MEASURING LABOR COMPENSATION
IN CONTROLS PROGRAMS

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D.P. # 82-02 February 1982

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December, 1981

*Presented at the NBER Conference on the Measurement of Labor Cost, Williamsburg, Virginia, December 4-5, 1981. We wish to acknowledge the helpful comments of Bruno Stein, Haig Nalbantian and the conference participants, especially Erwin Diewert and Jack Triplett.

I. INTRODUCTORY REMARKS

It is commonly said that wage-control programs are much easier to formulate and to administer than price-control programs. The reasons given are that consumer and producer products and services are much more heterogeneous than labor inputs and pricing practices are much more diverse than pay structures. While there is much truth to these comparisons, the difficulties of formulating an effective and workable program on the pay side are easily underestimated. The formulation of pay-change measurement rules is complicated by two major factors: (1) the existence, and increasing relative size, of many types of labor compensation other than straight hourly pay and (2) the existence of many types of salary structures and plans.

These complications create problems for any economic analysis requiring measurement of labor costs. They are, however, especially problematical in the formulation of wage limitations in a controls program. Whether the program is voluntary or mandatory (more realistically, regardless of where it is located on the voluntary-to-mandatory spectrum), issues of equity and universal comprehension of the rules of the game are paramount. If such issues could be ignored, the straightforward economic objective of such programs -- controlling labor costs[1] -- would be adequately served by a definition of labor compensation that is no different from that employed in any other economic analysis; there would be no special measurement issues and no purpose for this paper.

This objective, however, is inevitably compromised by the need to elicit and to maintain public support and cooperation, which require at least the appearance of equitable treatment of different employee groups (e.g., management/nonmanagement and union/nonunion). Equity considerations are central to "incomes policies" (controls on types of incomes -- labor compensation, profit, rent, and interest) commonly employed in Western European countries, and they have also inevitably crept into the price and wage control programs adopted in the U.S. Indeed, neutrality with respect to labor/nonlabor income shares was a basic tenet of all three programs of the last two decades: the Kennedy/Johnson guideposts, the Nixon controls, and the Carter pay/price standards.

Employer cooperation also requires that the rules stipulate a clear goal that can be attained through standard compensation-administration procedures. Requiring firms to controls costs that are substantially beyond their control can erode cooperation.

These issues of equity and administrative workability interact with the two pay-program complications listed above (multiple types of compensation and multiple types of salary structures) in a way that makes the measurement of labor costs more problematical in a controls program than in other types of labor-market analyses and programs. Controls programs confront all of the usual measurement problems, plus many others. These measurement problems provide the focus of this paper.[2]

In the following discussions, we relate the resolution of the measurement issues in Phase II of the Nixon Administration's Economic Stabilization Program (ESP) and the first year of the Carter Adminstration's Pay and Price Standards Program.[3] The first program was administered by the tripartite Pay Board, and was constrained by legislative mandate, whereas the Carter Administration's program was based on an executive order and therefore was, at least initially, relatively unconstrained by external factors. We ignore the two ESP freezes. We also devote little attention to Phases III and IV of the ESP and the second year of the Carter program, since they essentially constitute periods of gradual decontrol (the first administered by the Cost of Living Council and the second in effect enginneered by the Pay Advisory Committee).

In Section II, the labor-cost measurement concept in a controls program is placed in the context of the cost-push theory of inflation and the theory of production and cost minimization. In Section III, we discuss issues involving the coverage and treatment of nonwage compensation. In Section IV, we deal with the index-number issues that arise in choosing a method for calculating compensation-rate changes. Section V contains a few concluding remarks.

II. MODELING CONTROLS

1. Cost-Push Inflation and Measurement Rules

The objective of the labor-cost controls programs adopted in the U.S. has been to mitigate cost-push pressures on product prices. The underlying behavioral description of the firm is typically based on a proportional mark-up of prices over unit costs,[4] which in turn can be based on the theory of production and cost minimization. The cost function, C, of an input-price-taking firm is defined by[5]

$$(1)\qquad C(w,r,q) = \left\{\min_{\ell,z}\ w\cdot\ell + r\cdot q \;\middle|\; q \leq F(\ell,z)\right\},$$

where w is a vector of compensation rates for different types of labor, r is a vector of prices of other inputs (e.g., rental rates for capital and prices of intermediate goods), q is output, ℓ is the vector of labor inputs, z is the vector of nonlabor inputs, and F is the production function.

Our exposition can be simplified without loss of any essential aspects if we assume that the production function is homogenous of degree one, in which case the cost function can be structured into the multiple of output and a unit cost function, c (Shephard 1970):

$$(2)\qquad C(w,r,q) = c(w,r)\cdot q.$$

The mark-up theory of price behavior is then described by the following equation:

$$(3)\qquad p = \alpha\cdot c(w,r),$$

where α is a mark-up factor. By converting to logs,

$$(4)\qquad \ln p = \ln \alpha + \ln \tilde{c}(\ln w,\ \ln r),$$ [6]

and differentiating with respect to time, we obtain the corresponding expression for the rate of inflation:

$$(5) \quad \frac{\dot{p}}{p} = \frac{\dot{\alpha}}{\alpha} + \sum_i s_i(w,r) \frac{\dot{w}_i}{w_i} + \sum_j s_j(w,r) \frac{\dot{r}_j}{r_j},$$

where a dot over a variable indicates a time derivative (i.e., $\dot{p}/p$ is the rate of change of the product price) and $s_i(w,r)$ and $s_j(w,r)$ are, respectively, the shares of types of labor inputs and nonlabor inputs in total costs.[7]

Equation (5), in the spirit of the cost-push theory of inflation, allocates the rate of increase of price to rates of increase of cost components, as well as the rate of change of the mark-up factor. A comprehensive controls program would therefore place an upper limit on the rate of change of each of the cost components and the mark-up factor. Alternatively, a control could be placed on some of the input prices (e.g., labor compensation rates) as well as the rate of increase of price itself, $\dot{p}/p$, in which case the other (nonlabor) cost components would implicitly be controlled by the limitation on price increases. In either case, one possible guideline for labor cost is

$$(6) \quad \frac{\dot{w}_i}{w_i} \leq \beta \quad \forall\, i.$$

The principal problem with the control rule (6) is that it does not provide flexibility for relative compensation rates to change; for all rates for which the constraint is binding, relative compensation rates must remain fixed. This inflexibility exacerbates the problem of induced inefficiencies, particularly in the case of occupational shortages. Of course, one could adopt different upper bounds for different types of labor inputs, but the task of deciding on all of these limitations would be exceedingly difficult for anything but a trivial partition of the labor force. Reflecting these facts, controls programs have typically placed restrictions on some aggregate measure of labor costs. Permitting firms to comply with a limitation on an index of labor costs affords them the opportunity to change relative compensation rates in response to changing market conditions while meeting the control objective of limiting total labor costs.

The question is: Where does this index of labor costs come from? A natural measure is the second set of terms in equation (5), with the share weights normalized to sum to unity:

$$(7) \quad \sum_i s_i^L(w,r) \frac{\dot{w}_i}{w_i} < \beta,$$

where

$$s_i^L(w,r) = \frac{s_i(w,r)}{\sum_i s_i(w,r)}$$

is the share of labor-type i in total labor costs.

There does not in general exist an aggregate labor compensation rate (a theoretically consistent aggregation rule for compensation-rate levels) corresponding to the continuous measure of change in (7); integration of the left-hand side of (7) results in a function of both w and r. An aggregate compensation rate exists if and only if the unit cost function can be written as

$$(8) \quad c(w,r) = \hat{c}(W(w),r).$$

In this representation, the function W can be interpreted as the aggregation rule (or index specification), and W(w) is the aggregate compensation rate. This construction is possible if and only if compensation rates of various types of labor are separable from prices of other inputs - i.e., if and only if labor-price frontiers are independent of the prices of other inputs (Blackorby, Primont, and Russell 1978, p. 70). Under homotheticity - but only in this case - this condition is equivalent to separability of labor inputs from other inputs in the production function (Blackorby, Primont, and Russell 1978, p. 89). This in turn requires that technical rates of substitution between labor inputs are independent of the quantities of other inputs. Needless to say, this is a strong restriction.

If the conditions for aggregation across compensation rates are satisfied, the cost-push equation can be written as

$$(9)\quad \frac{\dot{p}}{p} = \frac{\dot{\alpha}}{\alpha} + s_L(W(w),r)\,\frac{\dot{W}(w)}{W(w)} + \sum_j s_j(w,r)\,\frac{\dot{r}_j}{r_j}$$

where

$$(10)\quad \frac{\dot{W}(w)}{W(w)} = \sum_i s_i^L(w)\,\frac{\dot{w}_i}{w_i},$$

$s_L(W(w),r)$ is labor's share of total costs, and $s_i^L(w)$ is the share of the ith labor input in total labor costs. The aggregate-compensation-rate control rule is then

$$(11)\quad \frac{\dot{W}(w)}{W(w)} \leq \beta.$$

The difference between control rules (7) and (11) is that the share weights in (7) depend on nonlabor-input prices as well as labor compensation rates. Thus, in principle (7) requires more information than (11); however, the required information about all price levels is embodied in the share weights, and in both cases data on shares of individual types of labor inputs suffice to construct the aggregate rate of change -- in the continuous case. In practice, however, aggregate compensation changes must be constructed from discrete data. If the aggregation condition in (8) is satisfied, such constructions are naturally and trivially given by

(12) $W(w(t_1))/W(w(t_0)) - 1 \leq \beta$,

where $w(t_0)$ and $w(t_1)$ are the compensation-rate vectors in the base period and terminal period, respectively. Alternatively, the discrete-time control rule can be constructed by taking a discrete approximation to (7) or (11). In general, however, such discrete approximations may not themselves be derivable from a well-behaved cost function; moreover, discrete indexes of the form (12) are not in general functions of share weights and percentage rates of change of individual compensation rates. (See Section IV for additional discussion of these issues.) In any event, the exposition that follows is somewhat more evocative if we assume the existence of a labor-cost aggregate, W; the reader can easily modify the arguments for the case where this condition is not satisfied.

2. Technological Change

The exposition thus far has ignored the effect of technological change. If the state of technology is not invariant, the mark-up rule is

(13) $p = \alpha \cdot c(w,r,\tau)$,

where τ is an index of the state of technology (i.e., total-factor productivity) and c is decreasing in τ. If compensation rates are separable not only from other input prices but also from the state of technology, then the unit cost function can be written as

(14) $c(w,r,\tau) = \hat{c}(W(w),r,\tau)$.

Under the maintained assumption of homogeneity, this separability condition is equivalent to Hicks neutrality of technological change with respect to labor inputs (Blackorby, Lovell, and Thursby 1976). In this case, the introduction of technological progress simply adds a term to the cost-push equation (9).

If the neutrality/separability condition is not satisfied, the unit-cost function image is

(15) $c(w,r,\tau) = \hat{c}(W(w,\tau),r,\tau)$.

In this case, the change in the aggregate compensation rate is given by

(16) $$\frac{\dot{W}(w)}{W(w)} = \sum_i S_i^L(w,\tau)\frac{\dot{w}_i}{w_i} + \varepsilon(w,\tau)\frac{\dot{\tau}}{\tau},$$

where $\varepsilon(w,\tau)$ is the elasticity of labor costs with respect to the state of technology. Thus, a rule of the type (11) would allow larger compensation increases in those firms with larger elasticities or more rapid rates of technological change, since the second term on the right-hand side of equation (16) is negative when there is technological progress. Indeed, many argue that the allowable compensation change should be sensitive to rates of productivity growth. To the extent, however, that disparities in rates of technological progress are attributable to differential rates of capital formation and to differences in the potential scope of innovation, this approach is inequitable and distortionary; with competitive labor and product markets, high productivity growth rates tend to be reflected in lower rates of price increases rather than higher rates of wage increase. On the other hand, to the extent that the disparities reflect differences in workers' or unions' resistance to labor-saving technological innovations, an aggregate labor-cost control rule that limited (15) might be more appropriate. In a practical vein, however, there is no way that controllers can discern those cases in which larger wage increases were granted in return for acceptance of labor-saving technological progress.

3. Incentive Pay

More vexing are the problems raised when rates of labor compensation include some form of incentive pay. There are two general types of such programs: (1) group productivity plans and (2) individual-worker incentive plans (such as piece-work pay).

In a group productivity plan, the hourly compensation of a group member depends on measured group performance, and group performance depends on the level of group effort and the state of technology. Thus, a simplified statement of the group compensation rate is

$$(17)\quad w_i(\omega_i,\gamma_i,\tau_i) = \omega_i + b_i(\gamma_i e_i(\gamma_i),\tau_i),$$

where ω_i is the hourly wage rate, b_i is the hourly-productivity-bonus function, γ_i is the incentive-rule parameter, $e_i(\gamma_i)$ is the level of group effort, and τ_i is a group-specific measure of technology.[8] The presumption of such plans is that effort, $e_i(\gamma_i)$, and therefore group productivity is increasing in γ_i. Further, if the increased worker efficiency induced by the plan outweighs the additional compensation generated by the plan, unit costs are reduced by its introduction; that is, the unit-cost function is decreasing in γ_i, at least over some interval, and in particular unit costs are lower for some positive γ_i than when $\gamma_i = 0$.

Over time, the hourly wage rate, the incentive-rule parameter, the level of effort, and technology may all change. The rate of change of hourly compensation for a group is

$$(18)\quad \frac{\dot{w}_i}{w_i} = \frac{1}{w_i}\left(\dot{\omega}_i + \frac{\partial b_i}{\partial \gamma_i}\dot{\gamma}_i + \frac{\partial b_i}{\partial e_i}\frac{de_i}{\partial \gamma_i}\dot{\gamma}_i + \frac{\partial b_i}{\partial \tau_i}\dot{\tau}_i\right),$$

and the change in the aggregate labor compensation rate is

$$(19)\quad \frac{\dot{W}(w)}{W(w)} = \sum_i \frac{s_i^L(w)}{w_i}\left(\dot{\omega}_i + \frac{\partial b_i}{\partial \gamma_i}\dot{\gamma}_i + \frac{\partial b_i}{\partial e_i}\frac{de_i}{d\gamma_i}\dot{\gamma}_i + \frac{\partial b_i}{\partial \tau}\dot{\tau}_i\right).$$ [9]

Corresponding to this decomposition of $\dot{W}(w)/W(w)$ there are several possible control rules, three of which are

$$(20)\quad \frac{\dot{W}(w)}{W(w)} \leq \beta,$$

$$(21)\quad \sum_i \frac{s_i^L}{w_i}\left(\dot{\omega}_i + \frac{\partial b_i}{\partial \gamma_i}\dot{\gamma}_i + \frac{\partial b_i}{\partial \tau}\dot{\tau}\right) \leq \beta,$$

and

$$(22)\quad \sum_i s_i^L \frac{\dot{\omega}_i}{\omega_i} \leq \beta.$$

The first of these rules is typically the strictest, charging employee units for all increased bonus payments as well as hourly wage gains; the second charges against the guideline only those increases in bonuses that are attributable to changes in technology and in the incentive-plan parameters, forgiving those that are attributable to increased group effort; the last ignores all changes in compensation rates attributable to the group productivity plan and hence is the most liberal of the three rules.

Choosing among these three rules was a matter of great controversy in both the Nixon controls program and the Carter standards program. The issue centers on the apparent conflict between the objectives of promoting economic efficiency and productivity growth (or minimizing induced inefficiencies) on the one hand and the objective of controlling labor costs on the other. To the extent that the group productivity plan induces workers to become more efficient and to the extent that the resultant bonuses do not overcompensate for those gains, the increases generated by the plan should be excluded from the measurement of labor compensation. Under these conditions, the most liberal rule, (22), would still be effective in controlling unit costs (and hence prices under the mark-up rule (3)).

There are, however, two problems with this rule. First, there is good reason to be skeptical about the incentive effects of group productivity plans, because of the free-rider phenomenon. Improvements in group productivity attributable to the increased diligence of any one member of the group are shared among all members, and each benefits from group-productivity improvements whether or not he makes a contribution. Consequently, looked at from the perspective of individual self interest, there may be little reason for such plans to improve group productivity. The counter-argument is that individual workers are likely to respond to peer-group pressure to perform effectively. Clearly, the severity of the free-rider problem is sensitive to the size of the group. Unfortunately, there is little empirical evidence about the effectiveness of such plans; most of the evidence is anecdotal.

Second there are economic arguments suggesting that the increased productivity attributable to technological change should be charged against the standard. In most industries, growth in total-factor productivity is an ongoing phenomenon because of technological change and capital investment. As noted above, providing higher allowable compensation-rate increases for workers in industries with more rapid technological progress and more capital investment is inequitable and fails to simulate market processes (in which relatively rapid rates of productivity growth tend to be reflected in relatively slower rates of inflation rather than relatively higher rates of growth of labor compensation). If it were possible to separate the productivity gains attributable to induced group effort from those attributable to technological progress and capital investment, there would be no problem, and rule (21) could be used. In practice, however, such distinctions are impractical; trained econometricians could construct models and perform experiments that could be used to infer such dichotomizations, but it is not possible to construct a reasonable set of rules that companies can follow in distinguishing between the two sources of productivity gains.[10]

For these two reasons - the free-rider problem and the measurement problem - no exception was provided for group productivity plans in the Carter Pay and Price Standards Program. Immense lobbying pressure - both directly and through the Congress - pressured the Council on Wage and Price Stability into the formulation of a tightly worded exception for group productivity plans (i.e., one that required a reasonable assurance that the bonuses were conditional on increased worker effort), but its promulgation was effectively blocked by the Pay Advisory Committee. In any event, the issue of exemptions for group productivity plans in today's economy is not of critical importance, because these plans are uncommon. (Much more common are incentive plans for which the performance criterion is not in terms of physical output; see Section III.) Such plans were even more uncommon in 1972, when the Congress mandated an exception for them in the ESP.

A feature of the control rules (21) and (22) is that, despite the exclusion of compensation increases attributable to productivity improvements, the base compensation rate, $w_i(\omega_i, \gamma_i, \tau_i)$, includes all compensation, including base group-productivity bonuses. This makes sense. The purpose of these exclusions is to encourage future productivity gains, and punishing workers for past gains in productivity would be inequitable. Moreover, workers may well in the past have given up fixed wage increases in return for the incentive plan. (This is, of course, less likely to be true for unions, which traditionally resist any type of incentive pay. At any rate, such plans are rare for union workers.)

One of the two problems associated with group productivity exceptions is eliminated in the case of individual-worker incentive plans such as piece-rate compensation payments. Such programs can be modeled by

$$(23) \quad w_{ij}(\omega_i, \gamma_i, \tau_i) = \omega_i + b_i(\gamma_i, e_{ij}(\gamma_i), \tau_i),$$

where w_{ij} is the total hourly compensation rate for the jth worker in the ith group and e_{ij} is the level of effort of that worker induced by the incentive rate for the ith group, γ_i. If all compensation is in the form of piece-work pay, the first term of (23) vanishes, and if the worker receives only fixed compensation the second term vanishes.

In this case, assuming sufficient structure to aggregate across employees within each group, the rate of change in the group compensation rate is given by

$$(23) \quad \frac{\dot{w}_i}{w_i} = \sum_j \frac{s^L_{ij}}{w_{ij}} \left(\dot{\omega}_i + \frac{\partial b_i}{\partial \gamma_i} \dot{\gamma}_i + \frac{\partial b_i}{\partial e_{ij}} \frac{de_i}{d\gamma_i} \dot{\gamma}_i + \frac{\partial b_i}{\partial \tau_i} \dot{\tau}_i \right),$$

where s^L_{ij} is the share of worker j in the total labor cost for group i. Further aggregation is then possible using (10).

As in the case of group productivity plans, three possible control rules are obtained by (1) controlling all four terms in (24), (2) eliminating the third term, or (3) eliminating the last three terms. The first of these rules is the most stringent, charging all compensation increases against the guidelines; the last is the most lenient, excluding all changes in incentive payments; the second is intermediate, excluding increases in compensation attributable to demonstrable increases in individual-worker productivity, but counting against the guideline increases attributable to changes in the piece-work formula, holding worker effort constant, and changes attributable to technological advance.

Although the free-rider problem does not exist for individual-worker incentive programs, the problem of separating productivity improvements attributable to increased worker effort from those attributable to the ongoing process of capital investment and technological change is still relevant. All piece-work payments were legislatively excluded from the purview of the ESP. The Carter program excluded compensation increases demonstrably attributable to increased output per hour.

Additional measurement problems, which are complicated by the control-program imperatives of equity considerations and the need to make the rules understandable and workable, are created by two factors: (1) the need to define precisely the compensation rates, w, taking into account the diverse types of compensation payment, and (2) the need to specify an aggregation technique. These two measurement problems are discussed respectively in Sections III and IV.

III. TREATMENT OF NONWAGE COMPENSATION

In the preceding section, we dealt with compensation as a single numerical entity. In fact, compensation comes in many diverse forms. In this section, we discuss three major types of compensation other than hourly wages and the measurement issues that arise in designing control rules to cover them. The first major category is incentive pay, including bonuses and profit-sharing plans (usually associated with management groups). A second category, future-value compensation, includes long-term incentive plans involving the issuance of awards where cost and value will not be known until some future time. The final and most important category is fringe benefits, such as medical insurance and pension plans.

1. General Issues

Administrators of controls programs face three general issues in the treatment of nonwage compensation: (1) whether a particular item should be covered, (2) whether the item should be measured in terms of employer costs or employee benefits, and (3) whether the rule should be applied separately to each component or to their aggregate. In the context of the simple model described in Section II, the answers tend to be obvious; when the control issues of equity and workability are taken into account, however, the answers are not so obvious.

As noted in Section II, the issue of whether to include certain types of incentive pay is a real one. The issue turns on whether the incentive pay induces commensurate productivity improvements that offset the effect of higher labor compensation. In the context of the simple model of Section II, however, any rise in the aggregate compensation rate that does not have offsetting productivity effects should be covered, since they result in higher price. Moreover, so long as the constraint is binding, any uncovered item would provide an escape mechanism, and the induced substitution toward the uncovered form of compensation would be undesirable from the perspective of economic efficiency as well as program effectiveness. Finally, exclusion of selected types of compensation can undermine public support for the program, particularly if executives appear to benefit most from the exclusions (as is the case for many types of nonwage compensation).

On the other hand, inclusion of some of these items requires complex rules, thereby increasing the administrative and reporting burden on firms and the monitoring burden on government administrators. In addition, some forms of pay are, to a greater or lesser extent, beyond the control of employers, and their inclusion can undermine support for the program.

The general approach of both the Pay Board and CWPS was to cover all forms of compensation. Both, however, excluded employer contributions to social security, because they are beyond the control of employers and because the legislated increases have differential impacts across groups of employees. The Congress directed the Pay Board to exclude most fringe benefits from its measure of labor compensation but allowed for limits on such benefits if the contributions made to support them were "unreasonably inconsistent" with the standards for wage or price stability. The Pay Board translated this general principle into some specific restrictions on the excludable fringe benefits (see the discussion in subsection 4).

The second question is whether the nonwage items should be measured in terms of the value of the benefits received by the employees or by the cost to the employers. Of course, benefits and cost coincide in the case of wages and salaries, but they can diverge markedly for many types of fringe benefits (for example, changes in pension-funding laws or regulations can affect employer costs substantially without changing employee benefits). The fundamental objective of controlling labor costs is clearly served by focusing on employer costs rather than employee benefits. In those instances, however, where the employer does not control the cost of providing a particular benefit, this approach can cause either equity distortions across employee groups or administrative bottleneck-as firms request exceptions on equity grounds. The Pay Board regulations and the CWPS standards were designed to embody the general principle of measuring the employer's cost when that cost was directly controlled by the employer and measuring the value of employee benefits when the costs were not directly controlled.

The third question is whether the individual nonwage items should be treated under separate limitations or be aggregated with wages under a common limitation. Under a common aggregate rule, employers would have the flexibility to substitute from one compensation form to another without violating the overall standard. This flexibility would be absent if separate limitations were imposed on each compensation type, resulting in a stricter standard but one that would inhibit substitution. The general approach of both the Pay Board and CWPS was to place all compensation forms under an aggregate standard whenever possible.

2. Incentive Pay

A wide variety of incentive-pay arrangements are used in the U.S. economy. In some, such as those discussed in Section II, nominal amounts are paid based on quantity measures of performance; examples are piece-work pay, unit-based sales-commission plans, and some employee-group production incentive plans. Others proceed on a percent-of-value basis; examples are sales-commission plans that are revenue based and profit-sharing bonus plans. Finally, some firms pay discretionary bonuses that are not tied to a specific performance-based formula.

These plans have two characteristics that make their treatment in a controls program problematical. The obvious one, discussed above, is the danger that controls will interfere with the salutary incentive effects of such programs. The second problem is that employer costs of these programs cannot be determined in advance. In fact, the primary rationale for such plans is that pay should be high when individual or company performance is good and low when it is not.

One measurement approach would be to charge the ex post employer payout in full. The objection that this approach would stifle performance incentives is most credible for those plans that provide direct incentives to individual employees, as in the case of piece-work and commission pay and productivity plans modeled for small employee groups. The argument carries less weight for company-wide plans, where the individual incentives are diluted. Moreover, in many cases the performance criterion bears little relationship to work performance - especially those that are based on revenue or profit rather than physical quantity or productivity.

On theoretical grounds, an ideal approach would be one that requires firms to design incentive-compensation packages with an expected payout value that will meet the standard, where the expectations would be determined assuming a common base performance. This approach would leave incentives intact. In applying such a prospective rule, however, it would be necessary to quantify the concept of performance, and this need raises a new set of measurement problems for all but the most basic incentive-pay programs.

As noted in Section II, the pay generated by productivity-incentive plans was legislatively excluded in the Nixon program whereas the CWPS standard allowed companies with sales-commission or production-incentive plans to assess compliance on the assumption of constant physical volume. All other forms of incentive pay were included at their actual value in the measure of labor compensation in both programs. The alternative of excluding these payments would have created a gaping loophole in the pay standard for managerial employees.[11] The Pay Board evaluated the plans prospectively on the assumption that it's targets were fully achieved, whereas the CWPS standard evaluated them retrospectively. Because of the considerable volatility of profits, and hence of profit-based bonus plans, both programs allowed considerable flexibility in the choice of a bonus base.

3. Future-Value Compensation

The salient characteristic of future-value compensation is that its value will not be known until some future time. In most cases, this type of compensation is used to provide long-run incentives to upper-level management. As such, it is relatively unimportant from the perspective of inflation impact. The justification for covering it in a controls program is based on equity considerations and promotion of public acceptance of the program by guaranteeing that managment compensation is covered in all forms.

The problem posed by covering future-value compensation, of course, is that of evaluating its cost. Consider for example, a stock-option grant providing an option to buy 500 shares at $40 per share any time in the next five years. Until the option is exercised, the cost to the employer is unrealized and unknown. The employee may never benefit from such a grant if the stock price never exceeds $40 over the exercise period.

In theory, an ideal approach would be to assign a market value to such awards when they are granted. This would measure both the opportunity cost to the employer (who could sell the awarded units) and the compensation benefit to the employee. In practice, such an assignment is difficult because of the absence of markets. For example, stock options are actively traded for only a handful of major stocks, and the exercise periods of marketable options normally do not exceed one year. In contrast, option awards often have multi-year exercise periods and are often contingent on multi-year performance criteria, making the determination of a market value difficult to codify.

Because of these problems, future-value awards under continuing plans were treated as a separate pay item with a separate numerical limitation under the CWPS standard. This was the only case where a compensation form was segregated rather than being included under an aggregate limitation. Awards under newly introduced plans were to be assigned a "reasonable value" and to be included with other pay items.

The Pay Board treated qualified stock-option plans -- those qualifying for preferred tax treatment under IRS rules -- differently from nonqualified plans. A separate standard limited the issuance of options under existing qualified plans to the average number issued during the three fiscal years before Phase II. Nonqualified plans, on the other hand, were evaluated and added to wages and salaries. Issuances were evaluated at the difference between the option price and the market price (one IRS condition for qualification for preferential tax treatment is equality of option and market prices) plus 25 percent of the market value (the Board's estimate of the discounted value of an option). In addition, if the option was exercised during the control period at a price more than 25 percent below market value, the amount above 25 percent was charged to labor compensation.

4. Fringe Benefits

Fringe benefits have become an increasingly large component of employer costs over the last two decades. Here, we consider the two major benefits, employer contributions for health-insurance coverage and pension-plan funding. Health-insurance costs have risen rapidly for two reasons: the widespread improvement in the coverage provided and rapid medical-cost inflation. The first factor is controlled by firms but the latter is not. Further, the timing and magnitude of employer-cost increases vary across plans and insurance providers depending on plan experience and other factors. As a result, it is possible for two firms to have radically different cost changes in a particular measurement period, although the benefits to employees are identical and remain unchanged. If these costs are charged against an aggregate pay standard, the company with the larger insurance-cost increases (after the program begins) would have to anticipate these increases and grant lesser wage changes to remain in compliance. If anticipations are correct, an equity problem across firms is created; if anticipations are incorrect, inadvertant noncomplicance can result.

Similar comments apply to pension-funding costs. Pension funds are of two basic types: defined-contribution plans, where the employer contributes amounts to employee-specific accounts, and defined-benefit plans, which specify the future benefits an employee will receive. For our purposes, defined-contribution plans can be treated as current cash payments, like wages, salaries, and bonuses. However, for defined-benefit plans, current employer costs are determined by actuarial computations based on planning assumptions about retirement ages, longevity after retirement, earnings growth rates, and rates of return. Thus, as with health-insurance costs, the linkage between changes in employer costs and changes in employee benefits is broken. Further, a simple exclusion rule for unchanged plans will lead to obvious inequity problems, since some plans are indexed (terminal-pay plans) whereas other pay fixed nominal amounts (flat-rate plans).

Thus, for both health insurance and pension plans, the employer can control the benefit rules but cannot control the cost of providing the benefits. Under the CWPS rules, the increase in all employer costs was to be checked against the standard, but automatic exceptions were provided for excesses above the standard when benefit levels remained unchanged. This approach was equivalent to simply excluding these fringe-benefit costs from the labor-compensation calculation when plans were not improved and costs rose at least as much as the allowable pay increase. If pension or health-care costs rose less than the guideline, additional increases in other forms of compensation were allowed. The costs of all improvements in benefit levels were charged against the standard. Thus, the rule was a hybrid of an employer-cost restriction and an employee-benefit constraint.

As noted above, the Pay Board standards for pension and health benefits were looser than the wage and salary standard, because the Congress mandated exclusion unless this was "unreasonably inconsistent" with the anti-inflation objectives of the program. Companies were allowed to increase these benefits by 0.7 percent of the total hourly compensation base. On average, this amounted to a 7-percent standard for fringe benefits (since fringes then accounted for about 10 percent of total compensation), compared to a 5.5-percent standard for wages, salaries, and bonuses. The fringe-benefit rules also allowed for catch-up for employees units whose benefit/total-compensation ratio was below the national average and those whose benefit increases for the previous three years were less than 1.5 percent of the compensation base.

IV. SALARY STRUCTURES AND INDEX-NUMBER PROBLEMS

The previous section discussed the issues entailed in the construction of the vector of compensation rates, w, in the control rule (11). This section discusses the aggregation rule, W, and the concomitant index-number construction, a discrete form of $\dot{W}/(w)/W(w)$ -- alternatively, a discrete approximation to (7) or (11). As discussed above, the formulation of workable rules regarding the construction of w is complicated by the existence of many types of compensation and the need to preserve the appearance of equity and the administrative workability of the program. Similary, the formulation of aggregation rules is complicated by the wide variety of compensation practices and the varying dynamic situations firms experience; any chosen method will limit the compensation increases of different firms and different employees in vastly different ways. Before proceeding to a discussion of the possible approaches, we briefly describe the main types of salary structures encountered in the economy. After analyzing the index-number problems in subsection 2, we discuss the treatment of cost-of-living adjustment clauses and time weighting in subsections 3 and 4.

1. Salary Structures

Company pay plans vary in terms of the timing of pay-rate changes and the salary structures of the workforce. In some companies, changes are irregular, but this is the exception. Most firms have annual or multi-year pay plans that are handled through salary-administration branches of personnel departments. These are of three basic types. The first involves across-the-board adjustment of varying amounts granted to the entire workforce at common times -- for example, annually or semi-annually. Equally common are anniversary plans, under which individual employees are evaluated on a staggered basis throughout the year, and changes are made consistent with a general salary objective for that year. Finally, there are multi-year plans under which increases are granted according to established formulae; these are usually associated with collective-bargaining agreements.

Salary structures also take on several characteristic forms. Production workers typically are paid flat job rates once journeyman status is achieved, while less senior employees are paid according to formal entry-level-to-job-rate progressions.

Supervisory employees and management employees are typically paid according to salary ranges. In most cases, the ranges are adjusted regularly, and an individual employee's position in the applicable range is adjusted according to annual merit reviews, performance evaluations, and other factors. In contrast, most government salary structures entail semi-automatic progression (step increases) up a salary scale, sometimes referred to as longevity increases.

In all cases, individual employees move along salary scales or within salary ranges and shift from scale to scale as a result of promotions and demotions. Also, over time, the composition of the workforce changes as workforce adjustments are made. To design its salary program under a compensation standard, a firm must evaluate the dynamics of its workforce in light of the way employee groups are to be defined and in light of the rules to be used in measuring average changes.

2. Indexing Methods

In principle, the natural index number to be used in calculating aggregate compensation-rate changes would be determined by the structure of the unit cost functions (and hence the structure of the underlying production function) of individual firms. In particular, a discrete form of $\dot{W}(w)/W(w) \leq \beta$,

(12) $W(w(t_1))/W(w(t_0)) - 1 \leq \beta$,

which is specific to each firm, would be the appropriate construction.

The problems with this approach are obvious: First, the separability condition underlying the existence of such an aggregate is unlikely to be satisfied in most cases. Second, individual firms are unlikely to be able to ascertain the structure of their unit cost functions even if this assumption were satisfied. Third, even if individual firms could construct the appropriate aggregate compensation rate, it would be virtually impossible for the government to monitor these constructions. In short, allowing the individual firms to decide on the type of index to be used would offer them a wide number of alternatives, and firms would naturally choose those constructions that serve their own purposes; in particular, if a firm wanted to pay more than the standard, it could probably find a (bogus) index-number construction that would allow it to do so. For this reason, controls programs typically stipulate the technique to be used in constructing changes in the aggregate compensation rate. The three approaches that have been used, graphically described as the "double-snapshot method", the "ice-cube method", and "the melting-ice-cube method", are in fact common calculation procedures.

The double-snapshot method is simply a unit-value construction. This involves a comparison of average compensation rates (total compensation divided by total hours worked) for active employees at the beginning and end of the measurment period. This method is simplest, most easily understood, and least ambiguous of the three methods. Unfortunately, the limitations that this method imposes can be significantly affected by changes in the functional composition of the workforce.

The ice-cube method adjusts for changes in the workforce composition by using a fixed-weight index. There are of course a large number of possible specifications of fixed-weight indexes and a voluminous literature on the subject. The theoretical construct,

$$(10) \quad \frac{\dot{W}(w)}{W(w)} = \sum_i s_i^L(w) \frac{\dot{w}_i}{w_i}$$

suggests a share-weighted index.

The index number (10) is called a Divisia Index (Divisia 1926), and there are a number of ways to approximate it by discrete index. One approach is to use base-period shares; another is to use terminal-period shares. The Törnqvist index uses the simple arithmetic average of the base-period and terminal-period shares as weights (Törnqvist 1936; Theil 1965). (Diewert 1976 has shown that the Törniqvist index can be derived from a homothetic translog aggregation function, W.) The problem with the terminal-period weights or the Törnqvist index is that the weights are not known until the end of the control period. Consequently, the more common approach to the specification of index-number calculations in a controls program is to use base-period shares as weights.

One problem with the ice-cube method is that it requires companies to perform what they often consider to be complex calculations. Small companies especially find the very notion of index-number construction, of mix adjustment, to be too esoteric. A simpler method for dealing with composition changes is the melting-ice-cube, or continuing-employee, method. Using this method, a firm computes average salary changes for those employees who are in the workforce throughout the measurment period.

New entrants into the workforce and terminated employees do not enter computations. Thus, this is a unit-value technique applied to continuing employees. To make calculated changes using this method comparable with those from the other methods, it is necessary to exclude those portions of compensation-rate increases attributable to legitimate promotions and qualification changes.

The characteristics of these three types of measurement techniques can be best illustrated by example. Consider a workforce with four jobs, Job 1 to Job 4, each with its own salary range (see Table 1). Assume, for simplicity, that there is initially one person in each job, Person A to Person D. At the beginning of the measurement period, each person is near the top of the salary range for his or her respective job and no range increases are made. During the measurement period, Person A retires, and Persons B,C, and D are promoted upward sequentially into vacated positions, with salaries set at the lower end of each range. A new employee, Person E, is hired into the vacated position in Job 4. There are no changes in the salary structure -- i.e., no general compensation-rate increases. These movements and the before-and-after salaries are presented in Table 2.

TABLE 1: JOBS AND SALARY RANGES

Job	Salary Ranges
1	$30,000 - 35,000
2	25,000 - 30,000
3	20,000 - 25,000
4	15,000 - 20,000

TABLE 2: WORKFORCE AND SALARY CHANGES

BEFORE			CHANGE			
Person	Job	Salary		Person	Job	Salary
A	1	$34,000	Retires			
B	2	29,000	Promoted	B	1	$30,000
C	3	24,000	Promoted	C	2	25,000
D	4	19,000	Promoted	D	3	20,000
			Hired	E	4	15,000

If the unit-value method is used, the average pay rate is $26,000 at the beginning of the period and $22,000 at the end -- a 15.5-percent decline. If the continuing-employee method, applied to Persons B, C, and D, is used, these averages are $24,000 and $25,000, respectively, indicating a 4.2-percent increase. If the salary changes attributable to promotions are eliminated under the continuing-employee method, the average compensation-rate change is zero; this is the same result that would be obtained using an index defined on the salary ranges.

This example illustrates several points. First, in any company with salary ranges and a policy of promotion from within -- the most common compensation structure for nonunion workforces -- the double-snapshot method will tend to understate both the average increase granted to continuing employees and the weighted average salary-range adjustment. The tendency for the turnover-and-promotion process to reduce measured average changes is called "slippage" by compensation administrators, and slippage values of from one to three percent are common. Employee groups with wide salary ranges and high turnover tend to experience the greatest slippage, whereas slippage is relatively small for employee groups with flat job rates and/or little turnover.

Second, the downward bias of the double-snapshot technique is even more pronounced for growing firms, since new hires in the lower ends of salary brackets will further reduce unit-value changes. On the other hand, workforce reductions, which tend to be concentrated among low-tenure, lower-paid workers in each range, work in the opposite direction.

Third, the continuing-employee approach would ten to overstate average changes if there were no adjustment for promotions and qualification increases. With such adjustments, this method would appear to approximate the fixed-weight approach. Further, the continuing-employee method provides a simple operational guideline (e.g., grant across-the-board increases that are consistent with the pay guideline and follow normal promotional practices), but its use raises the difficult problems of defining, tracking, and defending promotional increases in ex post compliance checks. (These problems are also serious from the controller's point of view, since, for example, a formal distinction must be drawn between promotions and longevity increases.)

Although there was much confusion about computational methods during Phase II, the Pay Board ultimately seemed to prescribe the ice-cube method for both union and nonunion employee groups. The CWPS rules mandated the ice-cube approach for multi-year collective-bargaining units (essentially requiring the construction of a fixed-weight index of wage changes for jobs) but allowed companies to choose among the three methods for single-year contracts and nonunion employee units. This choice -- particulary the option of choosing the double-snapshot method -- undoudtedly allowed average increases substantially above the standard for many high-growth companies, but CWPS was not able to obtain a quantitative estimate of this effect.

3. Evaluating Cost-of-Living Adjustments

Cost-of-living adjustments (COLAs), which have become increasingly prevalent over the last decade in response to high inflation rates, pose special problems for the measurement of labor compensation in a controls programs: the actual COLA payouts depend on future inflation and are therefore unknown at the time a collective-bargaining agreement is signed.

The Pay Board provided no special instructions for evaluating COLAs (other than time weighting, discussed below); thus, implicitly, such clauses could be evaluated retrospectively, and if unanticipated inflation threw an agreement out of compliance, a rollback could have been dictated by the Board. Because the Pay Board evaluated only those contracts that were challenged by one of its members, there was no general need to make prospective evaluations. In fact, there was no challenge of a COLA clause during Phase II.

At the time that the Carter Administration's program was promulgated, however, COLAs were a much more important phenomenon, and it was decided that a rule for prospective evaluation of COLA clauses was required. The one adopted in the CWPS standards provided an inflation assumption to be used in evaluations of all such clauses. The problem with this approach is a matter of painful history. Because the actual inflation rate during the two years of the program substantially exceeded the rate stipulated in the rules for evaluating COLAs, complying workers protected by these clauses could receive much larger increases than nonprotected employee units.[12] CWPS estimated that this factor averaged 1 1/2 percentage points for all collective-bargaining contracts signed during the first program year and 1 3/4 percentage points in the second year. Because some 40 percent of union workers are not covered by COLAs, the average for collective-bargaining units so covered was probably on the order of 3 percent. Indeed, the major collective-bargaining agreements during the first year of the program did generate average annual increases of about 10 percent (using realistic inflation forecasts), three points above the pay standard.[13]

4. Time Weighting

The numerical wage standards in the Nixon and Carter programs essentially involved point-to-point comparisons of wage rates. That is, the restriction was on the percentage increase in the average compensation rate from the base period to the end of the control period. The path of compensation rates within the control period - i.e., the timing of increases - was irrelevant. In both cases, organized labor argued vigorously that time weighting of pay-rate changes should be allowed. Under this approach, a 5-percent increase initiated on the first day of the year and maintained throughout the year would be judged equivalent to a 10-percent increase instituted half-way through the year. The essence of time weighting, therefore, is that any undershooting of the allowable pay-rate path should be allowed to be "banked" and used later in the year.

Time weighting as a general approach was rejected in both programs, because of the emphasis on the objective of controlling labor costs. To take an extreme example, a 365-percent increase in wages on the last day of a control year would be far more destructive to an anti-inflation effort than a 1-percent increase on the first day of the control period, but the two would be treated equivalently under time weighting.

Although the Pay Board rejected the notion of time weighting in general, it did ultimately allow time weighting of COLAs. This was justified on the ground that COLA payments are typically made with a lag whereas fixed wage increases are typically paid up front, and this creates an inequity between units with COLAs and those without. In the Carter Administration's program, however, time weighting was not allowed for COLAs or for fixed wage increases. In some instances, this approach undoubtedly promoted front-loading, or acceleration of increases.

V. CONCLUDING REMARKS AND AFTERTHOUGHTS

On the basis of the above discussion of the problems of measuring labor compensation in a controls program and of our experience with the CWPS program, we offer a few concluding remarks:

1. If there is to be retrocative monitoring of pay increases and penalties for noncompliance with a guideline, an elaborate specification of rules and regulations is necessary. A simple numerical guideline worked well during the Kennedy/Johnson years because there was no systematic monitoring or enforcement; only one or two full-time equivalent professional employees (at the Council of Economic Advisors) were involved in the program, and intervention by the Administration was for the most part limited to pre-settlement jawboning in a few major collective-bargaining negotiations. For the vast majority of the workforce, the guidepost was effectively self-administered by employers.

In the Nixon and Carter programs, however, the ambitious monitoring effort and attention given to the use of sanctions -- fines in the former and public stigmatization and debarment from government procurement in the latter -- resulted in a complex set of rules. Both began with relatively (indeed naively) simple notions of labor-compensation measurement, but business insistence on more and more specificity led to an increasingly complicated body of regulations and case law. The need for more rules and rulings is boundless, as each resolution of an ambiguity begets new questions and as each closing of a loophole challenges business ingenuity to find a new way around the guideline. This is not uniquely a feature of controls programs; an increasingly lengthy, detailed, and complex body of tax law and IRS rulings has built up over the years for similar reasons. But while the collection of taxes is a generally accepted government activity, there is considerable dispute about the propriety of government programs to control wages and prices. The growing body of regulations in a controls program therefore comes to be perceived as unduly onerous and even as evidence of the ultimate futility of direct government interventions in the marketplace and in collective bargaining to arrest inflation. The weight of the rules and regulations becomes a burden that the program cannot bear -- especially if it is proclaimed to be "voluntary".

2. An irony of ambitious controls program is that an inordiante amount of effort is expended on the design of measurement rules for types of compensation that have but a trivial effect on inflation -- especially many types of executive compensation. This is an implication of the paramount need to promote the appearance of equity -- an impression that appears, from the experience of the Nixon program, to be as essential in a mandatory program as in a voluntary one for building and maintaining public support.

3. There does not exist a set of measurement rules that would avert vociferous charges of inequity. Too many decisions about alternatives work to the advantage of some and the disadvantage of others. Both the Pay Board and CWPS were the subject of much criticism on this ground. Ultimately, feelings of inequitable treatment led, at least avowedly, to the labor walk-off from the Pay Board and to erosion of the grudging business support for the Carter program.

4. A program that is equitable (by some definition) under certain assumptions can be indisputably inequitable under others. The best example is the underevaluation of COLA clauses in the Carter program.

Had inflation rates been close to the Administration's forecast at the time the standards program was promulgated, the approach to evaluating COLAs would have been defensible. As it was, the problem of under-evaluation came to be seen as a severe union/nonunion inequity and more than anything else led to the erosion of business support for the program. (Although nonunion employee units had the advantage of slippage in the double-snapshot calculation method, this advantage was not nearly as important quantitatively as the underevaluation of COLA.)

5. Any successful incomes policy in the future will have to come to grips with the problem of evaluating COLA. Perhaps the only effective approach is to provide a ceiling above which total pay increases, including COLAs, are not allowed. Thus, COLAs in contracts entered into during the program would be required to be "capped". This approach, however, amounts to the virtual abrogation of COLA clauses and would meet with extreme resistance from organized labor. It would seem that any attempt to enforce a ban on COLAs in a controls program would require legislation. Thus, any successful wage-control program in the future is likely to be a legislatively mandated one.

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FOOTNOTES

1. The theoretical justifications for this goal are the need to retard inflationary expectations and/or to alter the (short-run) Phillips curve in order to lower the economic costs of anti-inflationary fiscal and monetary policies. These justifications can be elaborated upon by appealing either to the theory of informational disequilibrium (e.g., Lucas and Prescott 1974; Phelps 1979) or to the theory of implicit contracts (e.g., Azariadis 1975; Baily 1974; Gordon 1976; Okun 1981), each of which can explain sluggish adjustment of wages and prices to new equilibria. Such elaboration, however, would take us far afield of the topic of this paper.

2. The focus on measurement rules avoids dealing with other important (and controversial) design issues, such as numerical standards vs. case-by-case review, economy-wide vs. sectoral guidelines, the treatment of special pay situations such as tandem pay relationships and pattern bargaining, and exceptions criteria for such things as occupational labor shortages.

3. Our knowledge of the former is based on published materials; our knowledge of the latter is based on first-hand experience. The best sources for the ESP are Office of Economic Stabilization, Department of the Treasury 1974 and Weber and Mitchell 1978. Also see Dunlop and Fedor 1977; Yoshe, Allams, Russell, and Atkin 1972; Mitchell and Azevedo 1976. The best reference for the Kennedy/Johnson guideposts is Sheahan 1967. Ulman and Flanagan 1971 describe wage-restraint programs in other countries.

4. This theoretical predicate is not essential. Everything that follows could also be discussed in the context of a reduced-form price equation that includes demand-side variables (such as income) in addition to input prices as explanatory variables.

5. It may seem peculiar to posit a model of input-price-taking behavior in the context of a controls program, since the controls would be expected to be applicable only in those cases where there is discretion in the setting of the input prices. This approach, however, makes sense in a market characterized by collective bargaining; once a contract is signed, compensation rates are effectively determined for the duration of the contract (typically three years in major negotiating situations), and the managers seek to minimize costs subject to pre-determined compensation rates. Similarly, in the "wage-wage model" of the inflation process (see Hall 1974; Okun 1981, Ch. 3), nonunion wages tend to follow the pattern set by the major collective bargaining agreements. Whether the controls programs should apply to the nonunion labor markets as well as to major collective bargaining negotiations is a matter of contention among economists. Whether or not it makes sense from a strictly economic point of view to restrict the guidelines to major collective bargaining negotiations, political realities require that the program be much more comprehensive.

6. The function $\tilde{c}$ is defined by $\tilde{c}(\ln w, \ln r) = c(w,r)$.

7. That is,

$$s_i(w,r) = \frac{\partial \ln \tilde{c}(\ln w, \ln r)}{\partial \ln w_i} = \frac{\partial c(w,r)}{\partial w_i} \frac{w_i}{c(w,r)} = \frac{w_i \ell_i}{C(w,r,q)},$$

where the last identity follows from Hotelling's theorem Primont, and Russell 1978, p. 32):

$$\ell_i = \frac{\partial C(w,r,q)}{\partial w_i} = \frac{\partial c(w,r)}{\partial w_i} q,$$

8. For simplicity, we suppose that the group corresponds to a labor type, i; otherwise, the notation would be unduly cumbersome. We also ignore, in this formulation, the problem of distinguishing between work effort, $e(\gamma_i)$, and technology, τ_i -- an important practical problem in the design of these plans. In practice, there are very few productivity plans that so explicitly relate labor compensation to the level of group productivity. Most so-called group productivity plans in the real world are in fact little different from profit-sharing plans, which can result in higher rates of compensation simply because of higher product prices. The treatment of these types of plans is discussed in Section III.

9. At this point, we adopt the reprehensible practice of writing notations for functions when we mean function images in order to keep the notation from getting out of hand.

10. Of course, an appropriately constructed group productivity plan might induce technological progress within a reasonable defined group. For the most part, however, such plans are designed to promote increased worker effort rather than technological progress.

11. The Carter Administration's standard was applied separately to management and nonmanagement employee units; the ESP accorded firms sufficient flexibility in the choice of employee units to treat executives separately.

12. Recall, however, the computational advantage accorded many nonunion employee units by allowing them to calculate wage increases using the double-snapshot technique.

13. The COLA-costing assumption also promoted the design of COLA clauses tailored around the assumption, such as triggered or other nonlinear COLA formulae.