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"Supplemental Health Insurance at Old-age Financed by Social Security"

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Abstract

The paper studies the following issue: Can the Social Security play a role in the health-related out-of-pockets expenses at old-age? Senior citizens in many Western countries face inadequate health insurance coverage. Supplemental health insurance is needed for protection against random expenses that Medicare (or other governmental old-age insurance coverage) does not cover. Under the current uncertain circumstances one possible solution may be to alter the Social Security distribution of benefits among eligible recipients. The current empirical evidence justifies a modification of the Social Security program to provide mandatory supplemental health coverage, using some of the current funds of the Social Security. The current distribution of benefits of the Social Security system takes into account the level and length of the contributions made by each individual over the lifetime period. Since the Social Security program is a compulsory annuity plan aimed at increasing ex-ante well-being of individuals it does not take into account the 'true' state of nature (in terms of current well being when old) of Social Security recipients; i.e., the financial burden that each person encounters, for example due to illness, is not incorporated fully at the benefits level, namely, not taking health status and out of pocket health expenditures into account.

Using the existing data it is demonstrated that the out-of-pocket expenses of seniors who face medical problems are significant and are increasing over time. This can be shown even when we take into account the availability of some supplemental health insurance (such as Medigap). Due to the large financial stress faced by the Medicare system, high cost users on average are paying the most out-of-pocket fees, but the burden of high out-of- pocket expenditures is greatest for those who can least afford it. The paper demonstrates that the suggested changes in the Social Security benefits (that includes the compulsory supplemental health insurance) has two Pareto-enhancing welfare implications:

(a) The introduction of such supplemental insurance, financed by Social Security (as part of the benefits), improves the ex-ante well-being of all Social Security recipients.
(b) Such an intervention by the Social Security administration dominates (in ex-ante well being sense) the regime in which the supply of such supplemental insurance is carried out by private Insurance Companies.

Supplemental Health Insurance at Old-age

I. Introduction

We study here the inquiry related to the role that Social Security can play in the health out-of-pockets expenses at old-age. Senior citizens in the United States vary in the adequacy of their health insurance coverage. Supplemental health insurance is needed for protection against expenses that Medicare (or other governmental old-age insurance coverage) does not cover.

Under the current uncertain political circumstances one possible solution may be to alter the Social Security distribution of benefits among eligible recipients. Proposals include making Social Security cuts to the wealthy while increasing Social Security payments to the poor. The current empirical evidence justifies a modification of the Social Security program to provide mandatory supplemental health coverage, which implies improving the status of seniors who have larger medical expenditures. The current distribution of benefits of the Social Security system takes into account the level and length of the contributions made by each individual over the lifetime period. Since the Social Security program is a compulsory annuity plan aimed at increasing **ex-ante** well-being of individuals it does not take into account the 'true' state of nature (in terms of **current** well being when old) of benefit recipients; i.e., the financial burden that each person encounters, for example due to illness, is not incorporated fully at the benefits level, taking health status and out of pocket health expenditures into account.

Using the existing data we shall demonstrate that the out-of-pocket expenses of seniors who face medical problems are significant and are increasing over time. This can be shown even when we take into account the availability of some supplemental health insurance (such as Medigap). Due to the large financial stress faced by the Medicare system, high cost users on average are paying the most out-of-pocket fees, but the burden of high of out pocket expenditures is greatest for those who can least afford it. Even amongst the middle class, high out-of- pocket costs may result in a reduction of investments in annuities that would otherwise allow them to maintain a moderate standard of living in the context of rising inflation and volatility of income (although the Social Security increases are tied to inflation).

Using a modest part of Social Security benefits towards supplemental health insurance for all recipients may eventually reduce Medicare spending as well. The supplemental insurance we propose could also be tailored toward management of co-morbidity and preventive health care in order to further minimize moral hazard and to enhance efficiency and welfare gains without expanding costs and without jeopardizing welfare gains. While copayments, designed to minimize moral hazard should be incorporated into Medicare, the provision of supplemental insurance via Social Security benefits will also reduce Medicare expenditures by insuring access

to appropriate care. Medicare benefits should be designed to foster care that prevents increased illness due to the avoidance of care (such as cancer screening). These benefits may avoid more costly hospitalizations and more severe health outcomes associated with the postponement of treatable conditions. Similarly, by rewarding appropriate levels of care will reduce the excessive use of emergency rooms for non-emergent conditions.

As Medicare's (or other Governmental health provisions) financial situation becomes increasingly grave, which is expected over the next thirty years, and as lifespan increases due to advances in medicine and technology, the elderly will be paying a crippling amount of out-of-pocket payments for medical care. The change suggested in our paper, while reducing financial pressure on seniors, would maintain Social Security benefits **at the same level** as in the current program. Using a theoretical framework that takes into account uncertain health-related costs in the future, we demonstrate that introducing such a change in Social Security benefits would improve **ex-ante** the well- being of all. By modifying the system in this way, assuming it is carefully designed to guarantee administrative simplicity, greater equity and efficiency may be achieved in the distribution of the Social Security funds without imposing a financial penalty based on income (on the wealthy).

In order to substantiate this idea, the paper demonstrates first our claim regarding the rising costs of out-of-pocket expenses for the elderly. Later I examine my suggestion here from a theoretical point of view. I present recent economic data demonstrating that for elderly individuals, given their income, out-of-pocket health-related expenses are significant, and hence that intervention is desirable. In my theoretical framework I demonstrate that some compulsory redistribution of current Social Security funds so that benefits include protection against high out-of-pocket health expenses, will enhance ex-ante the well being of all individuals. Thus, along with the elderly, younger individuals will also prefer such a regime over the current Social Security situation. Moreover, I also show that this option dominates any option to provide such supplemental health insurance via the insurance markets.

I propose an improvement in the current system of distribution for Social Security recipients who are also covered by Medicare. I propose to deduct a certain sum from each Social Security monthly payment in order to provide supplemental medical insurance that will cover most of current out-of-pocket expenses. Since this program is mandatory for all Social Security recipients it avoids adverse selection problems, and allows the government to achieve supplemental coverage at a relatively low cost. The coverage of out-of-pocket expenditures must be the same for all participating insurance companies and for all individuals. The effect of this type of a program would be:

(a) The introduction of such supplemental insurance, financed by Social Security (as part of the benefits), improves the ex-ante well-being of all Social Security recipients.

(b) Such an intervention by the Social Security administration dominates (in ex-ante well being sense) the regime in which the supply of such supplemental insurance is carried out by private Insurance Companies.

The Pareto improvement resulting from our suggested compulsory supplemental health insurance, financed by the Social Security allowance, goes beyond the ex-ante sense : given the public programs, individuals may now hold multiple insurance policies, one public and one private (Finkelstein 2002).

First I review the studies covering out of pocket health care expenditures given the extent of coverage provided by Medicare. Following the justification of such a change I present a theoretical framework to support the claim for Pareto improvement. We conclude with a discussion of the welfare implications of this proposal.

II. Some Empirical Evidence

Medical expenditures, not covered by regular health insurance plans such as Medicare, have currently reached high levels for many elderly households with projections that indicate they will continue to climb in the foreseeable future. Since Medicare benefits are less comprehensive than most private health insurance, supplemental coverage is needed to cover out-of-pocket costs. However individuals may choose not to purchase supplemental health insurance because of cost or uncertainty about their future health, i.e. imperfect information about their demand for health care.

There are many consequences to the absence of supplemental health insurance. The cost of this insurance protection itself is regarded as an out of pocket expenditure. Lower income elderly who do not receive Medicaid or other public subsidy, and who cannot afford to purchase private individual supplemental insurance, are vulnerable to the risk of high out-of-pocket expenditures that consume a high percentage of their income. The consequence of these unanticipated medical expenditures may result in individuals : (a) foregoing necessary medical care, (b) reducing their consumption of other commodities such as housing and food, or (c) increasing the chance of becoming financially insolvent.

Middle income individuals may change their savings, consumption and investment patterns as protection against the risk of high expenditures. The uncertainty about the high out-of-pocket expenditures may also alter their bequest motives. Many middle income families either purchase private supplemental health insurance or have employer sponsored supplemental health insurance. They obtain this insurance to protect against reduction in their future consumption, which has been affected by their retirement and age-related higher risk aversion.

Higher income families have supplemental insurance (such as Medigap policies or employer-sponsored coverage plans) to avoid the risk of reduction of their assets.

De Nardi et al. (2006) and others have commented on the sustainability of health spending growth and its effects on low income elderly. Additionally, in the absence of suitable health insurance, the burden of out of pocket spending profoundly increases the share of income allocated to health care rather than being invested in annuities. The mere existence of random expenditures may be linked to the prudent financial behavior of the elderly. Goldman & Maestas (2007) report that acquiring Medigap or an employer policy increase the risky assets holding increase by 6 percentage points relative to those enrolled in only Medicare Parts A and B. Also, HMO participation increases risky asset holding by 12 percentage points. These empirical findings demonstrate the link between the availability and pricing of health insurance and the financial behavior of the elderly.

Individuals with high-out-of-pocket expenditures tend to be elderly, covered by Medicare and other non-group coverage (Banthin and Bernard 2006, Machlin and Zodet 2006, Shen & McFeeters 2006) with poorer state of health (Achman and Gold 2002). Some have illness that persist over time (Cohen and Yu 2009) and some have more chronic conditions as they age (Schoenberg et al 2008, Thorpe et al. 2009). This is particularly severe in the case of poor widowed women (McGarry and Schoeni 2005). However, the level of out-of-pocket health-related payments vary significantly by the type of supplemental insurance (see, Banthin and Bernard 2006, Machlin and Zodet 2006). Individuals with either private supplemental insurance or those with no supplemental insurance have higher costs than those covered by some combination of Medicare and public insurance. The terms of the supplemental health insurance contract, including the structure of copayments and deductibles affect significantly the distribution of these uncertain costs. For employer sponsored health insurance, the cost of out-of-pocket premiums vary with the timing of retirement and the number of years of service provided to the company and, in some cases, adds a significant financial burden (Buchmueller 2005).

From the Medical Expenditure Panel Survey, Buchmueller et.al. (2006) reports evidence of erosion in retiree health benefits since the mid-1990s. Based on a larger survey of private establishments (compared to what previous studies have used) , it has been shown that in 2003 only about **one-quarter** of private-sector employees have worked at establishments that offered health benefits to retirees, down from 32 percent in 1997. The data that support our discussion of the rising out-of-pocket health expenditures for the elderly are taken from government sponsored surveys. The data also shows an increase in the cost of supplemental health insurance as well. The 2002 Consumer Expenditure Survey (cited in the Aged Chartbook

(2007))[1] shows that out-of-pocket expenditures as a percentage of total expenditures increased with age (from 11.2% in age range 65-74 to 15.1% for those 75 and older) and that out-of-pocket health care expenditures for supplemental insurance is much larger than expenditures for medical services and supplies.

Results from the Banthin and Bernard (2006) represents the degree of financial burden for many elderly of this type of unexpected expenditures, especially for those with individual Medigap policies. They report that in 2003 about 29% of all elderly persons lived with family out-of-pocket spending on medical exceeds $5000. As many as 7.3%t of all elderly persons lived with family out-of-pocket spending on medical care exceeding $10,000. Among elderly persons with Medicare plus private non-group coverage, such as a Medigap plan, around 46 percent had family-level out-of-pocket spending above $5000, while 13.9% had family-level spending in excess of $10,000. Similarly, Machlin (2009) reported that in 2006 the median annual health care expenditure for persons age 65 and over was above $4,000 .

In the Medical Expenditures Panel Survey (Older Americans 2008)[2] a comparison of the years 1977 and 2004 found that: (a) out-of- pocket health care expenditures (including personal spending for health insurance premiums) increased over those years for all elderly and (b) the percentage of household income allocated to out-of-pocket health care spending increased most for the poor/near poor category (from 12% to 29%) compared to the other category (from 9% to 18%). Moreover, in 2004 Medicare enrollees age 65 and over paid 19% of their health care costs out-of-pocket. Lower income individuals pay a lower percent of health care costs out-of-pocket, but have a higher average cost for services than individuals with higher incomes.

This Medical Expenditures Panel Survey (Older Americans 2008)[3] also confirmed that over the period from 1997 to 2004 there was an increase in HMO enrollment and a decrease in private supplemental health insurance (Medigap) coverage. Similarly the survey Health, United States (2009)[4] revealed that the cost of medical care in 2007 compared to 1997 showed a greater percentage of seniors enrolling in a Medicare HMO.

Several approaches have been tried to contain out-of-pocket medical care costs including increasing levels of Medicare benefits (Burkhauser & Smeeding 1994) and managed care (Achman and Gold 2002). But out of pocket costs in Medicare managed care plans can be substantial and vary significantly with heath status, even though they are less than out-of-pocket spending for beneficiaries with a supplemental Medigap policy.

[1] Expenditures of the Aged Chartbook, Social Security Office of Policy and Office of Research, Evaluation and Statistics (2007).
[2] Older Americans 2008 Key Indicators of Well Being from the Federal Interagency Forum on Aging-Related Statistics (2008).
[3] Ibid.
[4] Health, United States 2009

The importance of Social Security income to the elderly is well known, but this is particularly the case for lower income families. The U.S. Census Bureau Current Population Survey, Annual Social and Economic Supplement 2007[5] reports that 83% of income for the lowest fifth of elderly comes from Social Security, and for the second lowest income quintile 79% of income comes from Social Security. By contrast only 18% of income for the highest income group comes from Social Security. Since Social Security is an inflation protected annuity without market risk, it is particularly valuable to low income families for whom it provides income security.

The welfare improving compulsory purchase of supplemental health insurance for the elderly through a mandatory deduction in Social Security payments would provide a better protection for all elderly through such a risk sharing arrangement. This type of redistribution would be more efficient than the current options of private and employer sponsored plans. The consequence would be to secure a higher consumption floor for lower income recipients and indirectly to encourage investment in additional annuities that provide income security to elderly beneficiaries. The redistribution we propose here is a redistribution based on health rather than on income. Health redistribution is more important than wealth redistribution in our approach.

III. The Theoretical Framework

To study the additional role for social security system to include health-dependent-benefits, without exceeding the current available funds of the system, is an important theoretical exercise. Moreover, we demonstrate that this can be done while improving the *ex-ante welfare* of all participants. For the younger working people, out-of-pocket expenditures at old age related to health are unknown, hence the proposed change will provide certain level of additional insurance against large health-related expenditures and, as a result improve lifetime **expected well-being**.

Changing the Social Security system will imply that at old age sick individuals receive more and healthy individuals receive less, compared to the current situation. *Ex ante* people do not know their state of health during their old age period, but if they face a severe illness this suggested reform in the system would offer them increased social security benefits. However, if they are healthy at old age they would receive less than under the current system. Due to risk aversion, at the outset, namely when 'young', they should prefer a system which incorporates this health-related risks into the social security benefits structure, although it contains a reduction in benefits if they are healthy. To demonstrate that this claim has a theoretical foundation we shall analyze these two alternatives in the following model.

[5] U.S. Census Bureau Current Population Survey, Annual Social and Economic Supplement 2007

Consider an economy with continuum set of homogenous individuals *i*. For simplicity let it be represented by the unit interval, i.e., $i \in [0,1]$. Each individual has two economically active periods: A **working period** with income $y_1^{\,i}$ and a **retirement period** with income (which may include partial work, pension etc) $y_2^{\,i}$. Lifetime during the retirement period for person *i* has a **random length** and it is given by a random variable θ^i, with a known distribution and which attains values between 0 and 1, i.e., $0 \le \theta^i \le 1$. We assume that these random variables are **independent** and **identically distributed** across people. Denote by $f(\theta)$ the probability **density** function of each θ^i. Each individual *i* consumes $c_1^{\,i}$ in the working period and a random consumption in the retirement period. Denote by $c_2^{\,i}(\theta)$, the consumption in period 2 if life horizon is θ. We assume that Individuals are risk averse have no bequest motive; their (von-Neumann Morgenstern) utility function from consumption in each period is $U(c)$, assumed to be increasing, strictly concave (namely, that $U' > 0$; $U'' < 0$). We also assume that the **absolute** measure of risk aversion is decreasing, namely, that $\frac{-U''(y)}{U'(y)}$ is decreasing (these properties hold, for example, for the Constant relative risk aversion, CRRA, family of preferences).

During the working period individuals pay social security (and Medicare) tax on their wage income at rate τ assumed to be fixed. To smooth consumption over time *i* will save s^i. If savings are negative it means that our decision maker has purchased life insurance as well due to life uncertainty. However, since there is no utility from bequest, individuals will annuitize their savings if they have positive savings (we assume that fair annuity markets exist); thus, if $s^i > 0$, the saving will generate a **flow of income** as long as this person *i* will survive: $\frac{Rs^i}{\bar{\theta}}$ where $R = 1 + r$, r is the rate of interest between the two periods and $\bar{\theta} = E[\tilde{\theta}^i]$ is the expected longevity (at the retirement period). In fact, the social security benefits are also an annuity that pays flow of income a^i and has an actuarial value equal to $\tau R y_1^{\,i}$. We take in this analysis all individuals to be identical ex-ante, hence we shall drop the index *i*.

In this framework individuals face some random **uninsurable expenses** related to the state of their health during the old-age period. These out-of-pocket random expenses are increasing with the realized lifetime horizon θ. These random expenditures constitute the **out-of-pocket costs** that individual *i* must pay if he/she becomes sick during the old-age period, and it is represented by the function $X(\theta)$. This random health-related total unrefundable expenditures in the retirement period is a non-decreasing and **convex** function of the life horizon θ. This can be justified by the increasing likelihood of being ill as a person ages. Note

that even with certain health insurance these assumptions hold due to the existence and co-payments and deductibles in the policy.

Under the current social security arrangement during the old-age period individuals receive a **constant flow** (up to CPI indexing) of benefits, given by:

(1) $\bar{a} = \frac{\tau R y_1^{\,i}}{\bar{\theta}}$.

Thus, Social Security provides fair annuities with tax level τ determined by the government. To simplify our analysis let us assume that all agents are identical, hence we can drop the index i . Now, we can write down the optimization problem, under this regime, of each person i, assuming that decision makers maximize lifetime **expected utility**:

(I) $MAX_s\, E[U(c_1) + \beta U(c_2(\tilde{\theta}))]$ s.t.

$$c_1 = (1-\tau)\, y_1 - s \geq 0$$

$$c_2(\theta) = y_2\theta + \frac{Rs}{\bar{\theta}}\theta + \bar{a}\theta - X(\theta) \geq 0\ ,\ \ for\ all\ realizations\ of\ \theta.$$

Where the expectation is with respect to the distribution of θ , and β is the rate of time preference. Note that $X(\theta)$ represents the health-related out-of-pocket expenses if the random lifetime horizon has value θ. Denote the optimal solution to Problem (I), which exist and unique due to the concavity assumption, by $\{c_1^{\,*}, c_2^{\,*}(\tilde{\theta}), s^*\}$. The first order conditions that the optimum should satisfy are:

(2) $U'(c_1^{\,*}) = \beta \frac{R}{\bar{\theta}} E[\tilde{\theta} U'(c_2^{\,*}(\tilde{\theta})]$

Denote the lifetime utility if the life horizon is θ by :

(3) $V^*(\theta) = U(c_1^{\,*}) + \beta U(c_2^{\,*}(\theta))$.

Now let us compare this solution with the one obtained under the assumption that social security benefits are positively correlated to the health-related expenditures of that individual.

IV. The Suggested Alternative

Consider now the following Social Security benefits program: the total payments made to this individual when "old" is:

(4) $a(\theta) = a^{*}\theta + m\,X(\theta)$ for all realizations of $\tilde{\theta}$

for some **participation** constant rate $0 < m \leq 1$. To make our analysis sensible let us assume that the expected benefits over lifetime from the Social Security system is higher than the expected out-of-pocket health-related expenditures, namely:

(5) $E[X(\tilde{\theta})] \leq \bar{a}\,\bar{\theta}$

Otherwise, a higher tax rate should be chosen since the system cannot support itself actuarially. Moreover, we shall assume that such an asymmetric redistribution is **neutral** with respect to the aggregate outlays of the Social Security system. Namely, we choose some a^{*} and m that cost **on average** of this Social Security program would be the same as the earlier "current regime". Thus,

(6) $E[\,a^{*}\theta + m[X(\theta)] = \bar{a}\,\bar{\theta}$

Now, the optimization of representative individual in period 1, under this regime is (note that any savings for later consumption should be annuitized):

(II) $MAX_{s}\, E[U(c_1) + \beta U(c_2(\theta))]$ s.t.

$$c_1 = (1-\tau)\,y_1 - s \geq 0$$

$$c_2(\theta) = y_2\theta + \frac{R\,s}{\bar{\theta}}\theta + a^{*}\theta - (1-m)X(\theta) \geq 0\,, \quad \textit{for all values of } \theta$$

Where y_2 and a^{*} are streams of income levels over the period of life in the "retirement period". To balance the benefits and costs of the social security program over the whole population condition (6) must hold. Denote by $\{\bar{c}_1, \bar{c}_2(\tilde{\theta}), \bar{s}\}$ the optimal solution for Problem (II). Let us define the expected lifetime expected utility under the "new" regime: $\bar{V}(\theta) = U(\bar{c}_1) + \beta U(\bar{c}_2(\theta))$.

Necessary and sufficient condition that $\bar{s}$ satisfies is :

(7) $U'(\bar{c}_1) = \beta\,\frac{R}{\bar{\theta}}\,E[\tilde{\theta}U'(\bar{c}_2(\tilde{\theta})]$

Individuals are **better off** (*ex-ante*) under the Alternative Social Security program if: $E[V^*(\tilde{\theta})] < E[\bar{V}(\tilde{\theta})]$.

Lemma 1: The total savings under the current Social Security system is higher than the total savings under the Alternative regime described above, namely, $s^* > \bar{s}$.

Thus, this change in the allocations of benefits by the Social Security system, which provides an additional insurance protection, will increase the resources consumed during the working period.

Proof : Let us use the well known results regarding optimal saving when second period income is random (see, Rothschild and Stiglitz (1970)). In both cases we are considering the first period income is the same: $I_1 = (1-\tau)\, y_1$. However, the second period random net income differs, these incomes are:

$$I_2^*(\tilde{\theta}) = y_2\tilde{\theta} + \bar{a}\,\tilde{\theta} - X(\tilde{\theta}) \quad \text{and} \quad \bar{I}_2(\tilde{\theta}) = y_2\tilde{\theta} + a^*\tilde{\theta} - (1-m)X(\tilde{\theta})$$

Now, from equation (6) we obtain that ,

$$(8) \qquad a^* = \bar{a} - \frac{m\,E[X(\tilde{\theta})]}{\bar{\theta}}$$

Which yields that $a^* \geq (1-m)\bar{a}$ holds. By our expense-neutrality condition (6) both period incomes have the same expected value, namely, that $E[I_2^*(\tilde{\theta})] = E[\bar{I}_2(\tilde{\theta})]$. However, since $0 < m < 1$, and condition (6), $I_2^*(\tilde{\theta})$ is a Mean-preserving-spread (MPS) of $\bar{I}_2(\tilde{\theta})$. This implies that $\bar{I}_2(\tilde{\theta})$ dominates in the **second degree** stochastic dominance (SDSD) $I_2^*(\tilde{\theta})$ [see, Rothschild and Stiglitz (1970)]. By our assumptions the absolute measure of risk aversion is decreasing, hence the marginal utility function $U'(y)$ is a **convex** function. By the results of Rothschild and Stiglitz (1970), in this case when the second period income is riskier, **higher** optimal savings in the first period, which proves our assertion.

Lemma 2: For any $\alpha > 0$ we have: $\bar{I}_2(\tilde{\theta}) + \alpha\tilde{\theta}$ dominates in SDSD $I_2^*(\tilde{\theta}) + \alpha\tilde{\theta}$.

Proof: Since the random total health care direct costs $X(\theta)$ is strictly increasing in life length (and convex) it can be verified that for some $\hat{\theta}$, $0 < \hat{\theta} < 1$, we have,

(9) $\bar{I}_2(\theta) \le I_2^{*}(\theta)$ for all $\theta \le \hat{\theta}$ and $\bar{I}_2(\theta) \ge I_2^{*}(\theta)$ for all $\theta \ge \hat{\theta}$.

Moreover, the **cumulative distribution functions** (cdf) of $\bar{I}_2(\tilde{\theta})$ and $I_2^{*}(\tilde{\theta})$, denoted by $\overline{F}_0(\xi)$ *and* $F_0^{*}(\xi)$ correspondingly, satisfy, due to the SDSD, for some ξ^*:

(10) $\overline{F}_0(\xi) \le F_0^{*}(\xi)$ for $\xi \le \xi^*$ and $\overline{F}_0(\xi) \ge F_0^{*}(\xi)$ for $\xi > \xi^*$.

From (9) we obtain that:

(11) $\bar{I}_2(\theta) + \alpha\theta \le I_2^{*}(\theta) + \alpha\theta$ for all $\theta \le \hat{\theta}$ and $\bar{I}_2(\theta) + \alpha\theta \ge I_2^{*}(\theta) + \alpha\theta$ for all $\theta \ge \hat{\theta}$.

Denote the cumulative distribution functions of the random variables $\bar{I}_2(\tilde{\theta}) + \alpha\tilde{\theta}$ and $I_2^{*}(\tilde{\theta}) + \alpha\tilde{\theta}$ by $\overline{F}_\alpha(\xi)$ *and* $F_\alpha^{*}(\xi)$ correspondingly. Then, from (11) we derive that for some $\hat{\xi}$:

(12) $\overline{F}_\alpha(\xi) \le F_\alpha^{*}(\xi)$ for all $\xi \le \hat{\xi}$ and $\overline{F}_\alpha(\xi) \ge F_\alpha^{*}(\xi)$ for all $\xi > \hat{\xi}$.

Thus, the cumulative distribution functions satisfy the 'integral condition' which characterizes Second degree stochastic dominance [see, Rothschild and Stiglitz (1970)], hence (12) proves our assertion.

Let us state the main result of this paper now:

Proposition 1: Comparing the ex-ante well- being decision makers *are better off with the above **Alternative** Social Security system than under the **current** Social Security system.*

Proof of the Proposition: We shall prove the Proposition using the tools obtained in the above two Lemmas. We claim first, and we demonstrate, that the following inequality holds,

$$U(y_1 - s^*) + \int_0^1 U[y_2\theta + \frac{Rs^*}{\bar{\theta}}\theta + \bar{a}\,\theta - X(\theta)]\,f(\theta)d\theta \;<$$

$$U(y_1 - \bar{s}) + \int_0^1 U[y_2\theta + \frac{R\bar{s}}{\bar{\theta}}\theta + a^*\theta - (1-m)X(\theta)]\,f(\theta)d\theta$$

We apply now the result that $\bar{I}_2(\tilde{\theta}) = [y_2\tilde{\theta} + a^*\tilde{\theta} - (1-m)X(\tilde{\theta})]$ **dominates** in SDSD the second period income (under current regime), $I_2{}^*(\tilde{\theta}) = y_2\tilde{\theta} + \bar{a}\,\tilde{\theta} - X(\tilde{\theta})$. Let us write:

$$MAX_s\{U(y_1 - s) + \beta E[U(I_2{}^*(\tilde{\theta}) + \frac{Rs}{\bar{\theta}}\tilde{\theta})] = U(y_1 - s^*) + \beta E[U(I^*{}_2(\tilde{\theta}) + \frac{Rs^*}{\bar{\theta}}\tilde{\theta})] \le$$

$$U(y_1 - s^*) + \beta E[U(\bar{I}_2(\tilde{\theta}) + \frac{Rs^*}{\bar{\theta}}\tilde{\theta})] \le$$

$$MAX_s\{U(y_1 - s) + \beta E[U(\bar{I}_2(\tilde{\theta}) + \frac{Rs}{\bar{\theta}}\tilde{\theta})]\} = U(y_1 - \bar{s}) + \beta E[U(\bar{I}_2(\tilde{\theta}) + \frac{R\bar{s}}{\bar{\theta}}\tilde{\theta})]$$

Where the first inequality follows from our Lemma 2, using to the strict concavity of the utility function. This proved the Proposition.

This Proposition demonstrates that if young individuals had the option to choose **at the outset** (namely, when young, before they have information about their state of health when 'old') between the **current** Social Security system and the above suggested reform of Social Security, they will choose the latter. Thus the suggested reform makes **all households** better off by introducing this additional risk sharing mechanism.

V. Comparison with the Case of Private Market Coverage

Let us consider a comparison of the above alternative for supplemental health coverage via the Social Security system with the same type of coverage via the insurance market. Assume that each individual purchases the same coverage as above from an Insurance company. To that end we shall specify the details: According to the alternative presented earlier the Insurance company should cover part of the uninsured expenditures C. The cost of this additional insurance, paid at the outset, is given by:

$$P = (1+\mu)mE[X(\tilde{\theta})]$$

Where $\mu > 0$ is the loading factor in the insurance contracts in this type of coverage.

Denote the consumption plan in this case by:

$$\hat{c}_1 = (1-\tau)\, y_1 - s \geq 0$$

$$\hat{c}_2(\theta) = y_2\theta + \frac{Rs}{\bar{\theta}}\theta + \bar{a}\theta - (1-m)X(\theta) - (1+\mu)mE[X(\theta)] \geq 0\ ,\quad \textit{for all values of } \theta$$

Note, that purchasing insurance policy privately means paying the insurance premium at the outset. Let us maximize the expected utility of each individual purchasing such insurance coverage:

$$MAX_s\ E[U(c_1) + \beta U(c_2(\theta))] \quad \text{s.t.}$$

$$\hat{c}_1 = (1-\tau)\, y_1 - s \geq 0$$

$$\hat{c}_2(\theta) = y_2\theta + \frac{Rs}{\bar{\theta}}\theta + \bar{a}\theta - (1-m)X(\theta) - (1+\mu)mE[X(\theta)] \geq 0\ ,\quad \textit{for all values of } \theta$$

The optimum level of expected welfare, under this system, is given by:

$$\hat{V} = U(y_1 - \hat{s}) + \int_0^1 U[y_2\theta + \frac{R\hat{s}}{\bar{\theta}}\theta + \bar{a}\theta - (1-m)X(\theta) - (1+\mu)mE[X(\theta)]\, f(\theta)d\theta$$

Proposition 2: In terms of ex-ante well- being decision makers *are better off with the **Alternative** Social Security system, described above, than the case where they purchase privately, using the insurance markets, the supplementary health coverage.*

Thus, our alternative additional role for Social Security dominates the option of using the existing Insurance market to provide such relief to the old-age population. Proposition 2 provides additional support, on top of Proposition 1, to the above suggestion.

Before we prove this claim let me present the following Karni and Zilcha (1995) result:

Lemma 3: Let W be a bounded random variable and let the constants A and B satisfy : A > B. Then: the random variable $\alpha(W+A)$ dominates in second-degree stochastic dominance the random variable $\beta(W+B)$ for any two positive numbers $\alpha \; and \; \beta$.

Proof of Proposition 2:

$$E[\hat{c}_2(\theta)] = y_2\bar{\theta} + \frac{R\bar{s}}{\bar{\theta}}\bar{\theta} + a^*\bar{\theta} - (1-m)E[X(\theta)] - (1+\mu)mE[X(\theta)] =$$

$$y_2\bar{\theta} + \frac{R\bar{s}}{\bar{\theta}}\bar{\theta} + \bar{a}\bar{\theta} - (1-m)E[X(\theta)] - (1+\mu)mE[X(\theta)]$$

Also,

$$E[c_2(\theta)] = y_2\bar{\theta} + \frac{Rs}{\bar{\theta}}\bar{\theta} + a^*\bar{\theta} - (1-m)X(\theta) = y_2\bar{\theta} + Rs + \bar{a}\theta - mE[X(\theta)] - (1-m)X(\theta)$$

Which yields that,

$$E[\hat{c}_2(\theta)] < E[c_2(\theta)]$$

And Using Lemma 3 we derive that $c_2(\theta)$ dominates in SD the second period consumption $\hat{c}_2(\theta)$. This result leads us to show that :

$$\bar{V} = U(y_1 - \bar{s}) + \int_0^1 U[y_2\theta + \frac{R\bar{s}}{\bar{\theta}}\theta + a^*\theta - (1-m)X(\theta)]f(\theta)d\theta > \hat{V}$$

This proves our claim.

VI. Discussion

Should we expand the role played by the existing Social Security program to finance supplemental health coverage? The answer is positive since out-of-pocket health-related payments have become so significant, particularly for the unhealthy elderly. In this analysis we make a suggestion that varies the current Social Security program, to include a welfare-enhancing role, due to the heterogeneous set of beneficiaries. We demonstrate that financing mandatory supplemental health insurance and making it compulsory for all Social security recipients can improve well-being in the *ex-ante* sense. We have provided ample evidence of

increasing out of pocket costs faced by elderly and have noted the trend in the growth of Medicare expenditures. These facts demonstrate the importance of acting in a timely fashion to increase the affordability of health care without imposing additional burdens on Social Security.

I demonstrate that this proposal will address the problems and might relieve the financial burden of Medicare by encouraging preventive care, routine checkups and screenings that can catch medical problems before they become serious and hence costly.

The costs of (compulsory) supplementary health insurance under our alternative would be lower for those who currently purchase individual Medigap plans and for those who have employer sponsored supplemental health insurance. Due to the tremendous bargaining power of such a compulsory public plan and since many employers are moving away from employee retiree health benefits. It would certainly facilitate timely reimbursement of providers since the insurance carriers would probably be the same ones who administer the Medicare program.

How to implement the suggested reform? There are numerous ways this can be done. This suggested insurance coverage, which should cover most of the out-of-pocket expenses of unhealthy Social Security recipients (perhaps some small deductible may be included), will be paid by Social Security while deducting the cost from each Social Security payment to the beneficiaries.

Should each household buy this type of insurance individually in the market? The tremendous differences in cost and the efficiency of implementation provide a negative answer. We design this additional coverage to be compulsory and verification, which is costly, is unnecessary. Since this particular coverage is purchased for all Social Security benefit recipients the group covered is sufficiently large hence the cost of the supplemental health insurance per-person will be relatively cheap and affordable even for the poor. Moreover, our analysis demonstrates that the suggestion we make here results in a better, or higher, ex-ante expected utility.

The value of our proposal is highlighted at a time when individuals are living longer and hence are more likely to have chronic conditions, including conditions that are normally found in older ages, e.g., heart disease, high blood pressure, diabetes, arthritis. This proposal does not discourage the use of Medicare HMOs as a cost efficient way to manage medical costs in retirement since there would still be opportunities for individuals to save through enrollment in one of these managed care plans.

While the costs of our proposal would be deducted from Social Security checks and this would diminish the income of those who rely entirely on Social Security for their income in retirement, obtaining such insurance to protect elderly people from lasting out of pocket health expenditures should compensate for the relatively inexpensive cost per person.

Our approach is based on consolidating the market for supplementary health insurance in such a way as to benefit most elderly persons without imposing a penalty on the wealthy, hence making it more politically appealing in a time of financial austerity. At the present time there are suggestions for Social Security to become a means tested program that while solving some of the funding problems of the Social Security Trust Fund it does not diminish the value of my suggestion here.

We provide here a proof in the theoretical analysis that supports the alternative intervention of Social Security in the health insurance network (see Proposition 2). Compulsory supplementary health coverage, financed by Social Security (hence paid indirectly by the elderly) would dominate (in terms of ex-ante expected utility) the current situation in which most elderly who receive Social Security payments purchase privately such supplementary insurance.

VI. References

Achman, L. and Gold, M. "Out of Pocket Health Care Expenses for Medicare HMO Beneficiaries: Estimates by Health Status," 1999-2001, February 2002.

Banthin, J. and D. Bernard, "Out-of-pocket Expenditures on Health Care and Insurance Premiums among the Elderly Population, 2003", Medical Expenditure Panel Survey, Statistical Brief #122, Agency of Healthcare Research and Quality, March 2006.

Buchmueller, T. “Price and Health Plan Choices of Retirees,” NBER Working Paper W11395, 2005.

Buchmueller, Thomas C., Richard W. Johnson, and Anthony T. Lo Sasso. “Trends in Retiree Health Insurance, 1997 to 2003.” *Health Affairs* 25(6), 2006, 1507–16.

Burkhauser, R. and Smeeding, T. "Social Security Reform: A Budget Neutral Approach to Reducing Older Women's Disproportionate Risk of Poverty, Syracuse University Policy Brief, No.2, 1994.

Cohen, S. and Yu, W. The Concentration and Persistence in the Level of Health Expenditures over Time: Estimates for the U.S. Population, 2005-2006. Statistical Brief #236. February 2009. Agency for Healthcare Research and Quality, Rockville, MD

Data Sources on Older Americans 2008, Key Indicators of Well Being, Federal Interagency Forum on Aging Related Statistics, National Center for Health Statistics.

DeNardi, M., French, E. and Jones, J. "Differential Mortality, Uncertain Medical Expenses, and the Saving of Elderly Singles, September 14, 2006, NBER Working Paper No. 12554.

Finkelstein, A. “When can Partial Public Insurance Produce Pareto Improvements,” NBER Working Paper, 2002.

Goldman, D. and Maestas, N. Medical Expenditure Risk, and Household Portfolio Choice, NBER Working Paper No. 11818, 2007.

Karni, E. and I. Zilcha, "Technological progress and income inequality", Economic Theory 5, 277-294 ,1995.

Machlin, S. “Trends in Health Care Expenditures for the Elderly Age 65 and over: 2006 versus 1996,” Statistical Brief #256, 2009, Agency for Health Care Research and Quality.

Machlin, S. and Zodet, M. "Out of Pocket Health Care Expenditure by Age and Insurance Coverage", 2003 Statistical Brief #126, Agency for Health Care Research and Quality.

Rojas, J.A. and C. Urrutia, "Social Security with uninsurable income risk and endogenous borrowing constraints," Review of Economic Dynamics 11, 2008, 83-103.

Rothschild, M. and J. Stiglitz, "Increasing Risk I: A Definition", Journal of Economic Theory, 225-243, 1970.

Schoenberg, N., Kim, H., Wewards, W. and Fleming, S., "Burden of Common Multiple-Morbidity Constellations on Out-)f-Pocket Medical Expenditures Among Older Adults," The Gerontologist, Vol 47, No.4, 2007, 423-437.

Shen, Y. and McFeeters, J., Out-of-pocket health spending between low-and higher-income populations: who is at risk of having high expenses and high burdens? Medical Care Mar 44(3), 2006, 200-209.

Social Security Administration "A Summary of the 2009 Annual Social Security and Medicare Trust Fund Reports."

Social Security Administration, Office of Policy, Office of Research, Evaluation and Statistics, "Expenditures of the Aged” Chartbook, May 2007.

U.S. Census Bureau, "The 2009 Statistical Abstract: Health Expenditures Last Modified March 24, 2009."

U.S. Census Bureau, “The 2006 Statistical Abstract of the United States” Table 679. (Tables 124, 156, 126, 129 and 133).