on municipal bond interest payments is enough to raise the after-tax yield on the municipal bond to 9 percent or more. Similarly, an individual will choose a 90-day treasury bill paying 5 percent over a corporate bond paying 9 percent if the cost of the reduced liquidity and increased risk of the corporate bond is enough to lower the true yield of the corporate bond to 5 percent or less. In general, differences in the nominal yields on wealth are due to differences in tax treatment, liquidity, risk, term to maturity, negotiability, or marketability of assets. The "true" yields should be equal.

To see this imagine that an individual could choose between two forms of wealth with identical characteristics but different yields. Suppose asset A cost $1000 and paid 50 dollars per year and asset B cost $1000 and paid 100 dollars per year. Such a situation would be untenable because wealth holders would attempt to sell asset A and buy asset B. This would continue until the price of A had fallen enough, and the price of B had risen enough to equalize the yields on A and B. The final prices for A and B might be $625 and $1250, respectively. Their common yields would be 8 percent (i.e., $50/625=100/1250=.08$).

This example suggests that when yields on nearly identical assets get out of line in the short run, their prices will adjust to reestablish equality of yield. Thus, changes in yields are reflected in the market values of wealth, and changes in the market values of wealth insure that the "true" or adjusted yield on wealth is the same regardless of the form in which wealth is held. This demonstrates the validity of the second generalization.

III. THE PROPER MEASURE OF PARENTS' ABILITY TO PAY
The Income-Wealth Equation

The discussion of the relationship between income and wealth may be summarized by the following equation:

1) $Y_i = R \bullet W_i \qquad i = 1, 2, \ldots 14$

Equation 1 states that the "true" or long run income, Y_i, derived from holding wealth in the form of asset i, W_i, is given by the product of the common rate of return on wealth, r, and W_i. Y_i is the income that would result if wealth in the form of asset i were maintained at it's present level. The rate of return, r, is generally taken to be the rate on long term, fully taxable, negotiable, marketable, government bonds or top-rated corporate bonds.

Annuity Income

Equation 1 suggests that a proper measure of parents' ability to pay would either be total wealth or total long run income, but not both. A measure which included both would be redundant and clumsy. It would be equivalent to measuring distance in both feet and inches.

In need analysis, there is an attempt to measure parents' ability to pay over the long run. This approach is implicit in the use of net assets in the UM's measure of ability to pay because net assets represents stored purchasing power to be used in the future. The use of a retirement allowance suggests that the time period involved in measuring parents' ability to pay is their remaining lifetime. It seems reasonable, therefore, to assume that any measure of ability

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to pay should be based on the assumption that parents will consume their wealth over their lifetime.

A simple measure which embodies this assumption is one called annunity income.[2] Annuity income is the constant income that parents' would receive each year (for n years) if they sold all of their wealth today and bought an annuity. Let A_n be the n period annuity income per dollar of wealth sold. Then annuity income from selling wealth held in form i is given by:

2) $Y_i = A_n \bullet W_i$ $i = 1, 2, \ldots, 14$

In equation 2, A_n is greater than r because it includes some consumed wealth in addition to the rate of return on wealth. The exact value of A_n varies inversely with n and directly with r. It is given by the expression: [3]

3) $A_n = r [1-(1+r)^{-n}]^{-1}$

In terms of the concepts of need analysis, A_n may be viewed as the analogue of the asset conversion rate now used by the UM to convert Net Available Assets to an income supplement. A_n is different from the asset conversion rate in that it varies among families depending upon the expected remaining life-time of the primary earner. This means that younger parents would have a dollar of Net Available Assets converted to an income flow at a lower rate than would older parents. This is a consequence of our assumption that wealth is to be viewed as stored-up purchasing power to be used in later years.

Table 2 presents illustrative values for A_n for different combinations of values of n and r. The majority of parents with college age children are probably between the ages of 35 and 55 when their children go to college. If their average expected lifespan is 70 years, then n would vary between 15 and 35 years. For rates of return between 7.5 and 9.5 percent, Table 2 shows that A_n would range

TABLE 2
Illustrative Values for A_n

		n (Years)		
		15	25	35
	7.5	.1133	.0897	.0815
r (%)	8.5	.1204	.0977	.0902
	9.5	.1277	.1059	.0992

between 8 and 13 percent. For most families, A_n would be lower than the current asset conversion rate. Thus, everything else equal, their expected contribution from assets would fall below its present level if the asset conversion rate were set equal to A_n.

IV. COMPARISON OF THE UM APPROVED AND THE ANNUITY INCOME APPROACH

The UM's measure of parents' ability to pay includes the actual income of parents adjusted for non-discretionary expenditures and an income supple-

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[2] This approach was first recommended in [4, 1968].
[3] The derivation of equation 3 is given in [2, 1974, p. 24].

ment from wealth. The income supplement is the product of the asset conversion rate and Net Available Assets. The sum of these two income measures yields the financial base from which the expected parental contribution is calculated.

The annuity income approach is superior to this approach because it is easier to administer, more comprehensive, more stable and more equitable. It is easier to administer because it does not require data on both actual income and the market value of wealth. It requires data on actual income only when the market value of some form of wealth must be estimated. This happens in case of asset items 1, 7, 8, and 9, in Table 1. Otherwise, data on actual income are not needed.

The annuity income approach is more comprehensive than the UM approach because it reflects realized and unrealized capital gains for the measurement year, whether or not an asset is actually sold. The actual income data now used in the UM measure includes realized gains only. These gains may cover a period longer or shorter than the one year period involved in measuring parents' current ability to pay. Thus, the true capital gain during the year may be overstated or understated even when data on realized capital gains are available.

The annuity income approach is more stable than the UM approach because annuity income is inherently less volatile than actual income. Actual income is subject to random, cyclical and seasonal variation not present in the annuity income measure.

Finally, the annuity income approach is more equitable than the UM approach because it treats all forms of wealth the same; something the UM approach fails to do. To see this, refer to Table 3. In it the 14 forms of wealth listed in Table 1 are sorted into 5 groups according to the way they are represented in the UM's measure of ability to pay. For example, it shows that wealth item #10 — the cash value of whole life insurance, endowment and retirement policies, pension funds and annuities — is not included in the UM measure. Similarly, it shows that wealth item #2 — the market value of credit instruments — is represented in the form of actual interest income from these assets *and* in the form of the income supplement from these assets.

Wealth held in the form of equity in a farm or business is included in the form of the actual net income of the farm and business and in the form of a subnormal income supplement. It is subnormal because a fraction of farm and busi-

TABLE 3

The Status of 14 Wealth Items in the UM's
Measure of Ability to Pay

Group	Wealth Items	How Represented in the UM Measure
1	10, 11, 12, 14	Not included
2	1, 6, 7, 8, 9	Included as actual income only
3	13	Included as income supplement only
4	4	Included as actual income plus a fraction of normal income supplement
5	2, 3, 5	Included as actual income *and* as an income supplement

ness assets is exempted from coverage. The fraction decreases as the value of farm and business increases. This preferential treatment of farm and business assets is not justifiable in terms of purely economic conditions.

The fact that a dollar of wealth is treated differently depending upon its form means that parents with equal total wealth, but different compositions of wealth, will be treated differently. This violates the principal of horizontal equity espoused by all need analysis models.

If need analysis is viewed as a system for taxing parental wealth, then Table 3 suggests that the implicit tax rate on wealth increases as one moves from group 1 to group 5. In concrete terms this means, for example, that parents who hold most of their wealth in the form of credit instruments, savings and checking accounts, stocks, mutual funds, or real estate (asset items 2, 3, and 5) are the *least* favored of all applicants in the need analysis process. Next on the list of the least favored are those holding most of their wealth in the form of equity in a farm or business. Homeowners are favored over renters. Parents having substantial wealth in the form of human capital, e.g., well-educated professionals and managers, are favored over parents holding most of their wealth in other forms. In the most favored group are those who hold wealth in the form of asset items 10, 11, 12, and 14 because these assets escape taxation altogether. Finally, widows who hold wealth in the form of assets 7 and 9, and divored parents who hold wealth in the form of asset item 8 are favored over those who hold wealth included in groups 4 and 5.

We conclude that the UM model for measuring parents' ability to pay deviates substantially from the model recommended by economic theory. We turn now to a consideration of changes in the UM model which would move it closer to the annuity income model.

V. REFORMING THE UM's MEASURE OF ABILITY TO PAY

In order to implement an annuity income measure of ability to pay, it would be necessary to estimate the value of wealth held in the form of asset items 1, 6, 7, 8, 9, 10, 11, 12 and 14 and to respecify the asset conversion rate along the lines discussed earlier. In addition, it would be necessary to drop actual income from the measure of ability to pay and to include farm and business assets at their full value. An overhaul of this dimension is not, however, likely to occur now or in the immediate future, because new data would be required and because political pressures would resist such major changes.

In the short term, the UM model can be modified to improve equity by implementing the following changes:

1. Use an asset conversion rate given by A_n.
2. Include equity in farm and business at its full market value.
3. Exclude all actual income except labor income from the measure of ability to pay.
4. Impute labor income for farmers and businessmen.

The first recommendation would require that each need analysis service estimate n for each family and r for each processing year. The value of n could be determined with a high degree of actuarial precision or it could be approxi-

mated by some average value which could be assumed to apply to all parents. The choice will depend upon political and administrative constraints facing the need analysis processors. The value of r should be set equal to the rate of return on long-term federal government bonds. This rate is fairly stable, generally ranging between 7 and 8 percent.

The second recommendation reflects the fact that income from a dollar of wealth held in the form of farm or business equity is no different in quantity or quality from income from a dollar of wealth held in any other form. It should not be given special treatment.

The third recommendation eliminates the double taxation of wealth held in the form of asset items 2, 3, 4, and 5. However, this recommendation creates one problem. The problem arises because profits from farm and business often include income from wealth held in the form of land, buildings and equipment *and* income from human capital. This is because most farmers and businessmen do not pay themselves salaries that reflect the true value of their labor. Since annuity income from the equity in the farm or business only reflects income from land, buildings and equipment, it is necessary to estimate labor income. This is the reason for the fourth recommendation.

To impute labor income for farmers and businessmen, it is necessary to subtract the income from the owner's share of the physical capital of the farm or business from his total income from the farm or business (which includes his labor income). The income from his share in the business could be estimated as the product of the rate of return on top-rated corporate bonds and the value of the owner's equity in the farm and business. In the event that the imputed labor income is too low, it should be replaced by a minimum labor income given by the product of the minimum wage and the length (in hours) of the average work year.

These recommended reforms are desirable but incomplete. Only when the UM model has been restructured to include all forms of wealth listed in Table 1 will it be complete and equitable. For readers who have been engaged in the construction or modification of need analysis models, they will recognize that this recommendation has been made before. It was known as the PVTR approach.[4]

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[4] See [1, 1971].

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