Cornell University
ILR School

Cornell University ILR School

DigitalCommons@ILR

CAHRS Working Paper Series

Center for Advanced Human Resource Studies
(CAHRS)

January 1994

Out-of-Pocket Costs and the Flexible Benefits Decision: Do Employees Make Effective Health Care Choices?

Michael C. Sturman
Cornell University, mcs5@cornell.edu

John W. Boudreau
Cornell University

Out-of-Pocket Costs and the Flexible Benefits Decision: Do Employees Make Effective Health Care Choices?

Abstract

This study analyzes employees' ability to select health insurance benefits that fit their needs.The study analyzes both the actual choices and the implications of those choices for employees, measured as out-of-pocket costs (OPC). By introducing OPC as a measure of decision quality, this study demonstrates its advantages over measuring only employee choice.

Results from a sample of manufacturing employees suggest that most employees made cost-optimizing decisions, out-performing recommendations from a linear model. Employees also were financially better off overall with choice than they would have been had they all been placed into either medical plan option available to them. This study supports the value of choice, but does not support the assertion that employees always make benefits decisions that best fit their needs.

Keywords

employ, health, benefit, cost, risk, utility, plan, OPC, care, choice

Comments

Suggested Citation

WORKING PAPER SERIES

Out-of-Pocket Costs and the Flexible Benefits Decisions: Do Employees Make Effective Health Care Choices?

Michael Sturman
John Boudreau

Working Paper 9 4 – 0 5

School of Industrial and Labor Relations

Advancing the World of Work

CORNELL
UNIVERSITY

Out-of-Pocket Costs and the Flexible Benefits Decision:
Do Employees Make Effective Health Care Choices

Michael Sturman

and

John Boudreau

Center for Advanced Human Resource Studies
School of Industrial and Labor Relations
Cornell University
Ithaca, NY 14853-3901

ABSTRACT

This study analyzes employees' ability to select health insurance benefits that fit their needs. The study analyzes both the actual choices and the implications of those choices for employees, measured as out-of-pocket costs (OPC). By introducing OPC as a measure of decision quality, this study demonstrates its advantages over measuring only employee choice.

Results from a sample of manufacturing employees suggest that most employees made cost-optimizing decisions, out-performing recommendations from a linear model. Employees also were financially better off overall with choice than they would have been had they all been placed into either medical plan option available to them. This study supports the value of choice, but does not support the assertion that employees always make benefits decisions that best fit their needs.

Flexible benefits plans are seen as a way of controlling benefits costs by changing from a defined benefit to a defined contribution financing method (Employee Benefit Research Institute, 1991; Davis, Giles & Feild, 1988). Flexible benefits plans purportedly allow employees to choose benefits to best meet their individual needs (Beam & McFadden, 1988; DeCenzo & Holoviak, 1990; Rosenbloom & Hallman, 1981). Research on employee benefits decision making has typically used rational decision making models to explain how employees make their benefits choices (Feldman, Finch, Dowd, & Cassou, 1989; Friedman & Savage, 1948; Friedman, 1974; Holmer, 1984). One measure of rationality is cost-minimization. Although no one has proposed that employees always make cost-minimizing choices, no research has yet examined whether actual employee benefit choices appear to reflect the desire and ability to minimize costs. Some evidence suggests that employees may not make such choices. The task of selecting benefits in a flexible benefits environment is difficult (Besser & Frank, 1989; Mamorsky, 1990; McCaffery, 1992; Rosenbloom & Hallman, 1981), and many have observed that humans are not always rational decision-makers (Baron, 1988; Bazerman, 1990; Rachlin, 1989; Thaler, 1992; Tversky & Kahneman, 1982). Employees' perceived needs may differ from their actual needs. If employees make poor selections, this may produce higher than anticipated costs and lower satisfaction (Rosenbloom & Hallman, 1981).

This study attempts to fill this gap by examining the assumption that employees know their benefit needs and make choices that fit those needs. While flexible benefits plans are common, the lack of a good measure of the consequences of decisions has limited the study of employee decisions. In this paper, we introduce an analytical approach to help address this limitation and to allow for more detailed study of employee decisions in a flexible benefits environment.

The analytical approach introduced here examines employee choices, but also the actual cost implications of the choices. Each individual's out-of-pocket costs (OPC) are calculated to determine how well the individual minimized expenses. This study introduces the use of OPC comparisons and demonstrates how this measure allows researchers to explore a much richer set of propositions than reliance only on information about benefit choices. We focus on health care benefit decisions because health care has become a significant factor in current flexible benefits approaches (Barringer, Milkovich & Mitchell, 1992), medical plans are frequently included in cafeteria plans (EBRI, 1991), and medical insurance is seen by employees as one of the most important benefits (Davis et al., 1988; Huseman, Hatfield & Robinson, 1978). The issue of health care choice is also the focus of intense national debate. This study's data reflect actual employee benefits choices, rather than simulated choices, thus providing useful field data on actual employee behaviors. Moreover, using OPC allows researchers to examine the effects

of benefit choices on *both* employee and employer costs. Boudreau (1991) has called for extending cost-benefit logic to rewards systems. This study addresses this issue.

Decision Models For Benefits

"In a flexible benefits plan, individuals are allowed to choose their own reward package so that it is sure to fit their needs and desires (Lawler & Jenkins, 1992, pg. 1046)." This fit between benefit coverage and employee needs should help enhance employee satisfaction (Gerhart & Milkovich, 1992). Yet it is unclear what this concept of "fit" means.

There are a number of possible interpretations of good fit. For some, fit may mean receiving a certain quality of coverage, or access to a specific doctor. For others, fit may mean not having to worry about the financial implications of a catastrophe. Any investigation of employee health insurance benefit effects must begin with a clear definition of fit.

Like much research on employee choice under flex plans (Holmer, 1984; Barringer et al., 1992), our definition of fit focuses on the financial implications (i.e. the out-of-pocket expenses) of plan choice. Our data come from plans with identical levels of coverage and quality of service but with varying methods of reimbursement. We propose that when employees must choose between two plans that are equivalent in all ways except for premium, deductible, and co-payment, fit can be measured by how well the chosen medical plan covers the medical costs of the employee and his or her family. Therefore, assuming people desire to minimize out-of-pocket expenses, we can construct a model of employee decision making for health care plan decisions in a flexible benefits environment.

Rational Model

A purely rational model of decision making suggests that employees have consistent preferences regarding the qualities of the medical plan they desire as well as reasonably accurate estimates of their potential future medical costs (Bazerman, 1990; Hogarth, 1980). Although the rational model does not presume that employees have perfect future knowledge (Baron, 1988), the literature expounding the merits of flexible benefits plans has generally assumed that individuals can generate a reasonably accurate estimate of their future medical expenses. A rational model of employee health care benefits decision making, shown in Figure 1, suggests that an individual will estimate next year's medical expenses based on prior expenses and personal characteristics, determine the OPC for each plan, and choose the plan which minimizes their expected OPC. Flexible benefits become valuable to employees by allowing those who expect lower future medical expenses to select a less comprehensive and lower-premium plan while allowing those who predict higher future medical expenses to pay higher premiums for a more comprehensive plan.

Figure 1: Rational Model of Employee Choice
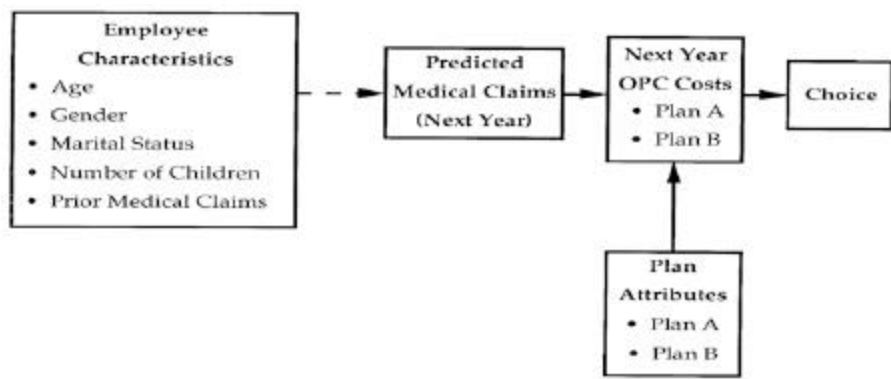
In the rational model of decision making, once an employee predicts his/her future medical expenses, plan choice is simple and determinate. Because all the calculations are prescribed by the specifics of the plan, the correlation between predicted medical expenses and predicted OPC is perfect (i.e. 1.00), and the decision rule, "choose lowest predicted OPC" is unambiguous. The extent to which future medical expenses can be predicted, though, limits the ability of employees to make benefit decisions which truly fit their needs.

Recent research on the predictability of health care expenditures has proposed that, at most, only 20 percent of the variance among individual, short-term, health care expenditures is predictable (van Vliet, 1992). This low level of predictable variance seriously challenges the idea that employees can choose plans which fit their needs. In Figure 1, the link between employee characteristics and predicted medical expenses may be tenuous. Therefore we predict

> H1: The percentage of employees making optimal decisions will
>   be significantly less than 100%.

The Value of Choice

If employees are unable to choose rationally, an obvious alternative to providing employees with choice is to choose a medical plan for them. This strategy is not necessarily inconsistent with the goal of helping employees control costs. For example, the employer could choose to offer the single plan that minimizes the total expected costs for the entire employee population. We will refer to this as the choose Plan A rule or choose Plan B rule because our data reflect a situation with two alternatives. Although we do not believe employees make perfect decisions, research on utility analysis has shown that low correlations can still have significant financial implications (Boudreau, 1991). Van Vliet's (1992) findings suggest that one could achieve a multiple correlation of up to 0.45 ($\sqrt{0.20}$) when predicting future medical expenses. Thus, we predict

H2:   Actual employee decisions will more frequently be cost

optimal than if all employees were forced into either of the

two plans.

Linear Model versus Human Decision Making

A linear model can be constructed to implement the rational model presented in Figure 1. This model follows the rational approach, but is limited by its inability to predict future medical costs. We will refer to this process of making health plan choices by using a linear model to predict the least cost alternative as the regression rule. The regression rule is normative rather than descriptive, so it does not reflect the implications of bounded rationality (Simon, March & Simon, 1958).

Bounded rationality means that while individuals try to make rational decisions, limitations of intelligence, information, perceptions, and time constrain the ability of the decision maker to reach the optimal decision (Bazerman, 1990). The task of selecting benefits from a cafeteria style plan is complex (Besser & Frank, 1989; Mamorsky, 1990; McCaffery, 1992) and employees often have little knowledge of their benefits (Gerhart & Milkovich, 1992; Milkovich, Sturman, & Hannon, 1994). The medical benefits decision is thus bounded by the employee's perception of future medical expenses, perception of the health care plans' qualities, and ability to calculate the optimal decision. Although we would not expect the regression rule to make optimal decisions 100% of the time, research comparing linear models to human decision making provides some guidance regarding what may be expected.

Research comparing human decision makers to models has its longest history in clinical psychology (Meehl, 1954), but similar research has been performed in a number of domains, including medicine, polygraphy, security investment, legal adjudication, auditing, and management (Kleinmuntz, 1990). Linear models might be expected to outperform human decision makers because the models are more consistent, can more systematically take advantage of underlying linear relationships found in specific data, and are not subject to a number of biases which have been shown to impair human judgment (Baron, 1988; Bazerman, 1990; Tversky & Kahneman, 1988). On the other hand, human decision makers might potentially outperform linear models when the true relationship being modeled is non-linear, when the linear model does not include all the necessary predictor variables and interactions, or when there is insufficient sample size to build an accurate model (Baron, 1988). Research comparing linear models to human decision-makers has shown that the linear models generally outperform human decision-makers (Kleinmuntz, 1990; Meehl, 1954). Thus,

H3:   The proportion of cost-optimal employee decisions will be significantly less than the proportion of cost-optimal recommendations prescribed by the <u>regression rule</u>.

OUT-OF-POCKET COSTS (OPC) AS A MEASURE OF DECISION QUALITY

Similar to past research, the first three hypotheses of this paper have only categorized employees by their choice. When employees make "wrong" (not cost-optimal) decisions, this may produce highly variable financial ramifications, depending on the interaction between their medical costs and the plan's coverage. This fact cannot be reflected in traditional measures of choice, or even by measures of the frequency of cost-optimal choices.

We now introduce out-of-pocket costs (OPC) as a way to capture the financial implications of employee choice. Estimating OPC requires two pieces of information: (1) individual medical charges, and (2) the medical cost reimbursement characteristics of the plan. For example, suppose an employee pays a premium of $100 for a medical insurance plan that will pay 80% of the first $1000 of medical expenses, and 100% thereafter. Such a plan creates an OPC function that has a minimum of $100, rises by 0.20 for each dollar of medical expenses up to $1000, and reaches a maximum of $300 (i.e. the $100 premium plus 0.20 times $1000). Similar functions can be constructed for any medical plan.

Using this measure of OPC, we can calculate a measure of "regret," defined as the financial consequence of making a non-cost-optimal choice. Given an individual's actual medical cost experience, we can calculate OPC for each available choice. If the employee chose the option which minimizes their OPC, then "regret" equals zero. If the employee chose a different option, regret equals the difference between the OPC of their chosen plan and the cost-minimizing plan. Regret allows us to quantify the ramifications of making the "wrong" choice, which enables us to determine for which employees the choice is most critical. Drawing on findings that it is difficult to predict future medical costs (van Vliet, 1992), we predict

H4:   Actual employee health care decisions will produce OPC significantly greater than the potential minimum OPC.

Using OPC to Measure the Value of Choice

We have argued that employees face formidable challenges to making cost-optimal decisions, but we are not proposing that choice offers no value. Flexible benefits plans are based on the premise that employees can make good choices (Lawler & Jenkins, 1992). If this premise has merit, we would expect that

H5: The OPC of actual employee decisions will be less than the OPC resulting from forcing all employees into either Plan A or Plan B.

While we expect choice to have value to employees, linear models frequently out-perform human decision-makers (Meehl, 1954; Kleinmuntz, 1990). Thus we predict,

H6: The OPC of actual employee decisions will be greater than the OPC of recommendations from the <u>regression rule</u>.

Finally, individuals may differ in the quality of their choices. Employees do perceive health care decisions as important (Davis, et al., 1988; Huseman et al., 1978), and research has shown that some employees spend considerable time making their benefits decisions (Milkovich, Sturman, & Hannon, 1994). Employees whose choice is most consequential are those facing the highest regret if they are wrong. This high level of potential regret may motivate greater effort, and therefore greater cost-optimality. Thus,

H7: Maximum potential "regret" will be higher for those who made optimal decisions than for those who did not.

METHOD

Sample

These data describe employees of a medium sized manufacturing firm. This firm, employing roughly 650 employees, has three plants, one of which offers a choice of medical plans. The flexible medical choice began in 1991. Data on employee choices, medical billings, and demographic characteristics were collected for 1991 and 1992 from the plant which offers the flex plan, and employed roughly 340 people in each year. Data were collected on individuals employed for both of these years. The company provided data on age, marital status, number of children, and plan choice for 314 employees. Information on medical billings was acquired from the medical insurance company, and yielded 287 overlapping cases. The average employee age was 34 years, 63% were male, 78% were married, and each employee had roughly 2 children (mean = 1.7; ranging from 0 - 7).

Medical Plans

Prior to 1991, the employer enrolled all employees in a single medical benefits plan, Plan A. Beginning in 1991, the firm offered a new medical plan option, Plan B, at this plant. Both Plan A and Plan B are fee-for-service type plans. The plans are identical in their co-payment and maximum payment amount. Premium and deductible levels differ across plans. The two plans also differ with regard to coverage of some medical claims. Plan A covers the full cost of up to 120 days of hospitalization and hospital treatments (e.g. hospital stays, surgery, etc.). Plan B

treats these claims similarly to any other type of claim by paying 80% of the expense after a deductible is met and 100% of the expense after the employee has exceeded a specific out-of-pocket maximum.

Measures

Three dependent categories reflect the number of dependents covered by the medical plan (i.e. 0, 1, or more than 1). Each plan has a different premium for each dependent category. OPC was calculated for each employee under each plan based on their total medical expenses (e.g. hospital and non-hospital), plan deductible, and plan premium. If the OPC for the employee's chosen plan was less than or equal to the OPC of the non-chosen plan, then the decision was cost optimal and regret was equal to zero. Otherwise, regret equaled the difference between these two values.

Employees' actual choices were coded as 0 if the employee chose Plan A and 1 for Plan B. A variable, "optimal choice" represented the cost-minimizing choice for each situation. It too was coded as 0 if Plan A was the cost optimal choice, and 1 if Plan B was the cost optimal choice for that individual. A new variable, "emp-optimal," was created, calculated as one minus the absolute value of the difference between employees' actual choices and the corresponding values of "optimal choice." When an employee's decision was optimal, "emp-optimal" would equal 1; otherwise, it would equal 0.

Two variables were created to represent the optimality of the <u>choose Plan A rule</u> and the <u>choose Plan B rule</u>: "A-optimal" and "B-optimal." For each employee, A-optimal was coded as 1 if Plan A was the cost-minimizing choice, and 0 otherwise. B-optimal was coded as 1 if Plan B was the cost-minimizing choice, and 0 otherwise.

To test the hypotheses involving the linear model, we regressed 1992 medical expenses on age, gender, marital status, number of children, and 1991 medical expenses. This regression also enabled us to compare the variance explained in this study to the finding that the variance in individual health care costs explained by individual and other characteristics has rarely exceeded 20 percent (van Vliet, 1992). Note that the log of 1991 and 1992 medical claims were used in the regression calculation so that the distributions would be better approximate normality, and thus conform to the assumptions of ordinary least squares regression (Neter, Wasserman, & Whitmore, 1988).

If employee decisions resembled the <u>regression rule</u>, employees would choose the plan which would minimize OPC for the predicted value of 1992 expenses. For each employee, a variable was created called "reg-choice", coded 0 when the predicted 1992 expense level would make Plan A optimal, and 1 when predicted 1992 expenses made Plan B optimal. To determine

the optimality of the regression rule, a new variable "reg-optimal" was calculated as one minus the absolute value of the difference between "reg choice" and "optimal choice" for each case. This variable equaled one when the regression-based choice was optimal and zero otherwise.

The OPC were calculated for actual employee decisions, the optimal decisions, the regression rule, the choose Plan A rule, and the choose Plan B rule. The maximum potential regret was also computed for each individual.

Analysis

Hypothesis one was tested using a t-test. Support for the first hypothesis would be indicated by a sample mean of "emp-optimal" statistically less than one.

Two t-tests can be used to determine if actual employee choices are more cost-optimal than each of the rules. These tests entail comparing "emp-optimal" to "A-optimal," and "emp-optimal" to "B-optimal." Support for the second hypothesis is indicated if "emp-optimal" is significantly greater in each case.

Hypothesis three predicts that the regression rule will have a higher frequency of cost-optimality. Thus we expect the mean value of "reg-optimal" to be significantly greater than the mean value of "emp-optimal".

The fourth hypothesis suggests that employee regret, OPC resulting from actual employee decisions minus the OPC of cost-optimal choices, will be significantly greater than zero. The fifth hypothesis can be tested by comparing OPC from the choose Plan A rule to actual OPC, and comparing OPC from the choose plan B rule to actual OPC. Hypothesis five is supported if actual OPC is lower in each case.

A t-test is also used to test the sixth hypothesis. Support is indicated if actual OPC is significantly greater than the regression rule's OPC.

The final hypothesis can be analyzed with a t-test. This hypothesis predicts that the average level of maximum potential regret for those who cost-minimized is greater than the average for those who did not cost-minimize.

Results

The frequency of plan choices is shown in Table 1. In 1991, 77% chose Plan A, 23% chose Plan B. In 1992, 78% chose Plan A, and 22% chose Plan B. Of those choosing Plan A, 55% made cost-optimal decision in each year. Of those choosing Plan B, 64% made optimal choices in 1991, while 92% of those choosing Plan B in 1992 made optimal choices. Including both plans, the proportion of optimal decisions was 57% in 1991, and 63% in 1992, for a combined optimality level of 60% across both years. Although the proportion of optimal decisions increased, it was not significantly different, suggesting that decision quality did not change from

1991 to 1992. Univariate tests of mean differences on individual characteristics revealed that, although mean age and gender did not differ between the cost-optimal decision makers and the non-cost-optimal decision makers, there were significant differences ($p < 0.05$) in terms of marital status (cost-optimal decision makers were more frequently married) and number of children (cost-optimal decision makers had, on average, more children). There were no significant differences, though, in terms of age, gender, marital status, and number of children between those who chose Plan A and those who chose Plan B.

Table 1: Actual Employee Enrollment Patterns

	Cost-Optimal	Not Cost-Optimal
Plan A 1991	120	100
Plan B 1991	43	24
Plan A 1992	123	101
Plan B 1992	58	5

Hypothesis #1 is supported, in that employees did not make perfectly optimal decisions. The proportion of non-optimal decisions across both plans, in both years is 40%, which is significantly greater than zero (t=11.15; one-tailed p<0.0001). However, employee choices were also not completely sub-optimal, as the correlation between employee choices and optimal choices was positive (r=0.391; p>0.0001).

Hypothesis #2 was supported for the <u>choose Plan A rule</u>. If every employee had chosen Plan A in both years, 47% of the decisions would have been cost-optimal (50% in 1991 and 44% in 1992). This proportion is significantly less than the 60% proportion of optimal actual decisions (t=7.253; one-tailed p<0.0001). However, Hypothesis #2 was not supported for the <u>choose Plan B rule</u>. If all employees had chosen Plan B in both years, 53% of the decisions would have been cost-optimal (50% in 1991 and 55% in 1992). This proportion is not significantly less than the 60% proportion of optimal actual decisions (t=1.473; one-tailed p = 0.1419).

To apply the <u>regression rule</u>, we first developed the regression equation predicting 1992 medical expenses from the available individual characteristics, including 1991 medical expenses. The results of the regression are shown in Table 2. The F-test suggests that the equation predicts a significant proportion of variance, and the R-squared of 0.15 is consistent with research on the amount of predictability of short-term health care costs (van Vliet, 1992).

Two predictors contributed significantly: Number of Children and the log of 1991 Medical Claims were both positively related to the log of 1992 Medical Expenses.

Table 2
Predicting log (1992 Medical Expenses)

Independent Variables	β	Standard Error of β	T-Ratio
Constant	0.910944	0.3602	2.53
Gender (Female = 1)	-0.065045	0.1710	-0.380
Marital Status (Married =1)	0.314554	0.2516	1.25
Number of Children	0.132934	0.0619	2.15*
Age	-0.001669	0.0094	-0.177
log(1991 Medical Claims)	0.278923	0.0609	4.58**
R^2	0.154		
Adj. R^2	0.139		
F	10.2 **		
df = 5,281			

N = 287
*$p \leq 0.05$; **$p \leq 0.01$

Applying the regression weights shown in Table 2 to each employee produced 287 predicted values for 1992 Medical Expenses. Using these predicted values to determine the choice of medical plan, 259 employees "chose" Plan A and 28 employees "chose" Plan B. Of those choosing Plan A, 61% were optimal, while of those choosing Plan B, 58% were optimal, producing an overall <u>regression rule</u> optimal-choice level of 59%. Hypothesis #3 was not supported, as the "Regression Rule" optimality proportion of 59% was in fact lower than the 63% optimal-choice level achieved by employees' actual 1992 decisions. Although actual employee decisions are more frequently optimal than decisions based on the regression rule, the t-test suggests that these two proportions are not significantly different (t=1.111; p<0.2666).

The results of the first three hypothesis tests suggest that employees' choices are imperfect, but not completely incorrect. However, results based only on the frequency of optimality provide no information on the consequences of wrong decisions. Table 3 summarizes the optimality frequencies and consequences of actual employee decisions for each year, as well as for the three decision rules. Note that the standard deviation in Row 14 is zero. This results from OPC being calculated using only hospital claims, because both plan reimburse other expenses equally. Because Plan A covers 100% of hospital claims, OPC is based solely on the premium. The regression rule only recommended Plan A for those in dependent category 3. Thus, OPC is

based on cost of this premium, and the standard deviation equals 0. Note that this is also why the means and standard deviations are equal in Rows 8, 9 and 10. Again, because Plan A OPC is based solely on premium, and because there were the same number of people in each dependent category in each year, the Plan A rule yields the same mean OPC and standard deviations in each year.

Table 3
Frequency and Cost of Non-Optimal Employee Benefit Decisions

	N	Number Non-Optimal	Percent Non-Optimal	Mean OPC (SD)	Mean Regret (SD)
Actual Plan A,1991	220	100	45%	480 (103)	111 (146)
Actual Plan B,1991	67	24	36%	478 (521)	189 (385)
Actual A and B,1991	287	124	43%	480 (266)	129 (227)
Actual Plan A,1992	224	101	45%	479 (104)	106 (140)
Actual Plan B,1992	63	5	8%	213 (220	27 (118)
Actual A and B,1992	287	106	37%	420 (176)	88 (139)
Actual A and B, 1991 and 1992	574	230	40%	450 (227)	109 (189)
"Choose Plan A" Rule, 1991	287	143	50%	477 (106)	127 (151)
"Choose Plan A" Rule, 1992	287	159	55%	477 (106)	145 (155)
"Choose Plan A" Rule, 1991 and 1992	574	302	53%	477 (106)	136 (153)
"Choose Plan B" Rule, 1991	287	144	50%	745 (756)	395 (638)
"Choose Plan B" Rule, 1992	287	128	46%	606 (647)	274 (533)
"Choose Plan B" Rule, 1991 and 1992	574	272	47%	676 (706)	335 (590)
"Regression Rule", Plan A (1992 Only)	41	16	39%	530 (0)	109 (151)
"Regression Rule", Plan B (1992 Only)	246	103	42%	547 (596)	230 (483)
"Regression Rule", A and B (1992 Only)	287	119	41%	545 (551)	213 (452)

Note: OPC = Out-of-pocket costs; Regret = Actual OPC minus Cost-Minimal OPC

The rows of Table 3 correspond to the different choices or choice rules, and the two different years. The first three rows reflect the results based on the actual choices for those employees who chose Plan A in 1991, those who chose Plan B in 1991, and the combined sample for 1991. The second three rows show the same information for the year 1992. The seventh row shows the combined sample for both plans in both years. Rows eight through ten show the results of assuming that every employee chose Plan A. Row eight reflects the results for 1991, row nine shows results for 1992, and Row ten shows the combined results for both years. Rows eleven through thirteen are similar, except that the decision rule assumes that all employees chose Plan B. The last three rows of Table 3 show the results for the regression-rule choice described above. Note that because 1991 medical costs were used as an input to the regression rule, the "Regression" rows reflect only the 1992 sample. For each choice or rule, the columns of Table 3 show the number of employees making non-cost-optimal decisions, the proportion of the decisions that were (or would have been) non-optimal, the mean and standard deviation of out-of-pocket costs (OPC), and the mean and standard deviation of Regret, defined as the difference between the OPC produced by the actual choice less the OPC of the optimal choice.

The pattern of results suggests that actual employee behavior produced roughly equal or lower proportions of non-optimal choices than any of the decision rules, as noted earlier. However, the results also suggest that augmenting such proportions with OPC and Regret more fully captures the consequences. For example, although the proportion of non-optimal choices under the "Choose Plan A" rule for the two combined years (53%) is higher than the corresponding proportion for the "Choose Plan B" rule (47%), the OPC and Regret for the "Choose Plan A" rule are substantially lower than those for the "Choose Plan B" rule. This is because the average cost consequences of being wrong by choosing Plan A are lower than the average cost consequences of being wrong by choosing Plan B.

Hypothesis #4 was supported. If employees had made choices that minimized OPC, the average level of Regret would be zero. As Table 3 shows, the level of Regret was never precisely zero in any of the first seven rows reflecting actual employee decisions. Mean Regret was significantly different from zero for actual choices encompassing both plans in 1991 and 1992. Mean Regret for both plans over both years (Row 7 in Table 3) was significantly greater than zero ($p < 0.0001$). These results suggest that employee choices are not always cost minimizing.

These Regret levels translate into substantial consequences for the entire 287 employee sample in each year. For example, even the lowest mean Regret level for the employee

population ($88 in Row 6) translates into a total over-spending of $25,256 per year. Where mean Regret is higher, the level of employee overspending is proportionately higher. Thus, it is important to examine whether providing choice is truly advantageous to employees.

Hypothesis #5 proposed that the mean OPC of actual employee decisions would be less than the mean OPC produced by the "Choose Plan A" and "Choose Plan B" decision rules. This hypothesis received mixed support. Considering only 1991 choices, the "Choose Plan A" rule did not yield a significantly different OPC than that yielded from actual choices ($480 in Row 3 versus $477 in Row 8); however, the OPC from actual choices was significantly lower than the "Choose Plan A" rule in 1992 ($420 in Row 6 versus $477 in Row 8), and actual OPC was lower than the "Choose Plan B" rule in both years. Finally, considering the combined choices from both 1991 and 1992, the mean OPC of actual decisions was $450, the mean OPC for "Choose Plan A" was $477, and the mean OPC for "Choose Plan B" was $676. Paired-sample t-tests revealed that the OPC of actual decisions was indeed significantly lower than mean OPC for the "Choose Plan A" rule (t=3.259; one-tailed p<0.001), and for the "Choose Plan B" rule (t=8.431; one-tailed p<0.0001). It is interesting to note that using OPC reveals the superiority of employee choice over the "Choose Plan B" rule for the combined two-year analysis, despite the fact that the proportion of optimal decisions from this rule (53%) was not significantly different from the proportion of actual optimal decisions (60%).

Hypothesis #6 proposed the superiority of the "Regression" rule for minimizing OPC. Because the "Regression" rule uses 1991 benefits claims as input, only 1992 choices can be analyzed. Hypothesis #6 was not supported. In fact, the results are significant in the opposite direction as expected. Considering Plan A choices or Plan B choices separately, the regression rule yields a significantly <u>higher</u> OPC than actual plan A (t = 7.451) or Plan B decisions (t = 7.102). Finally, considering the combination of Plan A and Plan B, the mean OPC of the "Regression" rule was $545, which is significantly <u>greater</u> (t=2.799, p<0.01) than the mean OPC of actual employee decisions ($450).

Hypothesis #7 proposed that employees making optimal decisions are averting greater levels of potential "Regret" than those who make non-cost-optimal choices. Across the entire two-year sample, those who cost-minimized avoided an average "Regret" level of $524, while those who did not cost-minimize experienced an average "Regret" level of $239. The cost-minimizing employees had a significantly higher level of avoided "Regret" (t=6.457; one-tailed p<0.0001).

DISCUSSION

This study supports the proposition that most employees are able to select benefits that best fit their needs. In a situation where employees were given a choice of medical plans that were similar in all ways except the premium, deductible, and method of reimbursement, employees made cost-optimizing decisions 60% of the time on average over two years. Further, these data suggest that employees are able to choose the least-cost alternative despite the difficulty of the decisions, and that the actual employee decisions outperform even those based on a linear regression model. Yet, the present results also suggest that employee choices are not perfect. It does not appear that when provided with benefits choices, "individuals can choose their own reward package so that it *is sure* to fit their needs and desires (Lawler & Jenkins, 1992, pg. 1046, emphasis added)." Indeed, 40% of employees did not make costs minimizing decisions, with a mean regret of $271. Although regret was as low as $2, it ranged as high as $2040, and its median was $255. In all, regret amounted to an average total overpayment of $31,283 per year.

Reasons for Employee Choice

This study, like other research on flexible benefits decision making, focuses on what decisions employees make. It is also important to address why employees make these decisions. This study does not intend, nor do we have the data, to provide a detailed analysis of this question. However, we can draw some exploratory evidence from the available data.

Table 4 shows the data illustrating three decision strategies that may cause employees to favor one option over the other: focus on premium (i.e. choose the lowest premium plan), choose the plan with minimum expected OPC, and choose the plan that minimizes the maximum possible OPC (minimize worst-case risk). If employees focused exclusively on premium, then everyone would have chosen Plan B. However, if employees based their decisions exclusively on expected OPC, then those in dependent category 1 and 2 would choose Plan B (27%), and those in dependent category 3 would choose Plan A (72%).

Table 4
Decision Making Strategies

		Dependent Category		
		1 (Employee Only)	2 (Employee + 1 Dependent)	3 (Employee + >1 Dependents)
Premium	Plan A	$231.36	$461.28	$530.40
	Plan B	$79.56	$80.64	$170.52
Mean OPC (SD)	Plan A*	$231.36 (0)	$461.28 (0)	$530.40 (0)
	Plan B	$180.26 (203.23)	$447.65 (567.96)	$723.10 (677.74)
Worst-Case Risk	Plan A	$231.36	$461.28	$530.40
	Plan B	$946.18	$2480.60	$2570.50
Actual Employee Choices (N)	1991 Plan A	31	26	163
	1991 Plan B	12	9	46
	1992 Plan A	32	29	163
	1992 Plan B	11	8	44

*Note: The OPC associated with Plan A is its Premium. This is because OPC in this study is calculated using only hospital claims (both plans reimburse other expenses equally), and Plan A covers 100% of hospital claims. Thus, the standard deviation associated with Plan A OPC within dependent category is 0.

If employees only looked at the worst-case scenario, then all employees would have chosen Plan A. In all, 77% of the employees chose Plan A. This suggests that employee decisions are concerned with worst-case risk, but it is impossible to tell with these data how employees actually make their decisions. The fact that employee choices are not consistent with a significant emphasis on premiums is somewhat inconsistent with other research in this area (Barringer et al., 1992) and deserves further study.

LIMITATIONS, IMPLICATIONS, AND FUTURE RESEARCH

This study offers the first empirical test of whether actual employee benefit decisions achieve cost-optimality. Nonetheless, there are some limitations which offer fruitful opportunities for further replication. These results reflect only a single plant in one company. Organization-specific factors such as the way the benefit plans were described, previous company history regarding what health-care options were offered, and the particular individual characteristics of this sample may have affected the present findings. Still, many organizations offer medical benefit insurance options similar to the ones studied here, the employee group is not atypical in terms of age, marital status and gender, and the results appear to replicate some previous research findings (van Vliet, 1992). While future research should certainly explore the generality of these findings, it does not appear that they are idiosyncratic.

Data limitations prevented us from fully implementing a comprehensive linear model. One key limitation was the availability of only one previous year's medical claims. A linear model based on a longer history may well prove more effective in predicting future medical claims. The data on employee characteristics was also limited. Information on anticipated future medical events, such as elective surgery, births, etc. might well have improved the predictive power of the linear model.

Finally, because the data are archival, we have no information on the actual decision processes followed by employees. While we can speculate about the apparent motivations for the observed decisions, clearer explanations of employee choice behavior will be possible when data on both the processes and the outcomes of employee decisions can be gathered.

It is possible that employee medical claims and plan choice are recursively related. Once employees choose a certain plan, they may alter their behavior to better fit that plan's characteristics. For example, those opting for a high-coverage, high-premium plan may increase their use of covered services to "get their money's worth." Thus, the cost-optimality levels observed here may be a function of both the choice process and subsequent behavior changes. The present data contained only a small number of plan "switchers" [N=8], so it was not possible to test this possibility here.

Despite these limitations, the results of the present study have both practical and research implications. The patterns observed suggest several fruitful avenues for future investigation.

Practical Implications

This study introduced OPC and Regret as measures of benefit decision quality, providing the first attempt to combine actual medical claims with employee choices. As shown, information from these two new variables revealed decision patterns that were not apparent from the choices alone, and provided a measure of the monetary implications of employee choices. The data required to estimate OPC and Regret are frequently available, but require cooperation between insurance carriers and companies. Moreover, the data analysis method introduced here is quite different from the typical approach to benefits information, which emphasizes the administrative requirements of government or insurance agencies, focuses only on total costs, or focuses on identifying health-care providers whose costs may be exorbitant. Boudreau (1991, 1992) and Broderick & Boudreau (1991, 1992) have proposed that human resource information and systems should consider not only the administrative cost-savings achievable by information, but its value in supporting decisions. Managers may well find the concepts of OPC and Regret useful in identifying the success or failure of organizational efforts

to help employees tailor their benefits choices to their individual needs. It may also make it possible to identify groups of employees who seem particularly prone to non-cost-optimal decisions, allowing the organization to target its communications and decision assistance more precisely to those for whom it provides the most benefit.

A substantial number of employees made non-cost-optimal decisions. This finding, if replicated in other situations, suggests that there may be substantial value in effective organizational education efforts to help employees improve their decisions. The present study offers some guidance in this effort. It appears that the probability of making cost-optimal decisions increases with the consequences of being non-cost-optimal. Though we could not test this directly, such results suggest that employees are aware of the cost implications of their decisions, at least above some threshold level, and that they do respond by making cost-optimal decisions when the consequences are high. Organizations might induce even higher rates of cost-optimal decision making by providing information specifically designed to highlight cost consequences. The results also show that the most frequently chosen benefits plan (Plan A) carried the highest premium but the lowest worst-case risk. This may suggest benefit plan factors that are most significant in employee choices, and may help organizations determine how to help employees focus on the most appropriate and useful plan characteristics. Research has suggested that combinations of linear models and human decision-makers can outperform either used alone (Kleinmuntz, 1990). While research on decision aids for benefit decisions is relatively new (Besser & Frank, 1989; Milkovich, Sturman & Hannon, 1993), the use of OPC to describe decision patterns may well assist in the development of such systems in the future.

In the present study, we found that forcing all employees into one plan or the other would not have produced lower OPC levels than the employees attained by making their own choices. It appears that choice provided value in this case. However, this outcome may be a result of the particular plan characteristics implemented here, or of specific organizational characteristics. Further replication is needed to determine the relative effects of these different factors, so that benefits managers can better construct plans that optimize employee ability to achieve "fit" between their needs/desires and the outcomes of their benefits.

However, we should note that such a "fit" carries costs for the organization. The organization in this study, like most organizations, was self-insured. Thus, any medical costs not paid by employees are paid by the organization. The more cost-optimal employee decisions, the more of the medical expenses are borne by the organization, rather than the employees. Such costs may be offset by improved employee motivation, attitudes and commitment resulting from the ability to tailor benefits to their needs. This suggests a "utility analysis" framework for employee

benefits (Boudreau, 1991). Implementing such a framework requires a comprehensive estimate of costs, and the introduction of OPC makes such an estimate more feasible.

Future Research Implications

Future research might address the antecedents and consequences of cost-optimality in employee benefits decisions. The present data provided only very limited information about employee characteristics that might influence benefit choices. Future research might examine whether individual characteristics such as knowledge of benefits plans, risk-aversion, cognitive ability, and motivation predict the likelihood of cost-minimization. OPC may also prove fruitful in measuring the effectiveness of interventions to improve benefits decision making, such as expert systems, benefits counseling, benefits communication, training and goal setting. Such research can investigate the frequency of cost-optimality, but adding the cost consequences will provide a richer set of measures to define the concept of optimality in decision making. A key antecedent to cost-optimality may be individual employee decision processes. To date, we have very little knowledge about the factors employees consider when making benefits decisions, or whether certain decision patterns result in more cost-optimal outcomes. The analysis approach introduced here can provide more detailed information about these outcomes.

Regarding the consequences of benefits decisions, the present analysis suggested that the frequency of correct decisions can mask more complex patterns, and that the use of OPC can help to reveal them. It appears that the magnitude of the cost consequences is correlated with the probability of making cost-optimal decisions. However, future research is needed to determine whether achieving cost-optimality affects employee attitudes and behaviors. Are cost-optimal employees more satisfied, motivated or committed? Do they perform better? Do employees alter their behaviors to "fit" the benefits they have chosen, or do they attempt to choose benefits that fit their planned behaviors? Are employees who make non-cost-optimal decisions more likely to seek assistance with future decisions, or more likely to change their future decisions?

Finally, the use of OPC allows a direct comparison between the benefits costs borne by the employer and those borne by the employees, for employers who "self-insure". Research on the reasons managers adopt human resource interventions is rare (Florin-Thuma & Boudreau, 1987; Boudreau & Berman, 1991), and requires estimating the consequences of those decisions for both the employees and the organization. OPC offers a common scale, dollar cost, that may allow direct comparisons of employee and employer consequences. It can also provide a tangible dollar-valued basis for comparing other benefit consequences such as improved motivation, performance and attitudes.

Choosing benefits is complex and difficult for both employers and employees. The present research offers the first empirical evidence of the cost consequences of employee choices, and suggests that while employee choices are far from perfect, offering choice appears to result in improved cost-optimization. By introducing OPC as an addition to more traditional variables reflecting the frequency of benefit choices, it is hoped that future research will be able to better describe, predict and explain this important process.

1. The authors would like to thank Theresa Welbourne and Renae Broderick for their helpful comments on an earlier version of this paper.

REFERENCES

Baron, J. (1988). *Thinking and deciding.* New York: Cambridge University Press.

Barringer, M. W., Milkovich, G. T., & Mitchell, Olivia S. (1992). Employee health insurance decisions in a flexible benefits environment. *Center for Advanced Human Resource Studies Working Paper.* Cornell University.

Barringer, M., & Milkovich, G. T. (1990). Predicting employee health care decisions in a flexible benefits environment. *Center for Advanced Human Resource Studies Working Paper.* Cornell University.

Bazerman, M. H. (1990). *Judgment in managerial decision making.* New York: John Wiley & Sons.

Beam, B. T. Jr., & McFadden, J. J. (1988). *Employee benefits.* Illinois: Irwin.

Besser, L. J., & Frank, G. B. (1989). Artificial intelligence and the flexible benefits decision: Can expert systems help employees make rational choices? *SAM Advanced Management Journal,* 4 - 13.

Boudreau, J. W. (1991). Utility analysis for decisions in human resource management. In M. D. Dunnette & L. M. Hough (Eds.) *Handbook of Industrial and Organizational Psychology,* (2nd ed.), Vol. 2. Palo Alto: Consulting Psychologists Press, pp. 621-745.

Boudreau, J. W. (1992). HRIS: Adding value or just cutting costs? *HR Monthly.* May, 8-13.

Boudreau, J. W. & Berman, R. (1991). Using performance measurement to evaluate strategic human resource management decisions: Eastman Kodak's experience with profit sharing. *Human Resource Management Journal,* 30 (3) 393-410.

Broderick R. & Boudreau, J. W. (1991). The evolution of computer use in human resource management: Interviews with ten leaders. *Human Resource Management Journal,* 30 (4), 485-508. (Published in November, 1992).

Broderick, R. & Boudreau, J. W. (1992). Human resource management, information technology, and the competitive edge. *Academy of Management Executive.* 6, May, 7-17.

Davis, K. R., Giles, W. F., & Feild, H. S. (1988). Opting for benefits: Do job-hunting college seniors envision more money or more benefits? *Personnel Administrator,* 62-66.

DeCenzo, D. A., & Holoviak, S. J. (1990). *Employee benefits.* New Jersey: Prentice Hall.

Employee Benefit Research Institute (1991). Flexible benefits plans and changing demographics. *EBRI Issue Brief,* 113.

Feldman, R., Finch, M., Dowd, B., & Cassou, S. (1989). The demand for employment-based health insurance plans. *Journal of Human Resources,* 24, 114-142.

Florin-Thuma, B. C., & Boudreau, J. W. (1987). Performance feedback utility in a small organization: Effects on organizational outcomes and managerial decision processes. *Personnel Psychology,* 40, 693-713.

Friedman, M. (1974). Risk aversion and consumer choice of health insurance option. *The Review of Economics and Statistics,* 56, 209-214.

Friedman, M., & Savage, L. J. (1948). The utility analysis of choices involving risk. *Journal of Political Economy,* 56, 279-304.

Gerhart, B., & Milkovich, G. T. (1992). Employee compensation: Research and practice. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial & organizational psychology* (2nd ed.), (Vol. 3, pp. 481-569). Palo Alto, CA: Consulting Psychologists Press.

Hogarth, R. (1987). *Judgement and choice.* New York: John Wiley.

Holmer, M. (1984). Tax policy and the demand for health insurance. *Journal of Health Economics,* 3, 203-221.

Huseman, R. C., Hatfield, J. D., & Robinson, R. B. (1978). The MBA and fringe benefits. *Personnel Administrator,* 23, 57-60.

Kleinmuntz, B. (1990). Why we still use our heads instead of formulas: Toward an integrative approach. *Psychological Bulletin,* 107, 3, 296-310.

Lawler, E. D. III, & Jenkins, G. D. Jr. (1992). Strategic reward systems. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial & organizational psychology* (2nd ed.), (Vol. 3, pp. 961-1055). Palo Alto, CA: Consulting Psychologists Press.

Mamorsky, J. D. (1990). *Employee benefits handbook.* New York: Warren, Gorham & Lamont.

March, J. G., & Simon, H. A. (1958). *Organizations.* New York: Wiley.

McCaffery, R. M. (1992). *Employee benefit programs: A total compensation perspective.* Boston, MA: PWS-Kent.

McGuire, T. G. (1981). Price and membership in a prepaid group medical practice. *Medical Care,* 19, 172-183.

Meehl, P. E. (1954). *Clinical versus Statistical Prediction: A Theoretical Analysis and a Review of the Evidence.* Minneapolis, MN: University of Minnesota Press.

Milkovich, G. T., Sturman M. C., & Hannon J. M. (1994). Using expert systems to aid employees' flexible benefits decisions. *ACA Journal.* Spring, 18-29.

Milkovich, G. T., Sturman M. C., & Hannon J. M. (1993). Effects of a flexible benefits expert system on employee decisions and satisfaction. Under Review.

Neter, J., Wasserman, W., & Whitmore, G. A. (1988). *Applied Statistics.* Boston, MA: Allyn & Bacon.

Piontkowski, D., & Butler, L. H. (1980). Selection of health insurance by an employee group in northern California. *American Journal of Public Health, 70,* 274 - 276.

Rachlin, H. (1989). *Judgment, decision, and choice.* New York: W. H. Freeman and Company.

Rosenbloom, J. S., & Hallman, G. V. (1981). *Employee benefit planning.* New Jersey: Prentice-Hall.

Simon, H. A. (1957). *Models of man.* New York: Wiley.

Thaler, R. H. (1992). *The winner's curse: Paradoxes and anomalies of economic life.* New York: Free Press.

Tversky, A., & Kahneman, D. (1982). Judgment under uncertainty: Heuristics and biases. In D. Kahneman, P. Slovic, & A. Tversky (Eds.) *Judgment under uncertainty: Heuristics and biases.* New York: Cambridge University Press.

van Vliet, R. C. A. (1992). Predictability of individual health care expenditures. *Journal of Risk and Insurance.* 59, 3, 443-460.

Welch, W. P. (1986). The elasticity of demand for health maintenance organization. *The Journal of Human Resources,* 21, 252-256.

Yates, J. F. (1990). *Judgment and decision making.* New York: Prentice-Hall.