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Securing Social Security: Sensitivity to Economic Assumptions and Analysis of Policy Options

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Securing Social Security: Sensitivity to Economic Assumptions and Analysis of Policy Options

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Executive Summary

Revamping the Social Security program has become a domestic policy priority of the Bush administration. The President has stated that the system is facing a "crisis" and will be "bankrupt" in 2041. His proposal to change Social Security is centered on the introduction of private accounts that would allow workers to direct a share of their Social Security taxes into investments such as stocks and bonds. In this paper we consider whether Social Security is really facing a crisis and whether any potential future shortfalls could be remedied without changing the basic structure of the existing program.

Projections of Social Security's finances, published by the Social Security Administration (SSA) and the Congressional Budget Office (CBO), are based on demographic and economic assumptions involving considerable uncertainty. The President's assertions of a system headed towards bankruptcy refer to recent analysis by the SSA that projects that the Social Security trust funds will become depleted in 2041. However, this estimate is one of three projections presented in the SSA report – in one scenario the trust funds become depleted in 2030 but in the other case the program is able to provide scheduled benefits through 2080 without any financial shortfall. Meanwhile, the CBO projection estimates that the trust funds will remain solvent until 2052.

The different forecasts are a result of differences in assumptions. The projections published by the government agencies provide forecasts based on four specific sets of assumptions. In this paper we analyze the sensitivity of Social Security's future to a broader range of economic assumptions. One scenario of particular interest that we analyze uses the assumptions made in the federal budget – assumptions that are quite favorable to the future finances of Social Security.

We also seek to determine the range of policy options within the current structure of the Social Security program that could be used to eliminate any funding shortfall over the standard 75-year planning period. These options include increasing the cap on income subject to Social Security taxation, increasing the Social Security tax rate, increasing the taxation of Social Security benefits, and slowing the growth of Social Security benefit payments. These options leave the basic structure of Social Security unchanged and are not dependent on the introduction of private accounts.

While the SSA and CBO have developed complex models to analyze the future finances of Social Security, these models are not readily available. Our approach in this paper is

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to develop a relatively simple, transparent, and accurate model that can replicate the baseline analysis of the government agencies and be used to produce valid forecasts under a wide range of economic assumptions and policy alternatives. Our model, explained in full detail in the paper, produces annual estimates of Social Security revenues and outlays as well as the balance in the trust funds. We test the validity of our model using several criteria, directly comparing our results with those produced by the government agencies. In general, our model produces results that reasonably replicate the published data. Thus while we recognize the limitations of our model, we consider it a useful tool that can be used to produce plausible forecasts under alternative assumptions and policy applications.

In our analysis of the future finances of Social Security using the assumptions made in the federal budget, we project that the trust funds would last until 2065 and that the 75-year shortfall could be eliminated by raising the Social Security tax by 0.24 percentage points. For comparison, the SSA's intermediate scenario concludes that Social Security tax rates would need to increase by about two percentage points to close the 75-year actuarial gap. This suggests that under the President's own assumptions made in the federal budget, Social Security faces a much less urgent "crisis" that could be remedied by a minor adjustment to the current system – costing the average household about $100 per year.

We also determine the long-run economic conditions that would bring the Social Security system into actuarial balance for the 75-year planning period. We first consider changing the long-run assumed value of just one economic variable at a time. From a baseline using the assumptions from the SSA's intermediate scenario, we find that the actuarial gap in Social Security would be closed by:

- Increasing the assumed annual growth rate of real wages from 1.1% to 2.85%, or
- Lowering the assumed long-term inflation rate from 2.8% annually to 1.5%, or
- Increasing the real rate of return on the trust funds from 3.0% to 5.5%.

We then determine several combinations of economic assumptions that would eliminate the funding gap. Of course, these values cannot simply be chosen by policy makers but the results suggest that macroeconomic policy can be an effective tool in addressing at least a share of Social Security's projected shortfall.

We also explore the potential for various policy actions to bring the Social Security program into balance. Our results indicate that the 75-year funding gap could be eliminated by increasing the cap on income subject to Social Security taxation, by slowing the growth of benefit payments, or raising the Social Security tax rate. However, increasing the taxation of Social Security benefits, without any other changes, would not be sufficient to close the funding gap.

As an example of a policy that could bring the system into balance, eliminating the cap on annual income subject to Social Security taxation would be more than sufficient. We also show that the 75-year actuarial gap could be eliminated by slightly slowing the

growth in average benefit payments. Given that average Social Security benefit payments currently grow faster than inflation (as long as real wages are growing), we estimate that the shortfall can be offset while still allowing average benefits to grow in real terms by 58% between 2005 and 2080. In addition to analyzing each policy in isolation, we indicate several combinations of policies, without altering the basic structure of the program, which could be used to bring Social Security into balance through 2080.

The perception of a crisis in Social Security is a relative and subjective viewpoint. It is true that under a range of plausible economic assumptions the program will not be able to provide currently scheduled benefits through 2080. However, even if the trust funds are eventually depleted, it is important to realize that the system will still be able to pay benefits from ongoing Social Security taxes. The SSA estimates that once the trust funds are depleted, it will still be able to pay 74% of currently scheduled benefits.

Another important point is that forecasts for the future of Social Security have been, and will continue to be, periodically revised. In the 1997 Social Security Trustees' report the intermediate scenario predicted that the combined trust funds would become depleted in 2029. Just five years later, in the 2002 report, the projected date for the depletion of the trust funds had been extended to 2041. As more information is available and expectations are altered, future Social Security reports will present revised analyses. A potential danger of a major overhaul intended to "permanently" fix Social Security is that changes in demographic or economic conditions will dictate that additional, possibly significant, changes be made. A measured approach that allows for future flexibility appears most desirable.

In conclusion, the Social Security program will need to be adjusted to reflect modern realities, just as it has been many times since its inception 70 years ago. For example, the Social Security tax rate has been increased twenty times since 1950, including five times in the 1980s. Does the Social Security system need to be totally overhauled? We believe that the system is not in crisis and cannot go bankrupt as long as revenues continue to be collected. We show in this paper that a wide range of existing policy options could be used to secure the finances of Social Security for the next 75 years without major structural changes. These options could be phased in gradually and incrementally adjusted as more information becomes available, while continuing to provide beneficiaries with a stable and predictable source of retirement income.

"… by the year 2041, the entire system will be bankrupt."

- President Bush speaking in reference to the Social Security program, April 18, 2005.[2]

I. Introduction

The President's statement that Social Security will be "broke" in 2041 is based on the 2005 annual report produced by the Social Security Administration (SSA) Trustees detailing the current and projected finances of the program.[3] This report projects that in 2041 the Social Security trust funds[4] will become depleted if the system continues to pay benefits under current law. Once the trust funds are depleted, the SSA projects that Social Security revenues will be sufficient to pay only 74% of scheduled benefits. This is what the President interprets as the system being "bankrupt."

This is not the only projection of the future finances of the Social Security program. Two other sets of projections are presented in the 2005 SSA report – a "low cost" projection which makes relatively optimistic assumptions about variables pertinent to Social Security's outlook and a "high cost" projection which makes relatively pessimistic assumptions. In the high cost scenario, the combined Social Security trust funds become depleted in 2030, eleven years earlier than in the intermediate case. But in the low cost scenario, the trust funds are not depleted during the 75-year horizon considered in the report. Even further, in this case the balances in the trust funds continually increase, implying that benefits could be increased and/or taxes decreased.

The Role of Economic Assumptions in Projecting Social Security's Finances

Social Security projections have also been complied by the Congressional Budget Office (CBO).[5] The CBO projects that the trust funds will become depleted in 2052 and that revenues after that would be sufficient to pay 78% of scheduled benefits. The main reason the CBO projects that the trust funds will maintain a positive balance for a longer period of time is that the CBO's economic assumptions are more optimistic than those used by the SSA. The differences in the long-term assumed values of several key economic variables are presented in Table 1. For each of these four variables, the value assumed by the CBO is more favorable for the future of Social Security's finances. The more encouraging outcome is explained by the following relationships:

- The higher the rate of real earnings growth, the higher the total income subject to Social Security taxation.

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[2] Excerpt from speech made at the South Carolina Statehouse, Columbia, South Carolina. Text available at http://www.whitehouse.gov/news/releases/2005/04/20050418-1.html.
[3] Full report available at http://www.ssa.gov/OACT/TR/TR05/tr05.pdf.
[4] There are actually two Social Security trust funds. One is the Old-Age and Survivors trust fund and the other is the Disability Insurance trust fund.
[5] Full report available at http://www.cbo.gov/ftpdocs/55xx/doc5530/06-14-SocialSecurity.pdf. The long-term projections were updated in March 2005, see http://www.cbo.gov/showdoc.cfm?index=6064&sequence=0.

- The higher the real interest rate, the higher the return on investments made with the trust fund balances.
- The lower the rate of inflation, the lower the required annual increase in Social Security benefit payments to provide cost-of-living adjustments.
- The lower the unemployment rate, the more workers pay Social Security taxes.

Table 1. Long-term Economic Assumptions Used to Model Social Security Finances by the CBO and SSA

Variable	CBO Assumption	SSA Assumption (Intermediate Scenario)	SSA Assumption (Low Cost Scenario)
Real Earnings Growth	1.3%	1.1%	1.6%
Real Interest Rate	3.3%	3.0%	3.7%
Inflation	2.2%	2.8%	1.8%
Unemployment Rate	5.2%	5.5%	4.5%

With the exception of the inflation rate, the differences between the assumptions made by the SSA in their intermediate scenario and the CBO are 0.3 percentage points or less. Table 1 also presents the "low cost" assumptions made by the SSA. For each of the four variables, we see that these values are even more favorable to Social Security's finances than the CBO values. But while the differences between the CBO and SSA low cost assumptions may not appear large in magnitude, the resulting projections are dramatically different. In one case (the CBO analysis) the trust funds are depleted in 2052 while in the other case the trust funds accrue sustained and growing balances.

Comparison of Economic Assumptions

The Bush administration has proposed a dramatic overhaul of Social Security emphasizing private investment accounts. The President claims that this plan is needed in response to the expected future insolvency of the Social Security program. However, as we see in the CBO and SSA analyses, the solvency of the program depends heavily on the assumed values of key economic variables; relatively minor changes in the assumptions can make a tremendous difference in the outlook for Social Security. The President's case for Social Security reform is bolstered by a pessimistic outlook for Social Security based on relatively unfavorable economic assumptions.

At the same time, the President has committed to reducing the federal budget deficit. The President's 2006 budget projects a declining federal budget deficit – down from 4.5% of GDP in 2004 to 1.3% of GDP in 2010.[6] These projections are also based on assumptions for the future values of key economic variables. But the very same assumptions that would paint a bleak picture for Social Security's future would also imply relatively slow economic growth and a comparatively higher federal budget deficit.

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[6] The 2006 federal budget is available at http://www.whitehouse.gov/omb/budget/fy2006/.

The 2006 federal budget projections only cover the period 2004-2010 while the Social Security projections by the CBO and SSA cover a much longer time period. In all cases, the analyses do not apply a single annual value for each variable to the entire time period. The federal budget generally assumes different economic values for each year from 2004-2010 but by the end of this period the values have generally stabilized to, apparently, their long-term expectations. The CBO makes specific numerical assumptions for different years but these values are relatively stable after the first several years of the time period. The SSA generally makes stable long-term economic assumptions for the period 2015-2080 with values varying in specific years prior to 2015. However, by 2010 the assumed values are very close to the long-term assumptions.

So, for the period 2004-2010 we can compare the economic assumptions made in the federal budget with the assumptions made by the SSA and the CBO. In all three analyses, the assumed economic values basically stabilize to long-term expectations by 2010. Several economic variables are included in each analysis and can be directly compared. These include the Consumer Price Index (CPI) growth, the unemployment rate, the real rate of interest on Treasury bills, and the growth rate of GDP. The comparable data for 2004 through 2010 from all three sources are graphed in Figures 1-4. We see in each case that the assumptions made in the federal budget are more favorable to the finances of Social Security than those made by the SSA in their intermediate case.

- For the CPI, the federal budget makes a long-term (2007 and beyond) assumption that is between the values applied by the SSA and CBO.
- The federal budget makes the lowest projection of the unemployment rate beyond 2007.
- The federal budget makes the same assumption in 2010 as the CBO regarding the real rate of interest.
- The federal budget makes the most optimistic projections of GDP growth for 2007 and beyond.

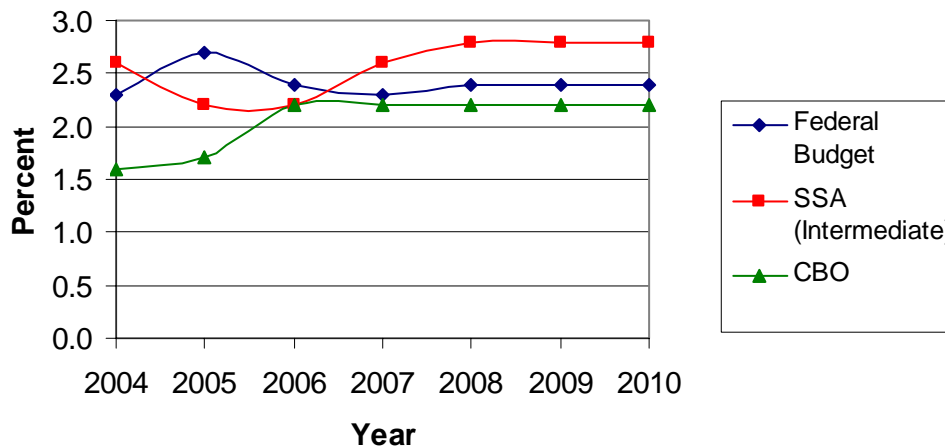Figure 1. Consumer Price Index Growth Assumptions, 2004-2010, by Data Source

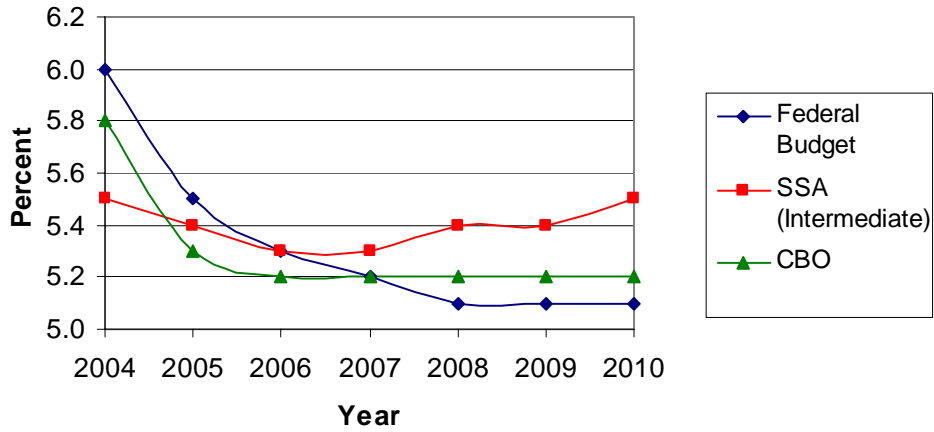Figure 2. Unemployment Rate Assumptions, 2004-2010, by Data Source

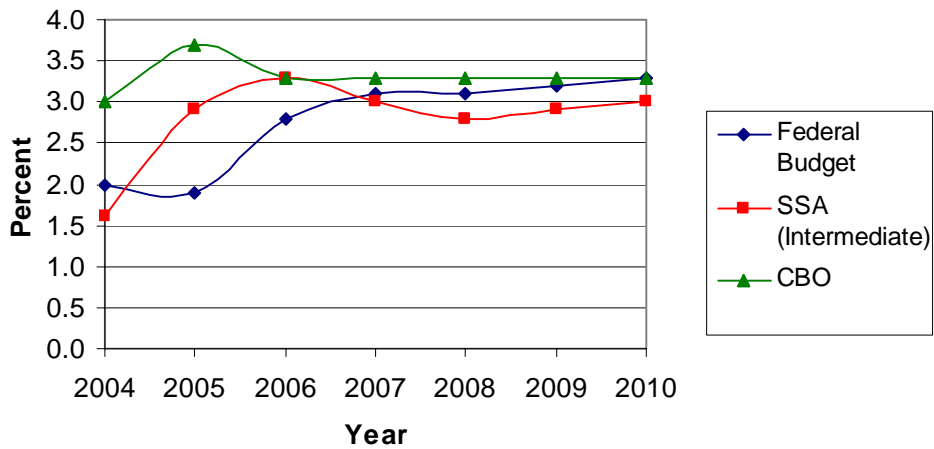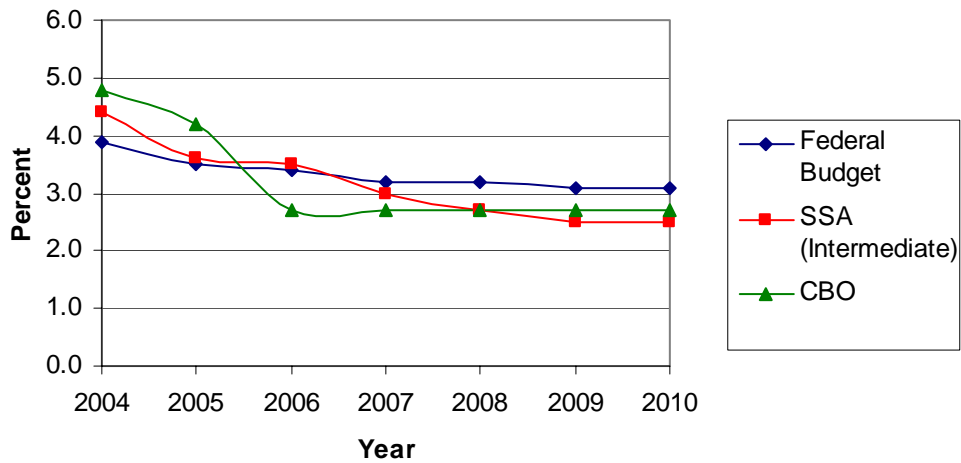Figure 3. Real Interest Rate Assumptions, 2004-2010, by Data Source

Figure 4. Annual Growth Rate of Real GDP Assumptions, 2004-2010, by Data Source

Based on Figures 1-4, we can conclude that performing an analysis of Social Security based on the long-term economic assumptions made in the federal budget for the CPI, unemployment rate, the real interest rate, and the rate of GDP growth would result in a more optimistic forecast for the finances of the program than in the SSA's intermediate case. The long-term assumptions made in the federal budget for the unemployment rate and GDP growth are even more favorable to the finances of Social Security than those made by the CBO. The federal budget makes the same long term assumption as the CBO regarding the real interest rate. Only with the CPI does the federal budget make an assumption that is less favorable towards Social Security's solvency than the CBO. Based on these data, we can conclude that applying the Bush administration's federal budget assumptions regarding these four variables to an analysis of Social Security would extent the solvency period of the Social Security trust funds beyond 2041.

A key variable in an analysis of Social Security is the overall growth rate of wage and salary earnings subject to Social Security taxation. The SSA presents assumptions about the growth of the real wage differential – the difference between the growth of nominal wages covered by Social Security and inflation. As shown in Table 1, the CBO assumes that real wages will grow by 1.3% annually in the long-term while the SSA, in its intermediate scenario, assumes a 1.1% rate of wage growth. The federal budget presents assumptions of the total wage and salary income, in current dollars, for 2004-2010. By adjusting these values for the growth of prices and the labor force,[7] one can calculate the implied rate of wage and salary growth assumed in the federal budget.

The assumptions of real wage growth from various sources are presented in Figure 5. In this case, it is illustrative to include the SSA's low cost assumptions – assumptions that would be very favorable to the future finances of Social Security. In Figure 5 we see the most dramatic difference in assumed values between the federal budget and the Social Security analyses. The federal budget assumes that real wages and salaries will grow by over 2% per year from 2006-2010, peaking at 2.6% in 2008 and falling slightly to 2.4% in 2010. Meanwhile, the most optimistic forecast made by the SSA, in their low cost scenario, projects real wages growing by less than 2% in the long term (1.6% per year over the period 2015-2080).

Yet again we see the federal budget making an economic assumption that if applied to an analysis of Social Security would imply higher balances and a longer life for the trust funds. Assuming that real wages will grow by 2.4% per year in the long run, along with the other federal budget assumptions, could result in the conclusion that Social Security will be able to provide full benefits for any foreseeable future.

How can the federal budget make such a significantly different assumption regarding the growth of real wages than the Social Security analyses? The text of the budget notes that "In recent years, growth of labor compensation adjusted for inflation has not kept up with the growth of productivity. During the projection period, however, labor compensation is

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[7] The growth of the labor force for 2004-2010 taken from the SSA's intermediate scenario.

Figure 5. Annual Growth Rate of Real Wages Assumptions, 2004-2010, by Data Source
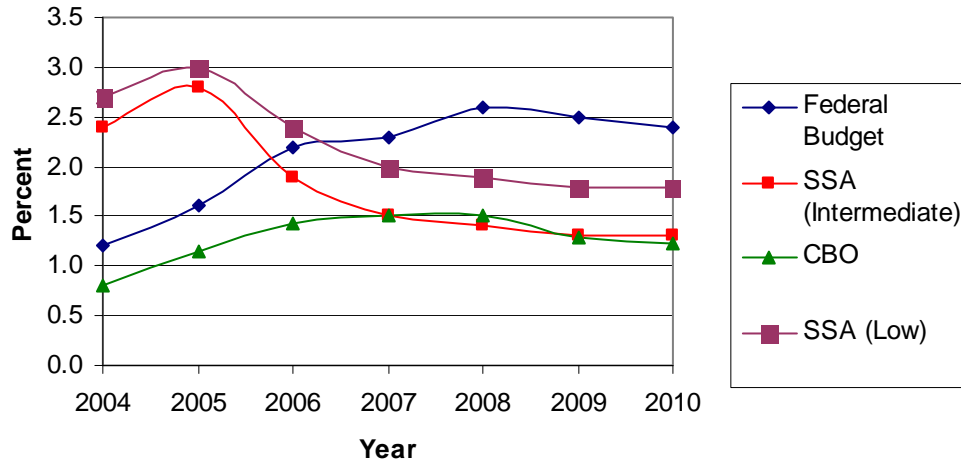
expected to catch up, which would raise the labor share in GDP back to its historical average."[8] Meanwhile, the Social Security analyses implicitly assume that real wages will not "catch up" but will instead continue along their recent trajectory of relatively low growth. As an interesting aside, the federal budget assumes that pre-tax corporate profits will remain approximately $1.3 trillion per year, in current dollars, for the period 2005-2010. When adjusted for inflation, corporate profits would actually decrease by about 2.4% per year. There is no obvious historical precedent for such an assumption of declining corporate profits during a time of consistent wage and GDP growth.

These differences in economic assumptions suggest the basis for an interesting experiment. What would result from an analysis using the federal budget's economic assumptions to model the future of Social Security? Would Social Security be solvent for the 75-year planning period using the federal budget's assumptions? Further, what different combinations of economic assumptions would be required to bring the Social Security system into actuarial balance for the 75-year planning period? Further, what policy approaches could be used to bring the system into balance? We attempt to answer these questions in this paper. We will show that many policy options are available to address the projected funding shortfall of Social Security over the next 75 years without any privatization of the system.

II. Modeling Social Security

<u>SSA and CBO Forecast Models</u>

The SSA and CBO have each developed their own models for deriving Social Security projections. The SSA uses a stochastic model that assigns random variations to 54

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[8] *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2006,* page 192. Available at http://www.whitehouse.gov/omb/budget/fy2006/pdf/spec.pdf.

demographic and economic variables.[9] The model is run as a series of nine sequential modules, with the output from each module used as inputs into the other modules. The CBO model also produces static simulations but can incorporate macroeconomic feedbacks and behavioral responses and produce distributional analyses.[10] The CBO model tracks the U.S. population through detailed age, gender, and marital status groups and, combined with economic assumptions, produces annual estimates of Social Security revenues and costs.

Neither model is readily publicly available in sufficient detail to allow replication of the government projections and simulations under alternative assumptions. This paper aims to develop a simplified model that can approximate the SSA and CBO results and produce Social Security forecasts under alternative economic assumptions.

Modeling Overview

As described above, the economic variables used to model Social Security revenues, outlays, and trust fund balances include the price level, unemployment, interest rates, GDP, and wages. Only revenues and outlays need to be specifically modeled because the difference between revenues and outlays provides the annual net addition (or subtraction) to the trust funds, and the assumed interest rate can be used to calculate the interest received on the trust funds and the year-to-year balances in the funds.

Social Security revenues come from three sources: Social Security taxes on wages, the taxation of Social Security benefits, and interest on the trust funds. There are also three categories of costs: OASDI[11] benefit payments, administrative costs, and the cost of the Railroad Retirement Board (RRB) interchange. While the railroad retirement system is operated separately from the Social Security system, the RRB interchange is an annual mandated transfer from the SSA to the RRB required to place the OASDI trust funds in the same position as if railroad retirement were covered by Social Security.

As described in more detail below, we will generally use historical data on the operation of the trust funds to develop predictive models for each of these six output variables. Significant amendments were made to Social Security in 1983 and phased in over several years. Thus, data prior to the mid-1980s are not considered in order to avoid variations arising from structural changes in the program. While legislative changes to Social Security have been enacted since 1983, these amendments are relatively minor. The current Social Security tax rate of 12.4% was first applied in 1990. Thus, we base our models on data beginning in 1990 to ensure a stable tax rate and structural consistency.

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[9] The SSA model is summarized in *A Stochastic Model of the Long-Range Financial Status of the OASDI Program*, Actuarial Study No. 117, September 2004, SSA Pub. No. 11-11555. Available at http://www.ssa.gov/OACT/NOTES/as117/as117.pdf.

[10] The CBO model is summarized in *Overview of the Congressional Budget Office Long-Term (CBOLT) Policy Simulation Model*, January 2004, Technical Paper Series 2004-1. Available at http://www.cbo.gov/ftpdocs/49xx/doc4994/2004-01.pdf.

[11] OASDI refers to Old-Age and Survivors Disability Insurance. It is the official name of the federal Social Security program.

For each of the sources of revenue and costs, the output variable is modeled as a function of one or more economic and demographic variables. All models in this analysis use the SSA's demographic projections. The six sections below described the methodology used to model each of the output variables. The models' results will be compared with the SSA and CBO forecasts later in this paper as a check of their validity. The models will then be used to derive forecasts under alternative economic assumptions.

Revenues from Social Security Taxes

Social Security revenues from taxes on wages and salaries in year t are defined as:

$$\text{Tax Revenues}_t = \text{Workers}_t * \text{Avg. Wages}_t * \text{Taxable Share}_t * \text{Tax Rate}_t$$

where:

Workers_t = the number of workers covered by Social Security in year t
Avg. Wages_t = the average annual wage per covered worker in year t
Taxable Share_t = the share of income that is taxable by Social Security
Tax Rate_t = the Social Security tax rate.

The SSA provides historical data and long-range forecasts of the number of workers covered by Social Security.[12] While the SSA projections of the number of covered workers could be used directly in the above equation, these estimates include imbedded assumptions of the growth of the labor force and employment rates. The approach taken here instead derives an estimate of the number of covered workers based on the size of the labor force and the unemployment rate. This allows us to model different assumptions about the growth of the labor force and unemployment rates.

We collected historical data on the size of the labor force, the unemployment rate, total employment, and the number of workers by Social Security. The data on these variables for 1990-2003 are presented in Table 2. The last column of Table 2 presents a ratio calculated as the number of covered workers to total average employment.

The number of covered workers is consistently greater than total employment. The reason is that many people are continually moving in and out of jobs and the labor force. We see in Table 2 that the ratio of covered workers to total employment is remarkably stable during 1990-2003. The average ratio is 1.128 with a standard deviation of only 0.004. Based on the stability of this ratio, we conclude that a reasonably accurate estimate of the number of covered workers can be obtained from an estimate of the total labor force and the unemployment rate as:

$$\text{Covered Workers} = [\text{Labor Force} - (\text{Labor Force} * \text{Unemployment Rate})] * 1.128$$

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[12] Table IV.B2 of the 2005 Trustees report. Historical data provided every year from 1990-2004. Projections provided for every fifth year through 2080 (i.e., 2005, 2010, etc.).

Table 2. Labor Force, Unemployment, Total Employment, and Covered Workers, 1990-2003.

Year	Labor Force (Thousands)[13]	Unemploy-ment Rate (Percent)	Total Employment (Thousands)	Covered Workers (Thousands)	Ratio of Covered Workers to Employment
1990	125,840	5.6	118,793	133,672	1.125
1991	126,346	6.8	117,754	132,969	1.129
1992	128,105	7.5	118,497	133,890	1.130
1993	129,200	6.9	120,285	136,117	1.132
1994	131,056	6.1	123,062	138,681	1.123
1995	132,304	5.6	124,895	140,981	1.129
1996	133,943	5.4	126,710	143,427	1.132
1997	136,297	4.9	129,618	146,279	1.127
1998	137,673	4.5	131,478	149,146	1.132
1999	139,368	4.2	133,515	151,957	1.133
2000	142,583	4	136,880	154,732	1.123
2001	143,734	4.7	136,979	155,130	1.122
2002	144,863	5.8	136,461	154,488	1.127
2003	146,510	6	137,736	154,471	1.122

We use this formula to project the number of covered workers starting with the actual size of the U.S. labor force in 2004. The SSA provides assumptions on the annual growth rate of the labor force in each of its three scenarios. Combining this growth rate with an assumption of the unemployment rate provides an estimate of total employment. Then, multiplication of total employment by 1.128 yields an estimate of the number of covered workers for each year to 2080.

Historical data on average wages in covered employment are given by the SSA.[14] Not all covered wages are subject to Social Security taxes because taxes are due only up to a specific cap, which is adjusted each year to account for the growth of wages. For example, in 2004 Social Security taxes were paid only on the first $87,900 of income. The SSA also provides data on the average taxable income per covered worker. These data are presented in Table 3.

Table 3 shows that the percentage of wages that are taxable under Social Security is not a constant but appears to be declining over time, although since 2000 there has been an increase in this percentage. We assume that the percent of wages that are taxable will continue to decline in the future. Note that this will produce a lower estimate of Social Security revenues compared to an assumption that the proportion of wages that are taxable will remain constant.

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[13] Labor force and employment data obtained from the U.S. Bureau of Labor Statistics.
[14] Table 4.B1 of the *2004 Annual Statistical Supplement to the Social Security Bulletin.* Available at http://www.ssa.gov/policy/docs/statcomps/supplement/2004/index.html.

Table 3. Average Covered Wages, Average Taxable Covered Wages, and the Percent of Wages Taxable, 1990-2003

Year	Average Annual Wage per Covered Worker (Current Dollars)	Average Annual Taxable Wage per Covered Worker (Current Dollars)	Percent of Wages Taxable
1990	$20,238	$17,650	87.2%
1991	20,756	18,214	87.8
1992	21,775	18,902	86.8
1993	22,211	19,369	87.2
1994	23,133	20,153	87.1
1995	24,126	20,703	85.8
1996	25,018	21,433	85.7
1997	26,403	22,478	85.1
1998	28,045	23,691	84.5
1999	29,518	24,777	83.9
2000	31,386	26,081	83.1
2001	32,013	27,129	84.7
2002	32,152	27,582	85.8
2003	32,808	28,201	86.0

Time-series regression analysis of the data in Table 3 indicates that the percentage of wages that are taxable is declining, on average, by about a quarter percentage point per year. Applying this coefficient throughout the 75-year planning horizon would result in only about 65% of wages being taxed by Social Security in 2080. This appears to be an unrealistic assumption that is without historical precedent. According to the SSA, the lowest percentage of wages subject to Social Security taxation was in 1965 when it fell to 71%.[15] Except for this brief period in the mid-1960s, the percentage has rarely fallen below 79%.

We assume values for the percentage of wages that are taxable based on their ability to replicate the revenue streams reported by the SSA for all scenarios. We initially (in 2005) assume that 84.0% of wages will be subject to Social Security taxation. We then assume that the percentage of wages that are taxable will decline linearly by 0.08 percentage points per year. By the end of the 75-year planning period these assumptions reduce the taxable share of wages to 78.0%.

The final step to estimate Social Security revenues from the taxation of wages is to multiply the wages subject to taxation by the tax rate. Since 1990 Social Security wages have been subject to a total tax of 12.4%, split equally between employees and employers

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[15] Table 4.B1 of the *2003 Annual Statistical Supplement to the Social Security Bulletin*, SSA Publication No. 13-11700, July 2004

(self-employed workers pay the full 12.4% share themselves). We assume, as does the SSA and CBO, that the tax rate will remain constant during the 75-year analysis period.

Note that by changing the tax rate, one can determine the appropriate rate that would be necessary to bring the Social Security program into actuarial balance during the 75-year period. The SSA presents estimates of these rates, under various assumptions, in their analysis. Later in the paper we will also provide estimates of the tax adjustments necessary to bring the system into actuarial balance, and compare our values to those produced by the SSA as a validity check of our model.

Revenue from the Taxation of Social Security Benefits

Prior to the 1983 amendments, Social Security benefits were not subject to the federal income tax. As a result of the 1983 changes, those tax filers with significant income from non-Social Security sources are required to pay federal income tax on some of their benefits. The taxes collected on Social Security income are not disbursed to the Treasury as general revenues but are allocated to the Social Security trust funds.

In 2004 the SSA received about $16 billion from the taxation of benefits. While this is significantly smaller than the income received from Social Security taxes on wages and salaries ($553 billion in 2004), the share of total revenues from the taxation of benefits is expected to increase in the future. Under current law the thresholds for the taxation of Social Security benefits are not indexed to inflation or wage growth. The SSA states that their projections assume that the ratio of income from the taxation of benefits to total benefits will increase over time based on analysis by the Office of Tax Analysis in the Department of the Treasury. However, no specifics are presented and the long-run analyses do not differentiate between income received from the taxation of benefits and from Social Security taxes on wages.

The CBO analysis provides more details on the future taxation of benefits. Their analysis indicates that under current law revenue from the taxation of benefits would rise from 3.4% of benefits in 2003 to 9.4% in 2050 and 11% in 2090. While the CBO analysis generally assumes that current laws will not be changed during the planning period, they assume that the tax code will be fully indexed to earnings beginning in 2015, which will slow the proportion of Social Security benefits that are taxed. Under this assumption, the report indicates that revenues from the taxation of benefits will rise to 5.7% of benefits in 2020 and stabilize at 6.6% of benefits in 2070. We use these values in our analysis, using linear interpolation to smooth the data between these years.

Revenue from Interest on the Trust Funds

The final category of income received by the Social Security program is interest on the balance of the trust funds. The amount of interest received is not a simple function of the current interest rate. The trust funds are primarily invested in bonds with different rates of return and different maturity dates. For example, in 2004 the annual rate of return on bonds held by the trust funds ranged from 3.5% to 8.75%. Maturity dates extended as far

as 2019 but most of the bonds were set to mature several years earlier. The SSA analysis of Social Security's future assumes that interest rates will converge by 2013 to long-term stable values for the remainder of the 75-year planning period. With the assumption of constant interest rates in the long run, the rate of return on the trust funds will gradually transition to a constant rate of return as older bonds, with varying rates of return, mature. The SSA projections provide details on the balance of the trust funds and interest received for 2005-2015 and for selected years in the long run. These data indicate that by 2015 the rate of return on the trust funds will essentially stabilize to the assumed long-run rate (for example, 5.8% in the intermediate case). We use the SSA's estimated annual rates of return on the trust funds for 2004-2014 for each scenario, with constant values from 2015-2080, as the basis for our projections.

Cost of Benefit Payments

The vast majority of the cost of Social Security (over 98%) is benefit payments to OASDI recipients. The majority of recipients (over 60%) are retirees. Other beneficiaries include dependents of retired workers, survivors of deceased workers, and disabled workers and their dependents. Rather than separate our cost analysis by the type of recipient or the trust fund, we lump all benefit payments together to simplify the modeling approach.

By definition, the total cost of OASDI benefit payments in year t is defined as:

$$\text{Benefits}_t = \text{Recipients}_t * \text{Average Payment}_t$$

The number of Social Security recipients is a function of demographics. The SSA provides historical estimates of the total number of OASDI beneficiaries, as well as projected estimates every five years for 2005-2080.[16] We use these projected values directly in our analysis, using linear interpolation to provide values for every year.

The average Social Security payment changes over time depending on two primary factors. First, the payments of existing beneficiaries are updated annually for a cost-of-living adjustment (COLA). The SSA calculates the COLA as the increase in the CPI-W averaged for July, August, and September from one year to the next. We collected CPI-W data from the BLS for comparison to the published COLAs to ensure these were similar. The annual CPI growth rates provided by the SSA provide the annual COLAs applicable to the majority of beneficiaries.

Figure 6 compares the percentage increase in OASDI average benefit payments with the COLA for 1986-2004. The annual increase in average benefit payments is consistently slightly higher than the annual COLA. On average, the increase in average benefit payments is 0.87 percentage points above the COLA, with a standard deviation of 0.23.

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[16] Table IV.B2. of the 2005 Trustees' report. Different projections are provided for each of the three scenarios.

Figure 6. Annual Percentage Increase in Average OASDI Benefit Payments and COLAs, 1986-2004
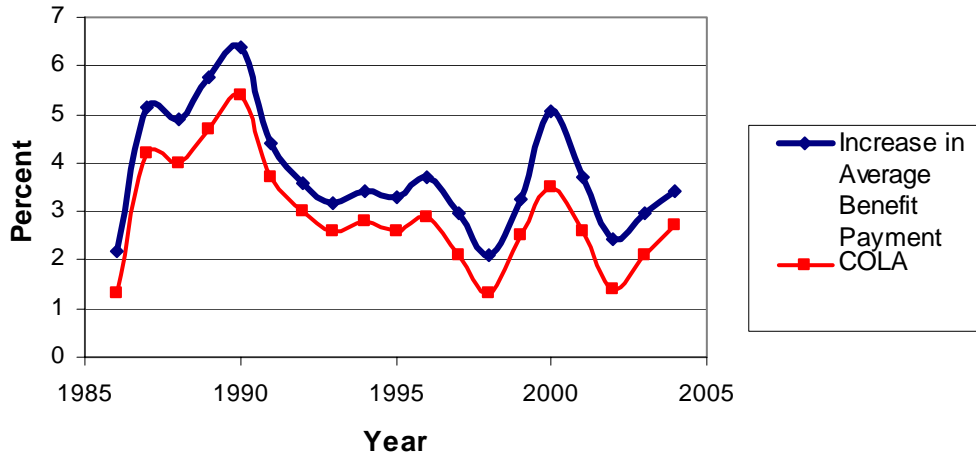
The reason that average benefit payments tend to grow at a higher rate than the annual COLA is the turnover in the program. Each year new beneficiaries begin receiving benefit payments while other beneficiaries die. The SSA projections indicate that in all three scenarios the total number of beneficiaries will increase each year. As the baby boom generation begins receiving benefit payments, the number of beneficiaries will grow rapidly (approximately 2-3% per year from 2010 to 2025). Then the growth in beneficiaries will slow, reaching about 0.3-0.6% per year by the end of the 75-year analysis period.

The turnover in the program is relevant because new beneficiaries may receive benefit payments that differ from beneficiaries that die each year. In particular, new beneficiaries will receive higher monthly payments than older beneficiaries as long as real wages are growing because initial benefit payments are calculated based on indexed real wages. Consider a beneficiary that retires in year t and receives an initial monthly benefit payment of $X. This beneficiary will then have her monthly benefit payment adjusted annually by the COLA for as long as she lives. If the annual COLA is a constant rate, r, then after t+n years her monthly benefit payment will be:

$$\text{Payment}_{t+n} = \$X * (1 + r)^n$$

Now consider a new retiree who begins receiving payments in year t+n. In calculating his initial benefit payment, his past wages will be indexed for real wage growth during the period from year t to year t+n.[17] Assuming positive real wage growth, his benefits will be higher in year t+n than our other beneficiary. The greater real wage growth during the previous n years, the greater the difference in benefit payments between these two recipients.

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[17] The SSA benefit formula actually indexes wage growth to the year a beneficiary turns 60 years old. However, the gap between the relevant wage index years in this example remains n years.

One approach for estimating the average benefit payments in future years would be to assume that each year average benefit payments increase by the projected COLA (equal to the CPI increase) plus the historical average of 0.87 percentage points. However, the differential between the growth in average benefits and the COLA is not expected to be consistent across scenarios. As mentioned above, the reason average benefits grow faster than the annual COLAs is the trend of real wage growth over time, providing new beneficiaries with higher initial benefit payments. Given that the long-term assumptions of real wage growth vary across scenarios, we need to account for variations in wage growth. We also need to account for variations in the growth of the total number of beneficiaries. Ceteris paribus, one would expect that the larger the number of new beneficiaries in a particular year, the greater the growth in average benefit payments.

We hypothesize that the growth in average benefit payments can be modeled as a linear function:

$$\text{Payment Growth}_t = (\beta_1 * \text{COLA}_t) + (\beta_2 * \text{Beneficiary Growth}_t) + (\beta_3 * \text{Real Wage Growth}_{[(t-n)\to t]})$$

The equation does not include an intercept term because with no inflation and no real wage growth, benefit payments should be constant. For the COLA and the growth in beneficiaries, only year t is relevant. However, for wage growth we need to consider, on average, the period from year t back to the year that those beneficiaries who die in year t began receiving benefit payments. We assume this period averages 15 years for the current generation of retirees.[18] The wage growth variable is the average annual real wage growth over the previous 15 years. Note that this value can be negative.

We collected historical data on the COLAs, the number of OASDI beneficiaries, and real wage growth and used regression analysis to obtain estimates of the coefficients in the above equation. While the estimated models[19] fit the historical data very well (R^2 values above 0.95), none of the equations proved to be accurate predictors of future benefit payment growth.

Rather than using historical data to obtain the coefficients, we sought for coefficient values that could accurately predict the projected growth in benefit payments under all three scenarios. The value of β_1 should be approximately one, as suggested by Figure 6.[20] Knowing this we analyzed the growth in benefit payments using different values for β_2 and β_3. We ultimately determined that the choice of coefficients that most accurately fit the SSA projections was β_1=0.97, β_2=0.20, and β_3=0.80. We use these coefficients in all our analyses to calculate average benefit payment growth for every year (2005-2080). We start with the known average benefit payment in 2004 and then calculate the annual

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[18] This assumption is based on Table V.A3 of the 2005 Trustees' report.
[19] Several different models were estimated using different historical periods (e.g., 1986-2004, 1990-2004).
[20] Consider that if there is no real wage growth, average benefit payments would increase by exactly the COLA each year. The value of β_1 could be slightly less than one if we consider that most, but not all, beneficiaries will have their benefit payments increased annually by the COLA. The regression models all produced a value of β_1 that was approximately one.

growth in average benefits using the above equation. With this time series indicating the annual growth in average benefit payments, we then obtain an estimate of the average benefit payment for every year. This is then multiplied by the number of recipients to obtain an estimate of total benefit payments.

Administrative Costs

Historical data on administrative costs indicate that administrative costs have not been a constant percentage of benefit payments. Administrative costs were about 1.2% of benefits in the late 1980s. Since 1990, administrative costs have consistently been less than 1.0% of benefit payments, with the lowest estimates at around 0.85% of benefits.

The SSA provides annual estimates of administrative costs for their short-range forecast analysis (2005-2014). In their intermediate scenario these estimates show a consistent decline in administrative costs as a percentage of benefit payments, reaching 0.75% of benefits in 2014. We use the SSA's implied percentages for 2005-2014 and then assume that administrative costs remain 0.75% of benefit payments for the rest of the 75-year analysis period.

Railroad Retirement Board Interchange Costs

RRB interchange costs are estimated in a similar manner to administrative costs. Actual RRB interchange costs have generally declined as a percentage of benefit payments since the mid-1980s. The SSA's intermediate scenario shows a continuing decline in the costs of the RRB interchange from 0.73% of benefit payments in 2005 to 0.55% in 2014. We use these 2004-2014 values in our analysis and assume that RRB costs remain at 0.55% of benefit payments thereafter.

III. Model Validity

We now consider the ability of our modeling approach to replicate the results published by the government agencies. Only if our model can produce baseline results similar to the more complex government models can we place some validity in our analysis of alternative policy scenarios. We consider several comparisons as a validity check of our mode:

1. The annual time series of Social Security revenues and costs
2. The predicted year of trust fund depletion in the intermediate and high cost scenarios and the percentage of scheduled benefits that can be paid thereafter
3. The trust fund balance over time in the low cost scenario
4. The adjustment to the current Social Security tax rate of 12.4% that would be necessary to bring the system into actuarial balance for the 75-year period in each scenario
5. Sensitivity of the results to changes in the assumed rate of real wage growth
6. Comparison to the CBO projections

In all comparisons we use the same demographic and economic assumptions used by the SSA (or CBO). Thus, any differences can be attributed to the difference in model structure, not the underlying assumptions. We now report on the accuracy of our model considering each of these criteria.

<u>Comparison to the SSA Projections of Revenues and Costs</u>

The SSA provides annual estimates of Social Security revenues (excluding interest on the trust funds) and total costs for 2005-2014 and then estimates every 5 years (i.e., 2015, 2020, etc.) to 2080. We compared the SSA time series of revenues and costs to the predictions of our models. Tables 4 and 5 present the comparisons for several years and indicate the differential between the SSA data and our results. The revenue predictions produced by our models tend to be slightly higher than those produced by the SSA with differentials of less than 6%. The differences generally decrease in magnitude over time. The average revenue differential (in absolute value) in Table 4 is 3.3%. The majority of our cost projections (Table 5) are also within 6% of the SSA values, and all cost estimates are within 9%. The differences tend to be largest in the middle of the planning period. The average differential for the cost comparison is 3.5%.

Table 4. Comparison of Social Security Revenue Projections, Excluding Trust Fund Interest, for Selected Years (Billions of Current Dollars)

Year	Intermediate Scenario			Low Cost Scenario			High Cost Scenario		
	SSA	Model	Diff.	SSA	Model	Diff.	SSA	Model	Diff.
2005	$596	$629	+5.5%	$596	$629	+5.5%	$588	$611	+3.9%
2020	1,221	1,288	+5.5	1,181	1,237	+4.7	1,305	1,387	+6.3
2040	2,837	2,920	+2.9	2,571	2,630	+2.3	3,286	3,421	+4.1
2060	6,456	6,505	+0.8	5,666	5,669	+0.1	7,795	7,983	+2.4
2080	14,573	14,336	-1.6	12,591	12,216	-3.0	17,939	18,103	+0.9

Table 5. Comparison of Social Security Total Cost Projections for Selected Years (Billions of Current Dollars)

Year	Intermediate Scenario			Low Cost Scenario			High Cost Scenario		
	SSA	Model	Diff.	SSA	Model	Diff.	SSA	Model	Diff.
2005	$527	$525	-0.4%	$525	$523	-0.4%	$530	$528	-0.4%
2020	1,318	1,375	+4.3	1,152	1,194	+3.6	1,566	1,655	+5.7
2040	3,756	3,953	+5.2	2,867	2,981	+4.0	5,118	5,547	+8.4
2060	8,799	8,958	+1.8	6,074	6,053	-0.3	13,505	14,397	+6.6
2080	20,879	20,298	-2.8	13,335	12,639	-5.2	35,095	36,163	+3.0

Comparison of Trust Fund Depletion Dates and Potential Benefit Payments Thereafter

In both the intermediate and high cost scenarios the SSA projects that the combined Social Security trust funds will become depleted within the 75-year planning period. In the intermediate scenario the trust funds are expected to become exhausted in 2041. In the high cost scenario, the depletion date is projected to be 2030. Our models predict the same trust fund depletion years. In the intermediate scenario our model predicts a positive trust fund balance of $425 billion at the beginning of 2041 but a negative balance of $658 by the end of that year. In the high cost scenario our model predicts a balance of $294 billion at the start of 2030 and a negative $778 billion balance by the start of 2031.

In the intermediate scenario the SSA estimates that once the trust funds are depleted in 2041 revenues would be sufficient to pay only 74% of scheduled benefits, gradually declining to 70% in 2080. Our model produces very similar estimates – that revenues would cover 74% of scheduled benefits immediately after the trust funds are depleted in 2041, declining to 71% in 2080. In the high cost scenario the SSA projects that immediately following the depletion of the trust funds in 2030 revenues would pay for 69% of scheduled benefits, declining to 51% in 2080.[21] Our model predicts that in the high cost scenario revenues would cover 67% of scheduled benefits immediately following the depletion of the trust funds in 2030, falling to 50% in 2080. Again, our model's results compare very closely to those of the SSA.

Trust Fund Balances in the Low Cost Scenario

In the low cost scenario the SSA projects that the trust funds will not become depleted during the 75-year planning period. When we use our model to analyze the low cost scenario, we also estimate that the trust fund will retain a positive balance over time. The trust fund balances over time in the low cost scenario are compared graphically in Figure 7. Our model predicts trust fund balances that are greater than those projected by the SSA. The differential increases over time – in 2020 the total trust fund balance is 10% greater in our analysis but by 2080 the differential is 27%. At the beginning of the difference primarily arises because our revenue projections exceed those of the SSA. However by the end of the period the difference is a result of cost projections that are lower than those estimated by the SSA.

Comparison of Actuarial Balance Requirements

The SSA estimates the adjustment to the current Social Security tax rate of 12.4% that would be necessary in each scenario to bring the system into actuarial balance for the 75-year planning period.[22] In the intermediate and high cost scenarios, where the trust funds become depleted, the tax rate would need to be increased. In the low cost scenario, the SSA estimate the maximum decrease in the tax rate that would still leave the system in balance in 2080.

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[21] Calculations for the SSA based on Table VI.F9 of the 2005 Trustees' report.
[22] The adjustment to the tax rate is assumed to be made immediately and then maintained without further change during the 75-year period.

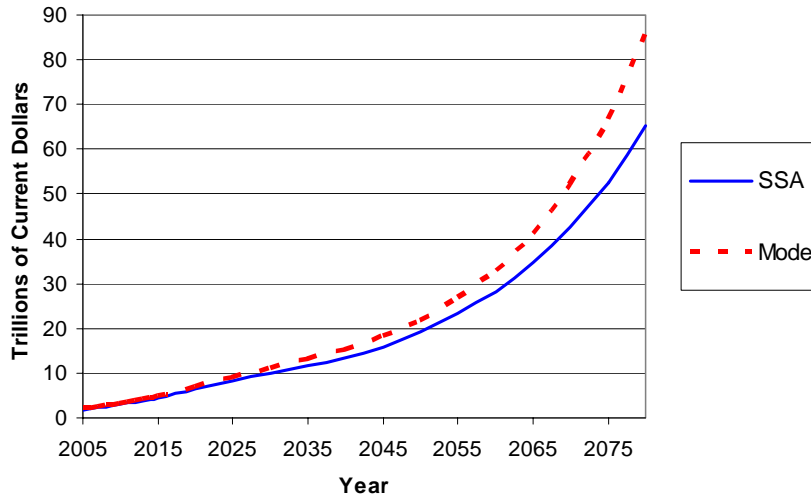Figure 7. Comparison of Combined Trust Fund Balance in Low Cost Scenario, 2005-2080

Table 6 compares the actuarial balance requirements of the SSA with our estimates based on each of the three scenarios. Using the assumptions for the intermediate scenario, our model estimates that the Social Security tax would need to be increased from 12.4% up to 14.25% in order to bring the system into balance over the 75-year planning period. This is very similar to the SSA's estimate of 14.32%. In the low cost scenario our model estimates that Social Security taxes could be lowered slightly more than the SSA. In the high cost scenario both the SSA and our results estimate that Social Security taxes would need to be increased to around 17.5% to bring the system into balance in 2080.

Table 6. Comparison of Actuarial Balance Requirements

Intermediate Scenario		Low Cost Scenario		High Cost Scenario	
SSA	Model	SSA	Model	SSA	Model
+1.92%	+1.85%	-0.38%	-0.59%	+4.96%	+5.26%

Comparison of Sensitivity to Changes in Real Wage Growth

As mentioned in the introduction to this paper, one of the policy scenarios that we want to consider is the sensitivity of the long-run Social Security projections to changes in the growth rate of real wages. The SSA provides sensitivity analyses that consider changes to various demographic and economic variables. For the economic variables the SSA uses the demographic assumptions in the intermediate scenario and then changes the values of one economic variable from its values in the intermediate scenario to its values in the low cost and high cost scenarios. The results then indicate the new adjustment to the Social Security tax rate that would be required to bring the system into actuarial balance for the 75-year planning period.

For the real wage growth sensitivity analysis the SSA continues to use the intermediate scenario assumption of long-range CPI growth (2.8% per year). The nominal wage growth is then adjusted to produce real wage growth values that match those in the low cost and high cost scenarios (1.6% and 0.6% per year respectively). Recall that in the intermediate scenario, the SSA estimates that the Social Security tax rate would need to be increased by 1.92% to bring the system into balance (Table 6). The SSA estimates that using the low cost assumptions of real wage growth (and keeping all other variables at their intermediate scenario values) the required tax rate increase would only be 1.39%. Using the high cost scenario assumptions of real wage growth, the required tax increase would be 2.45%.

Table 7 compares the SSA sensitivity analyses results for changes in real wage growth with our results. The comparison shows that our values are very similar to those produced by the SSA, with our results indicating slightly more sensitivity to changes in the long-run rate of real wage growth. Our results indicate that a long-term growth rate for real wages of 1.6% instead of 1.1% would, ceteris paribus, reduce the required increase in the Social Security tax rate for actuarial balance in 2080 by 0.61 percentage points – compared to a reduction of 0.53 percentage points estimated by the SSA. A lower long-term growth rate for real wages, 0.6% instead of 1.1%, would require a larger increase in the tax rate – 0.63 percentage points using our model and 0.53 according to the SSA.

Table 7. Comparison of Real Wage Growth Sensitivity Analysis Results (Tax Rate Adjustment Required for Actuarial Balance)

Scenario	SSA	Model
Intermediate Baseline (1.1% long-run growth in real wages)	+1.92%	+1.85%
Low Cost Assumptions (1.6% long-run growth in real wages)	+1.39%	+1.24%
High Cost Assumptions (0.6% long-run growth in real wages)	+2.45%	+2.48%

Comparison with the CBO Social Security Analysis

The final validity check we perform is to use the CBO economic assumptions in our model and compare our projections with those produced by the CBO. The CBO projects that the combined Social Security trust funds will become depleted in 2052. Our model projects that the trust funds will become depleted in 2044 using the CBO economic assumptions. While this is three years later than in the baseline intermediate scenario analysis, it is eight years earlier than the CBO projection. As neither the CBO nor the SSA has produced analyses using the exact same set of assumptions that the other agency uses, there may be structural differences in the CBO and SSA modeling approaches. We

have based our models on the SSA results. Thus the fact that our model projects a different trust fund depletion date than the CBO may reflect differences between the CBO and SSA modeling approach.

Summary of Validity Check

The validity checks performed above indicate that our relatively simple model produces projections that generally match quite well with the results published by the SSA. Our estimates of future Social Security revenues and costs, trust fund depletion dates, actuarial balance requirements, and sensitivity to changes in the growth rate of real wages are very similar to the comparable values produced by the SSA. In the low cost scenario, our model projects a higher trust fund balance over time. Using the CBO economic assumptions instead of the SSA intermediate scenario assumptions, our model correctly predicts that the trust funds will become depleted later but only by three years instead of eleven years.

Overall, the validity comparisons suggest that our models produce results that are reasonably comparable to those produced by the SSA, even though the latter uses much more complex modeling approaches.

We now turn to an analysis of several policy scenarios. The validity checks suggest that the results below should be reasonably close to the values that would be produced by the SSA if they used their modeling approach to analyze the same policy scenarios.


IV. Policy Analysis

Analysis of the Federal Budget Economic Assumptions

The first alternative policy scenario we consider with our model is the future finances of the Social Security program using the economic assumptions made in the federal budget. We input the 2005-2010 federal budget assumptions for wage growth, inflation, interest rates, and unemployment into our model using the demographic assumptions in the SSA's intermediate scenario. We then apply the 2010 federal budget assumptions for the duration of the 75-year planning period.

Figure 8 presents the projected trust fund balance over time using the federal budget assumptions as compared to the balance our model predicts using the SSA's intermediate set of demographic and economic assumptions. Using the federal budget assumptions the Social Security trust funds are still depleted during the 75-year planning period but they do not become exhausted until 2065 – 24 years later than projected by the SSA in their intermediate scenario. While our model estimates that Social Security taxes would need to be increased by 1.85 percentage points to bring the system into balance for the 75-year period in the baseline intermediate scenario (similar to the SSA estimate of 1.92 percentage points), using the federal budget assumptions an increase of only 0.24 percentage points would be required. In other words, using the federal budget

Figure 8. Comparison of Combined Trust Fund Balances Using SSA's Intermediate Scenario Assumptions and the Federal Budget Assumptions
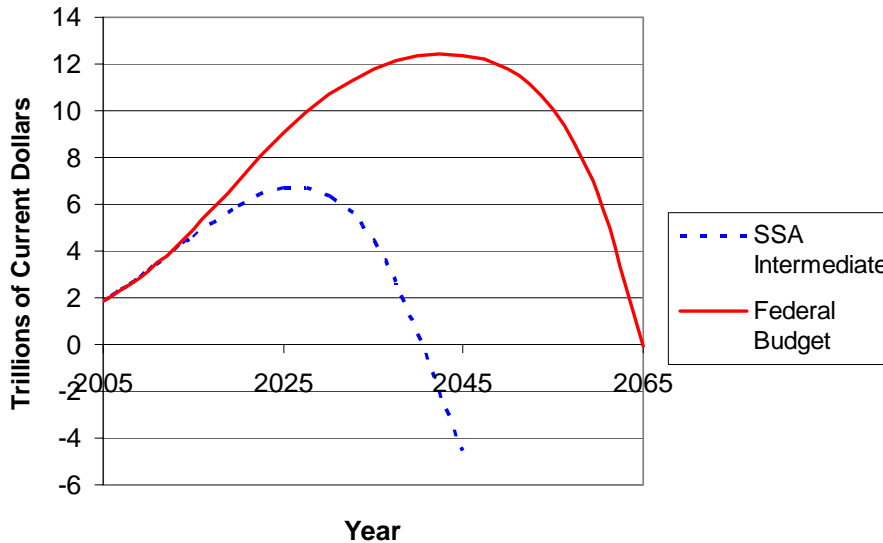
assumptions our models estimate that the Social Security shortfall for the next 75 years could be offset with an increase in the Social Security tax rate from 12.4% to 12.64%. This would be equivalent to an additional tax of $120 for a wage earner making $50,000 per year.

Variation in Economic Assumptions Required for Actuarial Balance

Next we consider what changes in economic assumptions would be necessary to bring the Social Security system into balance over the period 2005-2080. We start this analysis with the SSA assumptions for the intermediate scenario and then adjust the long-run assumed value for a single variable until the trust funds reach a positive combined balance in 2080. For example, with real wages we incrementally increase the long-term real wage growth rate from 1.1% until the trust funds show a positive balance remaining in 2080, while keeping all other variables constant at their intermediate scenario values.

We first consider increasing the long-run real wage growth. As shown in Table 8, the long-run real wage would need to increase by 2.85% per year in order to bring the system into balance – a significant increase from the 1.1% annual growth assumed in the SSA intermediate scenario. The system could also be brought into balance by lowering the assumed rate of inflation from 2.8% to about 1.5% in the long run. While a lower unemployment rate would improve the finances of the program, lowering the rate to zero would not be sufficient to bring the system into balance. A higher real rate of return on the trust fund balances, from 3.0% to about 5.5% would keep a positive balance in the trust funds through 2080.

Table 8. Changes in Economic Assumptions Required to Bring the Social Security System into Actuarial Balance through 2080

Variable	Long-Term Assumption in SSA Intermediate Scenario	Long-Term Assumption Required for Actuarial Balance through 2080
Real Wage Growth	1.1%	2.85%
Inflation Rate	2.8%	1.54%
Unemployment Rate	5.5%	NA[23]
Real Interest Rate	3.0%	5.58%

Table 8 considers changes in only one variable at a time. We also consider combinations of changes in long-term economic assumptions that would result in actuarial balance through 2080. Four such combinations are presented in Table 9. While none of these sets of assumptions entirely fall within the assumed values in the SSA's scenarios, they are intended to illustrate the point that macroeconomic policies affecting these variables provide an option for addressing at least a portion of the projected Social Security shortfall through 2080.

Table 9. Four Combinations of Long-Term Economic Assumptions that Bring the Social Security System into Actuarial Balance through 2080

Variable				
Real Wage Growth	2.3%	1.8%	2.3%	1.6%
Inflation Rate	2.2%	2.2%	1.7%	2.0%
Unemployment Rate	4.5%	4.0%	3.5%	1.5%
Real Interest Rate	4.4%	5.1%	4.9%	4.8%

Social Security Policy Options

Finally, we consider policy adjustments that would bring the system into actuarial balance through 2080. One suggestion that has been made to improve Social Security's finances is to increase or eliminate the income cap subject to taxation. There is a recent precedent for this approach as the income limit subject to the Medicare Hospital Insurance tax was eliminated under the 1993 Omnibus Budget Reconciliation Act.

As explained earlier, our analysis assumes that 84% of wage and salary income will be subject to Social Security taxation in 2005, declining to 78% by 2080. Our model indicates that setting the cap such that the percentage of income subject to taxation remains constant at 84% during the planning period would extend the duration of the trust funds only slightly – from 2041 to 2043.

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[23] Even if the unemployment rate were 0% Social Security would not be in actuarial balance through 2080.

We explored whether increasing the cap on income subject to Social Security taxation could be used to close the actuarial gap. We incrementally increased the percentage of wages subject to Social Security taxation until the system shows a positive balance in the trust funds in 2080. This requires that 93.8% of wage and salary income be subject to Social Security taxation. In recent decades, the share of income subject to Social Security taxation reached as high as 90.0% in the early 1980s.

An examination of the 2002 distribution of wage and salary income published by the Internal Revenue Service[24] indicates that 86.0% of all wage and salary income was captured by federal tax returns with incomes of $200,000 or less. Considering all returns with total wage and salary income of $500,000 or less increases the share of wage and salary income covered to 93.7%. An exact determination of the required change in the salary cap to bring the Social Security system into balance cannot be made as many income tax returns combine the incomes of two or more individuals. However, the IRS data suggest that approximately doubling the cap on income subject to Social Security taxation would be required to close the actuarial gap through 2080. Note that this estimate assumes no change in benefit payments, only an increase in revenues. Given that benefit payments are linked to the maximum income subject to Social Security taxation, under the current benefit formula any increase in the income cap would also result in higher benefits for high-income workers. Thus the largest improvement in Social Security's finances would result from a combination of a higher income cap and an adjustment of the benefit formula to lower the initial benefits of high-income workers.

Another suggestion to reduce the shortfall in Social Security finances is to reduce the growth in benefit payments, perhaps by indexing one's initial benefit payment to account for the growth in prices rather than wages. In the baseline intermediate scenario, our model projections that nominal benefit payments increase an average of 3.8% per year over the period 200-2080. We can then reduce the growth rate of average benefit payments until a positive balance remained in the trust funds in 2080. First, we limit the annual growth of benefit payments to the growth of the CPI (2.8% in the long run). Doing so is more than sufficient to bring the program into balance – annual revenues continually exceed annual costs, and by 2080 the trust funds have a large accumulated balance of $443 trillion. Next we incrementally reduced the annual growth in average benefit payments until the system was brought into balance. Our results indicate that slowing the growth in benefit payments by 11% (from 3.8% per year to 3.4% per year) would be required to avoid exhausting the trust funds by 2080. Note that even with this reduction in the growth of benefit payments the payments made to beneficiaries still grow in real terms. Reducing the annual growth in average benefit payments by 11% still permits benefit payments to grow in real terms by 58% between 2005 and 2080. This compares to real growth in average benefit payments of 114% in our baseline analysis of the SSA's intermediate scenario.

We also considered the extent to which the financial shortfall could be addressed through the taxation of Social Security benefit payments. As mentioned earlier, our model

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[24] "Income Tax Returns, 2002," by Michael Parisi and Scott Hollenbeck, *IRS Statistics of Income Bulletin*, Fall 2004, pages 8-45.

assumes that the current thresholds for the taxation of Social Security benefits will be indexed to the growth of wages in the future. Using estimates provided in the CBO analysis of Social Security, we first consider the impact of maintaining the current thresholds for the taxation of benefits. Our model estimates that this adjustment would have little effect on the finances of Social Security – the trust funds would become exhausted just one year later. Maintaining the current thresholds would reduce the increase in the Social Security tax required for actuarial balance from 1.85% to 1.58%.

Maintaining the current income tax thresholds would, according to the CBO, result in an overall tax rate on Social Security benefit payments of about 10% by 2080 (up from about 3.5% now). Suppose instead that Social Security benefit payments became fully taxable immediately. Assume that the overall tax rate on benefit payments was immediately raised to 10%. This would extend a positive balance on the trust funds out to 2049 and would reduce the necessary tax rate increase for actuarial balance from 1.85% to 1.19%. Actuarial balance would be achieved by raising the overall tax rate on Social Security benefits to 17.6%. Given that the majority of Social Security recipients are in the 10% or 15% federal income tax brackets, the taxation of Social Security benefits does not appear to be a policy that alone could be used to eliminate the shortfall.

Of course, the projected gap in Social Security's finances can be closed using a combination of policy options. Also, any changes could be phased in gradually over time. We determined a few policy combinations that could be used to bring Social Security into actuarial balance through 2080. These include:

- Gradually raise the cap on income subject to Social Security taxation such that the percentage of wage and salary income taxed increases from 84% currently to 90% in 2017 (an increase of 0.5% per year) AND reduce the growth of benefit payments by 16% annually (which will still allow real benefit payments to nearly double between 2005 and 2080). OR:
- Gradually raise the cap on income subject to Social Security taxation such that the percentage of wage and salary income taxed increases from 84% to 90% in 2017 (an increase of 0.5% per year) AND increase the Social Security tax rate by 0.1 percentage points per year from 12.4% to 13.1% in 2013. OR:
- Maintain the current thresholds for the taxation of Social Security benefit payments AND gradually raise the cap on income subject to Social Security taxation such that the percentage of wage and salary income taxed increases from 84% to 90% in 2017 (an increase of 0.5% per year) AND immediately increase the Social Security tax rate from 12.4% to 12.8%.

Caveats and Limitations

We have presented our results as deterministic. In reality there is considerable uncertainty in any analysis of the future of Social Security. The CBO explicitly models this uncertainty in their analysis – they estimate an 80% confidence interval for the date the trust funds become exhausted as between 2034 and 2085. The SSA also provides confidence intervals but theirs are considerably narrower than those estimated by the

CBO – the SSA 80% confidence interval for the depletion of the trust funds is between 2035 and 2052. No information is provided regarding why the SSA intervals are significantly narrower. Clearly, our results must also be viewed in light of significant uncertainty.

Similar to the CBO and SSA, our models assume that economic variables will maintain constant values in the long run. In reality the economy will go through business cycles that are impossible to predict. The timing and duration of these cycles can have an impact on the requirements to bring the Social Security system into actuarial balance.

We have not explored the sensitivity of our projections to variations in demographic assumptions such as life expectancy, fertility, and labor force participation rates. These variables are likely to be as important to the future finances of Social Security as economic factors. While different assumptions regarding demographic variables may produce significantly different forecasts, these variables are generally less influenced by policy decisions. Thus, we have limited our focus to economic policy options.

Our policy analyses have focused on bringing Social Security into actuarial balance through 2080. Note that doing so would, in all cases, still leave a shortfall in 2081 and beyond, when revenues will exceed costs and the trust funds will be depleted. Further changes would be required to bring the system into balance for a longer period into the future. Considering the significant uncertainty of future economic and demographic conditions and the fluxes of politics, it would be naive to suggest that Social Security could be indefinitely "fixed" now. Thus, we do not perform any analyses using an infinite planning horizon and consider the 75-year planning period sufficient. Most likely, any "permanent" adjustments would still require further changes in the future as actual values become known and expectations are revised.

Finally, our purpose was to construct a simple model that reasonably replicates the baseline and policy analysis of the SSA and gives some indication of the future of Social Security under alternative assumptions. We believe we have succeeded based on the validity checks conducted with our models. While similar analysis by the SSA (or the CBO) would obviously produce different results, we believe such differences would be comparatively small.

V. Conclusions

The Bush administration has indicated that Social Security is facing a crisis that requires prompt and sweeping reforms structured around a centerpiece of private investment accounts. The president has stated that the system will be "bankrupt" in 2041 based on the SSA's 2005 report on the finances of the Social Security system. As various policy options are debated for Social Security reform, several important points need to be kept in mind.

First, the projections of Social Security's future finances are based on demographic and economic assumptions involving considerable uncertainty. Even within the Bush administration, different sets of assumption regarding future economic conditions have been published. The federal budget makes relatively optimistic economic assumptions compared to those made by the Social Security Administration. The Congressional Budget Office economic assumptions fall between these two extremes. We have shown in this paper that the use of different sets of assumptions can have a significant impact on the future of Social Security. In particular, while the SSA's intermediate scenario predicts that the combined Social Security trust funds will become depleted in 2041 our analysis based on the federal budget assumptions projects that, without any policy changes, the trust funds will persist until 2065.

A second important point is that forecasts regarding the future of Social Security have been, and will continue to be, periodically revised. In the 1997 Social Security Trustees' report the intermediate scenario predicted that the combined trust funds would become depleted in 2029. Just five years later, in the 2002 report, the projected date for the depletion of the trust funds had been extended to 2041. As more information is available and expectations are altered, future Social Security reports will present revised analyses. A potential danger of a major overhaul intended to "permanently" fix Social Security is that changes in demographic or economic conditions will dictate that additional, possibly significant, changes be made. A measured approach that allows for future flexibility appears most desirable. One option would be to schedule periodic adjustments to the system as expectations are revised.

Thirdly, there is a wide range of policy options for making adjustments to the Social Security program. While the president has advocated the use of private accounts, we have shown in this paper that several other policies, either individually or combined, can be used to improve the future finances of Social Security. Among these are an increase in the cap on income subject to Social Security taxation, a reduction in the growth rate of benefit payments, an increase in the Social Security tax rate, and an increase in the taxation of Social Security benefits.

All of the policy options just mentioned for improving the finances of Social Security boil down to either a reduction in benefits or an increase in taxes. Of course, such options are politically unpopular. But if considered fully, these policies do not necessarily imply a net loss of income over a lifetime. The demographic changes taking place in the United States are the driving force motivating changes in the Social Security program. For example, life expectancy at age 65 is projected to increase from about 16 years for an American male in 2005 to over 20 years in 2080. American females will see life expectancy at age 65 increase from 19 years to 23 years over the same period.[25] Thus Social Security beneficiaries will, on average, receive their benefits for a longer period of time. In essence, this is equivalent to an increase in benefits arising from longer life expectancies. Greater benefit payments can only be funded through increased revenues. This can be accomplished by, for instance, raising Social Security taxes. But while an individual will pay higher Social Security taxes during his or her working years, this will

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[25] Projections based on Table V.A3 of the 2005 Trustees' report using the intermediate scenario.

be offset by receiving scheduled benefits for a longer period of time. Similarly, lower benefits during one's retirement years would be offset by receiving those benefits for more years. Again, beneficiaries do not necessarily suffer a loss of benefits in the long run.

The finances of Social Security are also affected by macroeconomic conditions that may be subject to influence through policies. In particular, macroeconomic policies that increase the growth of real wages, limit inflation, and reduce unemployment – policies that are desirable in themselves – will have the additional benefit of improving the future of Social Security. In this paper we have indicated several different policy options and macroeconomic conditions that can bring the Social Security program into actuarial balance through 2080 without resorting to the use of private accounts.

The Bush administration has been forwarding its agenda on Social Security using words such as "crisis" and "bankrupt." We believe the system is not in crisis and cannot go bankrupt as long as revenues continue to be collected. It is true, however, that under a range of plausible economic assumptions the program will not be able to provide currently scheduled benefits through 2080. The Social Security program will need to be adjusted to reflect modern realities, just as it has been many times in the past 70 years. We hope this paper provides some clarity regarding the feasibility and effectiveness of various policy options.

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