monthly review

FEDERAL RESERVE BANK OF KANSAS CITY

The Elementary Microeconomics Of Private Employee Benefits

By Dan M. Bechter

Employee benefit plans have achieved significant success and growth, as documented in several recent studies.' The number of workers and dependents covered by such plans has grown dramatically over the years, as have the types and amounts of benefits provided to the average worker. Employee benefits now account for a sizable share of compensation, challenging direct wages and salaries in importance in some types of employment. Paying wages in kind, rather than in money, is a trend with no apparent end.

What explains the rising popularity of employee benefits? How does this trend affect the economy through its impact on wage structure and labor mobility? This article explores these and related questions, following a review of developments in employee benefit plans.

EMPLOYEE BENEFITS OVER THE YEARS

Nonmonetary payment is obviously nothing new; barter has a longer history than does money. But, by the time the American economy had evolved to its industrialized state of 50 years ago, money wages had relegated wages in kind to fringe importance in most occupations. The major exception was in agriculture, where the employing farmer often provided his hired hands with board and room (a practice that prevails today).

In 1948, the Chamber of Commerce of the United States surveyed a cross section of American industry in order to estimate the "nonwage" labor costs of doing business in 1947. Among the findings:

> **Wages paid for time worked understate the direct labor costs of doing business by a significant amount. There has been a tremendous growth in the importance of nonwage labor costs in the past twenty years. The average nonwage payments of the companies in the national survey represent an addition to the labor costs of doing business equal to 15.4 per cent of the total wage bill.[2]**

In its latest report on employee benefits, published some 26 years after the first in the series, the national Chamber calculates that benefit payments add to labor costs by an average of 37.5 per cent of wages paid for time worked in the companies it surveyed. About 14.6 percentage points of this is part of payroll in the form of wages paid for time off (paid vacations, holidays, rest periods); the remaining 22.9 percentage points is outside of payroll in the form of employer contributions for social insurance, company benefit plans, and miscellaneous employee benefits. This nonpayroll category is one-sixth of total *compen-*

1/For example, see *Employee Benefits,* 1973 (Chamber of Commerce of the United States, 1974); Mitchell Meyer and Harland Fox, *Profile of Employee Benefits* (The Conference Board, 1974); and Walter W. Kolodrubetz, "Employee Benefit Plans, 1972," *Social Security Bulletin.* May 1974, pp, 15-21.

2/*The* Hidden *Payroll* (Washington: Chamber of Commerce of the United States, 1949). p. 5.

Table 1
EMPLOYEE COMPENSATION BY TYPE, 1929-73
(Per Cent of Total)

Type of Compensation	Companies Surveyed				Estimates-U.S.A.		
	221 in 1947	742 in 1973	The Same 155		1929	1953	1973
			1953	1973			
Total Compensation	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Payroll	92.4	83.3	89.1	82.2	98.7	93.0	86.7
Pay for time at work	88.3	75.7	82.6	72.9	98.0	87.7	79.3
Working time	86.7	72.8	80.8	70.2	97.0	85.6	76.2
Paid rest periods, lunch periods, etc.	1.6	2.9	1.8	2.7	1.0	2.1	3.1
Pay for time not at work — vacations, civic and personal leave, sick leave, etc.	4.1	7.7	6.6	9.3	0.7	5.3	7.4
Nonpayroll Employer Expenditures	7.6	16.7	10.9	17.8	1.3	7.0	13.3
Legally required social insurance	2.8	6.3	2.5	5.5	0.8	3.0	7.0
Private pension, health plans, life insurance, death benefits, severance pay, discounts on goods and services purchased from the company, etc.	3.9	8.7	6.6	10.7	0.4	3.0	5.5
Other items: profit sharing, special bonuses, thrift plan contributions, tuition refunds, etc.	1.0	1.7	1.8	1.6	0.1	1.0	0.9
Employee benefits by one definition: Total compensation minus paid working time	13.3	27.2	19.2	29.8	3.0	14.4	23.8

SOURCE: Chamber of Commerce of the United States.

sation, a more comprehensive measure of true wages that includes nonpayroll benefits as well as payroll (Table **1**).[3]

The national Chamber's estimates of employee benefit payments in the country as a whole in **1973** closely agree with those calculated from compensation statistics for the private nonfarm economy in **1972**, reported by the U.S. Bureau of Labor Statistics (Table 2). Most of the discrepancy between the two bottom-line percentages is due to the inclusion of coffee breaks, etc., in the larger figure. Were it available, the **1972** percentage for the economy as a whole would be somewhat less than for the private nonfarm economy, since this category excludes government (Federal, state, and local) employment, where supplements to wages and salaries are estimated to be slightly less than average, and agricultural employment, where such benefits are estimated to be substantially less than average.

Both tables show how benefits have grown as a percentage of compensation, indicating that benefits have been increasing faster than wages and salaries. While most types of benefits have grown in absolute terms along with wages and salaries, growth in relative importance is concentrated largely in paid leave time, and in employer contributions for legally required social insurance and for voluntary employee benefit plans.

According to a study by the Conference Board, "time off with pay has increased for all classes

3/*Employee Benefits, 1973*, p. 26.

Table 2
EMPLOYEE COMPENSATION BY TYPE, 1966 and 1972
(Per Cent of Total)

Type of Compensation	Private Nonfarm Industries	
	1966	1972
Total Compensation	100.0	100.0
Payroll	88.8	86.8
Pay for time at work	83.0	80.5
Straight-time pay	80.6	78.5
Premium pay (overtime, weekend, holiday work, and shift differentials)	2.4	2.0
Pay for time not at work (vacations, holidays, civic and personal leave, sick leave, etc.)	5.8	6.3
Nonpayroll Employer Expenditures	11.2	13.2
Legally required social insurance	5.2	5.5
Private retirement and health benefit programs (except sick leave), severance pay, supplemental unemployment benefit funds	4.7	6.5
Nonproduction bonuses, savings and thrift plans	1.3	1.2
Employee benefits by another definition: Total compensation minus pay for time at work	17.0	19.5

SOURCE: Employee Compensation in the Private Nonfarm Economy, 1972, Bureau of Labor Statistics.

of employees." The major current trends identified are (1) increases in the number of paid holidays, (2) increases in the length of paid vacations for long-service employees, (3) decreases in service requirements for vacations of given lengths, including more liberal vacations for new employees, (4) declining differences in paid vacations between office workers and plant workers, (5) increases in time off for civic duties and personal business, and (6) increases in the proportion of companies with paid, noninsured sick leave (but no increase in the duration of noninsured sick pay benefits).[4]

Employer contributions for social insurance have grown tremendously in the past generation (Table 3). Government employee retirement systems have increased rapidly, paralleling the trend in the private sector. But the largest and most rapidly growing component has been social security (OASDHI). This country's system of social

insurance has been much in the news of late, and is worthy of careful study. Employer contributions for social security are part of labor compensation, and the revenues do provide benefits for Americans. But the character of these benefits differs somewhat from private employee benefits, and they will not be considered further here.

Employer contributions to private employee benefit plans more than tripled between 1963 and 1973, growing to $39.2 billion at an average annual rate of 12.4 per cent. By coincidence, this rate of growth exactly matched the average annual rate of increase of employer contributions to social insurance over that same decade, during which time wages and salaries grew at an 8.3 per cent average annual rate.[5]

The types of coverage under privately underwritten employee benefit plans differ widely. For example, in 1972, an estimated 70 per cent of all wage and salary workers were covered by hospitalization plans written in compliance with the law, but fewer than one-third were covered by plans paying major medical expenses. Less than half of wage and salary workers in private industry have retirement benefit plan coverage, and only 14 per cent are covered by long-term disability benefits.[6] Of course, many workers without insurance coverage from their employers do have coverage obtained elsewhere. In the case of retirement plans, length-of-service requirements tend to hold down the percentage of all workers covered.

Private pension plans, including deferred profit sharing, account for nearly half of all employer contributions to private benefit plans. The Conference Board survey indicates that the proportion of companies with pension plans is increasing. Trends toward provisions for earlier retirement with more liberalized benefits are noted. Benefits under some plans are still unrelated to earnings, but the trend would appear to be toward the more common type of formula that in-

4/Profile, pp. 37, 85-103.

5/Survey of Current Business, U.S. Department of Commerce. July Issues, table 1.10.
6/Kolodrubetz, p. 16.

Table 3 EMPLOYER CONTRIBUTIONS FOR SOCIAL INSURANCE 1940, 1967, and 1973 Millions of Dollars (Per Cent of Total)					
Contribution Item	1940		1967		1973	
Total Contribution	$1,624	(100.0)	$21,869	(100.0)	$48,407	(100.0)
Federal old-age, survivors, disability, and hospital insurance	329	(20.3)	13,373	(61.1)	30,703	(63.4)
State and local employee retirement systems	155	(9.5)	3,320	(15.2)	6,946	(14.3)
Unemployment funds	978	(60.2)	3,396	(15.5)	6,733	(13.9)
Federal civilian employee retirement system	93	(5.7)	1,361	(6.2)	3,212	(6.6)
Railroad retirement insurance	67	(4.1)	399	(1.8)	758	(1.6)
Cash sickness compensation	—		12	(0.1)	46	(0.1)
Veterans life insurance	2	(0.1)	8	(0.0)	9	(0.0)

SOURCE: U.S. Department of Commerce.

cludes final average salary in its computation. The years-of-service requirements for qualifying for pension coverage (vesting of benefits) have been eased in many plans, and will soon be revised in many more in order to comply with new laws.'

The other half of employer contributions to employee benefit plans goes almost completely for insurance of one kind or another. In the health insurance category, the trend is toward more complete coverage of expenses, including new coverages such as dental care, outpatient medical and psychiatric care, and home nursing care. Long-term disability insurance has spread rapidly in the past few years, with a trend toward a reduction in service requirements for disability pensions, and an increase in benefit levels. Group life insurance continues to be the most common employee benefit plan, providing a benefit typically equal to twice salary. Rapidly gaining favor as a death benefit is the spouse's pension, which provides for income maintenance in the event the employee dies before retirement.

A relatively small share of total employer contributions to employee benefit plans provides for severance pay, supplementary unemployment benefits, and for supplements to employee savings in company thrift plans. This small share is partly due to the relatively low cost of termination pay allowances compared to health and

pension plan expenses, and to the small percentages of companies which have savings plans or provide private supplementary unemployment insurance. But for particular employees, these benefits can be a large percentage of compensation.[8]

THE ECONOMICS OF EMPLOYEE BENEFITS

A worker's compensation obviously involves two parties: the employee and the employer. But each such employment contract both reflects competitive forces and becomes a factor in the determination of labor market conditions. Thus, competition for workers tends to drive up money wages in companies that do not provide employee benefits. The payment of compensation in kind (in the form of goods and services) also affects others elsewhere in the economy. It has an economic impact on those who produce and sell employee benefit packages (e.g., insurance companies), and on those whose businesses are stimulated by employee benefit payments (hospitals, vacation spots, etc.). Pension fund accumulations play an important role in capital markets. Everyone is affected in some way if the nature and growth of employee benefits have consequences for income distribution and resource allocation in the economy as a whole. Although these equity and efficiency implications of employee benefits are not fully explored here, their directions can be indicated by economic analysis of the employer

7/Profile, pp. 47-64.

8/Ibid, pp. 1-9.

and employee reasons for wanting benefit plans, and of the resolution of these forces in the labor market.

The Employer

"Behavior in one's own self-interest" is the fundamental axiom of microeconomic analysis. In the theory of the firm, a business is assumed to utilize factors of production in such a way as to minimize the costs of operating at any particular level of output. This rule of thumb—applied to personnel policies—can be refined to take account of the fact that people are very special factors of production. Thus, assuming the employer tries to hire and perpetuate a labor force that gets the job done at minimum cost, how do employee benefits help the employer achieve this objective?[9]

Company payments for employee benefits may hold down labor costs in several ways. Compensation partly in benefit form may help promote the idea of the company family, thereby increasing productivity through greater employee loyalty and dedication (less absenteeism and turnover, more cooperation, etc.). Such benefits as "company subsidized" parking and eating facilities may help control work time better than if employees are forced to satisfy such needs on their own. The design of some employee benefits, such as vacation time and retirement credits, acts to reduce turnover because of the tie to seniority, or length of company service. The design of others can help increase turnover where and when it may be desired, as in pension plans with provisions for early retirement.

The employer also can design benefits to attract certain *types* of employees. For example, a dairy farmer who needs two full-time employees plus some readily available occasional labor can attract applications from couples with families by offering a large home and free milk as part compensation. In industrial situations, benefit packages can be made to appeal relatively more to younger or to older workers, to married or to single workers, to men or to women, and so forth. This is not to say that the benefits would be discriminatory in a legal sense, but only to observe that certain benefits may be valued more highly by certain groups.

Employers do not have to pay employment taxes on compensation paid in benefits. This is undoubtedly a primary reason for the growth of employee benefits as a form of compensation, discussed .more fully in a subsequent section on government influence. Finally, employee benefits can be the least costly method for employers to reward employees by rank or experience, or to hide the true compensation levels of certain employees from other employees, or from stockholders, regulatory bodies, or taxpayers.

The Employee

The principle of self-interest is assumed to guide the employee, too. Naturally, a worker wants to sell his services for as much compensation as possible, subject to the usual qualification of "other things equal" ("working conditions" is a convenient catch-all for many of these other things). Compensation includes, of course, the value that the worker places on benefits provided by the employer. Such payments in kind, therefore, are earned just as surely as are money wages. The Conference Board study observes that:

> **A second major pattern concerns the employee's pocketbook. The 1963 to 1973 decade has clearly shown that employee benefits are looked upon as earned compensation and, as such, the employee should not be required to pay any portion of the cost of these plans.[10]**

This statement is somewhat misleading, however, in implying that employees are better off if employers pay the cost of benefits. Tax considerations aside, this is not the case. Actually, employee benefits are earned compensation only to the extent that the employer *does* pay for them. It is important to remember that an employee earns a particular level of total compensation,

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9/Bevars Mabry, "The Economics of Fringe Benefits," *Industrial Relations,* Vol. 12, No. 1, February 1973, pp. 95-106.

10/*Profile*, p. 3

so that the more of compensation paid in the form of benefits, the less the employee receives in money wages. Thus, even if the employee were required to pay the entire cost of his benefits, his money wages would need to be that much higher. After deductions for these benefits, his remaining money wages would be just the same as if he were not required to pay any portion of the cost. Since the bookkeeping makes little difference in the usual case of benefits which cover all employees, the trend toward noncontributory benefits is explained best by the tax advantages of this alternative — advantages perceived by both employee and employer.

The idea that employees earn all of their compensation is not based on some philosophical notion, but on the economics of competitive markets. Employers, who want to minimize costs, compete with one another for employees, who sell their services for as much as they can get. This interaction of supply and demand results in a market price of labor, or level of compensation, for any particular type of worker. If compensation levels are market-determined, it follows that the greater are employee benefits, the lower are money wages.

Would an employee be better off with the option of receiving all of his compensation in money wages, assuming no tax advantages of benefit payments? If one accepts the premise that each individual should be allowed to make his own choices, the answer is yes. A neat proof in the theory of consumer preference shows that a worker is at least as well off with the money, since he can still buy those benefits that he wants, or something else that he prefers." Yet, while some of the growth in employee benefits as a share of compensation can be attributed to employer paternalism, much of the thrust behind this trend has come from employees, often through their unions.

Professor Mabry believes that union leaders like employee benefits:

(a) The administration of such programs requires a bureaucracy which tends to strengthen the rationale of union existence, membership dependency, and, hence, organizational survival.

(b) Fringe benefits are much less visible than [money] wages, and as such, are less likely to undermine the power of the union by attracting a large number of job applicants. Also, the lower visibility of benefits permits uniform money wages among firms within an industry, thereby lessening intra-union rivalry while still allowing unequal compensation levels.[12]

Employee compensation is higher with benefits, he adds, because the supply of labor is less than it would be if all compensation were in the more visible money wage form, because of group purchasing power (lower premiums) of insurance, and because of favorable tax treatment of benefits. Each of these alleged advantages to workers are scrutinized following a look at government influence on employee benefits.

The Government

A principal conclusion of the recent study of employee benefits by The Conference Board may be summarized this way:

The. . .pattern that clearly emerges from the Profile study is that government intervention in the employee benefit packages offered by private sector employers has increased, rather than decreased, over time. Not only has the government's role increased, but it has changed its basic orientation from regulator to social planner.

Regardless of which trends are followed by unions and corporate benefit staffs in the next ten years, the government is now almost certain to become a major, if not the dominant, force in the design of employee benefit packages during that time.[13]

In support of this conclusion, researchers Meyer and Fox give ample evidence including official

11/See, for example, Richard A. Leftwich, *The* Price System *and* Resource Allocation (5th ed.; Hinsdale, Ill.: The Dryden Press, 1973), pp. 92-94.

12/Closely follows Mabry, pp. 97-98.
13/*Profile*, p. 5.

designation of four Mondays as holidays, legislation affecting pension and health insurance provisions, and Internal Revenue Code regulations determining just what benefits qualify for special tax treatment.

The power to tax is power enough by itself to permit centralized social planning. By taxing various forms of compensation unequally, the government can encourage the development of certain types of employee earnings (benefits) at the expense of money wages. Tax inducements (and discouragements) work indirectly through the market system to bring about change, but their effects are just as certain as those from direct legislation. For example, a tax code that subsidizes compensation paid in the form of health insurance premiums leads to the widespread adoption of such plans by employers. Eventually, most American workers become covered by health insurance whether they want it or not. This is not to attack the idea of social planning aimed at universal coverage against losses of income due to death, illness, unemployment, etc. Rather, the intent here is to point out that it is an illusion to believe that the growth of privately underwritten employee benefit plans is completely the result of free choice in a free enterprise economy.

The strength of the Internal Revenue Service in shaping benefit packages is exemplified by the failure of the "cafeteria" concept of employee benefits to catch on. Under a cafeteria benefits system, an employee is allowed to choose from an assortment of compensation alternatives, including money, of equal cost to the employer.[14] This type of package is rare, because the government refuses to grant favorable tax treatment to certain options.[15]

It is clear that government intervention in compensation practices is largely responsible for the rapid growth of employee benefits. It can be argued that this growth is a desirable objective. However, not all of the economic consequences of government intervention in this area are summarized by the declining share of money wages in compensation. Moreover, not all of the tax advantages that employers and employees believe they get from benefits materialize once the labor market and the economy adjust to the changes that are introduced by such compensation schemes.

The Labor Market and the Economy

The individual employer-employee analysis is inadequate for determining the effects of employee benefits on the economy. The conclusions from such "partial equilibrium" analysis are not, in general, extendable to aggregations of business firms, workers, etc. Tracing the impact of an outside shock, such as tax subsidies for employee benefits, through the economy can be tedious, but a compact two-sector model of the labor market can explain some of the most important consequences.

Suppose that competitive economic conditions characterize the labor market, and that employers are divided into two groups: those who pay part of compensation in "free" benefits, and those who do not. Assume first that there are no employer or employee advantages to compensation paid in benefit form. Assume also that all workers want the goods and services (insurance, etc.) represented by the benefits, in at least the amounts provided, but that these also may be purchased on the free market. As indicated earlier, the result is straightforward: the equilibrium levels of compensation will be exactly the same for both types of employer, with the non-benefit group paying money wages higher by the value of the benefits. (Any difference in compensation levels between the two employer groups would be a disequilibrium. The higher level of compensation would attract more workers than needed; the lower, fewer workers, ultimately bringing about equality.)

Under this first set of assumptions, the economy is unaffected if some employers pay part of

14/See, for example, George W. Hettenhouse, "Cost/benefit analysis of executive compensation," Harvard Business Review, July-August 1970, pp. 114-24; also Donald H. Mehlig, "Compensation Planning--Cafeteria Style," Pension and Welfare News, April 1973, pp. 53-58.
15/Profile, pp. 2-3.

compensation in benefits.[16] Because the employees of the benefit-providing institutions would have bought the benefits on the free market anyway (by assumption), they lose nothing. But they do not gain anything either. This conclusion of no economic impact holds even if employees differ in their preferences for benefit-type goods and services, so long as there are enough workers who want benefits to fill all jobs providing benefits (or, put another way, so long as there are at least as many jobs without benefits as there are workers who do not want benefits). Free choice is then accomplished partly by choosing one's employer.

Why would any employer choose to provide employee benefits under these assumptions? Clearly, with tax advantages assumed away, the administrative cost of a benefits program would have to be offset by savings elsewhere, or the practice would soon die out. If net costs were lower because of benefit plans (due perhaps to productivity gains arising from a "we're all in this together" spirit), the practice would spread to other firms on employer initiative. At some point, however, as more and more employers adopted employee benefit programs, the supply of workers preferring such benefits to other goods and services might dry up. Beyond that point, benefit-providing employers would have to increase money wages to attract additional labor. This would increase their labor costs, of course. Therefore, benefit programs would continue to spread to other employers only until an equilibrium was reached. In this equilibrium, individual employers would gain nothing from having benefit plans. What about employees and the economy? This is difficult to answer. On the one hand, if employee benefit plans really increase productivity, then average real wages would be higher. On the other hand, some of this increase in real wages would be in forms (benefits) not preferred by all employees.

Impetus for employers to provide employee benefits may come from the employees, even without supposed tax or insurance premium advantages. Workers may want the employer to look after their interests. A company program spares the individual the problems of choosing an insurance company, a proper program, and the extent of his coverage. It also relieves him of the trouble and worry associated with accumulating funds to meet periodic premiums on due dates, and of the need to process papers to establish his eligibility."[17] In other words, employee benefit plans save the worker time and effort. How does this factor influence the labor market under the competitive conditions assumed?

If the employee wants the service, it is reasonable to believe that he pays for it, and this is what happens in the absence of any employer advantages from providing such plans. This outcome results in lower apparent total compensation in firms with benefits, because workers are willing to work for less. for such **employers.**[18] This would mean that money wages would not only be less (than in the no-benefit situation) by the value of the benefits, but also less by an additional amount equal to the value employees place on the service of administering these benefits. (This latter value may be greater than the cost of benefit administration, in which case the employer makes a "profit" on its employee benefits program!) To the extent that benefits plans are the result of such decisions, the economy is not adversely affected, and free choice is preserved.

Another advantage claimed for employee benefit plans is savings through group purchase of insurance. To be sure, premiums per participant are lower in group plans. But competition in the labor market erases this savings for employees, in the following manner. Start with the supposedly true situation that workers really do "save

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16/Except for those effects arising from the *administration* of benefits by employers.

17/Richard A. Lester, "Benefits as a Preferred Form of Compensation," *Southern Economic Journal,* Vol. 33, No. 4, April 1967, p. 490.
18/Total compensation really remains the same, since the service of providing benefits is a benefit itself.

money" in such plans. If that is the case, then compensation levels are higher in employment where benefit plans are provided. But, this is clearly a disequilibrium; employees and job applicants will desert the lower-compensation, non-benefit employers, and offer their services to benefit-providing employers. This has the market effect of depressing money wages in benefit employment, and increasing them in non-benefit employment. An equilibrium is reached only when the savings' advantage to benefit employment has disappeared.

Now, remove the assumption of no tax advantages to employee benefit plans. In the real world, there quite clearly are such tax advantages.[19] First, assume the tax advantage is to the employee only. Does he really end up ahead with a compensation package partly in the form of tax-free benefits? He does not in the case of a perfectly competitive labor market. This is obviously analogous to the situation described previously. Any tax savings from benefits are perceived by labor, and the wage structure adjusts to a new equilibrium that eliminates any such advantage. The employee's total compensation with tax-free benefits remains the same as without them.

Suppose all companies pay their employees partly with tax-free benefits. Are workers better off then? Are their real, after-tax incomes higher? No, workers are not better off if production remains the same and the government spends as much as before. The same amount of taxes must still be collected; unless this tax burden is shifted somehow to the owners of capital, lower taxation of benefits-type compensation must be made up by higher taxation of money wages.

Even though an employee's total compensation may be unaffected by benefit plans, the employer's labor costs may be reduced by the government's subsidization (through favorable tax treatment) of certain types of compensation in kind. This will certainly encourage the adoption of employee benefit plans, as firms not enjoying the subsidy are at a competitive disadvantage with those subsidized. In the adjustment phase, the effect is to shift the tax burden from businesses with benefit plans to those without them. As before, the tax revenues must come from somewhere. When "tax-free" benefits become nearly universal, the competitive advantage is gone: employers are no better off in the new equilibrium. Employees, it can be argued, are worse off since their choices have been reduced.

Suppose that it really is true that companies with benefit programs compensate their workers better (pay more) than those without such plans. This would imply imperfections in the labor market (such as barriers to entry) and a consequent misallocation of resources. In particular, the benefit-plan firms would be employing too little labor because their compensation level was held artificially high. Total output would be less because of these losses in efficiency. Since real wages are tied to production, this would mean lower average levels of real compensation in the economy.

The labor market is, in fact, replete with imperfections. Does this detract significantly from the conclusions of the preceding analysis, which is based primarily on equilibrium comparisons in perfectly competitive markets? It does not detract from the principal conclusion that employee benefit programs do not increase total compensation in the economy. Indeed, to the extent that employee benefits introduce additional imperfections, total employment and compensation are probably decreased. While interference in imperfect markets can improve resource allocation, this hardly seems to be the case for employee benefits, many of which reduce mobility and disguise levels of compensation. The existence and persistence of imperfections in the labor market do require a softening, however, of the conclusion that employees receiving bene-

19/See, for example, Thomas I. O'Regan, Jr., "501(c)(9)—Paying the Tax Collector," *Pension and Welfare News,* June 1973, pp. 46-48. Some of the tax advantage to employees is in the form of shifting tax burdens over time. This is particularly true of private pension plans. Taxes are not paid for contributions, but are paid when benefits are received during retirement. They are then generally taxed at lower marginal rates.

fits cannot realize a net gain in compensation. They can, but only at the expense of those not receiving benefits, so long as imperfections shield the favored group from free market forces.

SUMMARY

Benefit plans account for a large and increasing share of employee compensation. Legally required employer contributions for social insurance have grown rapidly in the past decade and the growth of private employee benefit plans has been equally rapid. To some extent, company benefits programs have come about as a result of free market, free choice interactions among employees and employers. Much of the increase in paid leisure time, for example, surely reflects the desire of employees to be paid partly with time rather than money. But to a large extent, the government's subsidization of benefit plans explains their popularity in compensation packages.

Economic analysis of the market consequences of paying wages in kind rather than in money reveals that levels of total compensation are unaffected by this practice if competitive conditions prevail. That is, workers enjoy no net savings from the tax free character of certain benefits, or from the lower premiums under group insurance. Tax advantages enjoyed by employers with benefit plans are tax disadvantages to those without such plans, which ultimately leads to widespread coverage by employers, and no remaining advantage to anyone. Employee benefit plans can only increase the compensation levels of particular groups of workers by interfering with competitive forces, and this translates into a loss to the economy as a whole, since resources will not be allocated efficiently.

Money and Income:
Is There a Simple Relationship?

By Robert D. Auerbach and Jack L. Rutner

The relationship between money and income has been the subject of a great deal of research over the last two decades. The approach commonly taken is based on the view that income is related to past and present values of money. The results of this research have generally indicated a relatively strong association between money and income with the major impact of money on income occurring several quarters after the initial change in money. [1]

The most common statistical model used in these research efforts is called a "reduced form" model, which contrasts with a large "structural" model of the economy. [2] In the typical reduced form model used by monetarists, emphasis is placed on the effect of money on income, almost completely excluding the potential impact of other variables. At the extreme, the reduced form model has been reduced to a single equation relating income only to money, thereby ignoring the specific impacts of other variables. Examples of the single equation approach are found in works by Michael Keran, Milton Friedman and David Meiselman, and Christopher Sims. [3]

Two problems appear to exist with the results obtained from the single equation model. One is that the users may not have adequately allowed for the presence of trend in the data when examining the relationship between money and income. Failure to adequately account for the presence of trend can severely bias common statistical procedures toward the acceptance of the view that two variables are related when indeed they may not be. [4] The second problem is that users of the single equation model have implicitly assumed that the direction of influence runs only from money to income with no significant feed-

[1] See Milton Friedman and David Meiselman, "The Relative Stability of Monetary Velocity and the Investment Multiplier in the United States, 1897-1958," Commission on Money and Credit, *Stabilization Policies* (Englewood Cliffs, N. J.: Prentice Hall, 1963). Also, several papers dealing with the relationship of money and income have been published in the Federal Reserve Bank of St. Louis *Review*. An example is Michael Keran's "Economic Theory and Forecasting," March 1967. A more recent example of a paper on this subject is Frederick E. Schadrack's "An Empirical Approach to the Definition of Money," *Monetary Aggregates and Monetary Policy,* Federal Reserve Bank of New York, October 1974.

[2] The two models differ because the structural model specifies a separate supply and demand equation for each market considered. The reduced form model, however, reduces the structural model to a set of equations that do not distinguish underlying supply and demand equations. It should be noted there need not be a difference in the results obtained from structural and reduced form models. Under certain conditions, having to do with the proper specification of dependent and independent variables and the attainment of equilibrium between demand and supply, both models can be formally equivalent.

[3] Keran; Friedman and Meiselman; and Christopher Sims, "Money, Income, and Causality." *American Economic Review,* Vol. 62 (September 1972), pp. 540-52.

[4] See Jack L. Rutner, "A Time Series Analysis of the Control of Money," *Monthly Review,* Federal Reserve Bank of Kansas City, January 1975; and Robert D. Auerbach and Jack L. Rutner, "U. S.-Canadian Economic Relationships," *Monthly Review,* Federal Reserve Bank of Kansas City, February 1975.

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back from income to **money.**[5] If a feedback effect is present, however, the statistical estimation of the relationship of income to money will also be biased.

Therefore this article examines the extent to which money and income are related in the context of a single equation model when adequate allowance is made for the presence of trend in the data. Also examined is the extent to which the direction of influence runs solely from money to income.

THEORETICAL BACKGROUND ON THE RELATIONSHIP OF MONEY AND INCOME

It is a fairly well established proposition in economics that an individual will desire to hold a certain quantity of money balances. When an individual's money holdings go beyond that point, so that the cost arising from holding an additional dollar of money exceeds the benefits, the individual will attempt to reduce his money balances by acquiring goods and services and other assets. If, on the average, individuals receive too much (little) money and attempt to reduce (increase) their cash balances, there will be changes in output, prices, and interest rates. In brief, it is generally expected that a change in money balances will lead to a change in money income.

The channels of influence may not run only from money to income because there may be feedback effects from income to money. Some of these feedback effects may arise within the normal course of events within the economy, while others may arise from the conscious decisions of monetary authorities to achieve certain national economic objectives, such as stable economic growth, full employment, and reasonable price stability.

One way income may affect money is through the impact a change in income may have on the desire of banks to expand loans and investments.

As business expands, for example, commercial banks may wish to expand loans and investments by reducing the stock of excess reserves they carry. This action would increase the deposit component of the money stock and thereby the total stock of money. Another way income may affect money is through the impact a change in income may have on the desire of the nonbank public to hold money balances. During periods of cyclical expansion, for example, individuals may find it more appropriate to carry larger supplies of deposits and as a consequence they may shift money from currency to **deposits.**[6]

There may also be feedback from income to money because the monetary authorities may attempt to alter the money supply in response to previous changes in output, prices, and interest rates. For instance, a decline in income and an increase in unemployment may result in the monetary authorities increasing the money stock. This would make it appear as if income were causing a change in money in the sense that a change in income precedes and is related to the level of money balances. Also, if the monetary authorities attempt to stabilize interest rates while market interest rates are positively correlated with the business cycle, it would again seem as if changes in income precede changes in money.'

Chart 1 illustrates a hypothetical interactive system between money and income. The effect money has on income, interest rates, prices, and employment is indicated by the arrow from money to income. The line from income to the monetary authorities indicates that a change in income may have an effect on the policy actions of the monetary authorities. The monetary authorities may

5/An important exception to the earlier studies is the work by Sims where he attempted to determine the presence of feedback in a way that has not been previously utilized. Sims reported that he found money caused income and that there was no feedback from income to money. Sims' work, however, is marred by the presence of trend and, for this reason, his results are biased.

6/Initially, individuals would probably shift out of currency into time deposits as interest rates rise during the cyclical expansion. The shift of currency into the banking system would supply it with reserves with which to increase demand deposits as well as time deposits. It is also possible that individuals would shift from demand to time deposits in which case the final effects on demand deposits of these various shifts would be ambiguous.

7/Another instance would be if prices and nominal income were to increase and the authorities wished to maintain a particular level of real money balances. In this case, the authorities would increase the money stock to maintain the desired level of real money balances. This action also would make it appear as if income were causing the increase in money because the change in income would be related to and would precede the change in money.

Chart 1
AM INTERACTIVE SYSTEM
BETWEEN MONEY AND INCOME
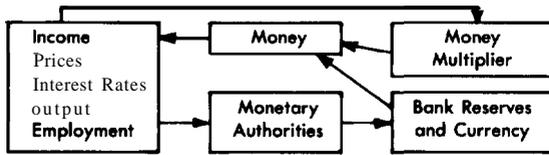
respond to movements in the economy by alter-ing the stock of bank reserves (or bank reserves and currency) and this, in turn, may affect the stock of money. Finally, there may be feedback from the economy to the money multiplier which is affected by the actions of the private sector, including the amount of excess reserves banks wish to hold relative to deposits.[8]

On the basis of this discussion it would appear there are substantial theoretical grounds to believe that a feedback from income to money would exist. On the same basis there is reason to doubt the validity of some earlier research results sug-gesting only one-way causality from money to income.[9] The next section explains the method of analysis used in this article to examine the presence or absence of feedback.

METHOD OF ANALYSIS

The first step in determining the presence or absence of feedback between money and income, and the relationship between these two variables in a single equation model, is to adequately ac-count for the presence of trend in the data. As illustrated in Chart 2, both income and money contain a strong upward trend over a period of time, such as 1953-73. The presence of such a strong trend, as mentioned earlier, tends to bias the relationships estimated by ordinary statistical

analysis toward acceptance of the view that the variables are related when they may not be. The presence of a trend may also invalidate statistical tests for measuring the existence or absence of feedback.[10] Thus, before relationships between variables containing a trend can be estimated properly, the effect of the trend must be account-ed for in each variable.

The method used to remove the trend from the data employed in this article is the **autore-gressive** technique. This technique removes that part of a variable which is related to its own past history. Chart 3 illustrates the values of money and income during 1953-73 after the trend is re-moved by use of the autoregressive technique.[11]

Once the trend is removed, the next step is the development of a single equation model that can be used to determine the relationship of money to income and simultaneously detect the pres-ence of feedback. This is accomplished by relat-ing one variable, such as current income, to past, present, and future values of a second variable, such as money. This relationship is summarized by the following simplified equation:[12]

Current Income = f[Current Money, Past Money, Future Money].

If, upon statistical examination, a significant relation is found between current income and

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8/To the extent the monetary authorities can affect the stock of re-serves banks must hold relative to deposits, they may also be able to offset this ratio.
9/For an example of these results, see Leonall C. Andersen and Jerry L. Jordan, "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization," *Review,* Federal Reserve Bank of St. Louis, November 1968; and Leonall C. Andersen and Keith Carlson, "A Monetarist Model for Economic Stabilization," *Review,* Federal Reserve Bank of St. Louis, April 1970.

10/Suppose, for example, a trend is present in money and income with money today being related to income four quarters into the future and to itself six quarters into the future. It might then appear as if movements in income were preceding movements in money by two quarters, and also be concluded that the direction of influence runs from income to money. Actually, however, it may be the simultaneous correlation of money with income four quarters in the future and with itself six quarters in the future that masks the relationship of income with previous movements in money. The removal of the association of income and money with their past values makes it possible to deter-mine the relationship of income to money without the presence of the spurious correlation of money to its past and future values.
11/The technique used in this article is summarized as follows: First, each variable (convened to natural logarithms) is regressed on its past values. Only those coefficients which are significant at a 99 per cent level of confidence are retained. Then, the residuals—i.e., the current values less weighted past values — where the weights are the regres-sion coefficients, are tested through spectral analysis to determine if the trend has been adequately removed. When it is so determined, the residuals are the new variables used in place of the levels.
12/The technique used here was first suggested by C. W. J. Granger, "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods," *Econometrica,* Vol. 37, No. 3 (July 1969), pp. 424-38, and later modified by Sims, "Money, Income and Causality," pp. 540-52.

Chart 2
LEVELS OF GROSS NATIONAL PRODUCT AND MONEY, 1953-73
(Quarterly data)
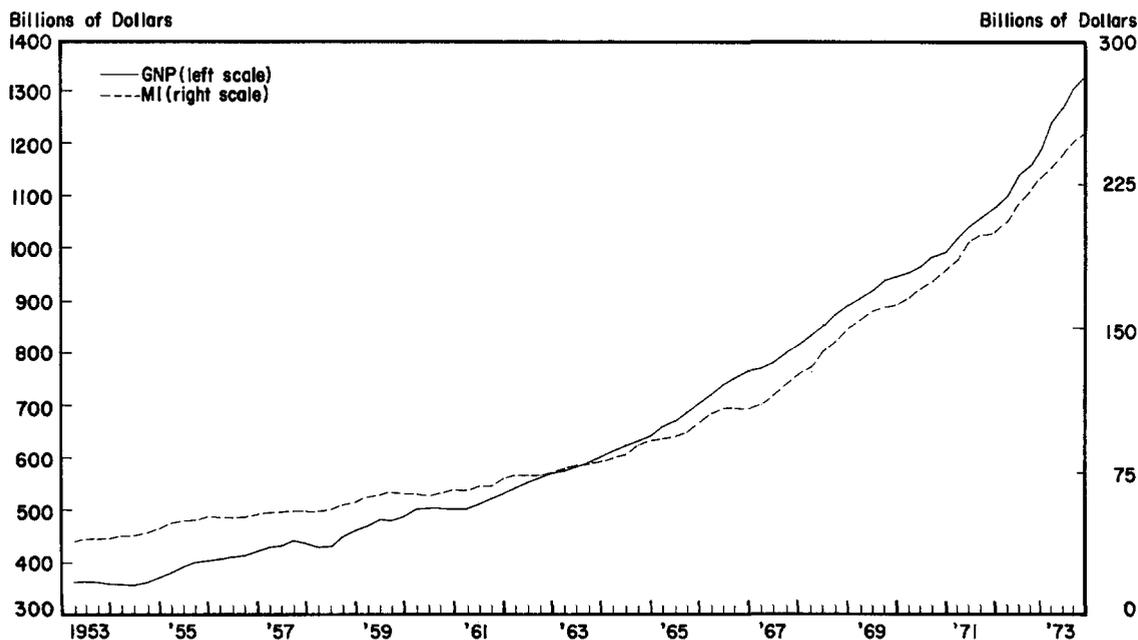
only past values of money, it can be inferred that money affects income but a feedback from income to money does not exist. When feedback is absent, there is said to be one-way or *unidirectional causality.* If future values of money as well as past values of money are found to be related to income, a feedback effect from income to money would exist. When feedback is present, there is said to be two-way or *bidirectional causality.* It should be noted that a significant relationship between money and income must exist before the direction of causality can be determined. A complete examination of the direction of causality also requires that money be made a function of income as well as income being made a function of money. This two-way testing—money on income and income on money—acts to simultaneously confirm the presence or absence of feedback.[13]

EMPIRICAL RESULTS

This section presents the empirical results of examining the relationship of income, or gross national product (GNP), to the M1 definition of money (currency held by the public plus demand deposits) within the context of the single equation model shown above, as well as the reverse relationship of M1 to GNP. Regression analysis was used to examine these relationships using quarterly detrended data for the 20-year period 1953-73, and for a longer period 1921-73. Table 1 summarizes the regression results. The degree of correlation between money

13/It might be possible, for example, that a test of income on money would indicate unidirectional causality from money to income, but a test of money on income would indicate the presence of bidirectional causality. If this occurred, it would indicate that bidirectional causality could not be ruled out and further tests would have to be performed to accept or reject the hypothesis of bidirectional causality. The tests for causality reported here reveal no such contradictory results.

Chart 3
DETRENDED VALUES OF GROSS NATIONAL PRODUCT AND MONEY, 1953-73
(Quarterly data)
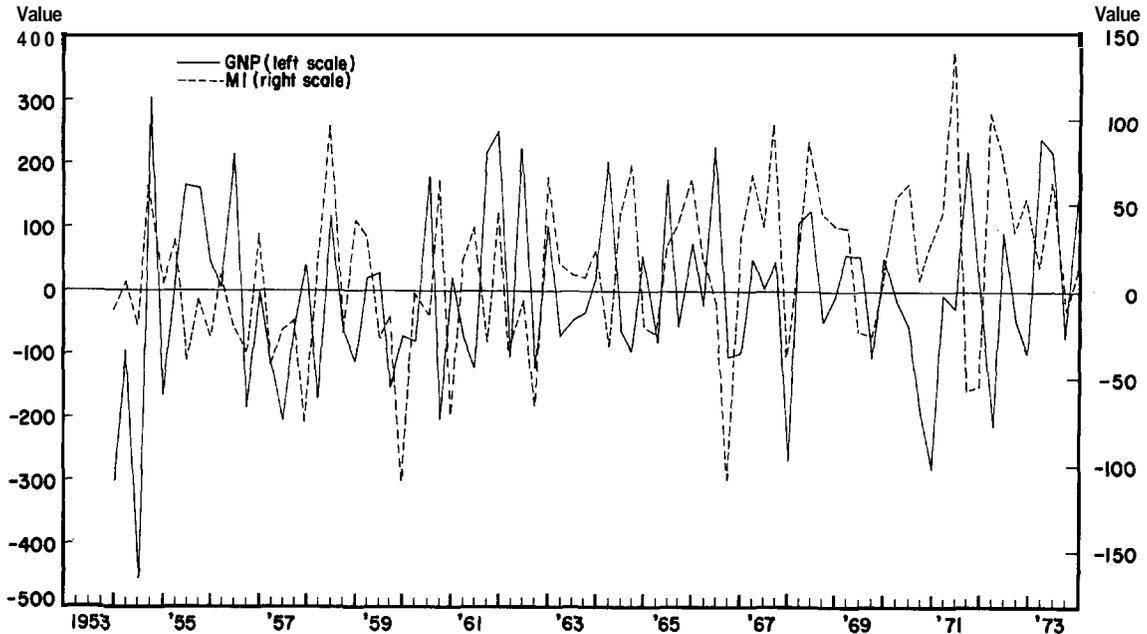
and income is shown by the correlation coefficient R^2, with a high value denoting a high degree of correlation. The direction of causality is also shown with bidirectional causality indicating a feedback relation was found.[14]

Table 1 contains the surprising result that within the context of the single equation model there was no relationship in the **1953-73** period between money and income when the trend was removed. The absence of a significant relationship between money and income for this period

makes it meaningless to test for **causality.**[15] For the longer period **1921-73,** the association between income and money, while not very high, was nonetheless significant. For this period, there was direct evidence of feedback from income to money in that current income affected money in the future.

The finding of no relationship in the **detrended** money and income data for the **1953-73** period and the presence of feedback in the longer period data suggest two things. The first is that previous tests of the monetary process which reported a high and significant association between income and money using reduced form models are open to question. These earlier tests were apparently biased in the direction of accepting the **hypoth-**

14/In practice, four regressions were fitted for each pair of variables. First, one variable was regressed on 1 synchronous, 8 past, and 4 future values of the other variable. Then a second equation was fitted with the dependent and independent variables reversed. Two additional equations were fitted by attaching seasonal dummies and a time variable to the first two equations. The equations in Table 1 were selected because they were considered most representative of the general findings. The entire table of regressions with R^2's will be furnished on request.

15/As if to confirm this conclusion, none of the coefficients of the income or monetary variables for the 1953-73 period were significant.

Table 1
REGRESSION RESULTS ON PME
RELATIONSHIP OF MONEY AND INCOME
Detrended quarterly data,
1921-73 and 1953-73

Dependent Variable	Independent Variable	R^2	Direction of Causality
	1953-73		
GNP	M1	.02	None
M1	GNP	.04	None
	1921-73		
GNP	M1	.14*	Bidirectional
M1	GNP	.13*	Bidirectional

NOTE: R^2 is the multiple correlation coefficient adjusted for degrees of freedom. The R^2 with an asterisk * indicates a significant R^2 at the 95 per cent level.

esis that money and income were related because of inadequate trend removal.[16] The process generating the trend may have been the same in both cases, but it is this process that must be determined and not simply the fact that two series have a common trend. **Secondly,** the presence of feedback from income to money shown for the longer period suggests it is necessary to formulate a model which allows for feedback effects from income to the demand and supply for money.

The results in Table 1 must be interpreted with care. **The** results do not indicate that money and income are **unrelated.** Indeed, an earlier article in this *Review* using spectral analysis found

a fairly high association between money and income.[17] Rather, the results indicate that within the context of the reduced form model there is little or no **relationship.**[18] In addition, to the extent that money and income are related in the period 1921-73, bidirectional causality is indicated. The evidence of bidirectional causality does not necessarily indicate that changes in income directly cause changes in money. Embedded in this result may be the policy reaction of the monetary authorities to prior changes in income as well as the reaction of the economy to movements in prices, output, and interest rates. What the finding of bidirectional causality indicates is that the single equation model—with income a function of only present and past values of money—is incorrectly specified. One alternative is a model which takes into account the effect of income on money, such as a structural model.

CONCLUSION

In summarizing the results of the tests conducted in this study, it can be said that for the 1953-73 period no relationship was found between money and income in the context of the reduced form model. Since the reduced form model fails to show any association between income and money in this period, one cannot ascertain whether or not feedback exists. For the longer period 1921-73, a weak but significant relationship between money and income was found with the presence of feedback indicated. *These findings suggest that the simple reduced form regression models used to test for the re-*

16/An early example of the extreme bias of the single equation reduced form model is presented below for illustrative purposes. An equation relating GNP to one past value of money was fitted for the period 1958-66 using first differences (Δ) and appeared in Keran's "Economic Theory and Forecasting."

$$\Delta GNP_t = 5.61 + 3.94 \, \Delta(M1)_{t-3} \qquad R^2 = .55$$

This equation suffers from both the feedback problem and the trend problem. First, the equation assumes without testing that the only direction of influence is from money to income. In other words, the researcher has essentially imposed a cause and effect model of a particular son on two variables which may have a more complicated two-way causal relationship. Second, in view of the results reported in Table I for the 1953-73 period, the R^2 of .55 does not mean that the change in money accounts for 55 per cent of the variability of the change in GNP or even the reverse. The R^2 is a spurious statistic produced by the common trend in both variables.

The recent work of Sims takes a step in the right direction by examining directly for the presence of feedback between income and money. See Sims, "Money, Income, and Causality." Sims' results for the postwar period indicate a strong relationship between income and money with the direction of influence going only from money to income. The results of Table 1, however, indicate no relationship for this period, with the consequence that questions concerning causality are unanswerable. The difference between these two results is the inadequate treatment of trend by Sims.

17/See Jack L. Rutner, "A Time Series Analysis of Income and Several Definitions of Money," Monthly Review, Federal Reserve Bank of Kansas City, November 1974. The discrepancy between the regression tests and the spectral tests arises, even with the same data, because the single equation models are incapable of picking out those cycles for which money and income are related. Spectral analysis, however, is pecisely geared for this type of analysis if the lags between one variable and its effects on another variable are related to cycle lengths and not chronological time periods.

18/A possible explanation for the lack of relationship during the 1953-73 period might be that the monetary authorities were quite adept at offsetting deviations of income from its trend, thereby reducing the simple association between income and money.

lationship between income and money may be **misspecified** *unless they allow for the effect of feedback from past income to money.* Other statistical tools, however, such as spectral analysis, which can simultaneously accommodate cycle leads and lags between two variables, have shown a strong and significant association between money and income. *Finally, whether one uses a single equation regression model or spectral analysis, the trend must be accounted for or removed. otherwise the results will be biased, often giving the impression of strong relationships where none might exist.* This conclusion is probably applicable to a great deal of contemporary empirical research because of the common trend in most post-World War II economic time series.