INCOMPLETELY VESTED PENSION PLANS AND LABOR MOBILITY

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The freedom of labor to enter and to leave employment is one of the fundamental requisites for economic efficiency. Received theory identifies this freedom as the necessary condition facilitating response to the wage signals of the marketplace. This study deals with the impact of incompletely vested pension plans upon the mobility of labor.

The presumption that pension plans impede the mobility of workers is widely accepted. A number of investigations have been undertaken to test the validity of this presumption. In general, these investigations have suggested that pension plans have not had a significant impact upon worker decisions to voluntarily leave jobs.

These investigations, however, did not involve tests for existence of a relationship between participant's non-vested retirement losses and mobility. Rather the tests were conducted to measure the strength of impediments to labor mobility inherent in non-vested pension plans per se.

The hypothesis this study is designed to test is that the significant impediment to labor mobility is the income value of retirement benefits lost by non-vested participants through separation, rather than the fact of their merely having non-vested status. The study identifies those factors determining the value of participants' retirement benefits, and then tests for a relationship between participants' non-vested retirement values and impediment to mobility.

Quit-rate data were collected and analyzed for two samples of university faculty (one sample composed at faculty at schools having deferred vesting plans; the other composed of faculty at schools having vested plans).

The major conclusion of the study is that, while no evidence of impediments to mobility from pension plans, per se, was found, quit-rates of non-vested faculty in the deferred vested plan diminish as the strength of the factors influencing the value of the income stream of benefits lost increases.

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CHAPTER I

INTRODUCTION

Freedom of labor to enter and to leave employment is one of the fundamental requisites for economic efficiency. Received theory identifies this freedom as the necessary condition facilitating response to the wage signals of the marketplace.

For some time it has been recognized that certain practices of unions, professional associations, and employers have a restraining effect upon the ability of physically and mentally qualified laborers to enter into a variety of occupations. But until recently, factors inhibiting exit from jobs have received little attention. As a result of the rapid extension of worker coverage in pension plans, however, attention has begun to focus upon the possible impact of these plans upon the freedom of workers to give up jobs covered by them.[1]

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[1]Although information concerning the number of workers covered by pension plans prior to World War II is not available, the Bureau of Labor Statistics has estimated that only two per cent of the private plans in existence in 1960 were established prior to 1940. See, U. S. Department of Labor, Bureau of Labor Statistics, Labor Mobility and Private Pension Plans, Bulletin Number 1407 (June, 1964), p. 4. The Secretary of Labor has estimated

The primary purpose of a private pension plan is to provide retirement income to employees. But it has been suggested that a major consideration for employers when contemplating establishment of pension plans has been reduction of the amount of labor turnover.[2]

Almost all plans require that employees be in the service of the employer for a specified number of years before they obtain the right to a retirement benefit. In the majority of plans, the employee, upon fulfilling enumerated requirements (usually stipulated periods of service and/or attainment of a stated minimum age), can leave the service of the employer and maintain the right to receive accrued pension benefits upon retirement. These plans fall into the category of "deferred vested" pension plans.

Other plans require employees to be in the service of the employer at the time of retirement if they are to receive retirement benefits. These are referred to as non-vested pension plans. All employees in non-vested plans, and non-vested employees in deferred-vested plans,

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combined private pension plan and profit-sharing plan coverage at 25,000,000 workers in 1966, increasing to 34,000,000 by 1970. See, U. S. Congress, Joint Economic Committee, Private Pension Plans, Hearings, before a subcommittee on Fiscal Policy, Part 2, 89th Cong., 2d sess., 1966, p. 363.

[2]Merton C. Bernstein, The Future of Private Pensions (London: The Free Press of Glencoe, 1964), p. 11.

lose accrued retirement benefits upon voluntary separation from the service of their employer.[3]

The presumption that pension plans impede the mobility of workers is widely accepted. Texts that include coverage of pension plans usually accept the hypothesis that plans have a restraining influence upon voluntary separation by employees.[4] The Department of Labor, although expressing concern over the loss of retirement income by those employees who separate, also has taken notice of the possible impact upon labor mobility of private pension plans.[5]

A number of investigations have been undertaken to determine the validity of the hypothesis that pension plans impede labor mobility.[6] In a study of college and university faculty quit-rates, Lurie observed that faculty belonging to plans that vested benefits after five years

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[3]Some plans make a distinction between voluntary and non-voluntary separation. For example, some plans stipulate that participants may vest in five years if involuntarily separated, but may vest only after ten years if separation is voluntary.

[4]For example: Neil W. Chamberlain, The Labor Sector (New York: McGraw-Hill Book Company, 1965), pp. 606-607; Allan M. Carter and F. Ray Marshall, Labor Economics (Homewood, Illinois: Richard D. Irwin, Inc., 1967), p. 556; Richard A. Lester, Economics of Labor (2d ed.; New York: Macmillan Co., 1964), p. 350.

[5]U. S. Department of Labor, Labor Mobility . . ., p. 4.

[6]Since the following studies will be the subject of extensive review and criticism in Chapter III, below, they are simply identified here.

of service were more mobile than were faculty belonging to plans that vested benefits prior to five years of service.[7] Parnes found no significant difference in attitudes of plant workers toward mobility when he compared attitudes of workers in a firm possessing a non-vested plan with those of their counterparts in a neighboring firm which had no pension plan.[8] Arthur Ross, in a study of labor turnover in manufacturing from 1910 through 1956, observed a modest reduction in quit-rates in the post World War II period.[9] However, Ross concluded that it was most unlikely that pension plans were a cause of the quit-rate decrease.[10] Harold Rubin, through an extensive mail questionnaire, invited the opinions of personnel managers for public institutions concerning the effect of their non-vested pension plans on separation and hiring of personnel.[11] Respondents, in general, thought their

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[7]Melvin Lurie, "The Effect of Non-Vested Pensions on Mobility: A Study of the Higher Education Industry," Industrial and Labor Relations Review (January, 1965), pp. 224-237.

[8]Herbert S. Parnes, "Workers Attitudes to Job Changing: The Effect of Private Pension Plans," in The Reluctant Job Changer, ed. by Gladys L. Palmer (Philadelphia: University of Pennsylvania Press, 1962), pp. 45-80, 182-189.

[9]Arthur M. Ross, "Do We Have a New Industrial Feudalism," American Economic Review (December, 1958), pp. 903-920.

[10]Ibid., p. 915.

[11]Harold Rubin, Pensions and Employee Mobility in the Public Service (New York: The Twentieth Century Fund, 1965).

plans were an insignificant deterrent to voluntary separations; although there was strong evidence that many felt that the non-vesting element in their pension plans was a significant factor in the refusal of job candidates to accept positions at their institutions.

Thus, in general, investigators have concluded that pension plans have not significantly restrained employees from voluntarily leaving jobs.

Statement of the Problem

The value of a pension plan participant's retirement benefit in almost all pension plans is directly related to the length of service and/or earnings of the participant while in the service of the employer. Thus, variation exists in the amount of benefits received at retirement by participants within the same plan. Also, at any point in time, participants having non-vested status within the same plan will have different lengths of service and different earnings. Since retirement benefits are related to service and/or earnings, non-vested participants face different retirement benefit losses upon separation. Furthermore, such factors as participant age, proximity to vesting, etc., affect the value of a non-vested participant's retirement benefit loss upon separation. Thus, assuming that retirement benefit losses influence the strength of the impediment to mobility, participants within the same plan are subject to different pension mobility restraints.

Hypothesis

In the studies mentioned earlier, investigators did not test for a relationship between participant's non-vested retirement benefit losses and mobility. Rather the tests were conducted basically to measure the strength of impediment to mobility provided by pension plans per se.

The hypothesis this study is designed to test is that the significant impediment to labor mobility does not lie in the pension plan per se, but is to be found, rather, in the income value of retirement benefits lost through separation.

Purpose of the Study

It is the purpose of this study to identify the factors determining the value of participant retirement benefits, and to test for a relationship between participant non-vested retirement values and impediment to mobility.

Using established tools of economic analysis to develop a model of the pension mobility hypothesis, quit-rate data collected from two samples of university faculty (one sample composed of schools using deferred vesting plans; the other composed of schools using vested plans), are examined and analyzed.

In Chapter II, the pension-labor mobility hypothesis is developed. The analysis depicts benefits received by pension plan participants at retirement as deferred income. It is shown that where pension plans fully and immediately vest employer contributions, such contributions are

correctly considered as deferred income in lieu of current wages and, as such, impart no impediment to labor mobility. However, it is further shown that under deferred-vested and non-vested plans, employers' contributions cannot be considered as payment in lieu of current wages and non-vested participants are subject to retirement benefit losses upon separation. It is the value of the loss of retirement benefits incurred by the non-vested participant upon separation that is the ingredient within pension plans that gives rise to the pension-mobility hypothesis. The balance of the chapter identifies those factors which determine the value of retirement income of non-vested participants.

The literature dealing with pension plans is examined in Chapter III. Investigators have used two general approaches to test the effect of plans on labor mobility. Under the first approach, investigators elicited the opinions of employees and employers in situations where incompletely vested plans are used. The second method involves measurement of the effect of plans on participant separation rates.

The procedure, data, and results of each study are examined and critically evaluated.

In Chapter IV, the pension-mobility hypothesis developed in Chapter II is tested by comparing the quit-rates of a sample of faculty belonging to the State

Universities Retirement System of Illinois as against the quit-rates of a sample of fully-vested faculty at other mid-western universities. The test period included the academic years 1964-65, 1965-66, and 1966-67, when the Illinois plan vested benefits upon completion of ten years of service. Although the quit-rates were higher for the non-vested faculty sample as compared to the vested sample quit-rates, the trend of quit-rates by year of service (a surrogate for non-vested income value in the non-vested sample), decreased more rapidly for the non-vested sample than for the vested. Thus, the test supported the pension-mobility hypothesis developed in Chapter II.

Conclusions and recommendations for further research are covered in Chapter V. Because of the complexity and diversity of pension plans, it is suggested that the effect on the mobility of participants in one plan, due to the loss of retirement benefits incurred upon separation, cannot be projected to non-vested participants in all incompletely vested plans. Research on the possible differing effect on mobility of various types of contribution, vesting, and benefit formula provisions among incompletely vested plans is suggested. Of particular importance is the need for research on the effect on the mobility of vested participants that might occur as a result of periodic improvements in benefit formulas.

CHAPTER II

THE THEORETICAL FRAMEWORK

A number of studies have been made to test the hypothesis that the lack of immediate vesting of employers' contributions to employee's retirement funds inhibits labor mobility.[1] These studies have centered on two issues: (1) the retirement losses incurred if a laborer loses the non-vested portion of his pension, and (2) the extent to which these pension losses impede mobility. Although some of the studies mention the impact of non-vested pensions on the allocation of resources, none has attempted to explain how this impact prevents society's attainment of maximum economic efficiency. It is the purpose of this chapter to explicate the effect of incomplete vested pension funds on economic efficiency.

Since the possible effect of incomplete or non-vested funds falls on the allocation of the labor resource between firms having separate pension systems, the initial

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[1] Parnes, "Workers Attitudes to Job Changing . . .," Chapter III; Ross, "Do We Have a New Industrial Feudalism, p. 903; Lurie, "The Effect of Non-Vested Pensions on Mobility . . .," pp. 224-237; Rubin, Pensions and Employee Mobility in the Public Service.

analysis will be limited to the efficient allocation of the labor resource between such firms. Resources will be considered as being efficiently allocated if, at any point in time, the value of output that conforms to the community's preferences cannot be increased by the reallocation of existing resources.[2]

The analysis will begin with the statement of the conditions of maximum economic efficiency in the allocation of resources and proceed to analysis of the effect of incomplete and non-vested pension plans on the attainment of maximum economic efficiency.

Efficiency Conditions

Assumptions:

1. Perfectly competitive market conditions.[3]
2. Two firms, I and II.
3. One product, x.
4. One input, labor, a (a labor unit).

Utilizing the marginal analysis, the condition of optimal resource allocation is as follows:

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[2]Bela Balassa, "Success Criteria for Economic Systems," in Comparative Economic Systems, ed. by Morris Bornstein (Homewood, Illinois: Richard D. Irwin, Inc., 1965), p. 5. The use of the static efficiency measure of optimal resource allocation is traditional in economics. This definition capsulizes the meaning of welfare maximization in pure welfare theory.

[3]This assumption encompasses all of the conditions of perfect competition plus the institutions of a market system.

$$(1) \quad VMP_{a_x}{}^{I} = VMP_{a_x}{}^{II}$$

$$\text{or } MPP_a{}^{I} \cdot P_x = MPP_a{}^{II} \cdot P_x$$

where $VMP_{a_x}{}^{I}$ is the value of the output attributed to the last unit of labor employed in the production of x in firm II.

A test of the optimality of equation (1) can be made by assuming the following condition:

$$(2) \quad VMP_{a_x}{}^{I} > VMP_{a_x}{}^{II}$$

$$\text{or } MPP_a{}^{I} \cdot P_x > MPP_a{}^{II} \cdot P_x$$

In statement (2), the value of the output attributed to a unit of labor in firm II in the production of x is less than in firm I. Therefore, the community's output of x would be increased through successive transfers of a from firm II to firm I until the change in total output of x attributed to the last unit of a employed by firm I, $(MPP_a{}^{I})$, is equal to the $MPP_a{}^{II}$. When this occurs, condition (1) is attained which is a resource allocation optimum in the sense that the resource a is allocated between two firms producing the same product, in such a way as to maximize a's value in production.

By removing assumptions (2) and (3) and expanding the analysis to firms in separate industries, the following inter-firm resource allocation condition for optimum efficiency holds:

$$(3) \quad VMP_{a_x}{}^{I} = VMP_{a_y}{}^{III}$$

where $VMP_{a_x}{}^{I}$ is the value of the output attributed to the last unit of labor employed in the production of x in firm I and, $VMP_{a_y}{}^{III}$ is the value of the output attributed to the last unit of labor employed in the production of y in firm III. From equation (1), the value of the marginal product of a in firm I producing product x is equal to the value of the marginal product of a in firm II producing product x. Therefore, the value of the marginal product of a in the production of x in firm II must be equal to the value of the marginal product of a in the production of y in firm III when a is efficiently allocated.

This allocation condition can be expanded to include all firms in all industries that use resource a as follows:

$$(4) \quad VMP_{a_x}{}^{I} = VMP_{a_x}{}^{II} = VMP_{a_y}{}^{III} = \ldots = VMP_{a_z}{}^{n}$$

where z represents all products that use a as an input and n represents all firms using resource a. If an inequality exists between the value of output attributed to the marginal unit of a between firms, then the maximum value of output would be increased by transferring a from firms where a's contributive value in production is greater.

The stimulant that motivates the transference of a can be ascertained from the following optimal condition:

$$(5)\quad VMP_{a_x}{}^{I} = VMP_{a_x}{}^{II} = VMP_{a_y}{}^{III} = \ldots = VMP_{a_z}{}^{n} = W_a{}^{n}$$

where W_a is the remuneration received by a for its production contribution. This remuneration is equal to the present money value of the production contribution of the labor unit, which is in turn equal to the labor units' highest opportunity cost in present money value terms. A behavioral condition of the market system that is implicit in condition (5) is that labor will attempt to maximize the present value of its remuneration. Given this condition, concomitant with the other conditions of a perfectly competitive market system, any change in the VMP_a in any firm will result in a change in the W_a for that firm and cause a movement of a from or toward that firm dependent on whether the VMP_a to the firm has risen or fallen. Thus, a in quest of higher remuneration will move from lower to higher paying firms and in this manner the efficiency condition of equation (5) is approached.

Pensions and the Efficiency Conditions

One of the assumptions of perfect competition must be made explicit before analyzing the affect of incomplete and non-vested pension plans on the efficient allocation of resources. Perfect competition assumes awareness of market conditions on the part of buyers and sellers. Kenneth Boulding describes this awareness assumption as follows:

> A competitive market is also one in which the buyers and sellers are in close contact. This means that there must be knowledge on the part of each buyer and seller of the prices at which transactions are being carried on, and on the prices at which other buyers and sellers are willing to buy and sell. It means also that there must be opportunity to take advantage of that knowledge.[4]

In the context of this study, this assumption means that a laborer is aware of the present value of his remuneration and is also aware of his opportunity income elsewhere. Further, the condition assumes that a laborer is not impeded from taking advantage of his best opportunity, i.e., if his opportunity income is higher in other employment, he must be free to move to such employment.

The opportunity remuneration to labor may be received in a variety of forms, of which present money income is the primary form in this nation. However, as noted above, millions of workers accept a portion of their current remuneration in the form of pension credits in lieu of current cash payment for their services. When the pension credits are fully and immediately vested, title to the entire employer's current contribution passes immediately from the control of the employer and into the employee's account. From the employee's viewpoint, gaining immediate title to the employer's current pension contribution permits him to terminate his employment without

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[4]Kenneth E. Boulding, Economic Analysis (3rd ed.; New York: Harper & Brothers, 1955), p. 46.

losing title to the employer's contribution. Mobility of labor is not hindered because of the full and immediate transfer of the employer's current pension contribution to the employee's ownership. An accurate measurement of the current remuneration value of the employer's contribution can be made. Therefore, the necessary condition for economic efficiency of buyer's and seller's having knowledge of the prices of transactions is not obstructed by a fully and immediately vested pension plan. Thus, the maximum efficiency condition as noted in equation (5) holds since, given knowledge by buyers and sellers of the prices of transactions, the employer's current contribution to the employee's pension fund must be equal to the present cash remuneration given up by the employee in lieu of pension credits.[5]

Rewriting equation (5) to include fully and immediately vested pension credits as a part of labor remuneration, the maximum efficiency condition is as follows:

$$(6)\quad VMP_{a_x}^{I} = CC_a^{I} + CV_a^{I} = CVR_a^{I} = VMP_{a_x}^{II} = VMP_{a_y}^{III} = \ldots VMP_{a_z}^{n} = W_a^{n}$$

where: CC_a^{I} = the current cash remuneration to labor, a, in firm I producing product x.

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[5]Competition among laborers and among firms will assure this equality.

CV_a^I = the current value of the current employer's contribution to the employee's pension fund

CVR_a^I = the current value of the employee's total current remuneration

As was noted previously, this is an equilibrium condition and any increase in the VMP_a in any firm, including firm I, will cause a movement of labor from other firms to that firm, generating a new equilibrium efficiency position symbolized by equation (6).

Incomplete Vesting and Economic Efficiency

An incompletely vested pension plan can be defined as one in which the employee does not receive full and immediate title to an employer's current pension contribution in lieu of current cash. Because of the variety of forms that incomplete vesting may take, the foregoing definition permits application of results of the following analysis of the effect of one such plan on economic efficiency to all incompletely vested plans.

The analysis begins with the following illustration:

Assume the following:

1. A $500 employer contribution is deposited at the end of each period of covered employment into an employee's retirement fund.
2. The employer's contribution is fully and immediately vested.

3. The pension credits earn 4% interest, compounded periodically.
4. The employee's current cash remuneration is $10,000 received at the end of the period.

Now, assume that the pension plan, although funded by the employer, is completely non-vested until the end of the twentieth year. When pensions are not fully and immediately vested, complete title of the employer's contributions does not immediately pass to the employee's pension fund. In fact, from the employee's viewpoint, the pension contract can be viewed as a firm commitment by the employer to contribute to the employee's retirement income stream an amount of money whose present value at the end of the twentieth year is $14,889. If the employee leaves his position any time prior to the close of the twentieth year, the present value of the retirement income stream is zero. Therefore, the non-vested portion of an employer's current contribution to an employee's pension fund cannot be precisely valued as is the case with vested pension credits. This is not to say that non-vested contributions to a pension plan have no value to an employee. But, the non-vested credits have a measurable value only when the employee has fulfilled specific covenants stipulated in the pension contract. In this example the stipulation is twenty years employment. When covenants such as these are fulfilled, non-vested credits

become vested and assume a measurable present value. It is the possibility of transferring non-vested credits to vested credits at the vesting date (or at retirement) which gives the non-vested credits value. For without it, the value of non-vested credits to the employee would be zero, and he would suffer no loss upon terminating his employment. It is the incapability of full and immediate transfer of non-vested credits to vested credits that causes non-vested credits to have a different current remunerative value than vested credits. Therefore, referring to Table 1, when the plan is completely vested, the employee is continually capable of measuring precisely the employer's current contribution, $500 at the end of each year. The summation of the employer's current pension contribution of $500 and the assumed current cash remuneration of $10,000 yields a current value of the employee's remuneration of $10,500 which is equal for all employees. This equality is a necessary condition for economic efficiency as noted in equation (6).

If, however, the assumption is made that the pension plan is completely non-vested until the end of the twentieth period of covered employment at which time it fully vests, then an employee who reaches full vestment would have a current value of remuneration in that time period equal to $14,889 plus his current cash remuneration. Employees prior to the full vesting period would have a

TABLE 1.--Contribution and benefit data for a hypothetical pension plan.

End-of-Year	Employer's Current Contribution	Employer's Cumulative Contribution	Cumulative Interest	Present Value of Retirement Income
1	$500	$ 500		$ 500
2	500	1,000	$ 20	1,020
3	500	1,500	41	1,561
4	500	2,000	62	2,123
5	500	2,500	85	2,708
6	500	3,000	108	3,316
7	500	3,500	133	3,949
8	500	4,000	158	4,607
9	500	4,500	184	5.291
10	500	5,000	211	6,003
11	500	5,500	240	6,743
12	500	6,000	270	7.513
13	500	6,500	301	8,313
14	500	7,000	333	9,146
15	500	7,500	366	10,012
16	500	8,000	400	10,912
17	500	8,500	436	11,849
18	500	9,000	474	12,822
19	500	9,500	513	13,835
20	500	10,000	553	14,889

lower current remuneration value, although their contribution value to output would be equal to the vesting employee's contribution value. Therefore, the necessary condition for economic efficiency of laborers receiving a current remuneration value equal to the VMP does not hold, and economic efficiency cannot exist. Only one type of pension plan can meet this condition, and that is the plan that incorporates full and immediate vesting of the employer's current contribution.

Furthermore, firms operating under competitive conditions must pay labor the market determined wage rate for current services equal to the value of the marginal product. If a firm offers a current remuneration lower than the market rate, employees will leave the firm to accept employment elsewhere. Thus, each firm is in competition with other firms for all labor including its present employees..

However, when a portion of the firm's current remuneration to employees is in the form of non-vested pension credits, the firm is no longer in perfect competition with other firms for the services of its employees. Although the non-vested credits have current value to the employee, the value is only realized by the employee if he remains with the firm until the credits vest. Thus, the employee has lost his complete freedom to choose employers based upon realized current remuneration because of the potential future retirement income loss incurred if he leaves

his employer. In essence, the employer is not in competition with other employers for his employees' services. Rather, he is in a monopsonistic position with his employees and can use his monopsony position to his advantage by paying his employees less than the competitive wage. Note that his monopsony position does not hold for prospective employees but only for those already in his employ. The factors that determine the extent of the employer's monopsony power will be discussed in the next section.

Non-vested Pensions and Labor Mobility

A second necessary condition for the attainment of economic efficiency is labor mobility. An employee is not inhibited by his present pension plan from accepting employment elsewhere if the credits are vested. When pension funds fully and immediately vest, the employee holds title to all employer pension contributions to the employee's account. Referring to the data in Table 1, if the employee terminates after the sixteenth year, the present value of his retirement income would be $10,912, the same as it would be if he continued in his present employment. Therefore, the fully and immediately vested plan does not impede the employee from terminating his present employment.

Now consider the effect upon labor mobility when the pension plan is completely non-vested until the end of the twentieth period, at which time it fully vests. It is the loss of the present value of the non-vested credits that inhibits an employee from quitting his job. Thus, it is important to enumerate the factors that influence the present value of an employee's non-vested pension credits.

The first factor is the present value of the future income stream at the time of vesting. Ceteris paribus, the higher the present value at the time of vesting, the higher the retirement income loss to the employee if he terminates his employment before vesting.

The second factor is the relationship between the present value of an employee's non-vested pension credits and his degree of certainty of attaining title to the credits. The objective measure of the degree of certainty is the additional time the employee must spend in covered employment until the complete vesting of his pension credits is attained. When credits are fully and immediately vested, the employee's probability of obtaining title to the pension credits is one. However, when the pension credits vest in the future, the certainty of attaining ownership is reduced and the probability of obtaining title to the pension credits must be less than one. Furthermore, all other things equal, the shorter

the time period to vesting, the higher the probability of attaining vesting and, therefore, the higher the present value of the non-vested credits (and the higher the impediment to mobility).

Two objective factors influence the present value of the non-vested credits: (1) the present value of previously non-vested credits at the moment of complete vesting and, (2) the additional time the employee must spend in covered employment until the complete vesting date.

A third factor that influences the employee's present value of non-vested credits is the employee's subjective valuation of the probability of his attaining ownership of the pension credits. Such variables as the physical environment of the workplace, the prospect of advancement, the prosperity of the firm, etc., may affect the employee's measure of the pension credit value. It is impossible to weigh the influence of such variables, but it is important to recognize their existence.

Summarizing, the present value of non-vested pension credits, p (PV_v), is a function of:

1. The value of non-vested credits at the moment of full vesting,
2. The additional time in covered employment until full vesting, and
3. the employee's subjective probability of attaining full vesting.

Since p (PV_v) is a loss at the employee's employment termination, its value must be realized (included in opportunity income) before he would move. The loss is a lump-sum amount, and need not be made up at the time of change in employment but over a time period. The relevant time period for consideration is the employee's work-life expectancy. To compensate the employee requires that the present value of the expected remuneration differential to retirement be,

$$(7) \quad CVR_a^{II} - CVR_a^{I} > p\,(PV_{Va})^{I} \div \frac{1 - (1 + i)^{-n}}{i}$$

where: CVR_a^{II} = the current value of the employee's total current remuneration with the new firm

CVR_a^{I} = the current value of the employee's total current remuneration with the present firm

$p\,(PV_{v_a})^{I}$ = the employee's present value of the non-vested pension credits

$\frac{1 - (1 + i)^{-n}}{i}$ = the present value of \$1.00 per period recieved at end of each period.

If, $p\,(PV_{v_a})^{I}$ = \$10,000, i = 4%, and n = 30, we have:

$$CVR_a^{II} - CVR_a^{I} > \$10{,}000 \div \frac{1 - (1 + .04)^{-30}}{.04} = \$578$$

Given condition (7), the employee would have to be offered a new salary where the current value exceeds his present salary by \$578, assuming the differential will remain

constant to retirement. If the differential increases over time, then the necessary initial differential would be less. The required differential is the measure of the monopsony power of the employee's present employer. A change in any of the other assumptions would alter the size of the necessary differential. Thus,

1. An increase in p (PV_{V_a}) will result in an increase in the required differential.
2. An increase in $\underline{i}$ will result in a decrease in the required differential.
3. An increase in $\underline{n}$ will result in a decrease in the required differential.

When non-vested credits vest prior to the employee's retirement, an additional consideration is posed. Although an employee will benefit from accepting a new position, (condition 7), the employee will increase his gain by terminating after vesting takes place if the following condition exists:

$$(8) \quad R > \Delta V - \left[\frac{X - \frac{\Delta V\,(1+i)^{\delta-1}}{i}}{\frac{1-(1+i)^{-n}}{i}} \right]$$

where: R = the increase in remuneration per year over his present remuneration after vesting

X = the present value of pension credits at the time of vesting

ΔV = the difference in yearly remuneration between a current job offer and his current employment

q = the number of years until vesting

n = the number of years after vesting until retirement

i = the rate of interest

Let: $X = \$10{,}000$, $\Delta V = \$1{,}000$, $q = 2$ years, $n = 28$ years, and $i = 4\%$, we have:

$$R > \$1{,}000 - \left[\frac{\$10{,}000 - \frac{\$1{,}000\ (1 + .04)^{2} - 1}{.04}}{\frac{1 - (1 + .04)^{-28}}{.04}} \right] = \$523$$

Thus, if the employee believes that he will receive an offer at the time of vesting that is in excess of $523 per year over his present job, then he should not accept at the present time an offer paying $1,000 per year more than what he is receiving in his present job.

The isolation of influential variables is necessary to test the mobility hypothesis of the effects of vesting and non-vesting of pension funds. The variables chosen for this study were selected after an analysis of other studies concerned with the pension mobility hypothesis. Therefore, the impediment to labor mobility increases

1. the higher the present value of a non-vested pension fund at the time of full vesting.
2. the shorter the necessary time to full vesting, and
3. the shorter the work-life expectancy of the employee.

CHAPTER III

PENSION-MOBILITY STUDIES

Although many economists have suggested that non-vested pension credits inhibit the mobility of labor, relatively few authors have attempted to verify the hypothesis. Probably the major reason for the limited number of studies in this area is that only recently has a high percentage of the labor force gained pension plan coverage. Thus, the possibility of non-vested funds impeding the mobility of a significant percentage of the labor force is a relatively new problem. The newness of pension-mobility studies attests to the validity of this explanation. If the trend of expanding coverage and benefits persists without significant liberalization of vesting provisions, it can be assumed that more surveys will be forthcoming.[1]

Two conditions are necessary for validation of the pension-mobility hypothesis. First, workers must be

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[1] U. S. Department of Labor, Labor Mobility . . ., Chart 1, p. 5. In 1946, less than four million workers (approximately seven per cent of the civilian labor force) were covered by private pension plans. By 1960, the number of covered workers had increased to about 15 million (approximately 23 per cent of the civilian labor force).

aware of the value of their non-vested credits, and secondly, the knowledge of the potential loss must tie them to their current employment. If the first condition is not satisfied, the second is not relevant. Accordingly, studies concerned with ascertaining the value that employees assign to compensation in the form of pension credits, while not directed specifically at testing the pension-mobility hypothesis, do yield insight with respect to the hypothesis' validity.

When investigators have attempted to test the pension-mobility hypothesis, two general approaches have been utilized. First, opinions have been elicited from employees, and management personnel, who might possibly be affected by non-vested pension funds. For example, employees covered by non-vested plans have been asked if loss of pension credits would be a significant deterrent to accepting another job. The second approach has been a comparison of quit-rates for employees with non-vested plans as against quit-rates of those employees where such plans do not exist. If the quit-rates for non-vested plans are significantly lower than for employees with vested plans, the pension-mobility hypothesis is verified.

Opinion Studies

Wagner and Bakerman obtained workers' opinions, concerning the value of various types of compensation, by interviewing 300 members of the United Steelworkers

(AFL-CIO), and 300 members of other unions in the Pittsburgh area, May-June, 1959.[2] The age distribution of respondents was selected to conform to the age distribution of all workers employed in the primary and fabricated metals industry.

The first question asked was: "Would an increase in fringe benefits satisfy you as much as a direct wage increase if it amounts to the same in dollars and cents?" Of the total number of responses, 91.0 per cent of the steelworkers and 79.7 per cent of the non-steelworkers were positive.[3]

For the second question: "Does your union stress fringe benefits too much compared with wage increases, or not enough?", the responses were as depicted in Table 2.

Finally, the workers were asked to rank four benefits which they considered most important. After a simple weighting of choices, Table 3 depicts the results.[4]

As indicated in Table 3, pensions ranked first among fringe benefits by weighted percentage in both samples. Also, although not depicted in Table 3, in both

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[2]Ludwig A. Wagner and Theodore Bakerman, "Wage Earners' Opinions of Insurance Fringe Benefits," The Journal of Insurance (June, 1960), pp. 17-28.

[3]All statistics quoted in the text are from Wagner and Bakerman, "Wage Earners' Opinions . . .," pp. 19-22.

[4]Weighting was as follows: four for first, three for second, two for third, and one for fourth.

TABLE 2.--Opinions of union stress on fringe benefits compared to wage increases.

Opinions of Union Stress	Steelworkers Number	Steelworkers Per cent	Non-steelworkers Number	Non-steelworkers Per cent
Too much	7	2.3	17	5.7
Not enough	147	49.0	112	37.3
Just right	143	47.7	167	55.7
No answer	3	1.0	4	1.3
Total	300	100.0	300	100.0

Source: Adapted from Wagner and Bakerman, "Wage Earners' Opinions . . .," p. 20.

TABLE 3.--Relative preferences for selected fringe benefits amongst steelworkers and non-steelworkers, Pittsburgh, May-June, 1959.

Fringe Benefits	Steelworkers	Non-steelworkers
Pensions	32.9	33.1
Group life and health	27.0	25.7
Group major medical	12.0	11.6
Vacations	6.5	8.4
Separation pay	1.0	2.7
Supplementary Unemployment	11.6	9.2
Guaranteed annual wage	9.0	9.3
Total	100.0	100.0

Source: Wagner and Bakerman, "Wage Earners' Opinions . . .," p. 22.

samples, pensions were ranked first by a weighted percentage for all age groups. Pensions were ranked first by 55 per cent of the steelworkers, and by 58 per cent of the non-steelworkers.

In a follow-up interview of 50 steelworkers in August, 1959, at the time of the steelworkers' strike, 66.0 per cent ranked pensions first among the seven suggested fringe benefits.

At first glance, Wagner and Bakerman's findings strongly suggest that workers prefer compensation increases in the form of fringe benefits rather than wages. However, as with all surveys, there is the possibility that the sample was biased. As Wagner and Bakerman themselves indicated, there had been a great deal of discussion in the Pittsburgh press, prior to and during the interview period, concerning the inflationary affects of wage increases. Therefore, it is possible that the respondents were convinced that increases in fringe benefits would be less inflationary than wage increases, and that the benefit obtained from wage increases would be reduced by rising prices. However, although one cannot generalize from the study, that all workers favor fringe benefit increases over wage increases, Wagner and Bakerman's findings cast doubt on the opposite belief that workers overwhelmingly prefer wage increases to fringe benefit increases. It seems that worker preference may

depend upon a number of factors of which inflation is one such factor.

Although expressing surprise that the majority of respondents selected pensions as the most important fringe benefit, Wagner and Bakerman did not offer an explanation for the choice. Normally, one might expect benefits such as a guaranteed annual wage or supplementary unemployment compensation to be rated higher than pensions by younger workers. Lower seniority status concomitant with cyclical and seasonal output fluctuations incur greater layoff possibilities to the young. Yet, for workers under age 30, pensions almost equalled the combined ratings of both for steelworkers, and almost doubled their combined ratings in the non-steelworker sample.

One possibility for the high rating of pensions suggested by Wagner and Bakerman, is that a pension is one fringe benefit that the worker hopes to collect. All other fringe benefits covered in this study, with the exception of vacations, are benefits which usually occur because of a calamity. It is possible that man does not predict misfortune for himself; therefore, benefits such as life and health insurance, unemployment compensation, etc, might have a negative appeal lacking the strength of blissful Florida retirement. Also, with increasing life expectancy coupled with a trend towards earlier retirement, the probability of having a longer retirement life is rising.

Also, pension credit compensation, if vested, is a form of saving. Unionized workers in the primary metals industry are at income levels well above the mean average income of workers in the nation. Therefore, if the propensity to save is higher among workers in the higher income brackets, then one might expect such workers to more readily accept income increments in the form of pension credits than lower income workers. Furthermore, pension credit compensation is not considered income by the Internal Revenue Bureau and, therefore, is not taxable as is the case with wages. Although the income from pensions is taxable upon retirement, workers stand to gain by deferring such tax payments.

In summary, although the Wagner and Bakerman study did not specifically attempt to test the pension-mobility hypothesis, it did offer some evidence to validate the hypothesis. Workers preferred increases in pension benefits over increases in regular wages.

Evidence contrary to the Wagner and Bakerman findings regarding the strength of pensions was found by Herbert Parnes.[5] From February through July of 1958, Parnes conducted interviews with a sample of workers employed at two metal-fabricating firms in Columbus, Ohio. The output, working conditions, wages, characteristics of

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[5]Parnes, "Workers Attitudes to Job Changing. . .," pp. 45-80, 182-189.

employees, and other conditions were similar in both establishments, the fundamental difference being that one provided its employees with a pension plan, while the other did not.[6]

Among several queries put to the workers, one directly pertained to the pension-mobility hypothesis. Respondents were asked whether they would accept an identical position elsewhere in Columbus at 30 cents an hour above the present wage. Unqualified refusals came from 59 per cent of the 97 workers interviewed from the non-pension plan firm and from 60 per cent of the 93 workers in the firm with a pension plan. When asked why they refused, none of the respondents mentioned the potential loss of pension rights. With regard to why they might return to work at their present firm, after being laid off and having an identical job elsewhere in Columbus, over 50 per cent of the workers employed by the firm having the pension plan said that they would return. None of the respondents mentioned the pension plan as a reason for returning. Parnes concluded, mainly on the strength of the responses to these two questions, that pensions

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[6] Ibid., p. 185. Employees, upon retirement at age 65, received a monthly benefit equal to (a) $.50 times the number of years of service until age 40, plus (b) $1.00 times the number of years of service from age 40 to 65. The foregoing benefit formula was doubled just prior to Parnes' study. Pension credits vested after 15 years of service.

were of little importance in attaching production workers to their jobs.[7]

It is necessary to make but a single comment concerning the merit of Parnes' pension-mobility study. If pension credit losses are to be an inhibiting factor to the mobility of labor, their value must be relatively important to the employee. The pension plan in Parnes' study was initiated by the firm in January, 1956, and the benefit formula was liberalized in early 1958, resulting in a 100 per cent benefit increase. All respondents were in the 35 to 50 age bracket. The maximum monthly retirement loss at age 65 that any respondent could incur if he quit his job at the time of the interview was $3.00 per month.[8] It seems inconceivable that a $3.00 per month loss at age 65 would impede any worker from leaving a job, let alone workers 50 years of age and under.

The most important condition for an accurate test of the pension-mobility hypothesis was absent in the Parnes' test, i.e., non-vested credits must be significantly high enough to be of importance to the individual employee. Parnes' study, regarding the mobility inhibiting effect of pension plans, borders on sophistry.

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[7] Ibid., p. 77.

[8] n. 6. Assuming age 40 when the plan began in January, 1956, the $3.00 per month benefit was computed as follows: $1.00 per month times two years of service plus $2.00 per month times one-half year's service.

In Oregon, in 1962, an opinion survey of faculty members of State Institutions of Higher Education was conducted by Mark Greene.[9] There were 1,850 replies to a mail questionnaire covering approximately 2,500 faculty members. Respondents were covered by the Oregon Public Employees Retirement System. The plan is contributory, with the state matching the employee's six per cent contribution. The employer's contribution vests after ten years of service.[10]

Although Greene did not specify the exact phrasing, respondents were asked questions concerning the importance of delayed vesting with respect to whether they would accept an offer from another institution. Table 4 summarizes the replies to such questions.

The data suggest that length of service had little effect on the strength of non-vested credits in inhibiting labor mobility. Greene, however, did not specify what questions were asked but merely stated that employees were asked questions concerning the importance of vesting to them. If employees' responses were based upon their present situation, then it is interesting to find that faculty having ten or more years of service would consider non-vesting a problem since the Oregon plan vests at the

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[9]Mark Greene, "Fringe Benefits or Salary," Journal of Marketing (October, 1963), pp. 63-68.

[10]Ibid., p. 64.

TABLE 4.--Importance of delayed vesting in a decision to accept an outside offer.

Length of service	No answer	Per cent Saying Vesting is of				Total
		Great importance	Moderate importance	Little importance	No importance	
Service not given	58.8	0.0	17.6	17.6	5.9	17
1-5 years	8.9	7.3	22.7	27.8	33.2	722
6-9 years	10.8	8.9	28.0	27.4	24.6	325
10-15 years	11.8	7.8	23.6	30.4	26.4	398
16-20 years	19.0	12.0	26.6	24.5	17.9	184
Over 20 years	16.7	8.8	26.5	28.4	19.6	204
Total	12.2	8.3	24.6	27.9	27.0	1850

Source: Taken from Greene, "Fringe Benefits or Salary," p. 67.

end of 10 years of service. If they were asked to assume that their pension credits were non-vested, then it is equally interesting to find such little importance placed upon non-vested credits, by many long service employees. Thus, it seems that respondents differed in their interpretation of Greene's questions. Some respondents answered with respect to their present employment within the Oregon plan, whereas others assumed they were not to consider their present vested or non-vested position. Thus, Greene's findings seem irrelevant to the general problem raised in this chapter.

In a 1964 survey, Harold Rubin studied the impact of pension plans on the mobility of public employees in professional job classifications.[11] Unlike the studies which solicited a sample of employees' opinions, Rubin restricted his inquiry to new personnel.[12]

By means of a mail questionnaire, employers were requested to provide data concerning (1) the number of applicants who declined offers, (2) the number who specifically mentioned pensions as a factor in their declination, and (3) the number of salary increases offered to applicants

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[11]Harold Rubin, Pensions and Employee Mobility in the Public Service.

[12]Ibid., pp. vii-viii. Public agencies surveyed included health, welfare, education, employment security, and agriculture, in the five largest cities and five largest states in the nation. Also, a selection of public colleges and universities in California, New York, Pennsylvania, Illinois, and Ohio was included.

in an effort to offset pension credit losses.[13] Thus, Rubin tested a combination of two impediments: (1) the restraining influence that non-vested plans impart in the hiring of personnel; and (2) the restraining influence that non-vested plans have on personnel considering termination.

Relatively few employers reported pensions as a factor in job offer refusals, and still fewer reported that salary increases had been used to offset employee pension losses.[14] Two factors, however, cast doubt as to the accuracy of the respondents' reports.

First, the low incidence of the pension factor as a condition of employment may have been due to an absence of accurate record keeping by employing agencies. For example, 8 out of 51 institutions of higher education in the State University of New York System accounted for all of the job declinations where pensions were a factor. All New York State Colleges and Universities are covered by the same retirement plan. It seems improbable that 43 of the 51 responding institutions would not have any pension declination cases.[15] Furthermore, the experience of one University in the New York State System was revealing.

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[13] Ibid., p. 94.

[14] Ibid., pp. 21-62. In general, there was no significant difference between the educational and non-educational responses.

[15] Ibid., p. 25. The 51 institutions of higher education in the New York State System responding to the

The State University at Buffalo had been the private University of Buffalo until 1962, at which time it joined the New York State System. When privately controlled, the university had a TIAA-CREF retirement plan which was discontinued at the time of entrance into the New York State System. After becoming a part of the New York State System, the State University at Buffalo continued its policy of recruiting faculty from private colleges and universities where TIAA-CREF is the predominant plan. Three-fourths of the reported declinations where pensions were a factor were accounted for at the State University of Buffalo. Approximately 50 per cent of the rejected offers at Buffalo were wholly or partly attributed to the pension factor.[16] Since TIAA-CREF plans are fully vested, it cannot be assumed that applicants refused positions at Buffalo because of the loss of pension credits due to separation from their present schools. Rather, it seems that two factors must have been responsible: (1) the inability to continue contributing to TIAA-CREF; and (2) the 15-year vesting period in the New York Retirement System.

The second reason that casts doubt on the statistically reported overall irrelevance of the pension factor

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questionnaire reported 600 job refusals and approximately 1 of 8 of the 600 refusals were partially or wholly related to pensions.

[16] Ibid., p. 25.

as an inhibiting force in the hiring of employees is the respondent's reply to a subjective question. The respondents were invited to give their opinions on the desirability of liberalizing vesting and transfer provisions in their retirement plan. More than 90 per cent of the respondents favored vesting and/or transfer provision liberalization. However, almost 75 per cent believed that liberalization would not affect employee turnover.[17] It seems that many of the respondents believed that vesting and transfer provision liberalization would be advantageous in hiring sought after personnel, but that it would not noticeably increase the rate of voluntary quits from their respective institutions. If such a high percentage of respondents wanted vesting and/or transfer provisions to be liberalized at their institutions in order to ease the hiring problem, then why did so few report that pensions were a factor in job offer refusals? The respondents' reports contain a measure of self-contradiction.

Rubin's findings concerning the experience of the University of Buffalo are enlightening. Pension plans may give rise to a fractionization of the labor market, especially of the professional labor market. Professional employees, if aware of the merits of fully vested plans and the relatively fast accrual of returns on

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[17] Ibid., p. 68.

contributions in such plans as TIAA-CREF, may limit their marketability to institutions having such plans.

Quit-Rates and Non-vested Funds

Melvin Lurie tested the pension-mobility hypothesis by comparing the voluntary quit-rates of college and university faculty employed at non-vested schools vs. the voluntary quit-rates of faculty from vested schools.[18] Lurie obtained pension and resignation data for faculty members in 10 departments at 339 colleges and 98 universities for the academic year 1959. By arbitrarily defining plans that did not fully vest within five years as non-vested, the sample contained 47 per cent vested schools and 53 per cent non-vested. Because of a variety of factors, other than loss of pension credits which could influence faculty resignations, the sample was standardized to attempt to isolate the pension variable.[19]

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[18]Lurie, "The Effect of Non-Vested Pensions on Mobility . . .," pp. 224-237.

[19]Lurie's "standardization" procedure was as follows: Within each university, factors such as geographic location, administrative control, research facilities, etc., would have approximately the same mobility affect on all faculty. However, faculty within an institution would have varying pension credit values. The greater the value of non-vested credits, the greater the impediment to quitting. Lurie did not have data on the value of pension credits, however, he assumed a service-pension credit value relationship, i.e., the longer the service, the greater the value of pension credits. Having no data on faculty length of service, he substituted rank for length of service. Thus, a double substitution was made, years of service for value of pension credits and rank for years of service. The higher the rank, the stronger the

The statistical results of Lurie's survey for all 437 institutions are summarized in Table 5.

TABLE 5.--Voluntary separation rates, according to length of covered service, in vested and non-vested institutions of higher education, 1959.

Relative Covered Service	Vested	Non-Vested	Ratio of Vested to Non-vested (sensitivity ratio)
Professor/Associate Professor	.311	.526	.591
Professor/Assistant Professor	.272	.273	.996
Professor/ Instructor	.135	.156	.865

Source: Melvin Lurie, "The Effect of Non-Vested Pensions on Mobility . . .," pp. 224-237.

If the value of non-vested credits inhibit faculty from leaving non-vested plan institutions, then the ratio of quit-rates in non-vested institutions should be lower than the quit-rate ratios in vested institutions. The data in Table 5 depicts the opposite. All the sensitivity ratios should be greater than unity if the pension-mobility hypothesis is to be validated. As the data indicate, all ratios are less than unity; therefore, the

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impediment to mobility within a non-vested institution. By dividing the quit-rate of professors by the quit-rate of each lower rank within an institution, Lurie obtained comparison ratios for each institution.

results seemingly invalidate the pension-mobility hypothesis.

However, Lurie arbitrarily defined all plans that did not vest within five years as non-vested. Many institutions have plans that at the time of Lurie's survey, vest after 10 or 15 years of covered service.[20] In such schools, a far higher percentage of full professors than those of lower rank would have attained a fully vested position. Therefore, if many such institutions were included in Lurie's sample, the results depicted in Table 5 may attest to the validity of the hypothesis rather than invalidate it. Certainly the low professor/associate professor sensitivity ratio, .591, attests to the validity of this possibility. It is logical to assume that a higher percentage of associates employed in schools that defer vesting are more proximate to obtaining full vesting than any other rank. Therefore, as a group, associates would be more tightly "locked in" than any of the other three ranks.[21]

Lurie disaggregated his vested and non-vested institution samples into college-university sub-samples and further sub-divided by type of administrative control. The results of the sub-division are depicted in Table 6.

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[20]See, William C. Greenough and Francis P. King, Retirement and Insurance Plans in American Colleges (New York: Columbia University Press, 1959).

[21]See the analysis on deferred vesting in Chapter II.

TABLE 6.--Faculty sensitivity ratios, according to length of covered service, in colleges and universities by type of control, 1959.

Relative Covered Service	Colleges		Universities	
	Private	Public	Private	Public
Professor/Associate	1.547	*	4.688	.654
Professor/Assistant	.986	.010	1.975	1.648
Professor/Instructor	.609	.002	2.279	1.014

*No voluntary separations at rank of associate professor among publicly controlled vested colleges.

Source: Lurie, "The Effect of Non-Vested Pensions on Mobility . . .," p. 230.

Note that the sensitivity ratios for universities, both public and private, are all greater than unity, with the exception of the professor/associate professor ratio for publicly controlled universities. This single exception again, given the number of public universities that vest after 10 to 15 years of service, may be a validation of the hypothesis rather than an invalidation. Also, there seems to be some inconsistency in Lurie's data, particularly the professor/associate professor sensitivity ratios. All of these ratios are larger than the aggregate ratio reported in Table 5.[22] The data in Table 5 are the aggregated information depicted in Table 6. How can each

[22]The professor/associate professor sensitivity ratio for publicly controlled colleges would be approaching infinity.

of the sub-divided samples have sensitivity ratios greater than the composite sample? This does not seem mathematically possible; the apparent contradiction, coupled with the inclusion of plans that vest after five years in the non-vested sample, seriously weakens the significance of Lurie's results.

In 1958, a study often quoted as shedding light on the pension-mobility hypothesis, was conducted by Arthur Ross.[23] The purpose of Ross's study was to ascertain whether the growth of seniority systems, health and welfare plans, and pension plans, had the effect of tying workers to their present positions.

Ross compared yearly quit-rates in manufacturing employment for the years 1910-1956. After adjusting for changes in the level of unemployment, a moderate reduction in the quit-rate was discernable in the 1950's. Ross ascribed the reduction in the manufacturing quit-rate to the following: (1) improved working conditions, (2) the aging of the labor force, (3) the stability of manufacturing employment, and (4) the effect of seniority rules in protecting the worker against replacement by a new worker. Ross did not directly challenge the pension-mobility hypothesis, rather he implied its invalidation

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[23]Ross, "Do We Have a New Industrial Feudalism," pp. 903,920.

by omitting pension plans as a cause in the declination of manufacturing employment quit-rates.

Although the factors suggested by Ross as influencing the decline in quit-rates have merit, they cannot be considered all-inclusive. By merely omitting the pension variable in his subjective analysis, Ross did not negate its influence.[24] Although Ross disclaimed the mobility inhibiting influence of non-vested pension plans, his procedure did not isolate the pension variable and, therefore, cannot be considered a test of the impact of pensions on labor mobility.

Concluding Remarks

The studies reviewed in this chapter have, on the whole, cast doubt on the validity of the pension-mobility hypothesis. However, the accuracy of findings are subject to rather damaging criticism. Wagner and Bakerman's survey, although giving some insight into employees' awareness of pension benefits, did not test the mobility restraining influence of pension benefits. Parnes' sample selection erased the possibility of his obtaining meaningful results. The responses to Rubin's queries were logically contradictory and Greene's results suggest respondents misinterpreted his questionnaire. Lurie's

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[24]Two other important factors omitted by Ross are increasing industry concentration and government economic policies.

inclusion of plans that vested after five years in his non-vested sample was akin to testing the braking power of a car by concurrently applying pressure on the accelerator as well as the brakes. Ross's test cannot be inferred as a test of the pension-mobility hypothesis since his procedure did not isolate the pension variable. Thus, it seems that little progress has been made concerning the empirical validation or invalidation of the hypothesis.

CHAPTER IV

EMPIRICAL TEST OF THE PENSION-MOBILITY HYPOTHESIS

Two general approaches typify the literature dealing with tests of the pension-mobility hypothesis. First, through questionnaires and personal interviews, investigators have endeavored to discover how cognizant workers are of their pension plans, and how important plan benefits are relative to other benefits in keeping workers in their jobs. Although this investigative technique is procedurely sound in isolating the pension variable, it does not directly measure the mobility inhibiting strength of non-vested pension credits. Rather, the investigator must translate workers' opinions of the value of pensions into mobility-impediment strength of non-vested plans.

The second technique involves comparison of quit-rates from non-vested employment with quit-rates where non-vested plans do not exist. This procedure does not suffer the opinion-method problem of transferring opinion to actual mobility-inhibiting strength of non-vested plans. It does pose greater difficulty in isolating the pension

variable, but by careful selection of samples, the influence of factors (other than non-vested pension credits) that might affect mobility can be mitigated. It is this procedure (specifically, comparison of voluntary separation rates of employees from non-vested employment with voluntary separation rates from vested employment) that will be used to test the validity of the hypothesis that the form of the pension plan affects mobility of university faculty.

Sample Selection

There are three requisites for a quit-rate test of the hypothesis: (1) a non-vested test sample, (2) a control sample, and (3) quit-rate data for both samples. Specific requirements that directly influence the selection of samples were as follows.

1. The non-vested plan selected must not be an atypical non-vested plan if the results of the test are to have general projective significance. Although pension plans are widely divergent with regard to participation, benefit requirements, and type and amount of benefits, the provision that is universal to all is the retirement benefit provision. The loss of the present value of retirement benefits is the major compensation loss incurred by the non-vested employee upon separation. Since the present value of non-vested credits is directly

related to benefits received at retirement, the investigator can destroy the projective applicability of his test results by selecting a non-vested plan sample yielding relatively low or high retirement benefits. In a recent Bureau of Labor Statistics survey of pension plans, retirement benefits among plans ranged from less than $10 per month to over $400 per month for participants having identical service and earnings histories.[1] Results obtained from a test utilizing data from a non-vested sample at either of these extremes would not be relevant to the economy. Therefore, in order to project test results, a primary criterion directing the selection of the non-vested sample was avoidance of plans paying atypical retirement benefits.

2. Since length of service is directly related to benefits in almost all plans, a second criterion directing the choice of the non-vested sample must be the life of the plan. Non-vested plans that meet the first criterion will not meet this second criterion if plan participants have not built up non-vested credit values to the point where their loss might impede voluntary separations.[2] Therefore, the second criterion that directed the choice

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[1]U. S. Department of Labor, Bureau of Labor Statistics, Private Pension Plan Benefits, Bulletin Number 1485 (June, 1966), Table 10, p. 32.

[2]This is a major criticism of both Parnes' and Ross's studies, discussed in the last chapter.

of the non-vested sample in this study was avoidance of plans with a limited history.

3. Factors recognized as affecting worker mobility may be broadly categorized under labor market conditions and personal characteristics of workers. More specifically, workers will tend to move into occupations, industries, regions, etc., that yield higher compensation, increased security, and better chance for advancement. Personal characteristics such as age, race, sex, marital status, education, and income, have recognizable influence on labor mobility. To minimize the influence of such variables and, therefore, to isolate the effect of non-vested pension credits on mobility, the vested sample must be as homogeneous as possible to the non-vested sample in all particulars affecting mobility.

4. Both samples must be large enough to insure statistically relevant results.

5. Finally, accurate voluntary separation data for both samples must be obtainable.

Non-vested Sample

With the aforementioned criteria as a guide, the non-vested sample selected for this study was comprised of faculty members, assistant professor and above, employed in ten departments at each of the six public

universities in the State of Illinois.[3] The ten departments were chosen on the basis of their common occurrence in American universities: Chemistry, Economics, English, History, Mathematics, Philosophy, Physics, Political Science, Psychology, and Sociology. All faculty members included in the non-vested sample were participants in the State Universities Retirement System of the State of Illinois.

Faculty participation in the Universities Retirement System of Illinois is voluntary for the first year of employment and mandatory beginning the second year. The plan provides benefits for retirement, survivors, and disability. Retirement and survivors' benefits, for the period in which the test was run, vest after ten years of participation.[4]

Monthly retirement benefits are defined by the following formula: 1-2/3 per cent times number of years of service, times final rate of earnings. "Final rate of earnings" is defined as the average yearly earnings (including summer session and all extras) during the five

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[3]The six universities included are: (1) The University of Illinois (Urbana campus), (2) Southern Illinois University (Carbondale campus), (3) Northern Illinois University, (4) Western Illinois University, (5) Eastern Illinois University, and (6) Illinois State University.

[4]The period for the test included the academic years 1964-65, 1965-66, and 1966-67. Beginning with the academic year 1967-68, the vesting period was reduced to five years.

consecutive fiscal years in which earnings were the highest. The plan is contributive, with the employee contributing six per cent of his monthly earnings as his share in the cost of retirement benefits. The participant can begin receiving full retirement benefits at age sixty unless he receives compensation from an employer covered by the State Universities Retirement System of Illinois, the State Employees' Retirement System of Illinois, or the Teachers' Retirement System of Illinois. Compensation received by the participant, during any month, in excess of the retirement annuity for services performed for any employer covered by these retirement systems, is subtracted from the State's share of the monthly annuity payment. The participant, however, receives that portion of the annuity provided by his contribution and interest. Thus, a participant, having obtained a vested position, can receive full monthly benefits at age sixty, while working for employers not participating in any of the three Illinois pension systems. This feature of the Universities Retirement Plan would seem to encourage voluntary separations upon obtaining vesting privileges.

Annuity payments, and a lump-sum of $1,000, are received by survivors upon the death of a participant. No single formula defines annuity payments, however, Table 7 illustrates more common survivor benefit schedules.

TABLE 7.--Illustration of monthly survivors benefits.

Monthly Final Rate of Earnings	Widow, Dependent Husband, or Dependent Parent (30 per cent)	Widow and 1 child (60 per cent)	Widow and 2 or more Children (80 per cent)
$100	$ 30	$ 60	$ 80
200	60	120	160
300	90	180	240
400	120	240	250*
500	150	250*	250*
600	180	250*	250*
666.67	200*	250*	250*

*Maximum

Source: State Universities Retirement System of Illinois, Handbook of Information, State Universities Retirement System (Urbana, Illinois: 1965), p. 31.

Survivor's annuity insurance is mandatory for all retirement plan participants. Costs of the survivor plan are shared by participants and the State of Illinois, with the participants contributing one per cent of gross earnings per month with a ceiling of $80 per year. The State of Illinois assumes all remaining costs.

The Actuary of the Illinois State Universities Retirement System has estimated the employer's share in the cost of the total plan at ten per cent of total participant payroll.[5]

[5]State Universities Retirement System of Illinois, Handbook of Information, State Universities Retirement System (Urbana: 1965), p. 48.

Non-vested credit values.--Although survivors' annuity benefits in the Illinois plan are vested after ten years of service, the factors that might influence participants' non-vested credit values are too numerous to permit objective appraisals of their possible mobility inhibiting strength.[6] It is sufficient to say that the value of non-vested survivor annuity credits almost certainly has some impediment effect upon mobility, however, it probably has far less effect than non-vested retirement credits.[7]

It is the value of non-vested credits that offers the possibility of significant curtailment in the rate of voluntary separations. Provisions in the retirement plan affecting non-vested retirement credit value are: (1) non-vested credits vest after ten years of service, (2) employees contribute six per cent of gross earnings each month into the retirement plan, (3) terminating participants receive a refund consisting of their contribution plus 3-1/2 per cent interest, compounded annually, and

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[6]The value of survivors' annuities depends upon: (1) the final rate of earnings of the participant, (2) the number of dependents, and (3) the ages of dependents. Add to these variables those which influence the probability of death during the period in which the participant has many dependents vs. periods in which there might be few or none.

[7]This statement assumes that the employer's share of survivor payments and retirement payments are proportional to the employee's contributions from earnings of one per cent or less and six per cent respectively, for these benefits.

(4) vested participants receive a yearly retirement income at age 60 equal to 1-2/3 per cent times years of service times final rate of earnings. Since retirement benefits vary with service and earnings, non-vested credit values will vary with changes in each of these parameters. Furthermore, as illustrated in Chapter II, the age of plan participants and the interest rate used to compute present values of pension credits influence the value of non-vested credits. To calculate the non-vested credit values for all possible value combinations of the parameters would be an insurmountable task. An example computation, however, will reveal the implications of changes in the parameters.

Assume the following:

1. A male participant's initial salary is $8,000 per year.
2. His salary increases at the rate of 6 per cent per year.
3. The interest rate for all calculations is 3-1/2 per cent per year.

Utilizing the benefit formula and the assumptions, the lump-sum value of the participant's annuity at age 60, upon completion of ten years of service, is $27,258.[8] By

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[8]The participant at age 60 will receive an annuity of $167.67 per month. The selling price, common to large insurance companies, of such an annuity is $27,258. See, Dan McGill, Fundamentals of Private Pensions (2d ed.; Homewood, Illinois: Richard D. Irwin, Inc., 1964), p. 90.

discounting the lump-sum value of the employer's share at age 60 to various participant age and service positions, one can compute the yearly remunerative value of non-vested credits to age 60. The values illustrated in Table 8 represent the yearly remuneration increase (to retirement at age 60) required to offset the non-vested credit loss if the participant leaves the plan.

TABLE 8.--Non-vested credit value per year to age sixty.

Vesting at 35			Vesting at 45			Vesting at 55		
Age	Service	Value	Age	Service	Value	Age	Service	Value
26	1	$158	36	1	$410	46	1	$1,051
27	2	166	37	2	436	47	2	1,153
28	3	174	38	3	465	48	3	1,273
29	4	184	39	4	496	49	4	1,414
30	5	194	40	5	531	50	5	1,584
31	6	204	41	6	570	51	6	1,792
32	7	216	42	7	613	52	7	2,053
33	8	229	43	8	662	53	8	2,389
34	9	242	44	9	716	54	9	2,837
35	10	257	45	10	779	55	10	3,466

An example will clarify the method used to obtain the values in Table 8. Assume the participant joined the plan on his 35th birthday. He would have contributed $480 during his first year of participation, $509 during his second year, etc. By taking each year's contribution separately to retirement at 3-1/2 per cent compound interest, the value of his contributions at retirement is $12,235. Therefore, the employer's share is equal to

$27,258 - $12,235, or $15,023, at age 60. At 3-1/2 per cent return on the year-end balance, the participant at age 44 would have to receive $716 per year for 16 years to obtain $15,023 at age 60.[9]

Observe that the plan favors the participant who begins his employment at a later age. Although contributing the same amount of money, the newly vested participant separating at age 35 receives the same benefit at age 60 as the participant who separates upon reaching vesting at age 55. This results from the fact that the retirement benefit formula does not credit interest on the participant's contribution if left in the plan upon separation.

Note also that the interest rate used for all computations was 3-1/2 per cent, the rate paid by the state on employee's contributions refunded upon separation. If the employee believes he can obtain a higher rate on his contributions upon termination, it might profit him to take the refund even if he has attained a vested position. For example, the value of a participant's contributions, including interest at 3-1/2 per cent, is $7,302 at vesting. If he separates at age 35, he has the option of leaving the $7,302 in the fund and collecting an annuity valued at

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[9]The procedure used, although differing from that presented in Chapter II, yields the same result. By taking the additional step of calculating the present values of non-vested credits for any age-service combination, the yearly remunerative values to retirement can be computed in accordance with condition (7) in Chapter II, and will equal those depicted in Table 8.

$27,258 at age 60, or he can take the refund. The interest rate per year on the $7,302 refund that would have to be earned for 25 years in order to equal $27,258 at age 60 is approximately 5-3/8 per cent. If a participant vests at age 45 and separates, the rate of return on the refund would have to be approximately 9-1/4 per cent; and at age 55, about 29-3/8 per cent. When one considers the added incentive of having access to the contributions, non-vested retirement credit losses should not be a significant hindrance to mobility to younger participants. Older non-vested participants, however, might hesitate to consider even casually a voluntary separation in view of the retirement losses that might be incurred.

Although outside offers lower in yearly differential remunerative value than those values depicted in Table 8 should be rejected by participants, acceptance of outside offers with differentials higher than the values in the table might not be the best choice of the participant. Discussion, to this point, has involved only two possible choices: (1) the non-vested participant could remain in his present position until retirement, or (2) the non-vested participant could accept a more remunerative position although losing the non-vested credits. A third choice, however, is available to participants. They might reject the superior outside offer in the belief that another offer will arise after a vested position has been

attained. This third possibility was discussed in Chapter II, and it culminated in formulation of condition (8) in that chapter. Illustration of this third choice makes it necessary to add the assumption of a specific offer to all previous assumptions used in computing the values in Table 8.

Table 9 depicts yearly remuneration values from the vesting date to retirement necessary to compensate the participant upon rejection of an offer, during the non-vested period, that is $1,000 per year higher to retirement than would be received in his present position.

TABLE 9.--Higher offer necessary at vesting to equal $1,000 higher offer during various non-vested periods.

Vesting at 35			Vesting at 45		
Age	Service	Value	Age	Service	Value
26	1	$1,372	36	1	$1,121
27	2	1,292	37	2	1,009
28	3	1,215	38	3	896
29	4	1,140	39	4	790
30	5	1,068	40	5	687
31	6	999	41	6	587
32	7	931	42	7	491
33	8	866	43	8	398
34	9	804	44	9	308

The values in Table 9 were calculated as follows. Assume age 43 and completion of the eighth year of service. The value of non-vested credits at the time of vesting, age 45, is $8,972. The differential that the participant must

receive upon completion of the tenth year equaling the $1,000 per year offer over his present renumeration at the end of the eighth year is $398.[10] Therefore, if the participant believes that he can obtain an offer at vesting that will be higher than $398 per year each year for 15 years than his expected income in his present position he should not accept the outside offer at the end of his eighth year of participation.

Note that an increase in the interest rate or an increase in the offer differential prior to vesting would increase the values in Table 9. For example, a differential increase of $2,000 per year rather than $1,000 per year would raise the renumeration differential required at vesting for the 43 year-old participant from $398 to $1,574 per year.

Because of the many parameters that influence nonvested credit value, it would be meaningless to specify a precise age-service combination where such values become a significant impediment to mobility. The results of the analysis, however, accent the importance of the age at

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[10]Utilizing condition (8), we have:

$$R = \$1{,}000 - \left[\frac{\$8{,}972 - \frac{\$1{,}000\ (1 + .035)^{2} - 1}{.035}}{\frac{1 - (1 + .035)^{-15}}{.035}} \right]$$

$$R = \$398$$

which participants begin their service.[11] It is doubtful if losses would be a significant deterrent to non-vested participants that joined the plan before the age of thirty. Those that become employed in their thirties have some concern when considering outside offers, while those employees who become participants in their forties might well feel "locked in."

Vested Sample

The vested sample included faculty members, assistant professor rank and above, at Iowa, Iowa State, Michigan State, and Purdue Universities employed in the ten departments included in the non-vested sample.

Each university in the vested sample provides pension coverage for faculty members through the Teachers Insurance and Annuity Association and College Retirement Equities Fund (henceforth referred to as TIAA-CREF). Benefits include retirement and survivor's income and are determined by the employer's and participant's

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[11]For example, the yearly remuneration values of non-vested credits to retirement for participants completing the first year of service and starting at ages 45 through 49 are:

Age 45, $1,051 per year.
Age 46, $1,172 per year.
Age 47, $1,312 per year.
Age 48, $1,478 per year.
Age 49, $1,679 per year.

One might accurately describe the Illinois plan as a "windfall" for the middle-aged entrant and a "penalty" for the young entrant.

contributions to the participant's account with TIAA-CREF, coupled with earnings from the total TIAA-CREF investment portfolio. Of singular importance for this study is the fact that employer's contributions are deposited in the participant's TIAA-CREF account and, thus, are immediately and fully vested to the participant. Therefore, the faculty members in the vested sample do not suffer the loss of employer's contributions upon employment termination.

Comparison of the Samples

It is clear that there are factors, other than the extent of pension vesting, that affect the quit-rates of faculty. To attempt to identify and measure the absolute impact on mobility of such factors is not necessary for this study. It is necessary, however, to consider those factors that might give rise to a difference in the quit-rates of the samples. Two such factors are the prestige of the institutions and the rate of faculty compensation.

It would be generally recognized by faculties throughout the nation that the institutions from which the vested sample was drawn are, as a group, more prestigious than those institutions from which the non-vested sample was selected. Assuming faculty tend to gravitate toward the more prestigious schools, this factor might have a dampening impact on the aggregate quit-rates of the vested sample relative to the non-vested.

The second factor, compensation differences between the samples, may have a substantial impact on the relative aggregate quit-rates. The average compensation at the sample non-vested universities and the vested universities, for the test period, is shown in Table 10.

TABLE 10.--Average compensation, full-time faculty.

Universities	1964-65	1965-66	1966-67
Vested	$11,361	$12,482	$13,245
Non-vested*	9,585	10,196	10,652
Differential	1,776	2,286	2,593

*Pension plan remuneration values are not included in the non-vested sample compensations.

Source: American Association of University Professors, AAUP Bulletins, Summer Issues (Washington: 1965, 1966, 1967).

Although the addition of the average compensation value of the pension plan would reduce the differential exhibited in Table 10, the average compensation of faculty from the vested schools would still be far above that received by faculty at schools from which the non-vested sample was drawn.[12] Given that labor seeks higher remuneration for services rendered, we might expect that faculty

[12]The value of non-vested credits to faculty participating in the Universities Retirement System of Illinois will be discussed later in this chapter.

in the non-vested sample would tend to voluntarily separate more readily than faculty in the vested sample.

Note, however, that all participants in the non-vested sample will be equally affected by the difference in prestige and compensation variables. Therefore, the effect of these variables would fall on aggregage comparisons of quit-rates, and should not affect comparisons that allow for the strength of non-vested credits within the non-vested sample. Additional comments on the affect of the compensation variable will be found below.

The data collected for the test were as follows:

1. The names of all faculty members, assistant professor rank and above, in each of the ten departments at all ten universities.
2. The date at which the faculty member was first employed with the university.
3. The last year employed for those faculty members who voluntarily terminated.

The collection procedure involved both mail and personal interviews with administrators, faculty, and staff at each university. Information was collected covering 98 departments (59 in the sample of vested plans and 39 in the non-vested).[13]

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[13]Illinois State University did not have a Philosophy Department during the test period, and the data from the Physics Department at Michigan State had not arrived at the time of this writing. Therefore, the returns from 98 departments comprise the total test data.

If non-vested pension credits inhibit the mobility of workers, the voluntary separation rates of faculty in the vested sample should exceed the voluntary separation rates of faculty in the non-vested sample. Table 11 summarizes the quit-rates for both samples by academic year.

Assuming homogeneity of all factors that influence mobility other than the pension plans, the non-vested sample quit-rates should be less than the vested sample quit-rates. The data depicts the reverse.

Note, however, that total separations, by year, were included in the computation of separation rates for both samples. The Illinois plan vests after ten years of service, therefore, the quit rate data for the non-vested sample includes faculty who terminated after attaining vested status.[14] To remove the influence of vested separations on the non-vested separation rates, voluntary separations in both samples were restricted to the non-vested period. The separation rates for the non-vested period are depicted in Table 12.

Although the separation rate for the academic year 1966-67 is smaller for the non-vested sample relative to the vested, the separation rate total for the three year

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[14]The inclusion of vested faculty as non-vested in the computation of quit-rates was a basic criticism of Lurie's procedure as was noted in the last chapter.

TABLE 11.--Voluntary separation rates, non-vested sample vs. vested sample.

Year	Non-vested Plan			Vested Plan		
	Number of Separations	Number in Sample	Separation Rate	Number of Separations	Number in Sample	Separation Rate
1964-65	62	1,000	6.20%	52	1,082	4.80%
1965-66	59	1,108	5.32%	52	1,169	4.45%
1966-67	93	1,222	7.61%	84	1,251	6.71%
Total	214	3,330	6.43%	188	3.502	5.37%

TABLE 12.--Voluntary separation rates during the non-vested period.

Year	Non-vested			Vested		
	Number of Separations	Number in Sample	Separation Rate	Number of Separations	Number in Sample	Separation Rate
1964-65	51	649	7.85%	44	625	7.04%
1965-66	56	745	7.52%	44	683	6.44%
1966-67	75	836	8.97%	67	721	9.29%
Total	182	2,230	8.16%	155	2,029	7.64%

period is larger for the non-vested sample. Though the size of the differential is less than that depicted in Table 11, voluntary separation rates were still higher in the non-vested sample. It should be understood, however, that the data in Table 12 conceals the strength of the basic inhibiting ingredient of the non-vested plan, the value of the non-vested credits. The value of non-vested credits increases as the participant approaches fully vested status, therefore, voluntary separation rates should diminish faster in the non-vested sample as compared to the vested sample. Table 13 depicts the voluntary separation rates by year of covered service and Figure 1 illustrates the quit rate trends.

TABLE 13.--Voluntary separation rates by year of participation.

End-of-year	Non-vested			Vested		
	Number of Separations	Total Faculty	Per Cent	Number of Separations	Total Faculty	Per Cent
1	46	514	8.95	21	417	5.04
2	38	376	10.11	28	366	7.65
3	25	268	9.33	36	286	12.59
4	21	253	8.30	26	215	12.09
5	27	227	11.89	7	175	4.00
6	6	191	3.14	12	142	8.45
7	9	153	5.88	12	133	9.02
8	8	132	6.06	9	141	6.38
9	2	116	1.72	4	144	2.78
10	5[a]	100	5.00	4	133	3.01
11	7	82	8.54	4	100	4.00
12	1	58	1.72	2	86	2.33
13+	19	860	2.21	23	1,164	1.98

[a]Faculty members terminating at the end-of-the tenth year have vested rights.

*The regression equations were as follows: Vested: $Y_c = 7.56 - .39\ x$

Non-Vested: $Y_c = 7.52 - .88\ x$

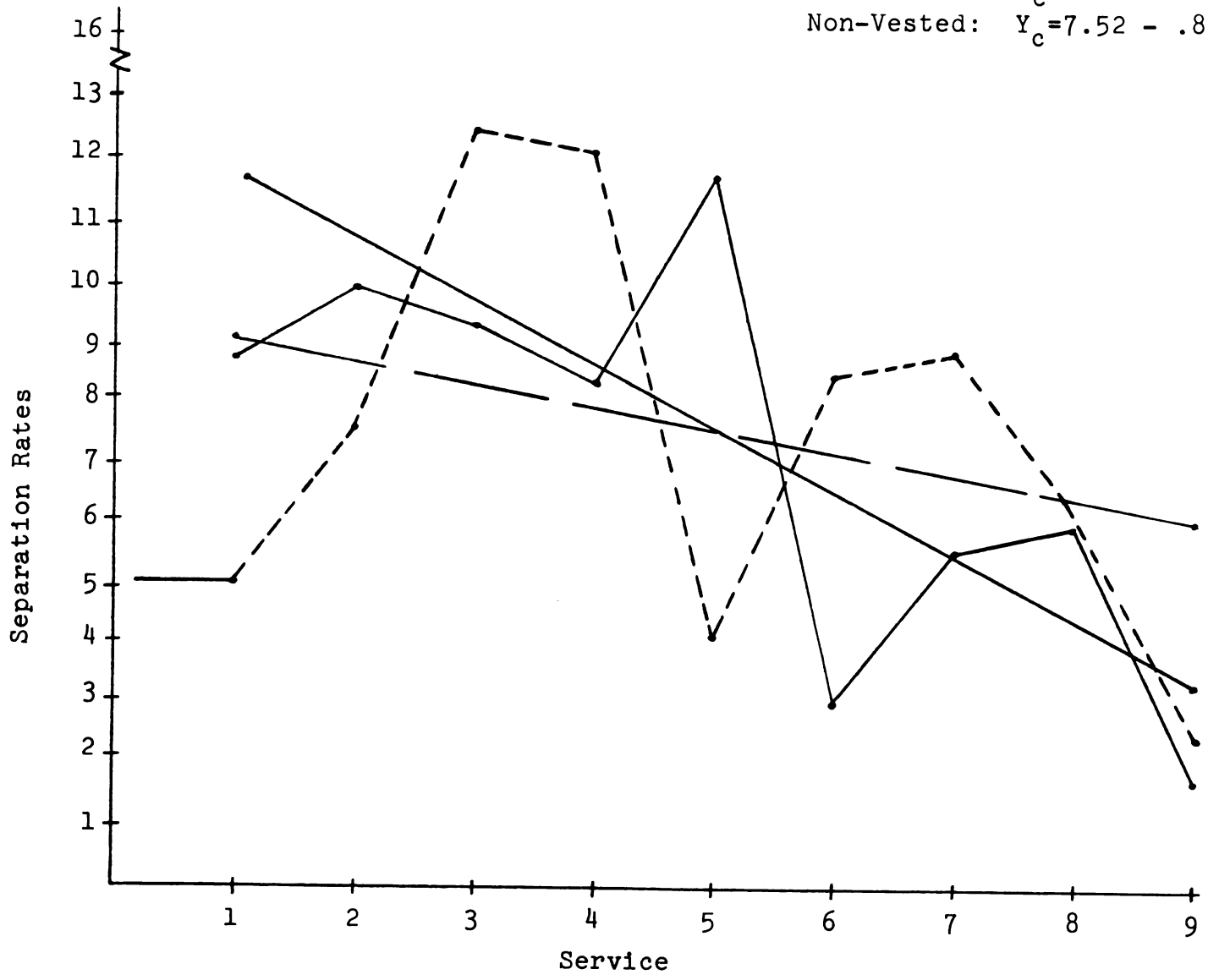

Figure 1*

As one would expect, the quit-rates for both samples decrease with length of service. If the increasing value of non-vested credits had an inhibiting effect on mobility, the non-vested sample trend should have decreased faster than that of the vested sample and, indeed, it did. This in itself, however, does not prove that the increasing value of non-vested credits was responsible for the difference in the decreasing rates of voluntary separations. Note the wide dispersion of the observed quit-rates for each sample from their respective trend rates. Obviously, factors other than length of service and the increasing value of non-vested credits influenced voluntary separations. It might be possible that the difference in pension plans had no bearing on the difference in trends, i.e., the observations are so widely dispersed that statistically, both samples might have been drawn from the same universe. Using a reliability test for regression coefficients, the probability that both samples are drawn from the same universe is approximately two in ten for both sample regression coefficients.[15] Statistically,

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[15]The standard deviation of regression coefficients from one sample to another can be estimated from the following equation:

$$S_{b_{y \cdot x}} = \frac{\bar{S}_y \cdot s}{S_x \sqrt{N}}$$

where $S_{b_{y \cdot x}}$ = the standard deviation of the regression coefficient

one cannot state that this result validates the hypothesis that credits inhibit mobility; however, it does cast doubt upon a priori judgments that flatly discredit the hypothesis.

One final observation concerning the data in Table 13 is that voluntary separation rates for the non-vested sample fall off much more sharply from the sixth through the ninth year as compared to the vested sample quit-rates. Since the value of non-vested credits increases with covered service, and the probability of obtaining

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$\bar{S}_{y \cdot x}$ = the standard deviation of observed values around the regression line

S_x = the standard deviation of the observed values around the mean

N = the number of observations

$S_{b_{y \cdot x}}$ = .35 for the non-vested sample

$S_{b_{y \cdot x}}$ = .32 for the vested sample

The confidence interval at 1.5 standard errors (including 82 cases out of 100) for regression coefficients obtained from additional samples containing nine observations is -.35 to -1.40 for the non-vested sample and -.86 to +.08 for the vested sample. The regression coefficient for the non-vested sample was -.88, and for the vested sample, -.39. Thus, for each sample, approximately eight of ten sample regression coefficients will fall within a confidence interval excluding the regression coefficient of the other sample.

For a discussion of the reliability of regression coefficients see: Mordecai Ezekiel and Karl A. Fox, Methods of Correlation and Regression Analysis (3rd ed. York: John Wiley and Sons, Inc., 1963), p. 281.

vested status increases with service, the more rapid reduction in the non-vested quit-rate seems to strengthen the pension-mobility hypothesis.

In the previous section, it was presumed that non-vested credit value would not be a significant deterrent to the mobility of employees that started participating in the Illinois Universities Retirement Plan prior to reaching their forties. It was possible to obtain the starting ages of 25 non-vested participants who separated after completing at least five years of service. The ages for the 25 separating participants at the time each entered the plan are depicted in Table 14.

TABLE 14.--Age at entrance to plan of departing non-vested participants.

Age	Age	Age	Age	Age
25	29	30	32	36
27	29	30	33	36
28	29	31	33	37
28	29	32	34	38
28	30	32	35	45

The mean average entrance age for the 25 participants is 32. Note that only one of the sample of 25 was beyond age 40 at the time of entrance into the plan. The starting ages of those who separated from the vested sample were not available; therefore, a comparison of the two samples cannot be made. In view of the universally

acknowledged relationship between mobility and age, one can assume that an inverse quit-age relationship would occur. It seems doubtful, however, that the quit-age relationship alone would be responsible for only one of twenty-five separating participants having begun participation beyond the age of forty.

Summary of Results

The step-by-step procedure utilized in testing the pension-mobility hypothesis elucidates the difference between what may be termed the "traditional" and the "appropriate" test. In the "traditional" test, which basically conforms to the type of investigation critically reviewed in the preceding chapter, relevant impediment variables within a non-vested plan are either overlooked or assumed to be of minor consequence. Essentially, investigators have homogenized all participants in non-vested plans and have failed to discriminate among participants on the basis of non-vested credits.

The "traditional" test is exemplified in the aggregate quit-rate comparison as exhibited in Table 11 where no allowance was made for the varying impact that non-vested credits might have on mobility. All participants in the non-vested plan, including those having vested status, were included in the non-vested sample and, therefore, all were given equal weight in determining the

non-vested quit rates. Also, by not isolating the relevant variables that determine non-vested credit value, the impact on mobility of factors other than the pension-vesting factor might submerge a genuine pension-mobility relationship. This is exemplified in the quit-rate comparison illustrated in Table 12 as well as in Table 11. In both tables, factors such as the difference in school prestige and faculty compensation between the samples drown out the capability of determining whether the loss of non-vested credit value might be an authentic impediment to mobility.[16] Thus, in what has been termed the "traditional" approach, investigators have failed to correctly discriminate between non-vested plans and non-vested credits. In essence, it is not the non-vesting

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[16]Of the six universities included in the non-vested sample, the University of Illinois is most comparable in prestige and compensation with the vested universities. According to the AAUP, faculty compensation at the University of Illinois was $10,952 in 1964-65, $11,480 in 1965-66, and $12,132 in 1966-67. Although these values are not as high as the average compensation (including pension plan remuneration values) at the vested schools as exhibited in Table 10, they are far above the average compensation for the non-vested schools. The quit-rates during the non-vested period for the University of Illinois sample were: 6.59 per cent in 1964-65, 5.86 per cent in 1965-66, and 10.00 per cent in 1966-67. The average for the three-year period was 7.55 per cent. Note that these quit-rates are lower than those of the total non-vested sample shown in Table 12 with the exception of the 1966-67 year. Although the difference in quit-rates between the non-vested sample and that of the University of Illinois sample is small, the lower quit-rate average for the University of Illinois sample suggests an inverse relationship between quit-rates and the compensation-prestige variables.

label on a pension plan that may restrain mobility, but rather the income value lost with separation by participants having non-vested status.

In what has been termed the "appropriate" test, recognition is given to the varying impact on mobility that non-vested credits might have on participants within the non-vested plan. Through the utilization of the retirement benefit formula coupled with employees' contributions, the factors that determined non-vested credit values were isolated. Thus, non-vested service, interest rates, and participants' ages at the time of certification were found to have an important effect on the value of non-vested credits. The appropriate test, therefore, had to incorporate these factors and, by so doing, the non-vested sample takes on heterogeneous characteristics.

Table 13 displays the results of recognizing the impact of length of service on the value of non-vested credits and the concomitant effect on mobility. Although the number of quits by year become relatively small in both samples with the approach of vesting, the faster reduction in quit-rates for the non-vested sample gives support, albeit weak, for the hypothesis. When the effect of starting age is recognized (Table 14), increasing support for the hypothesis is obtained since it was shown that only one of twenty-five non-vested participants having five or more years of service had begun service

after the age of thirty-eight. This infers the strong probability that only a very small fraction of those participants separating from the non-vested plan suffered significant pension credit losses. From this evidence, coupled with the more rapid reduction in quit-rates in the non-vested sample relative to the vested, some support exists for the pension-mobility hypothesis.

CHAPTER V

SUGGESTIONS FOR FURTHER STUDY

Up to this point, the theory of labor mobility with reference to non-vested provisions has been explicated; the literature of this area of economics has been reviewed; and a test of the impact of non-vested credits upon the mobility of college faculty has been conducted.

Two significant findings evolved from the test covered in the preceding chapter. First, participant non-vested credit income values, and not the act of being vested, were found to be the source of non-vested participant mobility restraint.

Second, the vesting and retirement benefit provisions of the Illinois plan gave rise to increases in the value of a participant's non-vested credit income with (1) increasing length of service, (2) higher salaries, and (3) higher certification ages. Of particular significance was the strong direct relationship between participant-certification age and non-vested credit income. Given an inverse relationship between age and mobility, it seems probable that relatively few participants in the Illinois

plan consider separation at a time at which they face serious non-vested credit income losses. Thus, one could not expect a much more rapid decrease in the quit-rates of non-vested faculty, compared to those of vested faculty over the non-vested period, than that exhibited in Figure 1. In fact, a much more rapid increase in the quit-rate differentials would imply that non-vested participants had over-valued their non-vested credit incomes.

If all incompletely vested plans were identical in structure to that of the Illinois plan, and if the characteristics of all non-vested participants were identical to those in the Illinois sample, then the mobility inhibiting impact on the labor force of non-vested credit income would be relatively slight. However, the diversity of incompletely vested plans, and the possible differences in response to non-vested credit income by non-vested employees in such plans from those of employees included in the Illinois sample, preclude direct projection of the results of the Illinois test.

One test of a sample of participants in one incompletely vested plan, in one occupation and in one industry is not a firm foundation for generalizations concerning the impact of incompletely vested plans on the mobility of all non-vested participants. Diversity of characteristics among plans, coupled with the diversity of the personal characteristics of participants, precludes any such

generalization. However, although the test results cannot be projected to all incompletely vested plans, the procedure used to test the mobility impediment strength is sound, i.e., future tests should be directed toward relation of participant non-vested credit income to mobility rather than simply assuming that all participants in a plan are equally inhibited from voluntary separation.

It would be presumptuous to predict the different possible impacts of identical non-vested credit values on the mobility decisions of workers who are employed in different industries, engaged in different occupations, and possessed of different educations. Only future test results can suggest the relevance of such variables on mobility. However, it is possible to suggest the effect certain provisions of incompletely vested plans may have on the values of non-vested credits and, thus, to evaluate the plan's potential effect on mobility.

Plan Differences and Their Impact Upon Mobility of Non-vested Participants

Financing, vesting, and retirement benefit formula provisions differ among plans, and must be included in any list of characteristics possessing potential to influence the impediment strength of non-vested credits.

Financing

Financing provisions are of two types: contributory and non-contributory. The contributory type is exemplified

by the Illinois plan, i.e., both the employer and employee share in the cost of the plan. Under a non-contributory plan, the employer bears all of the plan's cost. It can be assumed that participants in contributory plans would be more aware of the existence of the plan than participants in non-contributory plans because of the pension plan cost deductions from their wages. From this it would be expected that contributory plan participants would be more cognizant of pension losses upon separation and, therefore, more inhibited from voluntarily separating from their jobs. However, awareness of losses does not mean that the participant in the contributory plan is more aware of the value of non-vested credit losses, i.e., loss of the employer's contributive share. Furthermore, and probably extremely important in giving rise to a difference in the mobility decision of participants in both types of plans, the non-vested participant in the contributory plan receives his contributions (usually with interest) upon separation. This might give strong encouragement to participants in contributory plans to separate from their jobs, especially to younger participants such as those who left their positions in the Illinois test. Thus, one factor that should be tested is the effect of the type of financing on non-vested participant separation rates.

Deferred Vesting

Deferred vesting provisions are of two general types, deferred full vesting and deferred graded vesting. Under deferred full vesting, the participant moves from non-vested status to fully vested status upon fulfillment of service and/or age requirements. Under deferred graded vesting, the participant moves from non-vested to fully vested status by stages, e.g., 50 per cent vested after ten years of participation, with increases of 10 per cent per year over the succeeding five years. In both deferred full and deferred graded vesting plans, vesting periods vary anywhere from the completion of one year of service to thirty years of service and, in many plans, requires attainment of a minimum age. The predominant service requirements among plans are ten and fifteen years, whereas, ages forty and forty-five dominate where minimum age is a requirement.[1]

Tests could be directed toward ascertaining whether deferred full vesting plans or deferred graded vesting plans that fully vest at the end of the same time period have the greatest effect on mobility restraint. The reduction in the value of a participant's non-vested credits in deferred graded plans that occurs during the stages of increased vesting should yield greater mobility in such plans as compared to deferred full vesting plans.

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[1]U. S. Department of Labor, Labor Mobility . . ., p. 15.

Of particular importance is the effect of completely non-vested plans on mobility as compared to the effect of deferred vesting plans on mobility. If non-vested participants are aware of the value of their non-vested credits, then younger non-vested participants belonging to non-vested plans should be more mobile than their counterparts in plans that defer vesting. For example, assume that a 35-year-old participant has 10 years of service in a deferred full vesting plan that vests after 15 years of service. His counterpart covered by a non-vested plan paying the same benefits at normal retirement age of 65 must maintain his present position for 30 years to obtain retirement benefits. The value of non-vested credit income would be higher for the participant in the deferred vesting plan because of the higher probability of staying five more years in the plan as compared with 30 more years. In fact, given that mobility decreases with age, it seems probable that firms that have plans that defer vesting have lower labor turnover than plans without vesting. Thus, tests comparing the effect of various types of vesting provisions on mobility, might prove that "liberalizing" completely non-vested plans by insertion of deferred vesting provisions might induce less overall mobility.

Retirement Formulas

Retirement benefit formulas fall into three groups: (1) benefits that vary with service and earnings,

(2) benefits that vary with length of service, and (3) benefits that are set at a flat rate for all retirees.[2] Plans that include earnings in their benefit formulas are of two types, (1) "career average" earnings, the average earnings of the participant over his entire service, and (2) "final average" earnings, as was the case with the Illinois plan.

Where benefits vary with service and earnings, the value of a participant's non-vested credit income would be more closely related to the participant's earnings than under "flat rate" or "service only" benefit formula plans. Since it is the income differential between the present position and another position that is compared to the value of non-vested credits by the participant, it would seem that non-vested participants with relatively low earnings in plans where benefits are unrelated to earnings would be less mobile than participants in the same plan with relatively high earnings. For example, assume two 50-year-old participants are in the same plan that determines benefits on the basis of length of service. Further, assume that both have completed 10 years of service, the plan vests upon the completion of 15 years of service, and one employee is earning $5,000 per year

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[2]A fourth type of plan defines contributions but does not define benefits. This type is exemplified by the Teachers Insurance Annuity Association--College Retirement Equity Fund plans that are widespread throughout higher education. The TIAA-CREF plan is discussed below, on p. 89.

and the other $10,000 per year. It seems highly probable that the $10,000 per year participant would receive outside offers whose income differential would be, in absolute dollars, much higher than that received by the employee earning $5,000 per year. However, the value of non-vested credits to each participant would be identical. Thus, the higher paid participant has less effective mobility restraint than the lower paid participant. Given that higher paid employees have greater value to the firm, probably because of higher skills, such plans would impede the mobility of the less skilled employees more than those with greater skills. If one of the purposes of incomplely vested plans is to "lock-in" skilled employees, the plans varying benefits with earnings should be more successful than those plans omitting earnings as a determinant of retirement benefits. Quit-rate comparison tests of samples of such plans would be necessary to confirm or reject this hypothesis.

In summary, financing, vesting, and retirement benefit provisions in incompletely vested plans influence the value of a participant's non-vested credits and, thus, determine the magnitude of the concomitant restraint on labor mobility. Because of the variation in such provisions among plans, it is impossible to project the results of a test of a single plan's impact on labor mobility to all incompletely vested plans.

Mobility Implications of Vesting

When an employee is separated with a vested right, the amount of the benefit he will receive at retirement is fixed at the time of separation.[3] Thus, the separated vested employee receives no return on the value of his vested credits to retirement, nor does he receive the benefit of any improvements in the benefit formula that might occur between separation and retirement. Furthermore, given rising wage levels, especially evident with inflation, plans that relate benefits to earnings and length of service, gain mobility impediment strength without a change in the benefit formula.

Consider the following example for a hypothetical employee in the Illinois plan. Assume the employee begins participation in the Illinois plan at age 30, works for 15 years, quits, accepts another job at which he works for 15 years and is covered by a plan having a retirement formula identical to that of the Illinois plan. Further, assume that his "final average earnings" in his first position is $6,000 per year, and in the second, $12,000 per year. Given the same retirement formula in both plans, his retirement income at age 60 is: (1 2/3 percent x $6,000 x 15/12) + (1 2/3 per cent x $12,000 x 15/12), or $375 per month. Assuming his "final rate of earnings" would equal $12,000 per year if he had stayed at Illinois, his monthly

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[3]Bernstein, The Future of Private Pensions, p. 258.

retirement income would have been: (1 2/3 per cent x $12,000 x 30/12), or $500 per month. Thus, in plans that determine benefits on the basis of length of service and earnings, the value of a participant's vested credits increases with increases in earnings.

A further problem involves the possible effect upon mobility of workers with vested rights in plans that specify retirement benefits based upon length of service when such plans have experienced periodic improvements in their benefit formulas.[4] For example, the following is the history of benefits under the Caterpillar Tractor Corporation--United Auto Workers non-contributory plan that was initiated on December 1, 1950.[5]

December 1, 1950; $1.50 per month times years of service
August 8, 1955; $2.25 per month times years of service
October 1, 1958; $2.50 - $2.80* per month times years of service
October 1, 1964; $3.95 - $4.25* per month times years of service
October 1, 1965; $6.00 per month times years of service
October 1, 1967; $7.00 per month times years of service
October 1, 1968; $7.00 - $8.00* per month times years of service.

*The higher figure is applicable to specific skill categories, e.g., toolmakers.

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[4]Of 100 negotiated plans covering 3,508 thousand workers surveyed by the Department of Labor, 47 plans covering 2,065 thousand participants improved benefits during the period, 1961-1964. Of the 47 plans experiencing improvement, 17 plans covering 895 thousand workers had improvements in excess of 50 per cent. See, Harry E. Davis, "Changes in Negotiated Pension Plans Under Collective Bargaining, 1961-64," Monthly Labor Review (October, 1965), p. 1217.

[5]Benefit data obtained in an interview with Smith Applegate, Insurance Department, Caterpillar Tractor Corp., Peoria, Illinois, December 9, 1968.

The plan fully vests benefits upon the completion of 10 years of service and begins monthly annuity payments to participants retiring at age 62. If a participant in a skilled classification had separated in September, 1964, he would receive $28 per month throughout retirement. If he had stayed on the job to October 1, 1968, he would receive $8.00 per month for each of his 14 years of service, or $112 per month throughout retirement.[6] Furthermore, those participants who retire directly from employment at Caterpillar receive all succeeding general benefit improvements that occur during their retirement years, whereas the separated vested employee's monthly retirement benefits remain fixed throughout retirement. Again, as was the case with service-earnings benefit formula plans, the terminated vested employee might obtain employment covered by another plan and receive retirement benefits from that plan as well as from the first plan. However, it is doubtful whether the combined benefits would surpass the benefits that he would have received had he stayed in his first job.

Since benefits are not related to service in plans that specify flat-rate benefits to all employees with a vested right, this type of plan does not offer the same

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[6]Where plans are negotiated and unions are pressing for pension benefit improvements, participants might become highly immobile as the contract deadline is approached.

type of restraint upon vested employees as do the service benefit formula plans.

Finally, most plans specify a minimum service requirement, usually 10 or more years, to obtain retirement benefits.[7] Thus, older employees, having obtained a vested right, and faced with the possibility of not being able to make up a portion of their "lost vested credits" in another plan, might prove to be the most "locked-in" of all vested participants.

In summary, investigations of the mobility impact upon participants with vested rights, in plans yielding increasing vested credit values with improvements in service formulas, might find such plans to be a major detriment to labor mobility.

Conclusion

The only type of pension plan that seems not to contain inherent labor mobility restrictions is that which treats pension credits as current remuneration. Examples of such plans are those contracted with the Teachers Insurance Annuity Association--College Retirement Equities Fund. These plans formalize the contributions to be made by the employer (and by the employee if the plan is contributory), and omit a benefit schedule. Such plans are termed "defined contribution plans." All contributions

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[7]U. S. Department of Labor, Private Pension Plan Benefits, p. 7.

are fully and immediately vested, are expressed as a percentage of the employee's earnings, are deposited with TIAA-CREF in exchange for "accumulation units," and each employee has a separate account with TIAA-CREF. Up to 75 per cent of the contributions may be directed by the employee to be used to purchase CREF accumulation units, and the remainder is used to purchase TIAA accumulation units. TIAA places its funds in debt instruments, while CREF's funds are placed in equity instruments. All interest and dividents from the funds' portfolios are apportioned to each participant's account, according to the number of accumulation units owned by the participant. The dividends, interest, and contributions are used for the purpose of increasing the amount of accumulation units. Therefore, the value of each unit depends upon the market value of the TIAA-CREF portfolios. Upon retirement, the value of the participant's accumulation units are the basis for his retirement annuity.[8]

Note that vesting, financing, and retirement benefit provisions in TIAA-CREF plans impart no separation restraint on the participant. By relating contributions to current earnings and by fully and immediately vesting such contributions, the separating participant suffers no loss of retirement benefits, i.e., the value of his

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[8]College Retirement Equities Fund, Rules for Determining Benefits (New York: CREF, 1960).

pension credits earned up to the time he separates, will have the same value at retirement as if he had not separated.

In terms of the possible effect on labor mobility, and the concomitant effect on resource allocation, only those plans which fully and immediately vest current contributions, free the participant from suffering possible pension losses due to termination. By isolating the sources of pension plan mobility restraint (non-vested credit income and potential vested credit income losses), investigators can more accurately measure the mobility impediment effect of pension plans for labor.

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