**Generational Accounting and the Saving Rate Decline, 1960-2000**

(Draft)

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**Abstract**

Government agencies in twenty-six countries construct generational accounts, defined as the present value of remaining lifetime net taxes that a generation can expect to pay. This paper calculates generational accounts for the U.S. 1960-2000 and finds that generational account changes do not coincide with the abrupt decline in the saving rate that began in the mid-1980s. First, transfers to the elderly, as reflected in changes to the generational accounts, increased gradually after 1960. Second, the fiscal burden placed on future generations, measured both in real terms and relative to newborns, was no higher in 2000 than in 1960.
“Whether or not generational accounting replaces deficit accounting…serious discussion of a country’s generational policy necessitates producing a set of generational accounts and…requires doing generational accounting on an ongoing basis.”

“We still have no evidence that the generational account is relevant to explaining household consumption decisions.”

INTRODUCTION

The generational account is the present value of net taxes that a generation can expect to pay over its remaining lifetime, where net taxes are all federal, state, and local taxes minus transfer payments. Generational accounting was introduced in the early 1990s as an alternative to traditional deficit accounting by Auerbach, Gokhale, and Kotlikoff and Kotlikoff. They argued


that the federal budget deficit, measured as current outlays minus current revenue, is a poor indicator of both fiscal policy sustainability and generational redistribution. Although a budget deficit may imply that fiscal policy gives benefits to current generations with taxes paid by future generations, Kotlikoff shows that it is not possible to know which generations benefit from fiscal policy by looking only at the current budget deficit. This is because the budget deficit does not take into account future government spending obligations such as Social Security and Medicare transfer payments. For instance, although federal budget surpluses developed in the late 1990s, this did not imply that fiscal policy was sustainable in the long run. The baby-boom generation was entering its high-earnings years and contributing greatly to income tax and social insurance tax revenues. However, baby-boomers will retire in the next two decades and begin receiving Social Security and Medicare transfer payments. In order for these two programs to remain solvent, benefits, taxes collected, or the retirement age must be changed. Additionally, Kotlikoff shows that the 1980s was not necessarily a period of redistribution from future to current generations, despite the growing budget deficits.

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A significant number of countries produce generational accounts. Auerbach, Kotlikoff, and Leibfritz present generational accounts for seventeen countries, and the number has grown to at least twenty-six today.\(^6\) The International Monetary Fund, the World Bank, and the Organization for Economic Cooperation and Development have each produced generational accounts or studied them. Generational account updates for the U.S. are regularly made by researchers at the Congressional Budget Office and Federal Reserve.\(^7\) It is likely that even more countries will produce generational accounts in the near future.

Practitioners and researchers of government budgeting and finance will likely have more exposure to generational accounting in the future. Aging populations will place great burdens on programs, such as Social Security, which redistributes resources across generations. Discussion of policy changes will likely include a look at the resource implications for age-groups and generations, and generational accounting is uniquely able to guide policy.

An important question is do generations respond to changes in their generational account? Since generational accounts indicate lifetime net taxes, and therefore impact lifetime resources, one would expect that consumption and saving behavior would respond to generational account


\(^7\) Ibid.
changes. Specifically, an increase in resources to the elderly may cause them to save less. While some papers critique the methodology of generational accounting, such as Haveman, Sturrock, Diamond, and Banks, Disney, and Smith, there is only one paper that empirically tests the behavioral response to generational accounts. Gokhale, Kotlikoff, and Sabelhaus construct generational accounts 1960-90 and find a large increase in annual transfer payments to the elderly and a large decline in the aggregate saving rate. They argue that public intergenerational transfers caused much of the drop in saving. However, just because the saving rate was lower after thirty years and transfers to the elderly were higher, this does not mean that

8 In Ricardian equivalence models, resource redistribution to living generations will not cause consumption to change if, for example, altruistic parents save net transfers they receive in order to bequest an amount to their children equal in present value to the taxes that their children will eventually pay.


the correlation between the two series is very strong. Bosworth suggests that generational policy may have changed long before the fall in saving rates was observed. Parker, in a paper that does not use generational accounting, confirms this and finds that intergenerational transfers alone cannot explain the drop in the saving rate.\textsuperscript{11}

This paper provides a second look at generational accounting and the saving rate decline and asks whether the timing of changes to generational policy is consistent with the observed change in the saving rate. It constructs generational accounts of living generations a decade beyond Gokhale, Kotlikoff, and Sabelhaus to include the 1990s—the decade with the biggest drop in the saving rate. This paper also constructs the generational accounts of future generations from 1960 to 2000.\textsuperscript{12} Both are used to determine exactly when intergenerational policy changed the most since 1960. In contrast with Gokhale, Kotlikoff, and Sabelhaus, the updated accounts reveal that the timing of saving rate changes does not coincide with intergenerational transfer changes. This implies that the saving rate will not increase in the short run by reducing the magnitude of intergenerational transfers.

The paper is organized as follows. The next section explains generational account methodology. The following section discusses how public intergenerational transfers will change generational accounts and decrease the saving rate. Following that is a look at the saving rate decline. The next section constructs generational accounts 1960-2000 and the last section concludes with


\textsuperscript{12} Gokhale, Kotlikoff, and Sabelhaus do not report generational accounts for future generations.
policy implications. The appendix describes generational accounting in detail and the data sources used.

**GENERATIONAL ACCOUNTING**

Generational accounts are the present value of net taxes that a generation expects to pay to federal, state, and local governments over its remaining lifetime. A generation is all individuals born in the same year. Net taxes do not include past taxes paid or transfer payments received. Since generational accounts are usually reported in per-generation-member terms, they show what a typical generation member can expect to pay to all levels of government, net of transfers received, over their remaining lifetime. In any year, net taxes tend to be greatest for generations just entering their working years, since they are beginning to pay taxes such as income and wage taxes. Conversely, net taxes tend to be negative for generations in retirement, since the present value of transfer payments, such as Social Security and Medicare benefits, are greater than the present value of taxes. Net taxes for children are positive since they are assigned a portion of household taxes but they don’t receive the large benefits in Medicare and Social Security that the elderly receive. Net taxes of retirees rise with age since as the elderly age closer to death they expect fewer years in which to collect benefits. Female net taxes tend to be less than males since they earn less and thus pay lower income and wage taxes. Females also tend to receive greater transfers such as family assistance and Social Security survivors benefits in relation to taxes paid, which reduces net taxes in retirement. The appendix presents more detail on the construction of generational accounts.
Table 1 presents per capita generational accounts from 2000. A typical newborn male in 2000 can expect to pay $262,000 in discounted net taxes over his remaining lifetime. A typical twenty-year old male expects to pay $311,000 over his remaining lifetime. Lifetime net taxes are negative for sixty-year olds, which means that they can expect to receive $160,000 in net transfer payments over their remaining lifetime. The amounts for females differ somewhat. Non-adult and working-age females expect to pay less than half as much as males in remaining lifetime net taxes. By the age of forty, remaining lifetime net taxes is negative, which indicates a positive net transfer payment. A typical sixty-year old female expects to receive $244,000 in net transfer payments over her remaining lifetime.

[Table 1 about here]

The generational account of future generations is calculated from the long-run government budget constraint. Generational accounting assumes that the government must pay for spending with either its assets or the net taxes it collects from currently living and future generations. In the long-run, the present value of government expenditures is equal to the sum of government net

13 See the appendix for data and assumptions used to calculate the generational accounts.

Gokhale, Kotlikoff, and Sabelhaus report a similar age-pattern to generational accounts for 1998, although the magnitudes of lifetime net taxes are smaller. This is likely because they use a larger discount rate of six percent. They also modify the CBO’s budget projections, which makes direct comparisons with these results difficult. However, it is the timing of generational account changes, rather than the absolute magnitude of generational accounts, that is the focus of this paper.
wealth and the present value of net tax payments by current and future generations (see Auerbach and Kotlikoff, 1999).\textsuperscript{14} The government’s long-run budget constraint is

\[
\begin{pmatrix}
\text{Present value of government expenditures} \\
\end{pmatrix} = \begin{pmatrix}
\text{Government net wealth} \\
\end{pmatrix} + \begin{pmatrix}
\text{Sum of generational accounts of living generations} \\
\end{pmatrix} + \begin{pmatrix}
\text{Sum of generational accounts of future generations} \\
\end{pmatrix}
\]

(1)

where future generations include all generations born after the current year. In order to calculate the sum of generational accounts of future generations, one subtracts net government wealth and the generational accounts of living generations from the present value of government expenditures. Generational accounting assumes that fiscal policy remains constant for living generations but that net taxes for future generations change in order to satisfy the government budget constraint. Thus, if the government is not taxing current generations enough to pay for transfers and consumption, then future generations must pay the bill.\textsuperscript{15}


\textsuperscript{15} Generational accounting therefore assumes that future generations absorb the full impact of policy changes that are needed in order to balance the long-run budget constraint. This assumption creates the largest imbalance between future and current generations. It is likely, however, that current generations will bear some of the fiscal burden of adhering to the long-run
Table 1 shows the generational account of future generations in 2000. The government long-run budget constraint is satisfied if every future-born male pays $382,000 in discounted lifetime net taxes and every future-born female pays $163,000.\textsuperscript{16} In order to gauge the degree of redistribution from future to currently living generations, Auerbach, Gokhale, and Kotlikoff compare net taxes that future generations pay with net taxes that newborns are expected to pay.\textsuperscript{17} Table 1 shows that future males and females will pay forty-six percent more in lifetime net taxes than those born in 2000. This signals that current generational policy is redistributing considerable resources from future to living generations.

Generational accounts are an important supplement to traditional budgeting and can be used for at least two purposes. First, generational accounts can indicate whether or not fiscal policy is sustainable. For instance, if generational accounts of future generations are greater than generational accounts of newborns, then taxes will be raised at some point in the future, and fiscal policy will necessarily change. In other words, policy cannot treat current newborns and government budget constraint. Generational accounts therefore represent the worst case scenario for future generations.

\textsuperscript{16} Following Auerbach, Gokhale, and Kotlikoff, the sum of generational accounts from future generations is distributed such that all future generations face the same per capita generational account at birth after an adjustment for growth. For instance, males born in 2001 are expected to pay $382,000, while males born in 2002 are expected to pay this amount times a growth factor. The growth factor equals the growth rate of the economy.

\textsuperscript{17} Auerbach, Gokhale, and Kotlikoff, \textit{Deficit Accounting}. 
future generations the same and still obey the government long-run budget constraint. Second, generational accounts can indicate how proposed policy changes will impact the resources of each generation. If a policy change raises the generational account of some generations while lowering the generational account of others, then the policy change entails an intergenerational redistribution.

**GENERATIONAL ACCOUNTS AND THE SAVING RATE**

When government redistributes resources between generations, what happens to the saving rate and the generational accounts? First consider the saving rate. Most models of consumption predict that consumption will rise if expected lifetime resources rise. In the aggregate, a redistribution of resources between living generations will increase consumption and decrease saving only if those who receive the transfer have a higher marginal propensity to consume than those who pay for the transfer. Consider a simple overlapping generations model where people live for two periods, the young earn income, and both young and old consume. Assume that there are no bequests so that the elderly consume all resources. Further assume that there is no uncertainty, the population growth rate is zero, there is only one young person and one old person, and the interest rate is zero. Consumption during both periods of life is chosen in the first period, based on preferences and lifetime income. Define aggregate saving as aggregate disposable income minus aggregate consumption. Then the aggregate saving rate, $S$, is

$$S = \frac{Y_y - T_y - T_o - C_y - C_o}{Y_y - T_y - T_o}$$  \hspace{1cm} (2)$$

where $Y_y$ is income earned by the young, $T_y$ and $T_o$ are taxes paid by the young and old, respectively, and $C_y$ and $C_o$ are consumption by the young and old, respectively.
Suppose the government introduced a one-time, temporary transfer in period $t=1$ where the government collects a tax, $T$, from the young and transfers it to the elderly. Social Security retirement payments, which pay current retiree benefits from the tax revenues from current workers, is an example of such a program. If this is the only tax and transfer program, then $T_y=T$ and $T_o=-T$. The creation of this program leaves aggregate disposable income unchanged at $Y_y$ ($=Y_y - T + T$), but aggregate consumption rises, since there is a transfer from high- to low-savers. To see this, note that the remaining lifetime resources of the elderly, those born in period $t=0$, rises since they pay no tax. Thus, elderly consumption, $C_o$, will increase. Remaining lifetime resources of the young, those born in period $t=1$, will fall, since the temporary nature of the transfer means that they will not receive a transfer when old. They will respond by cutting consumption in both periods of life. However, aggregate consumption, $(C_o + C_y)$, rises since the rise in $C_o$ is greater than the fall in $C_y$. The elderly have a greater marginal propensity to consume than the young, since they are in the last period of life and leave no bequest.\(^{18}\) Since aggregate disposable income is unaffected and aggregate consumption rises, the aggregate saving rate falls. Suppose, instead, that the young expect the newly created transfer program to be permanent rather than temporary. Then they will expect to receive the same transfer, $T$, when they are retired and will therefore expect no change in remaining lifetime resources.\(^{19}\) In this

\(^{18}\) Many studies, such as Barry Bosworth, Gary Burtless, and John Sabelhaus, (1991) "The Decline in Saving: Evidence from Household Surveys," Brookings Papers on Economic Activity, no. 1 (1991): 183-256, and Gokhale, Kotlikoff, and Sabelhaus, find that the elderly consume a larger fraction of additional resources than other age-groups.

\(^{19}\) Since the interest rate is zero in this simple example, resources in both periods are simply added to get the present value of lifetime resources.
case, $C_y$ will not fall. Aggregate consumption, $(C_o + C_y)$, will rise more and the aggregate saving rate will fall more with the introduction of a permanent rather than a temporary transfer scheme. Thus, the creation of a public intergenerational transfer program will therefore lower the saving rate whether it is temporary or permanent.

How does the introduction of this transfer scheme alter the generational account of elderly, young, and future generations? Since the generational account is the sum of current and future taxes minus transfer payments, the generational account of each generation is zero before the introduction of the transfer program. Once the program is introduced in period $t=1$, the generational account of the elderly is equal to $-T$. If the transfer program is expected to be permanent, then the generational account of the young is equal to zero ($=T-T$). In order to calculate the generational account of future generations, note that the generational accounts of all living generations sum to $-T$. If the government's long-run budget constraint is satisfied, in the sense that it collects enough taxes to pay for transfers, then future generations must pay taxes equal to $T$. This is the gain to the first elderly generation. Therefore, creating a public

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20 Notice that even though there has been intergenerational redistribution, the government's budget is balanced and the deficit is zero, since the tax collected from the young is equal to the transfer payment made to the elderly. This illustrates the futility of the deficit as an indicator of intergenerational fiscal policy. According to Kotlikoff, *Deficit Delusion*, generations that focus on the deficit are subject to “deficit delusion.”

21 Assume that government expenditures and net wealth are zero.
intergenerational transfer program lowers the generational account of the current elderly and raises the generational account of future generations.\textsuperscript{22}

To summarize, increasing transfers to the elderly and raising taxes on the young will decrease the aggregate saving rate, lower (or make more negative) the generational accounts of the elderly, and raise the generational accounts of future generations. But how are net taxes to the elderly best measured? Social Security redistributes resources across generations, but so do programs such as Medicare, welfare, and Food Stamps. Taxes such as property and income taxes redistribute resources as well. Ultimately, it is the resource impact of all programs that are relevant to consumption and saving decisions. Changes in generational accounts, since they measure all net taxes paid, are a good way of measuring the impact of transfers and taxes on generational resources. The next two sections determine when saving rates and generational accounts changed the most 1960-2000.

\section*{SAVING RATES 1960-2000}

By every important measure current U.S. saving rates are the lowest they have been in forty years.\textsuperscript{23} The personal saving rate, defined as personal saving divided by disposable income in

\textsuperscript{22} In this example, the generational account of the current young will rise if the program is temporary, since a public transfer to the current elderly must be paid for either by the current young or future generations.

\textsuperscript{23} A large literature on the downturn in saving includes Lawrence Summers and Chris Carroll, "Why is U.S. National Saving So Low?" \textit{Brookings Papers on Economic Activity} 2, (1987): 607-642; Bosworth, Burtless, and Sabelhaus, and Martin Browning and Annamaria Lusardi,
the national income and product accounts (NIPAs), fell to one percent in 2000. When did the aggregate saving rate begin to fall? Figure 1 presents three different definitions of saving rates from the 2000 benchmark revision of the NIPAs. Saving rates display considerable year-to-year variation, but it is still possible to note changes in the trend in saving. The saving rate rose from 7.2 percent in 1960 to 10.9 percent in 1982. That rate began to fall in the mid-1980s and began an even greater drop in the 1990s. Two other measures of saving display a similar pattern. The first measure of saving comes from the Flow of Funds accounts, which is based on changes to household net wealth including durable goods and government pensions. This saving rate is personal saving divided by disposable personal income. The second divides total private saving by disposable income, where private saving is personal saving plus corporate retained earnings. Thus, private saving is a measure of saving by both the household and corporate sector. Both of these saving rates were fairly constant until the 1980s and fell over the next two decades.

Broader measures of saving rates show a similar decline starting in the 1980s. Gokhale, Kotlikoff, and Sabelhaus define the “net national saving rate” as net national product minus household and government expenditures divided by net national product. Their second saving rate, the “household saving rate,” is net national product minus household and government


expenditures divided by net national product minus government expenditures. Both saving rates are shown in Table 2 and, in each case, the largest percentage point drop in the saving rate was in the 1980s and the 1990s. Gale and Sabelhaus adjust private saving in the NIPA and the Federal Reserve's flow of funds accounts for inflation, durable purchases, treatment of government employee pensions, and other factors. The first saving rate is private savings as a percent of GDP from the adjusted NIPAs. The second saving rate is combined corporate and household net saving divided by disposable income from the Flow of Funds accounts. These adjusted saving rates show a general decline in saving rates from 1960-1998, although the decline is greatest in the 1990s. Browning and Lusardi review the literature on the saving rate decline and call attention to the "abruptness of the change in the aggregate series in the mid-1980s." This decline in saving rates is reflected in the increase in consumption that Parker finds. He determines that the consumption-GDP ratio began increasing after 1980. It seems, therefore, that any explanation for the decline in saving rates must be consistent with a break in saving behavior in the 1980s and 1990s.

[Table 2 about here]

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26 Browning and Lusardi, 1825.

27 Parker, 1 and Figure 1b.
GENERATIONAL ACCOUNTS 1960-2000

*Generational Accounts of the Elderly*

Did the generational accounts of the elderly fall the most in the 1980s and 1990s? Figures 2 and 3 plot male and female real per capita generational accounts by age in 1960, 1970, 1980, 1990, and 2000. These are the generational accounts of a typical member of a given age divided by the population of that age in constant 1996 dollars. The average newborn male in 1960 could have expected to pay about $250,000 in discounted net taxes over his lifetime. In the same year, a 60-year old could have expected to just break even in lifetime net taxes for the remainder of his life while a 70-year old could have expected to receive about $10,000 more in discounted transfers than he paid in taxes over his remaining lifetime. The average newborn female in 1960 could have expected to pay about $85,000 in discounted lifetime net taxes while a 55-year old could have expected to receive about $52,000 in net taxes over her remaining lifetime. In 1960, the typical 33-year old expects to just breaks even.

[Figure 2 about here]

[Figure 3 about here]

Figures 2 and 3 shows that since 1960, net taxes paid by the young have risen while net taxes paid by the elderly have fallen. However, elderly per capita generational accounts fell steadily over the period rather than abruptly in the late 1980s. For example, the typical 70-year old male generational account was -$10,000, -$66,000, -$106,000, -$157,000, and -$241,000 in 1960, 1970, 1980, 1990, and 2000, respectively. Seventy-year old females faced generational accounts
of -$29,000, -$100,000, -$141,000, -$189,000, and -$281,000 in 1960, 1970, 1980, 1990, and 2000, respectively. Increases in Social Security and Medicare benefits are mainly responsible for the increased transfers to the elderly. At the same time, generational accounts of the young rose due to increased wage and income tax collections.

If taxes and transfers remain a fixed fraction of income, then the dollar amount of transfers to the elderly and taxes on the young will increase over time if successive generations have higher incomes. The aggregate saving rate should not change if transfers and taxes are rising along with income. Is the rise in transfers and taxes only due to rising incomes of later-born generations? Between 1960 and 2000, real GDP per capita rose at a 2.29 percent annual rate. If this growth rate continues, then each generation will have a lifetime income of twenty-five percent (\(=1.0229^{10}\)) greater than the generation born ten years earlier. The generational account of the typical 70-year old male was 560 percent, 60 percent, 48 percent, and 54 percent greater in absolute magnitude compared to ten years earlier in 1970, 1980, 1990, and 2000, respectively. The generational account of the typical 70-year old female was 245 percent, 41 percent, 34 percent, and 49 percent greater compared to ten years earlier in 1970, 1980, 1990, and 2000, respectively. Thus, changes in elderly generational accounts stemmed in large part from changes in policy in addition to income growth.

Table 3 presents a closer look at changes to the generational accounts for the 65-year old, 75-year old, and 85-year old age groups. Consider generational accounts of 65-year old males. From 1960 to 1980, they fell by $95,578 but they fell by $124,701 from 1980 to 2000. However,

\[28\] Bureau of Economic Analysis.
the drop was 1066 percent over 1960-1980 compared to only 119 percent from 1980-2000.
Additionally, the drop in the generational account was far greater after adjusting for growth.
This growth-adjusted change is equal to the difference between the actual generational account at
the end of the period and the predicted generational account, where the predicted account is
calculated by increasing the account at the beginning of the period by an annual growth rate of
2.29 percent. For example, if the generational account of 65-year old males grew after 1960 at
the same rate as the economy, then it would be -$14,109 in 1980. However, the generational
account was actually $104,547 in 1980, so the growth-adjusted change is $90,438. By contrast,
the growth-adjusted change was only -$64,796 less in 2000. For both 65-year old and 75-year
old males and females, growth-adjusted changes to the generational accounts were greater 1960-
1980 than from 1980-2000. Only in the 85-year old age group is the growth-adjusted change
greater from 1980-2000 than from 1960-1980, but the difference is very small.

[Table 3 about here]

Even if per capita generational accounts grew steadily from 1960-2000, it may be that total
resources transferred rose if the elderly population rose. From 1960-2000, the population aged
sixty-five was 9.2 percent, 9.8 percent, 11.3 percent, 12.6 percent, and 12.4 percent in 1960,
accounts display a steady change from 1960-2000, just as do per capita generational accounts.

The total generational account of all 70-year old males was -$5 billion, -$36 billion, -$70 billion, -$122 billion, and -$202 billion in 1960, 1970, 1980, 1990, and 2000, respectively. All 70-year old females faced total generational accounts of -$17 billion, -$72 billion, -$122 billion, -$190 billion, and -$285 billion in 1960, 1970, 1980, 1990, and 2000, respectively. Thus, total resources transferred to the elderly increased about as much before 1980 as after.

Transfers to the elderly increased in every decade since the 1960s. If increased transfers to the elderly were responsible for the drop in the saving rate, then one would expect to find the largest increase in transfer payments during the 1980s and 1990s. Instead, elderly generational accounts fell about the same from 1960 to 1980 as from 1980 to 2000. This timing evidence suggests that transfers to elderly generations did not cause the saving rate to fall.

**Generational Accounts of Future Generations**

The example from a previous section showed that when transfers to the elderly increase, resources are transferred from future to current generations and the saving rate falls. Did transfers from future to current generations begin in the 1980s and 1990s? To answer this, one can compare the generational account of future generations to the account of newborns. Consider the year 1960. Given expectations regarding future taxes, transfers, and government expenditures in 1960, and given government net wealth in 1960, the government long-run budget constraint (1) can be used to calculate the generational accounts of future generations born after 1960. Table 4 shows real per capita generational accounts of future generations in 1960, 1970, 1980, 1990, and 2000. For example, in 1960, future males could expect to pay $483,158 in discounted lifetime net taxes. By 1970, the amount future males could expect to pay increased to $527,993. Finally, in the year 2000, future males could expect to pay $382,024 over their
lifetimes in net taxes. Future male generational accounts averaged much higher in 1960 and 1970 than in 1990 and 2000. The same finding holds for females, although the differences are not as pronounced. In 1960, a future female could expect to pay $162,370 in discounted net taxes over her lifetime, while in 2000, a future female could expect to pay $162,825. As Table 4 shows, transfers from future to living generations were not rising during the period when saving rates were decreasing.

[Table 4 about here]

Table 4 shows the ratio of future to newborn per capita generational accounts 1960-2000. By construction, this ratio is the same for males and females. In 1960, future generations could expect to pay ninety percent more in lifetime net taxes than newborns in 1960. By 2000, future generations could expect to pay only forty-six percent more than someone born in 2000. In every decade since 1960, the burden on future generations fell relative to newborns.

The data do not show evidence of increasing transfers from future to living generations after the mid-1980s—the period when saving rates began to decrease the most. While transfers from future to current generations were taking place in each year, transfers were greatest in the decades before 1980.

CONCLUSIONS

This paper asks whether households adjust consumption and saving when generational accounts change. It extends the time period of Gokhale, Kotlikoff, and Sabelhaus through 2000 and reports the generational accounts of future generations. First, the data show that over the period
1960-2000 elderly generational accounts dropped steadily rather than abruptly. Second, the generational accounts of future generations, measured both in constant dollars and as a fraction of newborn accounts, were no higher in 2000 than in 1960. This paper finds that changes in resource redistribution between generations do not coincide with the dramatic downturn in the saving rate that began in the mid-1980s.

These results do not mean that public intergenerational transfers will not affect behavior. First, households may make compensating private intergenerational transfers, such as bequests, to counter public taxes and transfers. Also, households will adjust saving behavior based on their expectations about future taxes and transfers, and those expectations may be different from those embedded in these generational accounts. Finally, a substantial lag may exist between generational policy changes and saving rate changes. Consider Medicare for example. Households may not have come to expect large medical benefits until a decade or two after the program was created in the 1960s. That means that the elderly of the 1980s adjusted their savings rather than the elderly of the 1960s. These are areas for further research and beyond the scope of this paper. The important finding for policy makers, however, is that it may take decades for saving behavior to respond to generational account changes.

Even if generational accounts do not explain the decline in the saving rate, policy makers may continue to be concerned about the rise of intergenerational transfers. Public budgeting and finance experts will likely use generational accounting to answer efficiency and equity questions.
regarding generational policy. However, as Sturrock notes, “Generational accounts might complement but cannot replace the deficit.”  

NOTE

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30 Sturrock, 64.
APPENDIX

Generational Account Methodology

Generational accounting methods and data sources are described in Auerbach and Kotlikoff, Auerbach, Gokhale, and Kotlikoff, Fiscal Policy, and Auerbach, Gokhale, and Kotlikoff, Deficit Accounting. As defined in the introduction, generational accounts are the present value of remaining net taxes that a generation expects to pay to federal, state, and local governments. They do not include past taxes paid and transfers received. The net tax payment in any year is the sum of taxes paid minus transfers received. Taxes include income, wage, excise, capital, and property taxes, while transfers include Social Security benefits, health insurance, family assistance, general welfare benefits, unemployment insurance, and Food Stamps. Following Auerbach, Gokhale, and Kotlikoff, Deficit Accounting, Social Security transfers include old age, survivors, and disability insurance, and federal and state supplementary security income payments. Health insurance includes federal Hospital Insurance and supplementary medical insurance and state medical care. Family assistance includes Temporary Assistance to Needy Families and the previous Aid to Families with Dependent Children. Income taxes include both federal and state taxes. The wage tax includes employer and employee contributions to old age, survivors, disability, and health insurance, federal and state collections for unemployment insurance, and supplemental medical contributions. The excise tax includes, among others, alcohol and sales tax, customs duties, and the business portion of property taxes. The capital tax includes, among others, federal and state corporate profit taxes and estate taxes. Property taxes include the non-business portion of property taxes.
A generation is defined as all individuals born in the same year and of the same sex. A birth-sex cohort's generational account is the present value of expected remaining lifetime net tax payments by the cohort. Following Auerbach and Kotlikoff one can write the generational account, \( N_{t,k} \), in year \( t \) of the cohort born in year \( k \) as

\[
N_{t,k} = \sum_{s=k}^{k+D} T_{s,k} P_{s,k} (1 + r)^{-(s-k)}
\]

where \( \kappa = \max(t,k) \), \( T_{s,k} \) is projected average net taxes paid in year \( s \) by someone in cohort \( k \), \( P_{s,k} \) is the population of cohort \( k \) in year \( s \), and \( r \) is the discount rate. \( D \) is the maximum length of life, which is assumed to be 110. Since generational accounts don't include past payments, they are not a measure of lifetime net tax burdens. There are male and female generational accounts for each birth year since a cohort is distinguished by sex. Since transfer payments are considered negative taxes, the average net taxes paid, \( T_{s,k} \), is the sum of average taxes and average transfers. Thus \( T_{s,k} \) is

\[
T_{s,k} = \sum_{r=1}^{R} T_{s,k}^r
\]

where \( T_{s,k}^r \) are the expected average tax payments in year \( s \) by someone in cohort \( k \) for the \( R \) individual tax and transfer programs.

To calculate a cohort's average tax payment, the average tax payment by the age is used, since data on average tax payments exist by age rather than by cohort. For instance, the average tax payment made in 2000 by someone born in 1970 is the same as the average tax payment made in 2000 by a thirty-year old. In our notation, since birth year plus age is equal to year, then \( k+i=s \), where \( i \) is age. To calculate a cohort's \( T_{s,k}^r \) for a particular program, one needs the total taxes
collected, the average tax payment by age, and the population by age. To simplify exposition, the following notation makes no distinction between the sexes. Define $T_{i,s}$ as the projected average tax paid by someone age $i$ in year $s$ and $A_{i,s} = T_{i,s}/T_{\text{base},s}$ where $T_{\text{base},s}$ is the average tax paid by the base age. The base age can be any age. $A_{i,s}$ is thus the average tax paid by someone age $i$ relative to someone the base age. If $P_i$ is the population age $i$ in year $s$, then aggregate taxes collected by an individual tax program, $TAX_s$, is

$$TAX_s = T_{\text{base},s} \sum_{i=0}^{110} A_{i,s} P_{i,s}.$$  (a.3)

Once $T_{\text{base},s}$ is calculated, $T_{i,s}$ for all other ages is calculated. Repeating this for each program and summing across programs yields the average net taxes paid, $T_{s,k}$, in year $s$ by members of age $i$ and cohort $k$. Average net taxes in all remaining years of the cohort's life can be calculated in the same way. Using population projections and the discount rate, the cohort's generational account, $N_{t,k}$, is calculated. The generational accounts of all living generations are then calculated using (a.1).

Generational accounts for future generations are determined using the government's long-run budget constraint in year $t$,

$$\sum_{s=t}^{\infty} G_s (1+r)^{-s-t} = W_t + \sum_{k=t-110}^{t} N_{t,k} + \sum_{k=t+1}^{\infty} N_{t,k} (1+r)^{-(k-t)}$$  (a.4)

---

31 As an illustration, suppose that 100 in income taxes were collected and that the length of life is two years. If there are five old and ten young, then $100 = T_y(10) + T_o$, where $T_y$ is the payment by a young person and $T_o$ is the payment by an old person. If each young person pays twice as much as an old person, then $T_y = 2T_o$, and $100 = T_o[2(10)+1(5)]$. Solving this yields $T_o = 4$ and $T_y = 8$. 
where $G_s$ is government spending in year $s$, $W_t^g$ is government net wealth (equal to the negative of the stock of government debt), and $N_{t,k}$ is the generational account of the cohort born in year $k$. The government's budget constraint is summed over both male and female generational accounts and, once again, sex subscripts are deleted to ease notation. The term on the left side is the present value of future government spending on goods and services. The first term on the right side, government net wealth, is the current stock of outstanding debt. The second term on the right is the sum of generational accounts of living cohorts. The third term is the sum of generational accounts of all future cohorts. Since the generational accounts of future generations, $N_{t,k}, k>t$, are discounted to year of birth, $k$, they must be discounted to year $t$ in order for the budget constraint to hold. This long-run budget constraint says that all current and future government spending must be paid for either by government assets or taxes on living and future generations.

Once the generational accounts of living generations, net government wealth, and future government spending are determined, the sum of the generational accounts of future generations is calculated using (a.4). Following Auerbach and Kotlikoff the sum is distributed such that all future generations face the same per capita generational account, $N_{t,k}/P_{t,k}$, at birth plus an adjustment for growth. In this paper per capita future generational accounts grow at the same rate as nominal GDP grows.

**Generational Account Data Sources**

The generational accounts in any year are forward looking since they are based on expected future values rather than historical values. In order to calculate generational accounts of living generations, one must project the expected future U.S. population by age and sex, expected
future average taxes and transfers by age and sex, and expected future aggregate taxes and transfers. Wherever possible, the assumptions and data sources are consistent with Gokhale, Kotlikoff, and Sabelhaus.

The population by age and sex comes from the Census Bureau. For years 1960-1999 population estimates are used from the U.S. Census Bureau. For years 2000-2100 population projections are used from the U.S. Census Bureau. In all cases, Census Bureau lifetables are used to extend the projection for each cohort to age 110. The number of births is assumed to be constant after 2110. Relative taxes by age-group and sex, $A_{i,s}$, and a description of how they are


calculated, are found in Auerbach, Gokhale, and Kotlikoff, *Deficit Accounting*.

This paper assumes that relative taxes by age and sex are the same in all years.

The projection of expected future aggregate taxes and transfers, $TAX_e$, uses both actual and projected amounts. Unfortunately, the CBO and other government agencies did not make detailed long-run projections of necessary budget components before the 1990s. Following Gokhale, Kotlikoff, and Sabelhaus, this paper uses actual taxes and transfers through 1999 as an unbiased estimator for expected values. For example, when calculating expected future taxes and transfers for 1960, actual taxes and transfers are used through 1999 and projected taxes and transfers are used for the years 2000 and beyond. Thus, generations in past years are assumed to have predicted fiscal policy from 1960 through 2000. Data through 1999 come from the NIPAs. Long-term estimates by the CBO are used for the years 2000-2070. For the years 2000-2010, the "Matches Rate of Inflation" scenario from CBO, *Long-term Budget*, is used and for the years 2011-2070 the "Maintains Total Surplus" scenario is used. Gokhale, Kotlikoff, and Sabelhaus use a modified version of this second scenario in their most recent update of generational accounts. These long-run projections assume that nominal GDP growth slows to three percent by 2070. The nominal GDP growth rate and inflation rate are three percent after 2070. This paper assumes that all tax, transfer, and government spending programs grow at the rate of nominal GDP growth in the long run.

---


Gokhale, Kotlikoff, and Sabelhaus prefer a six percent real interest rate. Diamond argues in favor of using a lower real discount rate that more accurately reflects the government's opportunity cost of borrowing. This is particularly important when using the government's budget constraint (5) to calculate the generational accounts of future generations. This paper uses a nominal discount rate of six percent, which yields, after subtracting the long-run inflation rate of three percent, a three percent real discount rate.
### TABLE 1
Real Per Capital Male and Female Generational Accounts by Age, 2000\(^a\)

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>262</td>
<td>112</td>
</tr>
<tr>
<td>10</td>
<td>298</td>
<td>119</td>
</tr>
<tr>
<td>20</td>
<td>311</td>
<td>109</td>
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<tr>
<td>30</td>
<td>307</td>
<td>73</td>
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<tr>
<td>40</td>
<td>195</td>
<td>-3</td>
</tr>
<tr>
<td>50</td>
<td>34</td>
<td>-113</td>
</tr>
<tr>
<td>60</td>
<td>-160</td>
<td>-244</td>
</tr>
<tr>
<td>70</td>
<td>-241</td>
<td>-281</td>
</tr>
<tr>
<td>80</td>
<td>-164</td>
<td>-199</td>
</tr>
<tr>
<td>90</td>
<td>-98</td>
<td>-119</td>
</tr>
<tr>
<td>Future(^b)</td>
<td>382</td>
<td>163</td>
</tr>
</tbody>
</table>

\(^a\)The present value of remaining lifetime net taxes divided by population of the age-group in thousands of 1996 dollars.

\(^b\)Future is all generations born after 2000.

*Source:* Author's calculations.
### TABLE 2

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gokhale, Kotlikoff, and Sabelhaus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net National Saving Rate(^a)</td>
<td>9.1</td>
<td>8.5</td>
<td>4.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Household Saving Rate(^b)</td>
<td>11.7</td>
<td>10.8</td>
<td>5.9</td>
<td>3.4</td>
</tr>
<tr>
<td><strong>Gale and Sabelhaus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted Private Saving Rate(^c)</td>
<td>10.6</td>
<td>9.0</td>
<td>8.6</td>
<td>7.3</td>
</tr>
<tr>
<td>Corporate and Household Net Saving Rate(^d)</td>
<td>17.2</td>
<td>16.7</td>
<td>15.2</td>
<td>11.2</td>
</tr>
</tbody>
</table>

\(^a\)Equals Net National Product minus household and government consumption divided by Net National Product. Calculated from the NIPA.

\(^b\)Equals Net National Product minus household and government consumption divided by Net National Product minus government consumption. Calculated from the NIPA.

\(^c\)Calculated from the NIPA.

\(^d\)Calculated from the Flow of Funds Accounts.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>male generational accounts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 65</td>
<td>Change(^b)</td>
<td>-95,578</td>
</tr>
<tr>
<td></td>
<td>Percent decrease(^c)</td>
<td>1066%</td>
</tr>
<tr>
<td></td>
<td>Growth-adjusted change(^d)</td>
<td>-90,438</td>
</tr>
<tr>
<td>Age 75</td>
<td>Change</td>
<td>-80,175</td>
</tr>
<tr>
<td></td>
<td>Percent decrease</td>
<td>1186%</td>
</tr>
<tr>
<td></td>
<td>Growth-adjusted change</td>
<td>-76,300</td>
</tr>
<tr>
<td>Age 85</td>
<td>Change</td>
<td>-47,387</td>
</tr>
<tr>
<td></td>
<td>Percent decrease</td>
<td>3173%</td>
</tr>
<tr>
<td></td>
<td>Growth-adjusted change</td>
<td>-46,532</td>
</tr>
<tr>
<td><strong>female generational accounts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 65</td>
<td>Change</td>
<td>-111,410</td>
</tr>
<tr>
<td></td>
<td>Percent decrease</td>
<td>293%</td>
</tr>
<tr>
<td></td>
<td>Growth-adjusted change</td>
<td>-89,635</td>
</tr>
<tr>
<td>Age 75</td>
<td>Change</td>
<td>-99,053</td>
</tr>
<tr>
<td></td>
<td>Percent decrease</td>
<td>517%</td>
</tr>
<tr>
<td></td>
<td>Growth-adjusted change</td>
<td>-88,081</td>
</tr>
<tr>
<td>Age 85</td>
<td>Change</td>
<td>-55,890</td>
</tr>
<tr>
<td></td>
<td>Percent decrease</td>
<td>555%</td>
</tr>
<tr>
<td></td>
<td>Growth-adjusted change</td>
<td>-50,120</td>
</tr>
</tbody>
</table>

\(^a\)Generational accounts are the present value of remaining lifetime net taxes divided by population of the age-group in thousands of 1996 dollars.

\(^b\)The absolute change to the generational account over the period.

\(^c\)The percent decrease in the generational account over the period.

\(^d\)The actual generational account minus the predicted generational account. The predicted generational account is the generational account at the beginning of the period increased by a 2.29 percent annual growth rate.

Source: Author's calculations.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Future Male</strong></td>
<td>$483,158</td>
<td>527,933</td>
<td>378,955</td>
<td>347,306</td>
<td>382,025</td>
</tr>
<tr>
<td><strong>Future Female</strong></td>
<td>162,370</td>
<td>194,117</td>
<td>146,583</td>
<td>141,316</td>
<td>162,825</td>
</tr>
<tr>
<td><strong>Ratio Future to Newborn</strong></td>
<td>1.90</td>
<td>1.70</td>
<td>1.63</td>
<td>1.57</td>
<td>1.46</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Constant 1996 dollars.

\textsuperscript{b}Future generation per capita generational account divided by age-0 per capita account.

\textit{Source:} Author's calculations.
Personal saving is household sector saving. Private saving equals personal saving plus undistributed corporate profits. All saving is net of fixed capital consumption. FFA saving includes changes to consumer durables.

FIGURE 2
Real Per Capita Male Generational Accounts by Age, 1960-2000a

\[ \text{Present value of remaining lifetime net taxes divided by age-group population in constant 1996 dollars.} \]

Source: Author's Calculations.
FIGURE 3
Real Per Capita Female Generational Accounts by Age, 1960-2000

*Present value of remaining lifetime net taxes divided by age-group population in constant 1996 dollars.

Source: Author's Calculations.