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**TAX-PREFERRED MEDICAL  
SAVINGS ACCOUNTS AND  
CATASTROPHIC HEALTH INSURANCE  
PLANS: A NUMERICAL ANALYSIS  
OF WINNERS AND LOSERS**

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## I. INTRODUCTION

Tax-favored medical savings accounts (MSAs) are among the most controversial of the health reform proposals in the 104th Congress. The issues raised by the many different MSA proposals are complex, and there has been no shortage of recent writing on this subject (American Academy of Actuaries (AAA), 1995a, 1995b; Eichner, McClellan, and Wise, 1995; Ferrara, 1995; Goodman and Musgrave, 1988; Jensen, 1995; Minnesota Department of Health, 1994; Pauly, 1994; Pauly and Goodman, 1995; Rodgers and Mays, 1995; Tanner, 1995; Thorpe, 1995; White 1995). With a few notable exceptions<sup>1</sup>, however, most papers on MSAs describe how specific proposals would work or debate the logic of arguments pro and con without systematically analyzing the quantitative implications of the arguments. Perhaps this is one reason the differences of opinion about the wisdom of passing MSA legislation remain so large. A careful numerical analysis may still add light to what has become a very heated debate.

This paper uses nationally representative data to analyze the implications of introducing tax-favored MSAs, coupled with catastrophic health insurance plans, into the current mix of employer-sponsored health insurance arrangements. Specifically, we address four questions: (1) What would be the likely effect on national health expenditures if all employees switched into MSA/catastrophic plans? (2) Who would gain and who would lose financially, and by how much, if all workers switched to MSA/catastrophic plans? (3) What would be the effect on premiums for comprehensive plans if an MSA/catastrophic option was added as a choice for all workers? (4) How would employers and workers likely respond to these quantitative

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<sup>1</sup>The AAA report (1995a) is the most thorough assessment of MSAs that has been written to date.

implications? In the next section, we provide a brief overview of our data and methods. Our results and analyses are then presented and discussed. Methodological details and explicit assumptions are described in an appendix to this paper.

We have analyzed potential interactions of MSAs and other state health insurance market reforms in a companion paper (Moon, Nichols, and Walls, 1996). In that paper we also discussed broad differences between MSA-based and managed-care-plus-insurance reform approaches to health system reform. The present paper is more narrowly focused on some quantitative implications of a generic MSA proposal at the federal level.<sup>2</sup>

MSAs are personal funds established by individuals or their employers to pay current out-of-pocket medical costs and to accumulate funds for future expenses. MSAs *per se* could be set up under current law. The proposals now before the Congress and already enacted in several states would shield these funds from income and payroll taxes. By extending the tax preference to funds that could be used for out-of-pocket spending, these proposals would “level the playing field” between comprehensive insurance and high-deductible catastrophic policies.<sup>3</sup> Current tax law favors comprehensive policies, since only employer contributions toward premiums are exempt from income and payroll taxes. We assume, as most current proposals require, that MSAs would be combined with high deductible (catastrophic) health insurance policies that would cover certain medical expenses once the insured spends up to a deductible.

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<sup>2</sup>We do not estimate tax revenue effects of MSAs, but instead focus on insurance market outcomes.

<sup>3</sup>The House passed H.R. 3103, which contains MSA provisions, on March 28, 1996.

## II. Overview of Data and Methods<sup>4</sup>

We use data from the 1987 National Medical Expenditure Survey (NMES), the most recent publicly available, nationally representative survey of households which collected actual health expenditures of individuals as well as employer and employee premiums. We use historical trends in spending to age the data to 1994 levels.<sup>5</sup> The basic methodology is counterfactual microsimulation: we take individuals from their current situation, described with survey data that have been weighted to reflect the nation as a whole, and test for the effects on their health expenditures and financial well-being if they were to switch from their current health insurance arrangement to one of two alternatives. The first is a garden variety comprehensive indemnity policy, the features of which were selected to represent norms in the marketplace today.<sup>6</sup> This is done to set up a common benchmark. The second is a catastrophic policy expected to emerge in the market if current MSA proposals become law.<sup>7</sup> Since the most likely adoption of MSAs will occur within employer-provided arrangements, we concentrate on that market. For ease of exposition and computation, we focus exclusively on single policy holders.<sup>8</sup>

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<sup>4</sup>This section can be skimmed by those less interested in methodological issues. Greater detail about methods, data, and assumptions is provided in the appendix.

<sup>5</sup>The NMES data have been used extensively for health services research. The survey is described in Edwards and Berlin (1987). The aging algorithms used by the Urban Institute are explained in Moon and Mulvey (1996).

<sup>6</sup>This policy has a \$250 deductible, 20 percent coinsurance above the deductible, and \$1,250 stop-loss protection for a single individual.

<sup>7</sup>The catastrophic policy we simulate has a \$2000 deductible and stop-loss. That is, once the deductible is met, no further coinsurance is required.

<sup>8</sup>While consideration of family policy holders is obviously important, the American Academy of Actuaries found that the general qualitative results that hold for single policy holders hold for family policy holders as well (AAA, 1995a). The set of assumptions necessary to take into account the range of options facing households with more than one wage-earner would require a level of microsimulation effort and behavioral modeling well beyond the scope or requirements of this paper.

The first step is to compute premiums for the benchmark indemnity plan and for the catastrophic plan as if every worker in the NMES sample was alternatively in one or the other plan in the same firm. We used a premium estimation methodology similar to that employed by the Health Care Financing Administration during the health reform debates of 1993-94 for both of these premium calculations (Rivlin, Cutler, Nichols, 1994). It entails adjusting total health expenditures in response to the change in out-of-pocket spending that would occur if everyone switched from their current policy to the hypothetical one. These expenditure adjustments are based on a schedule used by the American Academy of Actuaries (1995). After these adjustments, one simply runs each individual's adjusted total spending through the new insurance policy features (deductible, coinsurance, and stop-loss) to generate benefits paid by the insurance policy. A "premium" is the average of these benefits paid over the insured group, multiplied by a loading factor to cover administrative and other overhead costs. This methodology yields estimates of total health expenditures and out-of-pocket payments for each individual under the assumption that they are enrolled in each type of plan. After this step, one can easily estimate the effect on total health spending of switching from the comprehensive plan to the catastrophic plan (our question #1).

The next step is to simulate the effects on individuals of switching from the benchmark indemnity to the proposed MSA/catastrophic alternative (question #2). We assume that employers would, at least initially, contribute the same amount toward a workers' health insurance in either case: employer premium savings from switching to lower cost plans are presumed to be deposited in the workers' MSAs. We compute financial winners and losers,

based on total expenditures on premiums plus out-of-pocket payments for health services, after one year and after three years of enrollment in the MSA/catastrophic plan.

After simulating “all or nothing” insurance arrangements, we investigate some implications of preserving choice between comprehensive insurance plans and MSA/catastrophic alternatives (questions #3 and #4). In particular, we estimate the effect on the comprehensive premium under different assumptions about the proportion of workers that would shift to the MSA/catastrophic plan. The average health risk in the comprehensive risk pool could change as more workers shift out of it. Finally, we estimate the probability that workers could correctly predict whether they would gain or lose from switching to an MSA/catastrophic arrangement. This experiment allows us to comment more definitively about likely risk selection effects from introducing tax-favored MSAs.

### **III. Numerical Analyses of Some Policy Questions Surrounding MSAs**

#### **Question #1:**

**What would be the likely effect on national health expenditures (NHE)  
if all employees switched into MSA/catastrophic plans?**

Advocates have argued that widespread adoption of MSAs could substantially lower national health expenditures (NHE) and its rate of growth (Ferrara, 1995). Increasing individuals’ out-of-pocket obligations through a wholesale shift from comprehensive plans to MSA/catastrophic plans would decrease the level of total expenditures. The reduction in utilization implicit in these reduced expenditures is likely to be greater for some services than

others, and these factors are taken into account by economists and actuaries when devising the expenditure adjustment schedules that are used to estimate the net effect on total spending.<sup>9</sup>

Our best estimate is that if all workers in the US switched to this prototypical catastrophic plan from our example indemnity plan, total health spending by workers and their families would fall by about 15 percent. This would be a considerable achievement.

Three considerations suggest that the ultimate effect on total NHE would be substantially less than 15 percent, however. First, Medicare, Medicaid, and spending on behalf of both the uninsured and of those under 65 with private non-group coverage are outside the reach of MSA/catastrophic plans for workers in employer-sponsored plans. HCFA and NMES data together suggest that at most about 40 percent of national health spending is on behalf of workers covered by employer-sponsored insurance.<sup>10</sup> This alone means 15 percent is too high. Second, the 15 percent estimate is based on the assumption that all employer-sponsored workers move from comprehensive indemnity plans. Today, about 25 percent of those in employer-sponsored plans are in HMOs, and more than half are in some form of managed care plan (Employee Benefit Research Institute [EBRI], 1995). Since many workers are already in plans that have reduced costs relative to indemnity plans,<sup>11</sup> it is optimistic to think there is 15 percent more in unrealized savings in all of those plans. Finally, the 15 percent estimate assumed that the existence of the MSA fund itself would have no effect on total spending. Our upper bound estimate of health expenditure reduction is based solely on the increase in out-of-

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<sup>9</sup>See the appendix for the schedule we used.

<sup>10</sup>See the appendix for the sources and derivation of this 40 percent estimate.

<sup>11</sup>The evidence is fairly clear that HMOs at least have lowered costs relative to indemnity plans (Miller and Luft, 1994).

pocket obligation from switching to the catastrophic health plan. Since funds in the MSA would cushion this out-of-pocket blow somewhat -- people may view the MSA balance as insurance, not as savings<sup>12</sup> -- the 15 percent estimate is probably biased upward even for those moving from comprehensive indemnity plans to MSA/catastrophic plans. All of these considerations lead us to conclude that a one-time national health spending reduction in the 4-6 percent range<sup>13</sup> is a much more likely outcome of moving the entire employer-sponsored insurance population into MSA/catastrophic arrangements in one fell swoop.

A reduction of health spending even of this magnitude is still substantial and should not be discounted. At the same time, it should not be confused with reductions in the rate of growth of health spending. For it is the growth in spending that most worries analysts of health care costs. Many experts believe technological improvement is the major source of health care cost growth (Newhouse, 1993a), and much of this technology is heavily used by specialists, often in inpatient settings (Weisbrod, 1993). Since this is where the majority of spending occurs, outside the reach of even the high deductibles of catastrophic policies, high priced procedures and techniques may actually face less market discipline if more patients have indemnity policies that fully protect them once the high deductible/stop-loss is met. Managed care plans may exert more effective discipline on high-end expenditures.

It is surely in the catastrophic insurers' interest to do likewise, but it may be harder to sell catastrophic plans that *also* manage care. Certainly many advocates of MSAs and catastrophic insurance policies celebrate their promise to prevent individual patient and

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<sup>12</sup>The AAA report (1995a) explores this point in detail.

<sup>13</sup>Others have reached similar conclusions, e.g., White (1995).



provider preferences from being overruled by the utilization management systems of managed care organizations. Thus, to the extent that high-end technology is responsible for cost growth in the first place, it is possible that widespread MSA/catastrophic indemnity arrangements could actually increase long run health care cost growth rates. While MSAs may have other desirable effects depending on one's point of view, significant aggregate reductions in health care costs over the long term are not likely to be among them. Of course, no other long-term cost-containment strategy (managed care, government regulation) has compelling evidence to support its likelihood of success either.

## **Question #2**

**Who would gain and who would lose financially, and by how much,  
if all workers switched to MSA/catastrophic plans?**

Changes in relative prices always produce some winners and some losers from the status quo. But the status quo is not necessarily preferred, for existing relative prices may reflect artificial "distortions." Economists consider any government action a distortion of the market if relative prices are changed as a result of that action. Current federal tax law artificially distorts the relative price of health insurance by allowing workers to pay in pre-tax dollars through the device of their employers' contributions. Workers implicitly or explicitly agree to accept lower wages in return for these tax-favored employer contributions.<sup>14</sup> This artificially lower price of health insurance leads more firms and workers to adopt more comprehensive

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<sup>14</sup>Some workers, about 16 percent of those in firms with more than 500 employees, arrange to make their own contributions toward health insurance in pre-tax dollars as well (Foster-Higgins, 1995).

insurance arrangements than they otherwise would, since a dollar of foregone wages buys a full pre-tax dollar worth of health insurance, but a dollar of increased wages delivers 70 cents (or less) of general purchasing power to workers after federal income and payroll taxes are subtracted. The higher the tax bracket of the worker, the larger this differential between pre- and post-tax dollars, making the incentive stronger for those with higher incomes. This distortion clearly encourages health spending financed by comprehensive health insurance. At the same time it has the net effect of including more people in comprehensive insurance risk pools than might otherwise be the case, which lowers the average risk of the pool and hence the premium that the relatively unhealthy would pay in the absence of this tax policy. In this way the distortion in the relative price of insurance enhances the current cross-subsidy of the sick by the healthy (Monheit, Nichols, and Selden, 1996).

MSA legislation would change existing relative prices by extending the tax preference beyond employer premium payments to include contributions to the MSA which would then be available to cover out-of-pocket obligations. Thus, MSAs would produce tax neutrality between premiums and out-of-pocket payments to the extent the latter are financed out of MSAs that are limited to the difference in premiums. A distortion in the economist's sense remains, however, since this treatment continues to favor health care spending over other goods and services.<sup>15</sup>

Generally, the people who are most likely to gain from widespread availability of tax-preferred MSAs, i.e., those likely to gain from switching from a comprehensive health insurance plan to an MSA/catastrophic arrangement, are those who are buying more comprehensive

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<sup>15</sup>See Pauly (1994) for a discussion of these distortions and tax preferences for out-of-pocket spending. Moreover, if the MSA tax deduction goes beyond the difference in premiums, a further distortion would occur.

insurance today than they really want under current law. They are doing so now because of the tax law distortion, because “too much” insurance through an employer is cheaper than purchasing less generous insurance products they might prefer in the non-group market,<sup>16</sup> and because “too much” insurance under these circumstances is preferable (to them) to being uninsured. For most people, holding insurance conveys value because it provides protection against risk, i.e., it reduces their financial uncertainty. Comprehensive insurance reduces the insured’s financial risk considerably, but less comprehensive packages may provide a preferred combination of lower premiums and less (but still adequate) financial protection, especially for those who expect to have low health expenditures. Tax-favored MSAs would enable workers to purchase less comprehensive catastrophic insurance policies through their employer (holding onto group purchasing advantages), put the employer’s premium savings into the MSA, and spend the balance (net of withdrawal penalties and taxes due) on other goods if the MSA proved to be larger than their new out-of-pocket obligation.

People who would expect to have a positive MSA balance to spend at the end of the year are those who believe themselves to be the most “overinsured” at present: those whose premium payments (employee plus employer) exceed their expected medical expenses (over their low deductible) by the greatest amount, relative to their willingness to pay for financial protection. These are most likely to be the healthiest members of the risk pool with low current spending on health services. Fundamentally, those who would likely win from shifting to MSA/catastrophic arrangements are the healthy who will “take back” some of their “excess” contributions that effectively help to subsidize others.

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<sup>16</sup>For a discussion of why the non-group market does not work as well as the group market, see Blumberg and Nichols (1995).

Since most people are healthy most of the time, the health expenditure distribution is highly skewed each year<sup>17</sup> and care for the few is financed from overpayments by the majority of policy holders. Some might argue that this excess payment when healthy and underpayment when sick is the purpose and social function of combining risks into insurance pools. Supporters of this view tend to prefer broad risk pools and policies that make it difficult to segment the market. Others argue that insurance markets should be segmented into groups with similar risks as much as possible, that each identifiable group should pay their own expected costs, and that society should subsidize only those it explicitly deems worthy of public funds, rather than forcing implicit cross-subsidization through community rating rules or other regulations imposed on the private insurance industry. These opposing views about the “optimal” health insurance market reflect philosophical differences in approach to health system reform.

Our purpose here is not to demarcate political fault lines but to assess the quantitative implications of MSA/catastrophic combinations. Specifically, we ask the following question: if all workers were forced to switch from our generic comprehensive indemnity plan to an MSA/catastrophic arrangement, how many of them would be better off financially and by how much? A worker is labeled a “winner” if total payments -- employer premium plus worker premium + out-of-pocket payments for health services -- are lower under the MSA/catastrophic arrangement than under the traditional comprehensive plan. Tax effects on out-of-pocket spending, on catastrophic premiums, and thereby on MSAs themselves, as well as the net

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<sup>17</sup>Approximately 10 percent of people account for 70 percent of all health spending in a given year (Berk and Monheit, 1992).

spendable value of left-over MSA balances, were taken into account.<sup>18</sup> We calculated the financial effects on winners and losers for one year and over three years. We also investigated whether the socio-demographic characteristics of winners were different from those of losers.

Table 1 reports the premium and MSA contribution estimates used in our simulations.

**Table 1. Premium and MSA Estimates**

<b>Health Insurance Plan type</b>	<b>Actuarial Premium</b>	<b>Employer Insurance Contribution</b>	<b>Employee Insurance Contribution</b>	<b>MSA contribution by employer</b>
<b>Comprehensive</b>	<b>\$1,701</b>	<b>\$1,361</b>	<b>\$340</b>	<b>n/a</b>
<b>Catastrophic</b>	<b>\$1,110</b>	<b>\$1,110</b>	<b>0</b>	<b>\$251</b>

**Source: Urban Institute analysis of NMES data, 1994 dollars.**

We estimated the comprehensive single premium at \$1,701 and the catastrophic premium at \$1,110. We assumed that the employer would pay, on average, 80 percent of the premium in the comprehensive case and would be willing to spend the same amount on each worker in the MSA/catastrophic arrangement. Thus, the employer would spend \$1,361 regardless: either as 80 percent of the comprehensive premium or as 100 percent of the catastrophic premium plus a deposit of the remainder, \$251, into the worker's MSA. This means that shifting to the MSA/catastrophic arrangement immediately returns \$340 to the worker in saved out-of-pocket premium payments. Theoretically, this \$340 could be put in the MSA or returned to the worker and applied to out-of-pocket obligations as they arise.

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<sup>18</sup>We could not measure the implicit value of financial protection in either the comprehensive or MSA/catastrophic arrangement, for while real, this amount is subjective. Because we could not take this value into account, we have somewhat overstated the number of winners -- for some the financial gains from switching to the MSA/catastrophic plan will be smaller than the value they place on greater financial protection. In real life, these workers might not switch from the hypothetical comprehensive arrangement to the postulated MSA/catastrophic plan, even though from a sheer financial point of view they could "win" by doing so.

How would this work in practice? H.R. 3103 as passed, like the MSA provisions in the Balanced Budget Act of 1995, does not allow both employers and workers to make contributions to the MSA. For this reason we assumed that the worker would not contribute her \$340 in premium savings to the MSA, but instead would keep it and spend it on health services (or something else if possible) without forfeiting the extra \$251 the firm was willing to contribute to the MSA. This \$251 was shielded from the worker's income and payroll taxes under current law, and it would be shielded from tax liability under the MSA proposals now under consideration.<sup>19</sup> Thus, this formulation of the MSA is tax-neutral compared to current law.<sup>20</sup>

Table 2 displays the results of our simulations of winners and losers from shifting into an MSA/catastrophic arrangement from our specific indemnity plan. These results confirm two important conclusions: (1) a large majority of workers would gain from a shift to MSA/catastrophic insurance from comprehensive indemnity plans; and (2) the winners are more likely to have much lower health expenditures than losers, on average. These are not surprising results, since as we noted earlier, health spending each year is concentrated among a

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<sup>19</sup>The employer could pay the \$251 to the worker in increased wages, and then the worker, after paying income taxes on the \$251, could defer up to \$2000 from taxes by contributing directly to the MSA herself. Higher wage workers may find this an attractive arrangement, but we assume most will want to minimize their own direct contribution to the MSA and keep the maximum amount of money out of the restrictions placed upon it, hoping and expecting that health expenditures, and the need for an MSA balance, will be low.

<sup>20</sup>Tax-neutrality will hold as long as workers spend the MSA on services that were covered under the traditional policy. If the MSA is used to purchase services outside the benefit package, e.g., designer eyeglasses or cosmetic surgery, then the MSA will cost the Treasury revenue. This tax loss could be mitigated by allowing expenses to count toward the insurance plan's deductible only if they are on services covered by the basic policy.

We assume throughout that each worker is clear on expenditures that are allowed from an MSA and those that count toward the deductible. These are not necessarily identical, the former often being larger than the latter, and they represent an important design issue. For more discussion of this point, see the American Academy of Actuaries's report (1995).

few individuals. Simple descriptive statistics indicate that winners are more likely to be younger, male, healthier, and receive lower wages as well. The extent to which workers can predict, *a priori*, whether they would win or lose is explored later when we consider question # 4.

Interestingly, in year one, the losers would lose more on average (\$402) than the winners would win (\$397), though not by much. This is also a function of the skewed distribution of health expenditures. Winners, who did not have large health expenditures in the first place, cannot reclaim as much money as high expenditure losers can lose when out-of-pocket liabilities increase. At the same time, it is important to keep in mind that the losers' losses are limited by the stop-loss provision on the catastrophic policy. This feature would make MSAs/catastrophic combinations attractive to workers who currently have no stop-loss protection.<sup>21</sup>

Computing winning and losing cumulatively over three years, the proportion of workers who are winners declined slightly, from 80.3 percent to 73.0 percent, but the winners over the longer time period gained more (\$1,328) than the losers lose (\$962). This is because of the lack of persistence, generally, in high health spending. If one is a high expenditure "loser" in a single year, the likelihood is that one will not be a high expenditure loser in other years. Whereas, if one is a low expenditure winner in year 1, the likelihood is that one will remain a low expenditure winner in years 2 and 3 as well, so that gains from reducing premium payments will accumulate over time.

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<sup>21</sup>There is of course no guarantee that catastrophic plans would be as comprehensive once the deductible is met, as we have assumed here. For example, to keep premiums low, insurers may retain coinsurance above the deductible.

<b>Table 2. Winners and Losers From Switching Into an MSA/Catastrophic Health Plan</b>				
	<b>After 1 year</b>		<b>After 3 years</b>	
<b>% Winners</b>	<b>80.3%</b>		<b>73.0%</b>	
<b>Average Overall Gain (Loss)</b>	<b>\$240</b>		<b>\$710</b>	
	<b>Winners</b>	<b>Losers</b>	<b>Winners</b>	<b>Losers</b>
<b>Characteristics of winners and losers:</b>				
<b>AVERAGE TOTAL EXPENDITURES ON HEALTH SERVICES (Worker plus Insurer)</b>	<b>\$323</b>	<b>\$6,770</b>	<b>\$1,038 per year</b>	<b>\$4467 per year</b>
<b>AVERAGE AGE</b>	<b>34.7</b>	<b>41.6</b>	<b>34.7</b>	<b>38.6</b>
<b>PERCENT FEMALE</b>	<b>46%</b>	<b>59%</b>	<b>44%</b>	<b>54%</b>
<b>HEALTH STATUS (1=excellent)</b>	<b>1.7</b>	<b>2.0</b>	<b>1.7</b>	<b>1.8</b>
<b>WAGE</b>	<b>\$23,110</b>	<b>\$24,626</b>	<b>\$25,011</b>	<b>\$28,099</b>
<b>AVERAGE GAIN (LOSS)</b>	<b>\$397</b>	<b>(\$402)</b>	<b>\$1,328 (cumulative)</b>	<b>(\$962) (cumulative)</b>

**Source:** Urban Institute analysis of NMES data, 1994 dollars.



Table 3 presents a set of examples to illustrate the winners and losers in year 1 more concretely. Each row represents people within the defined demographic cells. For example, of all the 18-35 year old males with excellent health, the one with the 75th percentile of health spending under the traditional plan would gain \$390 from switching to an MSA/catastrophic arrangement. In toto, the examples illustrate that more than 75 percent of workers under 46 years of age would gain from switching, while fewer than 75 percent of workers over 45 would gain, since workers at the 75th percentile of expenditures are already losing in these older demographic cells. These examples also illustrate the general points that most workers would gain from MSA/catastrophic health insurance arrangements and that the winners tend to be younger and healthier.

In general, the farther one is up the expenditure distribution of each demographic cell, i.e., as one moves from left to right in each row, the lower the gain or the greater the loss, but there are exceptions. Given the plans' cost-sharing provisions and an assumed set of responses to increased cost-sharing obligations, exact gains and losses are determined by the joint distribution of expenditures, MSA contributions, and marginal tax rates. Those with the largest losses, all other things equal, are those who had less than the maximum out-of-pocket spending under the comprehensive policy but hit the maximum under the catastrophic policy (i.e., those with total spending between \$2,000 and \$5,250).<sup>22</sup> People in this range of spending are in different expenditure percentiles, depending on the particular demographic cell to which they

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<sup>22</sup>The stop-loss in the comprehensive plan, \$1,250, is reached only if the worker incurs at least \$5,250 in expenditures on covered health services. In the exact case, out-of-pocket spending for health services would be  $= \$250 + .2*(5000) = \$1,250$ .

belong. In general, however, the examples support the rule that higher expenditures are associated with a lower probability of winning from MSA/catastrophic combinations.

<b>Table 3. Gains/Losses Under an MSA Arrangement Relative to Traditional Insurance</b>					
<b>Gender</b>	<b>Age</b>	<b>Health Status</b>	<b>Gain/(Loss)</b>		
			<b>50th percentile</b>	<b>75th percentile</b>	<b>95th percentile</b>
<b>Male</b>	<b>18-35</b>	<b>Excellent</b>	<b>\$412</b>	<b>\$390</b>	<b>(\$431)</b>
<b>Male</b>	<b>18-35</b>	<b>Good/Fair/Poor</b>	<b>\$385</b>	<b>\$247</b>	<b>(\$311)</b>
<b>Female</b>	<b>18-35</b>	<b>Excellent</b>	<b>\$361</b>	<b>\$215</b>	<b>(\$372)</b>
<b>Female</b>	<b>18-35</b>	<b>Good/Fair/Poor</b>	<b>\$411</b>	<b>\$280</b>	<b>(\$311)</b>
<b>All</b>	<b>36-45</b>	<b>Excellent</b>	<b>\$408</b>	<b>\$225</b>	<b>(\$594)</b>
<b>All</b>	<b>36-45</b>	<b>Good/Fair/Poor</b>	<b>\$340</b>	<b>\$ 84</b>	<b>(\$311)</b>
<b>All</b>	<b>46-65</b>	<b>Excellent</b>	<b>\$350</b>	<b>(\$147)</b>	<b>(\$340)</b>
<b>All</b>	<b>46-65</b>	<b>Good/Fair/Poor</b>	<b>\$290</b>	<b>(\$681)</b>	<b>(\$311)</b>

**Source:** Urban Institute analysis of NMES data, 1994 dollars.

### Question #3

#### **What would be the effect on premiums for comprehensive plans if an MSA/catastrophic option was made available to all workers?**

The numerical experiments so far have assumed that all workers joined the MSA/catastrophic arrangement. In actuality, some if not most employers will at least consider maintaining a comprehensive insurance product as a choice. A major question in this case is, what will happen to the premium for the comprehensive policy if an MSA/catastrophic alternative is presented to the work force? Table 4 presents our simulations of some possibilities. The rows of this table represent alternative assumptions about what fraction of likely winners are presumed to actually switch to an MSA. In each case, switchers are chosen at random from the set of all winners, those who could gain financially from switching.<sup>23</sup>

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<sup>23</sup>This method introduces countervailing effects on the estimated premium. The assumption that losers are prescient, i.e., they never choose an MSA, increases the degree of adverse selection into the comprehensive plan and raises the estimated premium. On the other hand, the assumption that winners are drawn for the MSA at random, i.e., that a very small winner is just as likely to switch to an MSA/catastrophic plan as someone who would gain a lot, biases the comprehensive premium estimate downward by keeping more very healthy workers in the comprehensive plan than is likely. This implicitly recognizes that even some would-be “winners” would prefer more comprehensive insurance, i.e., that they are risk averse. The net result of these assumptions and the distribution of expenditures and winners in our NMES data base is that 61.4 percent of those in the MSA in each case presented in Table 4 are drawn at random from the bottom half of the expenditure distribution, only slightly more favorable selection into the MSAs than would result from a purely random draw. Given the ability to predict one’s win/loss status, the likelihood of which is shown later, our assumption of only moderately favorable selection into the MSA probably understates the amount of selection that would actually occur. In the absence of hard evidence about switching to MSAs from comprehensive plans (which is not publicly available), we believe these countervailing effects largely offset one another and that our method produces a reasonable first order approximation of a comprehensive premium estimate. At a minimum, the method should yield an accurate rank ordering of how the comprehensive premium will change as the absolute number of workers choosing the MSA increases.

**Table 4. Effect on Comprehensive Premium of Employer Offering an MSA Alternative**

<b>Percent Choosing MSA</b>	<b>Comprehensive Premium</b>	<b>Employee contribution toward comprehensive premium if the employer contributes the same amount to all workers</b>	<b>Employee contribution toward comprehensive premium if the employer reduces the MSA contribution to zero and diverts these funds to shield workers in comprehensive plans</b>
<b>0%</b>	<b>\$1701</b>	<b>\$340</b>	<b>n/a</b>
<b>25% of winners (20% of total)</b>	<b>\$2766</b>	<b>\$1405</b>	<b>\$1342</b>
<b>50% of winners (40% of total)</b>	<b>\$3444</b>	<b>\$2083</b>	<b>\$1916</b>
<b>75% of winners (60% of total)</b>	<b>\$4628</b>	<b>\$3267</b>	<b>\$2891</b>
<b>all winners (80% of total)</b>	<b>\$7396</b>	<b>\$6035</b>	<b>\$5031</b>

**Source: Urban Institute analysis of NMES data, 1994 data.**

These estimates suggest that as the number of those choosing MSA/catastrophic combinations rises, the traditional premium increases. This is due to the fact that as more healthy workers shift out of comprehensive insurance, the traditional risk pool deteriorates. And this deterioration happens almost immediately. If even a quarter of likely winners choose an MSA, the premium for traditional insurance would rise by over 60 percent.<sup>24</sup> The final simulation of all “winners” moving to the MSA is particularly striking, because then there are no good risks left in the comprehensive pool.

A higher comprehensive premium is the flip side of “savings” to winners -- those savings were previously used to help finance health insurance for the relatively unhealthy in the employer sponsored risk pool. We assume throughout that employers want to spend no more than they do currently for the health insurance of their workers. If this assumption holds, employees’ contributions would have to rise dramatically to pay these higher premiums, as shown in the last two columns.

#### **Question #4**

#### **How would employers and workers likely respond to these quantitative implications?**

The deterioration in the traditional risk pool would present employers who wanted to offer a choice with a dilemma. To encourage movement into the MSA, they would prefer to make the MSA contribution as large as possible. But the increase in the traditional premium

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<sup>24</sup>Companies’ experience with offering MSAs even without favorable federal tax treatment, as reported by Ferrara (1995), suggest that a large majority of workers presented with a choice do switch to the MSA/catastrophic alternative, at least initially. If only a very small percentage did so, then an employers’ ability to maintain a comprehensive alternative would be considerably enhanced.

would be great as larger numbers of relatively healthy workers move to take advantage of their ability to

gain from MSAs. Thus, there would be pressure to increase the employer contribution to the traditional plan. This can only be financed with lower employer MSA contributions, which reduce the healthy workers' incentives to move into MSA/catastrophic arrangements. The expenditure distribution being what it would appear to be, based on our nationally representative data, there is not enough MSA cushion to permit the employer to effectively shield those who prefer the traditional indemnity plan. This is shown in the last column of Table 4, where we assume that all of the employer's MSA contributions would go toward reducing the traditional premium -- an unlikely scenario but one that puts an upper bound on the degree to which workers who preferred the comprehensive plan could be shielded. Here again, even if only one quarter of the winners shift to MSAs, the traditional premium contribution by employees would have to nearly quadruple.

Some might argue that employers would do more to shield workers who remain in comprehensive plans, perhaps by reducing the premium contribution to the catastrophic premium. But this immediately reduces the potential gain to employees who are being encouraged to accept higher financial risk through higher deductibles and zero MSA already (in this part of our example). These gains and risks put limits on employers' flexibility to shield workers who might prefer to remain in comprehensive plans.

Thus, we would expect firms to give up on maintaining more comprehensive choices relatively quickly if large numbers of employees switch to the MSA/catastrophic combination. We note from Table 2 that the average losses to the losers from an MSA are smaller than the

losses they would suffer if trying to maintain comprehensive coverage in response to a deteriorating risk pool (columns 3 or 4 of Table 4). These workers would prefer an MSA/catastrophic option to no insurance and to inordinately expensive comprehensive insurance. Thus, introduction of an MSA option would likely crowd out comprehensive insurance over time.<sup>25</sup>

Table 4 showed what could happen to comprehensive premiums if some or all workers switched into MSA/catastrophic arrangements while others remained in the traditional plan. The crucial question is, how accurately could workers predict their likelihood of winning or losing should they enroll in an MSA/catastrophic plan? To address this question, we estimated two models that predict the probability of being a financial winner from switching to the MSA/catastrophic plan. In our exercise for question #2 we already computed whether a particular worker would gain or lose from switching. Our models use that “actual” win/lose status to formulate the dependent variable and then try to determine the likelihood that

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<sup>25</sup>We have compared two indemnity policies in this example. MSA vs. managed care competition could be quite different, but this is not certain. Analysts normally assume that both tend to attract healthier individuals *relative to comprehensive indemnity plans*. If they compete against each other, it is impossible to predict which product type will attract more favorable risks *a priori*. However, if risk selection does favor either MSAs or managed care against each other, then a similar unstable market result can occur. It is clear that those who would lose from switching to MSA/catastrophic plans from indemnity plans would lose even more financially if they were switching from comprehensive managed care plans, for their current out-of-pocket obligations would be lower. This could affect the size of losses in Table 3 substantially.

It is not clear, however, if faced with an MSA/catastrophic alternative, that the higher level of financial protection from comprehensive managed care would still effectively offset the cost of reduced autonomy in choosing providers for most workers. The MSA/catastrophic option would provide lower financial protection, to be sure, but also a potential financial gain plus absolute choice of providers. It is plausible that good health risks will find both alternatives attractive in this case. We suspect that MSAs will attract better health risks, for the healthiest will still gain considerably compared to managed care, but more work must precede firm conclusions on this issue.

We also have not factored in any assumptions regarding disposable income. Many believe that the MSA approach will be more appealing to those with higher incomes, for they are presumed to be less concerned about the risk of bearing higher out-of-pocket liabilities (the difference between the high deductible and the size of the MSA). If this turns out to be true, then sorting along income lines might occur, especially if the other choice is a low deductible managed care plan.



objective characteristics could help a worker to correctly predict whether they would in fact win or lose.

Model One used simple demographics -- age and gender -- along with self-reported (and thus self-determined) health status as explanatory variables. Workers would certainly know these characteristics about themselves prior to selecting a health plan alternative. Model Two includes gender, age, and health status plus *ex post* total expenditures on health services.

Workers cannot know expenditures *a priori*, but last year's expenditures are a good estimate of next year's expenditures for most people, and workers are expected to know this from their own experience.<sup>26</sup> The details of the estimation results are presented in the appendix. Table 5 presents each model's predictions of winner/loser status as well as the actual outcomes, assuming each worker switched to the MSA/catastrophic plan.

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<sup>26</sup>As shown in Table A.5. in the appendix, workers spending less than \$1,000 in year 1 will spend less than \$1,000 in year 2 approximately 80-90 percent of the time.

**TABLE 5. Models predicting Winning and Losing from Switching to MSA/Catastrophic Plans**

Both models included age, gender, and health status as explanatory variables. They differed in their treatment of expenditures on health services.

**Model One: Expenditures *Excluded***

	Actual Win	Actual Lose
Predicted Win	80.3%	18.6%
Predicted Lose	0.3%	0.8%

**Model Two: Expenditures *Included***

	Actual Win	Actual Lose
Predicted Win	79.6%	1.8%
Predicted Lose	1.0%	17.6%

**Source:** SUDAAN Logit analysis by the Urban Institute on NMES data, in 1994 dollars. Full estimation results presented in the Appendix.

The first panel of Table 5 shows that even ignoring expenditures, 81 percent of all workers could accurately predict whether they would win or lose from switching to an MSA/catastrophic plan (80.3 percent + 0.8 percent). Model Two shows that if workers were able to predict health expenditures perfectly, they could accurately predict win/loss status 97 percent of the time (79.6 percent plus 17.6 percent). Thus, if their own recent health expenditure experience is any guide at all to future expenditures by workers and their families, as would appear to be the case from the evidence we have on expenditures over time,<sup>27</sup> between 81 and 97 percent of workers could correctly predict their win/loss status under MSAs. Note that the bulk of incorrect predictions in the model without expenditures are for those who would have predicted they would gain but would in fact lose. Those who would actually win are extremely highly likely to be able to predict that outcome. This is particularly important for assumptions regarding who would switch to MSAs. We know from Table 2 and from the detailed probability model results that those who are likely to win on average are those with the lowest expenditures, the healthiest workers. Thus, the likelihood of favorable selection into MSA/catastrophic arrangements vs. comprehensive arrangements appears to be very high, and would likely increase over time if losers drifted back to comprehensive plans. These results strengthen the conclusions reached from Table 4: it will be difficult for firms to offer both MSA/catastrophic plans and comprehensive health plans at the same time.

#### **IV. Concluding Discussion**

This paper has used nationally representative data and both microsimulation and econometric methods to generate quantitative answers to important questions being raised in

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<sup>27</sup>See, for example, Eichner, Wise, and McClellan (1995).

the current debate over tax-preferred MSAs. Considerable uncertainty is present in any hypothetical estimate of the results of health insurance policy changes, and we have gone to some length to clarify our assumptions and methodology in the appendix. Ultimately, any model's predictions are only as good as the data and judgment that go into it, and while we tried to make our judgment as informed and balanced as possible, no current nationally representative and publicly available data set is perfectly suited for analyses of tax-preferred MSA/catastrophic plans. The NMES data are the best data currently available, but they are far from perfect. Fortunately, our aging algorithms serve to correct their greatest weakness,<sup>28</sup> but all results should be interpreted as our best point estimate within a reasonable range.

With these caveats in mind, four inferences are consistent with our analyses.

(1) Widespread adoption of MSAs would reduce the level of national health spending by 4 to 6 percent, but would not likely reduce the long run rate of growth of health care costs. (2) About 75 to 80 percent of workers could gain financially by switching from comprehensive indemnity health insurance plans to MSA/catastrophic arrangements. (3) The winners from switching differ from losers. Most importantly, winners are healthier and have lower health expenditures. Higher out-of-pocket obligations may reduce some unnecessary utilization, but MSA/catastrophic plans will also shift costs to those who do not currently over utilize health services but who happen to be sicker. In addition, winners are younger, more likely to be male, and are paid lower wages than losers. Wealthier workers may be more willing to bear the financial risks of increased out-of-pocket liabilities, but our results show that on average, lower wage workers would benefit from switching to MSA/catastrophic plans. (4) Workers would be

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<sup>28</sup> They were drawn in 1987 from a health delivery system that was rather different from today's.

very likely to accurately predict their winner or loser status from switching, so that considerable favorable selection into MSA/catastrophic arrangements should be expected. This will likely increase comprehensive premiums so much that firms would be forced to choose between offering MSA/catastrophic plans OR traditional, comprehensive health insurance arrangements, but not both simultaneously. This will be more difficult for some firms than others. Firms with a preponderance of young, healthy workers would find it easier to switch to MSA/catastrophic arrangements, while firms with a large fraction of older workers will be more reluctant to switch, for worker opposition there would be higher. If enough firms who are not currently self-insured switched to MSA/catastrophic plans, then the integrity of the overall comprehensive risk pool could be compromised. At the same time, losers' losses from switching to MSA/catastrophic plans would be lower, on average, than the costs of trying to maintain comprehensive insurance alternatives for these workers alone. The stop-loss provision of the catastrophic plan is a crucial parameter for the financial well-being of the would-be losers.

It is not possible to reach a summary judgment about the wisdom of tax-preferred MSA legislation without making clear value judgments. This paper has tried to steer clear of those rocky shoals and to focus on the most likely and important numerical consequences of tax-preferred MSAs. The ultimate choice would seem to come down to a tradeoff, as careful analyses of real world choices often do. On the one hand, most workers would gain financially, on average, from having less comprehensive premium payments deducted from their salaries in one way or another. On the other hand, some workers, specifically the older and the less healthy ones, would probably lose some financial well-being if tax-preferred MSAs became

widespread and could lose the option of choosing more comprehensive insurance in the long run. At the same time, all young workers will grow older, and some of them will become unhealthy. The willingness to pay for insurance to reduce financial risk varies, and may change as people age or encounter even temporarily poor health. We have not tried to capture this taste for insurance in the analyses presented here, primarily because it is extremely difficult to estimate precisely.

Our analysis does allow us to conclude that the current system implicitly subsidizes the less healthy by overcharging the more healthy in exchange for an implicit promise to subsidize them should they come to need it. Tax-preferred MSAs would reduce this cross-subsidy. Whether this would be a better bargain for the society at large requires careful political judgment beyond the numerical scope of this paper.

## Appendix

This appendix describes the methods and assumptions used for each of the analyses reported in the text. It is organized by policy question posed in the text.

### **1. What would be the likely effect on national health expenditures (NHE) if all employees switched into MSA/catastrophic plans?**

We assumed that family policy holders would respond to increased cost sharing similarly to single policy holders, as was found in the Rand Health Insurance Experiment (Newhouse, 1993). This allowed us to estimate the magnitude of effects using only the single policy holders that were insured through their employers, the same sample we used in the other analyses. The first step was to simulate what total spending by single policy holders would have been had they all been in a hypothetical indemnity plan with a \$250 deductible, a 20 percent coinsurance rate, and a \$1,250 stop-loss. This entails using assumptions about how total spending will change when an individual's out-of-pocket obligations change from their current plan. The NMES data provide, among other things, out-of-pocket spending on health services and total health spending by all payors on behalf of each individual. Thus, they can be used to simulate how a worker's out-of-pocket obligations would change if she switched to the health plan specified.

What is required is an explicit set of assumptions about how people would react to different cost sharing obligations. Economists call this concept "the elasticity of demand for health services." Actuaries use the term "induction" to describe the response of total spending to changes in out-of-pocket spending. The actuarial concept is more operational for actual data. We used a set of induction assumptions consistent with those employed by the American Academy of Actuaries in their study of MSAs (AAA, 1995) and provided by the Academy by request on diskette, displayed in Table A.1.

**Table A.1**

<b>If total health spending is between . . .</b>	<b>. . . then a \$1 increase in an out-of-pocket obligation will induce a \$0.x reduction in total spending</b>
<b>0-\$1,000</b>	<b>.76</b>
<b>\$1,000-\$4,999</b>	<b>.79</b>
<b>\$5,000-\$9,999</b>	<b>.62</b>
<b>\$10,000-\$24,999</b>	<b>.47</b>
<b>\$25,000 +</b>	<b>.36</b>

**Source: American Academy of Actuaries, 1995.**

The values in column 2 are called "induction factors" (IF). This table reflects the assumption that more expensive services, typically inpatient or those associated with serious chronic

problems, are less discretionary and are likely to be reduced less in the face of higher cost sharing obligations than more discretionary, lower cost services. Technically, the IFs in the table are weighted averages, appropriate for each spending category, of the different induction factors assumed (by the AAA and by the Health Care Financing Administration, [HCFA]) to apply to specific health services: inpatient = .3, prescription drugs = 1.0, and other services = .7.

Specifically, each single policy holder's expenditures in the NMES data were compared to the cost sharing structure of the hypothetical indemnity plan and the change in out-of-pocket ( $\Delta$ OOP) obligation from their original was determined. Then "new" health expenditures were computed according to:

$$(1) \text{ New Health Spending} = \text{Original Health Spending} - \text{IF} * (\Delta \text{OOP}).$$

For example, suppose a single policy holder had \$3000 in total health expenditures in the NMES file (aged to 1994), and \$400 in out-of-pocket payments. Under the hypothetical comprehensive indemnity policy, the person would face a deductible of \$250 and 20 percent coinsurance until total out-of-pocket spending reached the stop-loss maximum of \$1250. This person then would owe \$800 ( $\$800 = \$250 + .2 * 2750$ ) if she did not change her behavior at all. We assume that the extra \$400 in out-of-pocket obligation would induce a reduction in total services of \$316 ( $.79 * 400$ ), i.e.,  $\text{New Health Spending} = \$2,684 = 3000 - .79(400)$ . This \$2,684 is the total health spending associated with this person when simulating behavior in the hypothetical indemnity plan.

The next step was to shift all single workers from the hypothetical indemnity plan into a hypothetical catastrophic plan (with a \$2,000 deductible and stop-loss) and to estimate by how much total spending by these workers would fall, since their out-of-pocket obligations would clearly rise, in some cases quite a lot. Applying the induction factors from Table A.1 to our data set yields an estimate that total spending by single, employer-sponsored policy holders would be 15 percent lower in the aggregate if they had catastrophic policies instead of comprehensive indemnity policies.

**Table A.2.**

	<b>All in comprehensive plan</b>	<b>All in catastrophic plan</b>
<b>Total health spending on behalf of single, employer-sponsored policy holders</b>	<b>\$32.78 Billion</b>	<b>\$28.05 Billion</b>

**Source: Urban Institute Analysis of NMES data, 1994 dollars.**

As discussed above, we assumed that workers with families would reduce their costs in the same proportion.



As discussed in the text, total national health spending would not thereby fall by 15 percent. First, Medicare, Medicaid, and spending on behalf of both the uninsured and of those under 65 with private non-group coverage are outside the reach of employer-sponsored MSA/catastrophic plans. HCFA, the official chronicler of national health expenditures, estimates the breakdown by national health spending payor as follows:

**Table A.3.**  
**Shares of NHE, by Payor**

<b>Payor Category</b>	<b>Share of NHE</b>
<b>Private Health Insurance</b>	<b>34%</b>
<b>Out-of-pocket</b>	<b>18%</b>
<b>Medicare</b>	<b>17%</b>
<b>Medicaid</b>	<b>13%</b>
<b>Other Public</b>	<b>13%</b>
<b>Other Private</b>	<b>5%</b>

**Source: Levit, et al, 1994.**

Two sub-categories of national health spending are relevant to employer-sponsored MSAs: the fractions of private health insurance (PHI) and of out-of-pocket (OOP) payments made on behalf of or by the under-65 population that is insured through employers. Some private health insurance payments are made for the under-65 population insured through non-group policies as well as for Medicare enrollees who hold private supplemental policies. Some out-of-pocket payments are made by these two groups as well as by the uninsured. Thus, the share of NHE accounted for by the employer-sponsored-privately-insured is certainly less than 52 percent.

It is not possible to estimate precisely how much less from aggregate data, but Current Population Survey (CPS) and NMES data permit us to derive a reasonable ballpark. Employee Benefits Research Institute (EBRI) tabulations from the March 1995 CPS indicate that about 90 percent of the under-65 that are privately insured are in employer-sponsored insurance (ESI) plans (ESI/PHI = .9).<sup>29</sup> Tabulations of NMES data by Hahn and Lefkowitz (1992) can be used to derive the estimate that 60 percent of aggregate out-of-pocket spending is undertaken by those who are in private insurance plans (PHIOOP/AggOOP = .6). Using these two assumptions, an upper bound estimate of the share of NHE accounted for by those with employer-sponsored insurance (ESI) is:

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<sup>29</sup>EBRI, 1996.

$$\text{Share of NHE on ESI} = (\text{ESI/PHI}) * (\text{PHI/NHE}) + (\text{ESI/PHI}) * (\text{PHIOOP/AggOOP}) * (\text{AggOOP/NHE})$$

or

$$\text{Share of NHE on ESI} = .403 = .9 * .34 + .9 * .6 * .18.$$

This is an upper bound estimate of the share of NHE spent on the ESI population, however, since PHI spending on behalf of Medicare enrollees is embedded in the 40.3 percent. Thus, if MSAs and catastrophic policies would lower total health spending by the ESI population by 15 percent, NHE would fall by, at most, about 6 percent ( $.06 = .4 * .15$ ).

Even this estimate is too high, however, since the 15 percent estimate is based on the assumption that all ESI workers move into catastrophic health plans from comprehensive indemnity plans. Today, about 25 percent of those in ESI plans are in HMOs and over half are in some form of managed care plan.<sup>30</sup> Therefore, many workers are already in plans that have already reduced costs relative to indemnity plans, and therefore it is unrealistic to think that costs could fall another 15 percent. Finally, there is the point made in the text about the MSA balance reducing the sting of the high out-of-pocket obligation to the extent the MSA was viewed as insurance vs. savings. Even ignoring this effect, our best point estimate of the reduction in NHE that would result from moving all workers into MSA/catastrophic plans is 4 percent ( $.04 = .4 * .15 * .75$ ).

## **2. Who would gain and who would lose financially, and by how much, if all workers switched to MSA/catastrophic plans?**

The first step to answering this question was to estimate a premium using the health expenditure estimates, post-induction adjustments, that were computed for question # 1 for both the comprehensive indemnity plan and for the catastrophic plan. This is done by filtering these expenditures through the cost-sharing features of each plan to separate the insured's out-of-pocket obligation from the benefit that would be paid by the insurance company. For example, returning to the example started above (\$3,000 in total health expenditures in the NMES file), the person would have \$2,684 in total spending in our hypothetical indemnity plan. This would engender \$736.80 in out-of-pocket payments ( $\$250 + .2 * \$2434$ ) and \$1,947.20 in insurance benefit payments. The average insurance benefit paid across all workers, increased by 15 percent to account for administrative loading costs, yields our premium estimate of \$1701 for single policy holders.<sup>31</sup>

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<sup>30</sup>EBRI, 1995.

<sup>31</sup>We also estimated a comprehensive premium assuming slightly favorable selection into the MSA/catastrophic plan. We did this by assuming that only 50 percent of all workers join the MSA/catastrophic plan and that 60 percent of those who would join are drawn at random from the lower 50 percent of the expenditure distribution. The average premium over 20 draws differed from \$1,701 by less than 2 percent.

The procedure was similar for the catastrophic premium, however, the presence of the MSA complicates the induction calculation a bit. Essentially, the tax preference for MSAs reduces the induction that would occur because spending pre-tax dollars is cheaper than spending post-tax dollars on health services. Also, the change in out-of-pocket spending used to calculate the new total spending depends upon whether the MSA is smaller or larger than the out-of-pocket obligation under the catastrophic policy. That is, when  $OOP(cat) > MSA$ , then

$$\Delta OOP = (1-t)*MSA + OOP(cat) - MSA - OOP(trad);$$

and when  $OOP(cat) \leq MSA$ ,

$$\text{then } \Delta OOP = (1-t)OOP(cat) - OOP(trad),$$

where  $t$  = federal tax rate,  $cat$  = catastrophic, and  $trad$  = traditional, comprehensive indemnity.

Finally, an iteration algorithm is required since the MSA is integral to the change in OOP calculation and therefore to total spending and premium estimation, but the size of the MSA cannot be known until the catastrophic premium is determined. We used an approximation to begin the process and stopped iterating when the catastrophic premium was within 2 percent of a consistent equilibrium.

Our calculation assumed that the employer contributes the same amount to a worker's catastrophic policy and MSA as its original contribution, 80 percent of the traditional premium. Further, it is assumed that the employer pays the entire premium of the catastrophic policy and deposits the remainder in the employee's MSA.

The federal tax rate ( $t$ ) that was used to compute new spending and the premium for the MSA/catastrophic policy was taken from the following table.

**Table A.4.**

**$t$  = 15% of income for payroll taxes + the following marginal tax rates for single individuals:**

<b><u>Taxable income</u></b>	<b><u>Tax rate</u></b>
<b>\$0-22,100</b>	<b>0.150</b>
<b>\$22,101-53,500</b>	<b>0.280</b>
<b>\$53,501-115,000</b>	<b>0.310</b>
<b>\$115,001-250,000</b>	<b>0.360</b>
<b>\$250,001 +</b>	<b>0.396</b>

**Source: Advisory Commission on Intergovernmental Relations, 1995.**

The catastrophic premium estimate was \$1,110.

Once we had the two premium estimates, all workers were assumed to switch from the indemnity plan to the MSA/catastrophic plan with their employer contributing \$251 (\$251 = .8\*1701 - \$1,110) to the worker's MSA. Then the total cost to the worker in the first year was compared under both the hypothetical comprehensive plan (OLD SPENDING) and the hypothetical MSA/catastrophic plan ( NEW SPENDING). A worker was counted as a WINNER in year 1 if OLD SPENDING > NEW SPENDING. Algebraically,

$$\text{OLD SPENDING} = (1-t)P(\text{trad})_{\text{ER}} + P(\text{trad})_{\text{EE}} + \text{OOP}(\text{trad}),$$

where  $t$  = correct marginal tax rate (federal income tax plus both social security rates)

$P(\text{trad})$  = total traditional comprehensive premium

$P(\text{trad})_{\text{ER}}$  = employer contribution to traditional premium

$P(\text{trad})_{\text{EE}}$  = employee contribution to traditional premium

$\text{OOP}(\text{trad})$  = out of pocket spending under traditional plan.

*IF  $\text{OOP}(\text{cat}) > \text{MSA}(\text{total})$ , then*

$$\text{NEW SPENDING} = (1-t)[P(\text{cat})_{\text{ER}} + \text{MSA}(\text{total})] + \text{OOP}(\text{cat}) - \text{MSA}(\text{total}) + P(\text{cat})_{\text{EE}}$$

*IF  $\text{OOP}(\text{cat}) \leq \text{MSA}(\text{total})$ , then*

$$\begin{aligned} \text{NEW SPENDING} = (1-t)[P(\text{cat})_{\text{ER}} + \text{OOP}(\text{cat})] + P(\text{cat})_{\text{EE}} - \\ [\text{MSA}(\text{total}) - \text{OOP}(\text{cat})](1-p)(1-t)(1-I). \end{aligned}$$

where  $P(\text{cat})$  = total catastrophic premium

$P(\text{cat})_{\text{ER}}$  = employer contribution to catastrophic premium

$P(\text{cat})_{\text{EE}}$  = employee contribution to catastrophic premium

$\text{OOP}(\text{cat})$  = out of pocket spending under catastrophic plan

$\text{MSA}(\text{total}) = \text{MSA}_{\text{ER}} + \text{MSA}_{\text{EE}}$

$\text{MSA}_{\text{ER}} = P(\text{trad})_{\text{ER}} - P(\text{cat})_{\text{ER}}$

$\text{MSA}_{\text{EE}} = 0$

$P(\text{cat})_{\text{EE}} = 0$  in our case, since  $.8 * P(\text{trad}) > P(\text{cat})$  for our data.

$p$  = % penalty for withdrawal of MSA balance at the end of the year (assumed .1)

$I$  = % of MSA considered to be insurance vs. savings (we use  $I=0$ ).

Thus for the purposes of calculating winners and losers in one year, we assumed an individual would withdraw any remaining MSA balance at the end of the year, and that net withdrawal reduces her NEW SPENDING total.

Each person's experience in year 1 was replicated for year's 2 and 3, with the cumulative results simply summed over the three year's experiences. Expenditures in years 2 and 3 were estimated from the multiyear expenditure distribution table reported in Eichner, et al (1995),

inflated to 1994 dollars, which was taken from the actual experience of a large manufacturing firm.

**Table A. 5.**

**Percent Distribution of Year 2 Expenditures,  
by Year 1 Expenditure Interval and by Age**

Age	Year 1 Expenditure	Year 2 Expenditure				
		\$0	\$0-\$300	\$300-\$1000	\$1000-\$5000	\$5000+
18-35	\$0	40.94%	33.97%	12.92%	8.25%	3.92%
	\$0-\$300	51.62%	26.57%	11.36%	7.27%	3.19%
	\$300-\$1000	35.55%	25.50%	18.76%	13.69%	6.51%
	\$1000-\$5000	32.90%	20.93%	17.12%	19.00%	10.05%
	\$5000+	29.17%	17.36%	14.76%	17.92%	20.79%
36-45	\$0	40.27%	33.06%	13.60%	8.65%	4.41%
	\$0-\$300	36.57%	33.03%	16.11%	10.12%	4.18%
	\$300-\$1000	23.93%	26.83%	24.07%	18.25%	6.92%
	\$1000-\$5000	18.88%	19.97%	21.19%	27.93%	12.04%
	\$5000+	18.63%	16.82%	16.67%	22.81%	25.07%
46-55	\$0	37.65%	32.14%	14.52%	10.15%	5.53%
	\$0-\$300	30.99%	34.29%	17.90%	11.61%	5.21%
	\$300-\$1000	17.84%	26.35%	28.20%	19.47%	8.13%
	\$1000-\$5000	15.59%	19.55%	22.41%	28.76%	13.70%
	\$5000+	14.41%	15.73%	16.88%	24.38%	28.60%
56-65	\$0	31.14%	34.73%	15.64%	10.89%	7.60%
	\$0-\$300	35.87%	31.89%	16.52%	10.14%	5.58%
	\$300-\$1000	22.62%	24.54%	26.68%	17.36%	8.80%
	\$1000-\$5000	19.17%	18.87%	21.66%	26.07%	14.23%
	\$5000+	21.50%	13.82%	15.67%	22.42%	26.60%

**Source:** Matthew J. Eichner, Mark B. McClellan, and David A. Wise, *Insurance or Self-Insurance?: Variation, Persistence, and Individual Health Accounts*, May 1995.

Depending on the expenditures associated with each person in the NMES file in year 1, each person was given a “draw” from the probability distribution of expenditures in year 2 and 3, conditional on that person’s expenditures in year 1. Each draw was the median of the ranges

for years 2 and 3. So, for example, a 20-year old with \$200 in expenditures in year 1 would have a 51.62 percent chance of being assigned \$0 in health expenditures in year 2. A similar table for year 3 is contained in Eichner, et al (1995), but not reproduced here. Each person was assumed to retain any remaining MSA balance at the end of years 1 and 2, and to cash it in after year three.

### **3. What would be the effect on premiums for comprehensive plans if an MSA/catastrophic option was made available to all workers?**

Here we merely re-computed the comprehensive indemnity premium using the methods outlined above under varying assumptions about who would remain in the comprehensive risk pool, i.e., who would not choose the MSA/catastrophic plan if given a choice. Our basic assumption was that no loser, as determined in our analysis of question # 2, would choose to switch from the indemnity plan. We also assumed that all winners were equally likely to switch to the MSA/catastrophic plan; we drew the switchers from the pool of winners at random. The first assumption biases the comprehensive premium estimate upward, for some who would turn out to lose might have anticipated winning. On the other hand, the second assumption biases the comprehensive premium estimate downward, for it says that those who are likely to gain a little are just as likely to switch as those who are likely to gain a lot. We believe these biases to be roughly offsetting. Given the ability of workers to predict their winner/loser status, discussed below, it seems quite reasonable to expect that favorable selection into the MSA/catastrophic plan will be considerable. The net effect of these assumptions and the underlying expenditure distribution is that 62.5 percent of those who would shift into MSA/catastrophic plans are drawn from the bottom half of the expenditure distribution, modestly favorable selection shown not to materially affect other premium estimates (see note 26).

The final column of Table 4 in the text was computed assuming that the employer would contribute nothing to the MSA for those who would choose the catastrophic plan and would instead use these funds to defray some of the increased cost of the comprehensive plan for workers choosing to remain in it. The total amount of money there is to shift and the per worker subsidy increases with the number of workers assumed to choose the MSA/catastrophic plan. This is why the workers choosing the comprehensive plan would each get a subsidy equal to \$1,004 if all winners switched and the employer carried out this strategy, but only \$63 each if only 25 percent of the winners switched.

### **4. How would employers and workers likely respond to these quantitative implications?**

To assess workers' ability to predict how they would fare under MSA/catastrophic arrangements, we estimated two logistic regression models which predict the odds of winning or

losing based on objective characteristics of the worker.<sup>32</sup> Model 1 predicts the odds of winning as a function of gender, age, and self-reported health status. Model 2 adds health expenditures to Model 1's list of explanatory variables. To aid in model convergence with the complex survey data, we use categorical variables for each explanatory influence. Omitted categories were workers between 18-35, workers in excellent health, and workers with health expenditures below \$1000. Table A.5 presents the logistic regression results.

These models were used to produce the tables of correct and incorrect predictions in the text. The model with expenditures obviously performs better, but the model without expenditures performs very well. The results in Table A.6. suggest that age and health status are highly correlated with expenditures, unquestionably the best predictors of winning or losing from switching to an MSA/catastrophic plan.

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<sup>32</sup>Logistic regression is a commonly used econometric technique when the dependent variable is binary (Greene, 1995). A special estimation algorithm, SUDAAN Logit, is necessary when using logistic regression with the NMES data, because of the complex design of that survey.

**Table A.6. Logistic Regression Models of Winning from Switching to an MSA/Catastrophic Plan**

**dependent variable: log odds ratio of winning**

<b>Explanatory Variable</b>	<b>Model 1</b>	<b>Model 2</b>
<b>Intercept</b>	<b>2.416*** (0.174)</b>	<b>6.594*** (0.998)</b>
<b>Female</b>	<b>-0.298 (0.2)</b>	<b>-0.245 (0.540)</b>
<b>Age 36-45</b>	<b>-0.455* (0.242)</b>	<b>-0.102 (0.603)</b>
<b>Age 46-55</b>	<b>-0.978*** (0.238)</b>	<b>-0.475 (0.636)</b>
<b>Age 56-65</b>	<b>-0.764*** (0.283)</b>	<b>-0.281 (0.852)</b>
<b>GOOD HEALTH</b>	<b>-0.712*** (0.223)</b>	<b>0.031 (0.604)</b>
<b>FAIR HEALTH</b>	<b>-1.056*** (0.330)</b>	<b>-0.128 (0.611)</b>
<b>POOR HEALTH</b>	<b>-2.767*** (0.913)</b>	<b>-3.217*** (1.178)</b>
<b>EXPEND \$1001-2000</b>		<b>-4.288*** (1.157)</b>
<b>EXPEND \$2001+</b>		<b>-8.875*** (1.251)</b>
<b>unweighted n</b>	<b>1012</b>	<b>1012</b>
<b>log likelihood (weighted)</b>	<b>-467.4386</b>	<b>-109.777</b>

\* = significant at the  $\alpha = .1$  level.

\*\* = significant at the  $\alpha = .05$  level.

\*\*\* = significant at the  $\alpha = .01$  level.

**Source: Urban Institute analysis of NMES data.**

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