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THE WELFARE IMPLICATIONS OF ALTERNATIVE UNEMPLOYMENT INSURANCE PLANS

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A recent survey of and extension to research on the topic of unemployment insurance (UI) by Topel and Welch (1980) focuses on the issue of UI financing.' In particular, following Becker (1972), they are interested in the influence of the experience-rating provisions of the American UI system on a firm's layoff policy. They suggest that a more complete model of both firms and workers would be a fruitful endeavor, and two efforts of this type have been made by Azariadis (1979) and Brown (1980).[2] This paper investigates a penumbral issue in the UI financing literature: the relationship between experience rating, public and private UI systems, and individual welfare. A public insurance system can never be perfectly experience-rated if the government desires people with different layoff probabilities to hold identical insurance policies. A corollary proposition is that a private insurance system, if information is perfect, would always feature fully-rated plans, but the characteristics of these plans may frustrate other public policy goals (e.g., income transfer or maintenance).

Though virtually all previous research points out the moral hazard aspects of the UI system, there has been little attention paid to the efficiency-equity trade-off introduced by government control of the insurance contract. This paper introduces this issue explicitly. Full experience rating for each firm is tantamount to complete exposure for the firm to the vagaries of the business cycle.

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Firms may be willing to bear this exposure when UI is part of an implicit labor contract with its employees, and employees likewise may be willing to pay for the risk shifting through wage adjustments (Azariadis (1975), Baily (1977a),(1977b). However, for some firms, the degree of exposure necessary to insure all workers legally may contribute to insolvency. Incomplete experience rating is one method of achieving risk-pooling among firms and limits the exposure of high-turnover firms. Incomplete experience rating is a form of market intervention by government for the benefit of high risk firms and employees. Incomplete experience rating is controversial where UI is concerned, in part because of the adverse incentives it provides firms and employees. A great deal is known about the distribution of the turnover risk ex ante than is the case in many other insurance markets. For example, Munts and Asher (1980) show that construction, manufacturing, and agriculture are most likely to be subsidized and that trade, finance, insurance, and real estate are most often the subsidizing industries.

Part I. Basic Model

The basic model follows the one developed for competitive insurance markets by Rothschild and Stiglitz (1976). An individual has an income of W if he is fully employed for some period, and an income of W-d if he suffers a layoff.[3] The individual can insure himself against this layoff by paying a premium α_1 to an insurance company, in return for which a net benefit of α_2 is paid in the event

of layoff. The vector $a = (\alpha_1, \alpha_2)$ denotes the insurance contract. Preferences for income in the two states of nature are given by the the expected utility function:

$$(1) \qquad \hat{V}(W_1, W_2, \rho) = (1 - \rho)\, U(W_1) + \rho U(W_2),$$

where $U(\cdot)$ describes preferences for money income, $W_1 = W - \alpha_1$, (net income), $W_2 = W - d + \alpha_2$ (net income), and ρ is the layoff probability. All individuals are identical except for their layoff probabilities, and all are risk averse ($U'' < 0$). Contracts are sold by risk-neutral, expected-profit-maximizing insurance companies. When contract a is sold to an individual with layoff probability ρ, the contract is worth:

$$(2) \qquad V(\alpha, \rho) = \hat{V}(W - \alpha_1, W - d + \alpha_2, \rho)$$

to the individual and,

$$(3) \qquad \Pi(\alpha, \rho) = (1 - \rho)\alpha_1 - \rho\, \alpha_2$$

to the insurance company. Free entry and perfect competition require zero expected profits. In equilibrium, individuals have complete insurance (i.e., they expect the same income whether laid off or not) purchased at actuarial odds.[4]

Suppose a fraction λ of all individuals work for high turnover firms and a fraction $(1 - \lambda)$ work for low-turnover firms. If layoffs within firms of each type are random, then individuals can be classified as high- and low-risk types purely on the basis of their employment affiliation.[5] High-, and low-, and average-risk probabilities

are denoted by:

$$\rho^H,\ \rho^L\ (\rho^H > \rho^L),\ \text{and}\ \ \bar{\rho} = \lambda\rho^H + (1 - \lambda)\,\rho^L.$$

Rothschild and Stiglitz (1976) demonstrate that in this type of market, with imperfect information, there cannot be an equilibrium in which both groups of individuals purchase the same insurance contract (pooling equilibrium).[6] They further establish that even when high-and low-risk types purchase separate contracts, an equilibrium may not exist (separating equilibrium). A diagram, which will be used in various forms throughout the paper, clarifies the basic model (see Figure 1).[7] The point E represents expected income in each of the two states of the world. The EH line has slope $(1 - p^H)/p^H$; it represents all actuarially fair contracts for high-risk individuals (or firms). The EL line has slope $(1 - p^L)/p^L$ and an analogous interpretation. The slope of EF is $(1 - \bar{\rho}/\bar{\rho})$. Solid line indifference curves depict high-risk individuals and dashed line indifference curves depict low-risk individuals.

In contrast with Rothschild and Stiglitz, I am interested in examining an insurance market in which the accident (layoff) probabilities are known by customers, insurance companies, and the government. In the case of UI, this point of view is legitimate. First, the moral hazard for the employee to extend his unemployment spell is not being considered here, so only the occurrence of a layoff is important. Furthermore, the employment and layoff policies of firms tend to be related more to industry type and size than to

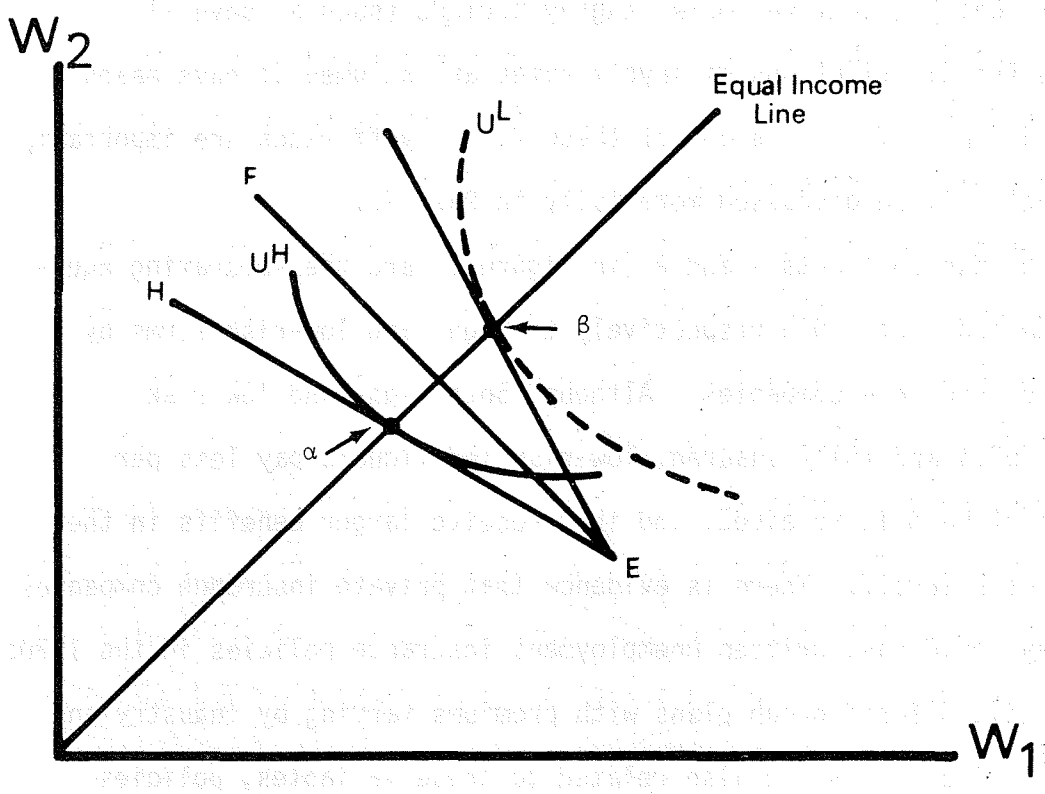


Figure 1

other variables, and information of this type is easy to obtain.[8] Finally, going concerns have a known track record regarding turnovers that result in UI benefits paid. Future layoffs cannot be perfectly predicted, of course, but relative layoff rates among firms are likely to be fairly constant over time. Over short periods of time, the actual layoff rates for high- and low-risk firms may differ from ρ^H and ρ^L, but over more lengthy periods (such as several years) the distributions of layoff rates are assumed to have means of ρ^H and ρ^L. The variances of these firm layoff rates are important, and they will be discussed more fully in Part II.

The two contracts *a* and β (in Figure 1) are the separating equilibrium contracts sold respectively to high- and low-risk firms by private insurance companies. Although both high- and low-risk individuals are fully insured, low-risk individuals pay less per dollar of benefit received, and they receive larger benefits in the event of a layoff. There is evidence that private insurance companies, if they could have written unemployment insurance policies in the 1920s, would have offered group plans with premiums varying by industry and firm.[9] If benefits are also related to these variables, policies such as a and B could result. Private insurers would not be confined to issuing only contracts *a* and β, but they would restrict themselves to policies on or "below" the EH and EL lines. Free entry presumably would guarantee that all private policies actually appear on the EH and EL lines, and that in fact policies *a* and B result.

Part II. Government Intervention

Suppose the government would require that the benefit payments of insurance companies must be identical among all policyholders whose conditional income is represented by E in Figure 2, regardless of their layoff probability. Some insurance companies might sell policy ϕ to all individuals and earn zero-expected profits. High-risk individuals would be better off, while low-risk individuals would become worse off. Companies pursuing this strategy might find that another company, selling α to high-risk individuals and τ to low-risk individuals ($\alpha_2 = \tau_2$), garners all of the low-risk business. The ϕ policy is viable only when it is purchased by high- and low-risk types in the proportions of A and (1 - A). The separating equilibrium $S = (\alpha, \tau)$ dominates the pooling equilibrium ϕ.

This description of government intervention illuminates some issues associated with the establishment of UI in the United States. Various interest groups were interested in different goals; some wanted high benefits, others wanted limited liability, others wanted one national plan. Disagreement over the form of UI insurance to be established by state governments in the 1920s could be construed as disagreement over whether S or ϕ was the better social policy. Policies of type S, it was argued, encouraged employers to reduce layoffs (in effect, pivoting the EH line up toward the EL line). Other states argued for pooling plans like ϕ on the grounds that S did not represent true insurance.[10]

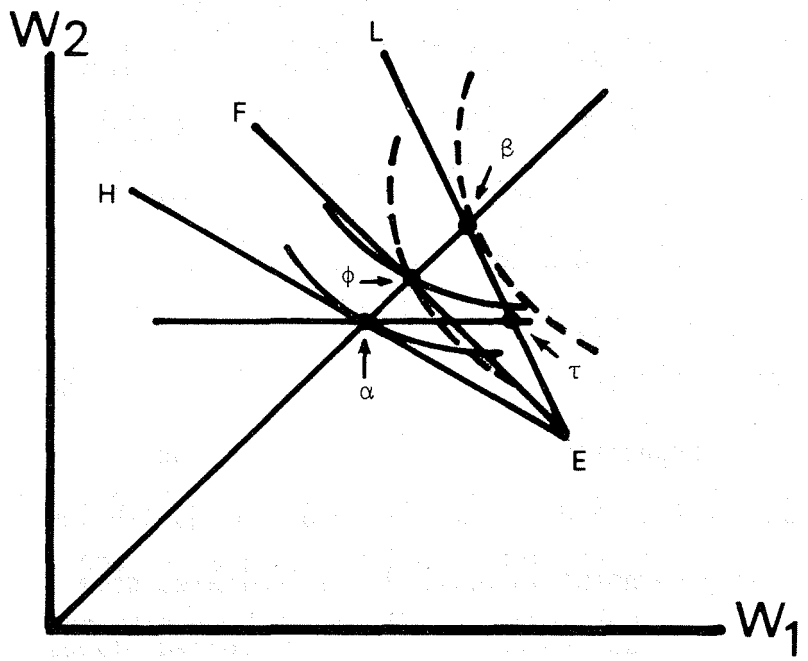


Figure 2

The debate over whether plans like S represent true insurance and risk pooling relates to the diversifiability of the unemployment risk. The Rothschild-Stiglitz model applies to diversifiable risks, a broader class than the class of independent risks.[11] Topel and Welch concede that "...the primary force militating against the provision of firm-financed UI is probably the high correlation in the timing of unemployed spells for workers."[12] To the extent that layoffs are correlated among covered workers, "insurance" plans merely serve the purpose of transferring the lending and borrowing activities of employees to their employers.[13] Topel and Welch provide evidence that in the United States the uninsurable portion of total risk *is* so large as to "strain the solvency of private UI programs."[14] The covariance of firm-layoff rates over time and with other firms thus is crucial to 1) the size and composition of the pool of firms required of a diversifiable UI plan, and 2) whether such a UI plan is true insurance (guarantees stipulated benefits) or is a reserve fund that pays out until it is depleted.[15]

The equilibrium plans S and ϕ in Figure 2 are both true insurance plans if the diversifiability of the layoff risks is sufficient to guarantee solvency of the insurer. In actual practice, neither one may be viable. The policies α and τ may be marketed by different insurance companies. Since information is perfect, self-selection is not an issue. But the market for one of these policies may be too thin to guarantee solvency for the insuring company.[16] Similarly, ϕ may not prove to be a solvent policy ex post; a firm

can sell ϕ in the ex ante correct (zero-expected profit) ratio between the two risk classes and still have a deficient number of policyholders (and/or deficient capital) to guarantee solvency.

The diversifiability of the layoff risks is, of course, not related to the government requirement that all UI plans pay identical benefits to all policyholders. This problem would exist in completely unregulated markets. However, it is unlikely that state governments would permit undercapitalized underwriters to operate within their borders.[17] Private insurers may perceive the limits of diversification, even where reinsurance is possible, as preventing their participation in any UI market, even if benefit payments are very low. However, governments could guarantee "thick" markets, for example, by assigning a sufficient number of diverse policyholders to each insurer so that the probability of insolvency would be considerably reduced. In the limit, this law-of-large-numbers approach might imply a monopoly insurance system, public or private. A public monoooly UI system provides governments with the opportunity to set benefit leve1s, tax rates, and eligibility requirements in accordance with other public goals. Governments may choose to offer S or ϕ as the compulsory UI system. Theycould also elect to earn negative-expected profits by transferring income from general tax receipts to UI recipients.

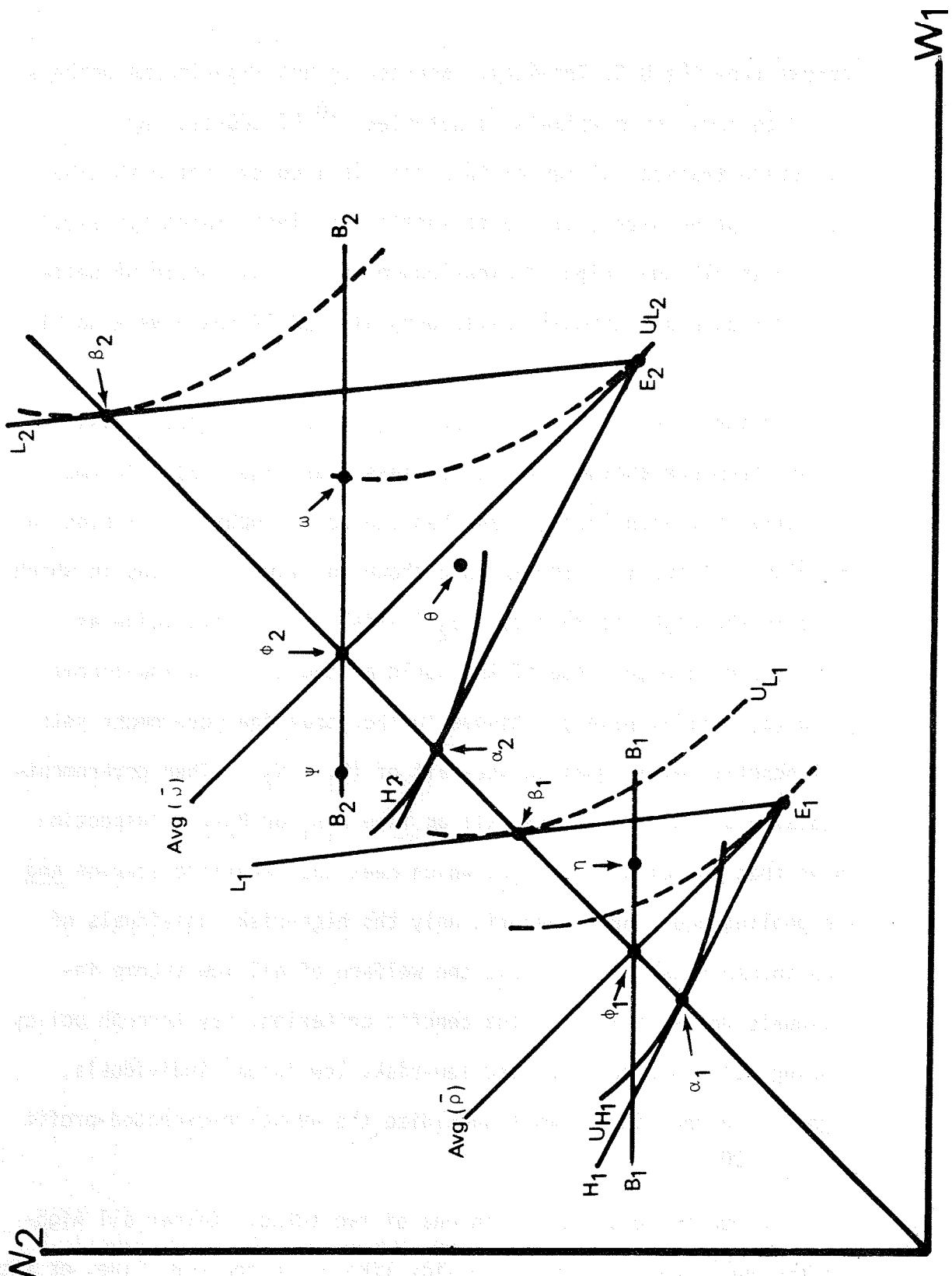
The current UI program in the United States operates as a transfer system in ways other than inter-industry transfers. Covered workers are subsidized by the general public when the UI system

borrows from the U.S. Treasury. Whether or not high-income workers subsidize low-income workers is not clear.[18] Of course, any deliberate transfer system of this sort is inconsistent with true insurance principles (i.e., a perfectly experience-rated system).[19] It is possible that high-and low-income individuals would be better off under such an income-transfer program than if there were no UI at all.

Consider the situation of two large groups of people, distinguished from one another by income class (see Figure 3). Assume initially that each income class has the same proportion of high- and low-risk individuals. The example shown in Figure 3 is one in which those in the high-income group (E_2 initial point) have twice as much income in each state of the world as those in the low-income group (E_1 initial point). Assume further that the government sets a UI benefit level equal to one-half of $(W_1 - W_2)$. Then government-regulated UI contracts must fall on line B_1B_1 or B_2B_2. Inspection shows that policies ϕ_1 and ϕ_2, which meet the benefit criterion and are pooling equilibria, benefit only the high-risk individuals of each income class. To improve the welfare of all low-income individuals while satisfying the benefit criterion, say through policy η being sold to both high- and low-risk, low-income individuals, high-income individuals must subsidize the negative-expected-profit policy η.[20]

The subsidy could occur in one of two forms. Either all high-income individuals purchase a policy like Ψ, on the B_2B_2 line, or they

Figure 3



purchase a policy like e, near the $\bar{\rho}$ line. The Ψ policy respects the proportional-benefit criterion but severely punishes the high-income, low-risk individuals. The θ policy greatly improves their lot but violates the proportional-benefit criterion. An intermediate policy, located in the area formed by Ψ, ϕ_2, e, and α_2, is in the spirit of a compromise. The actual choice of a subsidy is partly a function of arithmetic (the number of high-income individuals in the society) and partly of politics (which risk class among the high-income group is rendered more worse off). In the American UI system, benefit replacement is typically proportional to a ceiling income, at which point the benefit increases no further. If the group of high-income individuals contained a larger proportion of low-risk individuals than the group of low-income individuals, it might be possible to (1) satisfy the proportional-benefit rule for both income groups and (2) subsidize expected losses of the low-income group while not making anyone worse off. This situation would arise when the $\bar{\rho}$ line for high-income individuals in Figure 3 is very close to the L_2 line. Then a policy like ω makes positive-expected profits, is on the B_2B_2 line, and makes no high-income individuals worse off.

The expected utility function ($\hat{V}$) that underlies the argument illustrated in Figure 3 generates homothetic expansion paths (i.e., the slopes of UL_1 at E_1 and UL_2 at E_2 are equal). The logarithmic utility function, which displays constant relative risk aversion of unity, yields an expected utility function with a homothetic expansion path. When the expansion paths are not homothetic, it may

be possible to improve the welfare of both high- and low-risk high-income individuals, while at the same time subsidizing the low-income individuals. The situation is illustrated in Figure 4. Low-income individuals receive a policy like η on the B_1B_1 line, while high-income individuals receive a policy like θ, which improves their position relative to E_2 (regardless of risk type). Notice that the slope of UL_1 at E_1 no longer equals the slope of UL_2 at E_2.

Part III. Conclusion

A proper concern of state governments is the solvency of UI plans operating within state jurisdictions. Perfectly experience-rated private UI plans are likely to structure premiums and indemnities differently than public UI plans, partly because public plans are less concerned about solvency. Public plans in principle can be perfectly experience-rated, but such plans would entail different costs per dollar of insurance for high- and low-risk individuals. Though economically justifiable, these differences may be difficult to defend politically. Yet, once governments attempt to provide "adequate" benefits, or "proportional" benefits, perfect experience rating must be replaced by some pooled-equilibria-contracting pattern. A monopoly UI system based on pooling (imperfect experience rating) forces some people to purchase less than optimal insurance coverage, while others may purchase more than is optimal.

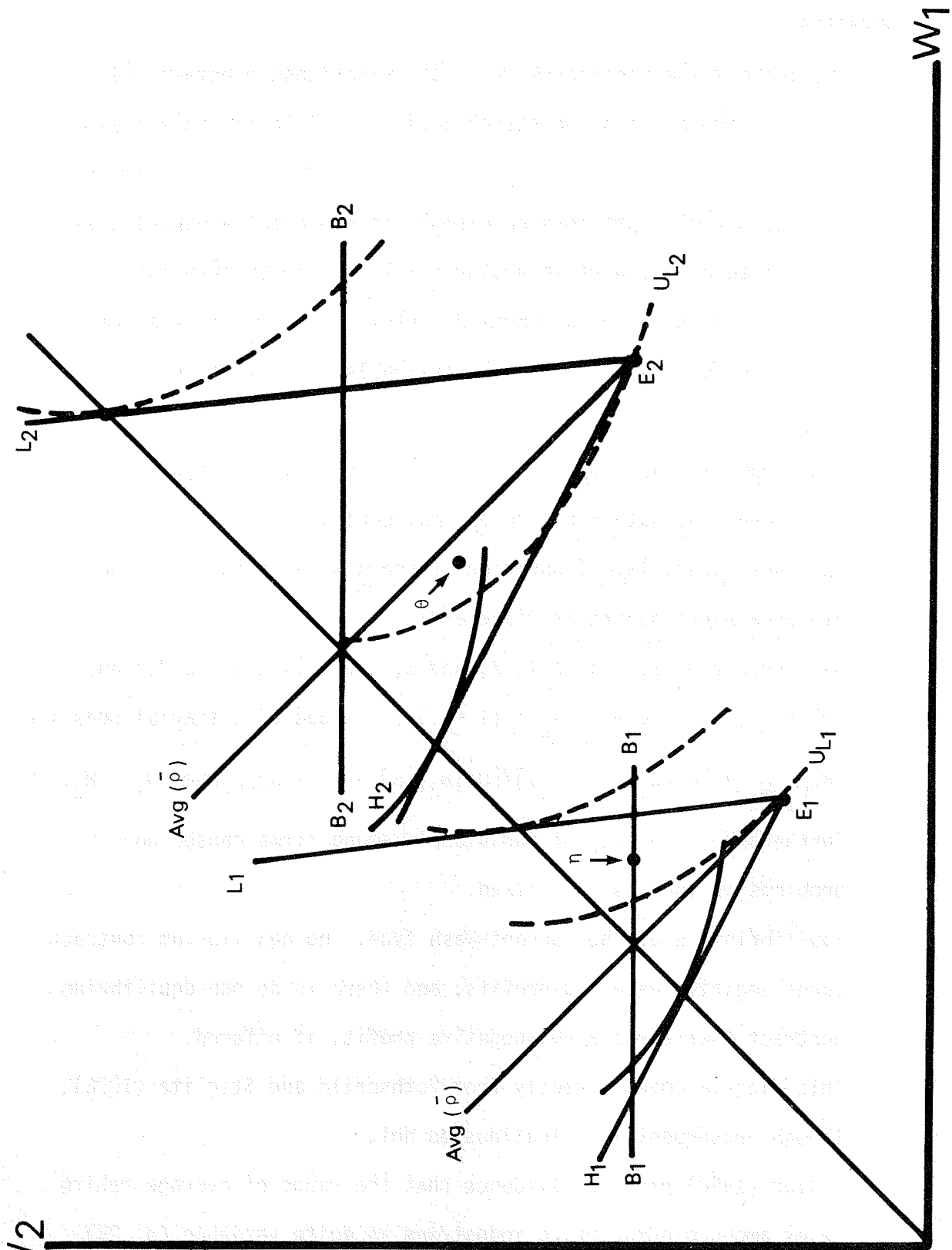


Figure 4

FOOTNOTES:

1. The authors are unconcerned with the relationship between UI benefit payments and job search activity. I ignore this issue as well.
2. Azariadis (1970) provides an example of how a fully experience-rated plan can support an employment level larger than is socially optimal; for an unrated system, the benefit level can be chosen to yield the socially desirable employment level (see pp. 18-22). Brown's model shows that severance pay and labor mobility are important factors in the firm's layoff policy and the nature of the optimal contract.
3. In other words, layoff duration is known with certainty. The employee moral hazard is disregarded.
4. As a result of equations 1, 2, and 3, the following conditions hold: $\pi(\alpha,\rho) = 0 \rightarrow \alpha_2/\alpha_1 = (1 - \rho)/\rho$ = slope of actuarial odds line $MRS_{W_1,W_2} = [U'(W_1)\ (1 - \rho)]/[U'(W_2)\ \rho] = (1 - \rho)/\rho$ when $W_1 = W_2$.
5. Furthermore, mobility of individuals among firms causes no problems as long as λ is fixed.
6. Equilibrium is of the Cournot-Nash type: no equilibrium contract earns negative expected profits, and there is no non-equilibrium contract that earns a non-negative profit, if offered.
7. This diagram comes directly from Rothschild and Stiglitz (1976), though subsequent modifications do not.
8. Lilien (1980) provides evidence that the range of average rehire rates among manufacturing industries is quite variable (p. 28).

FOOTNOTES (cont')

9. James (1947) recounts the attempts of the Metropolitan Life Insurance Co. to obtain permission to write UI policies from the New York State Assembly. In the Metropolitan plan benefits would depend on wages, employment tenure, and unemployment duration. See pp. 226-31.

10. Under the Wisconsin plan, each employer's liability was limited to the reserves set aside in a fund. There was no guaranteed minimum benefit. This plan was decried as not being true insurance. Some states, such as Ohio, believed that minimum benefits could be guaranteed by pooling plans. For a more general description of the historical and legislative history of UI, see Nelson (1969) and Haber and Murray (1966).

11. Rothschild and Stiglitz (1976), p. 631, footnote 4.

12. Topel and Welch (1980), p. 355.

13. This is likely to be desirable from the employees' viewpoint, because the firm has comparative advantages in these practices. Furthermore, firms can diversify more completely than employees.

14. Topel and Welch (1980), p. 356.

15. Supplemental unemployment benefit funds in the automobile and steel industries are examples of such reserve funds.

16. The state of Michigan recently considered revoking the self-insurance status of Chrysler Corporation in the state workmen's compensation program, because of the firm's potential insolvency. See "Chrysler Must Buy Workers' Insurance, Says State of Michigan," Wall Street Journal, December 26, 1980, p.3.

FOOTNOTES (con't)

17. Again, the experience of Metropolitan Life is instructive. The New York State Senate Insurance Committee was concerned that Metropolitan Life policyholders would be exposed to too much risk if the company were permitted to offer UI. See James (1947), pp. 226-31.

18. There is not much evidence on this point. The range of benefit maxima in state UI programs (50 to 70 percent of average wages) suggests that an intra-program transfer exists. But taxes are collected on only the first $6,000 of each employees' earnings, suggesting a higher tax incidence on low-income workers. Of course, the tax exemption of UI benefits means that high-income beneficiaries require fewer before-tax dollars than low-income beneficiaries to be on equal footing after tax. Feldstein (1974) reports that the distribution of benefits is similar to the distribution of income for the general population. On this basis, he argues that the poor do not benefit much from UI. My interest is only in transfers among covered workers.

19. Practical matters, however, apart from an income-transfer motive, might lead to an insurance system with the ex post characteristic of income transfer. These practical considerations include employer and employee moral hazards and imply coinsurance for certain groups of people.

20. Assuming, of course, that the entire UI program is designed to be actuarially sound.

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