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**THE BURDEN OF GERMAN UNIFICATION:
A GENERATIONAL ACCOUNTING APPROACH**

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ABSTRACT

Germany recently introduced several unification-related tax measures for financing resource transfers to support the eastern economy. This paper assesses the generational stance of postunification German fiscal policy and estimates the burden of unification-related fiscal measures on West German generations. It finds that postunification German fiscal policy is, generationally speaking, imbalanced: Future generations will bear 22 percent larger lifetime net tax burdens than current newborn German generations. Most of the burden of the tax increases falls on young and working-age generations. Additional tax increases or spending reductions are required to produce a generationally balanced fiscal policy.

I. Introduction

The fall of the Berlin wall in 1989 initiated the process of unifying the very different economies of East and West Germany. Initial euphoria over unification has been replaced by apprehension about the likely costs of financing the eastern region's transition. So far, the transition has necessitated large annual resource transfers -- exceeding 5 percent of western GDP -- to support economically dislocated eastern residents and to improve the eastern public infrastructure and industrial base. These transfers, which are expected to continue for a number of years, will surely impose sizable additional burdens on living and future German generations, especially on those residing in the West. Recent legislation has enacted various tax measures, including a surcharge on income taxes, to help defray the costs of these transfers.¹

This paper evaluates the generational stance of postunification German fiscal policy and assesses how the burden of unification is being spread across different West German generations. The estimation uses the technique of generational accounting (Auerbach, Gokhale, and Kotlikoff [1991, 1992]). It finds that, from a generational perspective, postunification German fiscal policy is imbalanced. The paper assesses the sensitivity of the imbalance to alternative assumptions regarding 1) future interest and growth rates and 2) the number of years for which the income tax surcharge is kept in place. It indicates the extent of additional spending, benefit cuts, or tax increases that

¹ See the Federal Consolidation Program (*Gesetz zur Umsetzung des federalen Konsolidierungsprogramms*) of July 6, 1993. Most of the measures are permanent; the income tax surcharge is, however, expected to continue only as long as is deemed necessary to complete the process of transition.

would be needed to fully restore generational balance in German fiscal policy. Finally, it compares German and U.S. fiscal policies from a generational perspective.

The main results of the paper are that, under the postunification fiscal policies, unborn German generations face lifetime net tax payments that are 22 percent larger than those of current newborn generations, after adjusting for economic growth. Furthermore, most of the burden of unification is borne by young and middle-aged western residents -- those age 55 or less. The introduction and maintenance of the income tax surcharge reduces but does not eliminate the imbalance in German fiscal policy. Income taxes need to be increased permanently by another 9 percent, on average, to achieve a balanced fiscal policy. Finally, the paper finds that German fiscal policy is not as severely imbalanced as that of the United States under current policy projections.

The paper continues in section II with a description of the macroeconomic aspects of unification. Section III briefly describes the method of generational accounting. Section IV contains a description of the data used in the analysis. Section V describes the findings and their sensitivity to alternative assumptions and policy scenarios. Section VI compares baseline generational accounts for Germany and the United States, and section VII summarizes and concludes the paper.

II. Macroeconomic Aspects of Unification²

Territorially, East Germany is 44 percent as large as West Germany; in terms of population, it is 24 percent as large. As of 1990, however, East Germany's capital stock

²Broader analysis of the macroeconomic consequences of German unification is found in Lipschitz and McDonald (1990), Sinn and Sinn (1992) and Raffelhüschen (1994).

was only about 10 percent as large as that of West Germany. This deficiency was mainly due to the obsolete technology embodied in the East German capital stock. Hence, immediately after the German economic, monetary, and social union (GEMSU) in July 1990, eastern GDP per capita amounted to only 26.3 percent of the western figure.

GEMSU replaced the East German mark (M) with the deutsche mark (DM), lifted all economic barriers, and extended the western social insurance and legal systems to cover eastern residents. One common market was established, ending all restrictions on capital flows and leaving people free to relocate. On October 3, 1990, the former German Democratic Republic (GDR) joined West Germany as five new states in the German federal structure.

Before unification, East German productivity suffered because of a highly distorted allocation of resources. Factor prices did not reflect capital and labor scarcities, commodity prices did not signal market demands, and international trade was mostly restricted to the Council for Mutual Economic Assistance (CMEA). Moreover, most of the physical capital was outdated. After unification, central planning had to be replaced by a framework involving competitive markets. In introducing reforms, Germany chose a “big bang” approach.

Prior to GEMSU, eastern labor productivity and per capita output amounted to roughly one-third of the western levels. The training of the eastern labor force, however, was apparently similar to that of the West. Hence, the gap in labor productivity was mainly due to scarcity of capital. Indeed, according to Sinn and Sinn (1992), roughly two-thirds of the eastern physical capital embodied obsolete technology. With nominal wages

at about one-third of the western level, a one-for-one conversion between the two currencies seemed appropriate. However, GEMSU's promulgation of this exchange rate induced one of the most dramatic regional depressions in European history. As a consequence of massive demand shocks, eastern product prices fell by 50 percent, on average, between May and August of 1990 (Akerlof et al. [1991]), while nominal wages and salaries remained constant. Hence, eastern firms were squeezed between low product prices and high input costs, forcing the closure of many companies that were formerly state owned. Furthermore, the market value of surviving firms targeted for privatization by the German Trust Fund (*Treuhandanstalt*) declined substantially.³

These events caused eastern GDP per worker to drop from a pre-GEMSU level of 33 percent of the western figure to 22 percent by the first half of 1991. Output began to increase by mid-1991, reflecting the typical J-curve effect associated with an adjustment toward a market economy (Siebert [1991]). Labor productivity recovered to the pre-GEMSU level in late 1992. Presently, it is still less than 50 percent of the western level. Although significant transfers of capital and technology were undertaken during the first four years of transition, the rise in productivity was predominantly caused by a substantial decline in labor force participation. Indeed, the industrial labor force decreased from 3.4 million in 1989 to 1.0 million in 1993.⁴

Despite existing unemployment, eastern wages continued to increase rapidly, mainly because both eastern and western labor unions, as well as western employer

³See Akerlof et al. (1991) for a more detailed analysis of the macroeconomic consequences of GEMSU.

⁴See *Deutsche Bundesbank, Monatsberichte*, various recent issues.

associations, insisted on accelerating the pace of wage equalization.⁵ Eastern wages increased from 33.5 percent to 40 percent of the western level within six months after GEMSU, and subsequently increased by 10 percentage points per year. Presently, eastern nominal wages have risen to nearly 80 percent of the western level. While the prices of nontraded goods, like housing, were catching up with those in the West, prices of traded goods remained relatively stable after adjusting to the western level due to GEMSU. Hence, overall price inflation in the East lagged behind the pace of nominal wage increases, which implied growing real wages there.

A widening gap between real wages and the marginal product of labor caused unemployment to rise. Registered unemployment, however, rose from a rate of 5 percent in 1990 to only 15.9 percent by 1993. This official number fails to account for a significant number of involuntary short-time employees and early retirees, as well as those participating in retraining or labor creation programs. A more accurate estimate that takes these factors into account has eastern unemployment rising from a rate of 16.3 percent to 32.1 percent during the same period (Raffelhüschen [1994]). Even this figure may understate the unemployment rate by about 5 percentage points because it excludes workers in nonviable firms kept afloat by grants from the *Treuhandanstalt*.

These macroeconomic events obviously have serious fiscal implications. First, the eastern region's extraordinarily large need for public goods, services, and assistance must be met, in order to ensure a socially tolerable transition. This includes support for

⁵ Sinn and Sinn (1992) labeled this a "strategy of prohibiting employment." Eastern labor unions were, obviously, in favor of quick wage increases. Western labor unions feared pressure on western wages, and western employer associations were afraid of competition from goods produced with cheap labor in the East.

unemployed individuals, social security benefits for old and early-retiring workers, income support for nonmarket employed persons, welfare payments for the needy, etc. In addition, direct infrastructure investments and private investment subsidies will be necessary for a successful long-term strategy of economic development. On the other hand, the current low productivity implies a small tax base in the East. Although the eastern population exceeds 20 percent of the total, tax revenue from the East constituted only 6.5 percent of all tax revenue in 1992 (Council of Economic Advisors SVR [1993]). Financing the transition, therefore, necessitates massive transfers from the West to the eastern regions.

Net transfers of \$25 billion totaled 1.6 percent of the western GDP in 1990.⁶ As shown in table 1, these transfers grew to over 5 percent of western GDP in subsequent years. In 1992, roughly two-thirds of these transfers were allocated for income support, one-fourth went toward public infrastructure investments, and the remainder was used for providing investment incentives for eastern firms (Bräcker and Raffelhüschen [1994]). These large regional transfers compelled the German government to end an era of tax and expenditure reductions that had led to falling public-debt-to-GDP ratios in the 1980s. Funding the transfers required substantial increases in both taxes and deficits.

The various tax amendments, however, produced additional revenue of only about 1 percent of western GDP annually during the years 1991 through 1993. The remaining net transfer was financed through higher public deficits. This increased the ratio of total public debt to western GDP from 47.6 in 1991 to 59.7 in 1993. In 1994, higher gasoline taxes and projected growth in revenue from value-added taxes are expected to almost

⁶ Throughout the analysis we assume an exchange rate of DM 1.56 per dollar.

double the contribution of taxes as a percentage of western GDP to 1.9 percent. In addition, beginning in 1995, the reintroduction of the income-tax surcharge is expected to boost the contribution of taxes to 3.1 percent of western GDP. Despite the additional tax measures in 1994 and 1995, the ratio of debt to western GDP is projected to rise further. However, the rate of increase of this ratio is likely to be somewhat lower than in the past three years.

The tax initiatives of the last three years imply that the burden of unification will be partially borne by generations alive today. But will future generations bear a disproportionate share? To measure the cross-generational distribution of the burden, we have developed generational accounts for pre- and postunification Germany. In this analysis, we incorporate projections of revenue and spending until 1995, based on the macroeconomic and fiscal aspects of the transition process as outlined above.

III. Methodology of Generational Accounting⁷

Generational accounting begins by considering the government's intertemporal budget constraint as shown in equation (1):

$$(1) \quad \sum_{s=t}^{\infty} G_s(1+r)^{t-s} = W_t^g + \sum_{s=0}^D N_{t,t-s} + \sum_{s=1}^{\infty} N_{t,t+s} .$$

The left-hand side of equation (1) discounts and adds together the projected government consumption spending for every future period s , G_s . The discounting is done at an assumed pretax real interest rate, r . This present value of spending must be paid for

⁷ This section contains only a brief description of the method of generational accounting. For a more detailed explanation, see Auerbach, Gokhale, and Kotlikoff (1991).

out of three possible sources: 1) the current net worth of the government, 2) the present value of net tax payments projected to be made by generations presently alive, or 3) the present value of net tax payments by future generations. In equation (1), W_t^g represents the government's net worth in the base period, t . Let D denote the maximum age, and let $N_{t,k}$ stand for the present value of the net tax payments, that is, taxes net of transfer receipts, to be made in future years by all members of the generation born in year k . The second term in equation (1), then, equals the sum of the present value of net taxes of all generations alive in year t . The third term in the equation is the sum of the present value of net tax payments made by generations born in year $t+1$ and later.

The condition of intertemporal balance can also be viewed as a financing constraint: A policy change that alters one of these components must be accompanied by a corresponding change in one or more of the other terms to "finance" the first change. For example, policies that reduce projected net tax payments from living generations as a whole must be accompanied by either a reduction in the present value of government spending or an increase in the present value of net taxes paid by future generations, or both.⁸ The term $N_{t,k}$ is defined as

$$(2) \quad N_{t,k} = \sum_{s=\max(t,k)}^{k+D} T_{s,k} P_{s,k} (1+r)^{t-s}.$$

In equation (2), $T_{s,k}$ refers to the *average* net payment made in year s by members of the generation born in year k , while $P_{s,k}$ stands for the number of members of the generation born in year k who survive until year s . The summation begins in year t for generations

⁸ Note that in the base period t , government net worth is given and (usually) cannot be altered through a change in policy.

born prior to year t . For future generations -- those born in year $k > t$ -- the summation begins in year k . Irrespective of the year of birth of a generation, the discounting is always back to year t . Dividing the $N_{t,k}$'s for a given generation by the population of that generation in the base year, $P_{t,k}$, yields the actuarially discounted per capita net payment of that generation, $n_{t,k}$. This number is the "generational account" of the generation born in year k .

It should be emphasized that generational accounts encompass only taxes paid net of transfers received. They do not attribute government spending for the provision of public goods and services (alternatively labeled as the sum of government investment and consumption spending) to particular generations. Thus, generational accounts should not be interpreted as reflecting the full burden or benefit of government policy as a whole. Rather, they should be viewed as reflecting the per capita burden on particular generations of financing public spending as a whole. Thus, generational accounts' calculations are particularly useful in evaluating the redistribution, among living and future generations, of net-payment burdens arising from policy changes that affect only taxes and transfers.

Having estimated the left-hand side and the first two terms on the right-hand side of equation (1), the last term can be inferred as a residual. This term represents the total payment in time- t present value that future generations must make if intertemporal budget balance is to hold. How the burden of this required payment will *actually* be distributed among future generations is uncertain as of time t , because this distribution will be determined by policies adopted in the future. For illustrative purposes, however, we divide this residual payment equally among all future generations (those born in time $t+1$

and later). German population projections, derived and extended using official statistics, are used to perform this calculation. The distribution is equal among future generations except for an adjustment for productivity growth: Each future generation makes a net payment that is $(1+g)$ times larger than that of the generation born in the preceding year, where g is an assumed rate of growth in labor productivity.

It should be noted that generational accounts are prospective calculations: They show the present value of *future* net payments per capita for all generations. Past tax payments and transfer receipts of living generations are not included in the calculations. Thus, they represent present-value net payment burdens over the entire lifetimes only for newborn (those born in year t) and future generations. A comparison of these generations' accounts can be used to reveal whether the current set of policies are generationally balanced. The generational account for the newborn generation reflects its prospective net-payment burden under the assumption that it (and all older generations) will be treated over its entire lifetime according to the prevailing set of policies. If the resulting future generations' generational account is larger than the newborn generation's account by more than the assumed rate of growth, the current set of policies are said to be imbalanced. Imbalanced fiscal policies that impose larger burdens on future generations are also unsustainable: If kept in place, such policies imply that an ever-growing share of future generations' incomes may have to be taxed away.⁹

⁹ This assumes that future generations' income also grows at rate g . For detailed discussions of intergenerational equity, imbalance, and the sustainability of fiscal policy, see Kotlikoff (1993) and Kotlikoff and Gokhale (1994). See also Budget of the United States Government, Analytical Perspectives, Fiscal Year 1995, chapter 3.

IV. Data Description

From equation (2) it is apparent that the calculation of future net payments $N_{t,k}$ for presently living generations requires two projections. First, we need a gender-specific population projection, as described in subsection A. Second, all future taxes paid and transfers received have to be estimated by age and sex. The data description for this procedure is contained in subsection B. In order to derive the net payments of all future generations according to equation (1), we need to specify net government wealth and future government spending. These are the subjects of subsections C and D, respectively. In subsection E, we discuss our choice of the interest rate for discounting future payments and receipts, and of the rate of growth to account for future increases in productivity and output. Finally, subsection F specifies the adjustment of capital income taxes according to the German system of investment incentives.

A. Population

Starting from the eastern and western German population structures in 1992, we initially follow the official baseline population projections of the German Bureau of the Census (*Statistisches Bundesamt* [1993]) that take into account estimates of future fertility and mortality rates as well as rates of net immigration. In particular, the 1992 western gross fertility rate is 1.42, whereas the eastern rate is 0.96. Assuming that these rates hold over the entire period, the German population would decrease from about 80 million in 1992 to less than 20 million in 2100 and less than 5 million in 2200. Since this is not realistic, we assume fertility rates to increase linearly in both regions between 2000 and 2040, and to remain stationary at their 2040 level thereafter. This results in a stationary

population of 48 million from 2100 on. We maintain the official estimates for rates of mortality and net immigration.

B. Taxes and Transfers

The aggregate taxes and transfers are obtained from official statistics on German national income and product accounts (*Statistisches Bundesamt* [1993]), government financial statistics (Ministry of Finance, BMF [1993]), and the monthly statistical report of the German central bank (*Monatsbericht der Deutschen Bundesbank*, recent issues).

Public revenues include taxes on labor and capital income, as well as gasoline taxes, value-added taxes, excise taxes, insurance taxes, vehicle and other taxes, and seigniorage and social-insurance payroll taxes.¹⁰ Furthermore, we consider transfer payments of the various branches of social insurance, welfare benefits, and housing, child, and maternity support payments. Table 2 quantifies these items in greater detail.

Total taxes and transfers are distributed by age and sex to the regional populations in accordance with relative age-sex profiles applicable to each aggregate. These payment profiles are obtained from microdata surveys, the German Socioeconomic Panel (SOEP), and the Consumer Expenditure Survey (EVS).¹¹

¹⁰ The aggregate for labor income taxes includes taxes on wages, salary payments, and imputed labor income taxes of the self-employed. For the self-employed, the residual represents capital income taxes. Capital income taxes also include corporate taxes, local business taxes on capital, and various minor taxes on wealth and property. Excise taxes include those indirect taxes not included elsewhere, and comprise tobacco taxes and a range of special taxes on commodities.

¹¹ Because of the lack of appropriate data for estimating relative profiles for indirect taxes and welfare benefits for eastern residents, we distribute the aggregates for these items for the entire German population using relative profiles of the West. The profiles for health insurance are obtained from Henke and Behrens (1989).

C. Government Net Wealth

According to the official statistics, government debt, including all off-budget authorities, amounts to \$1,051 billion, of which 22.7 percent is attributed to the eastern region.¹² We correct this number by estimating government assets based on the net income from publicly owned enterprises, land, and other assets (\$286 billion). Thus, our estimate for the government's net wealth is -\$766 billion, which amounts to 39.5 percent of GDP.

D. Government Spending on Goods and Services

Total government expenditures minus expenditures on transfers and subsidies to private firms corresponds to public spending on net investment and provision of public goods and services (government consumption).¹³ As shown in table 2, 1992 government consumption spending amounted to \$382.6 billion, and net investment amounted to \$40.0 billion.

Future government spending on goods and services is projected by assuming that net investment spending grows at a prespecified rate of economic growth after 1992 (see below). The government consumption component takes into account changes in the population structure. As in Auerbach, Gokhale, and Kotlikoff (1991, 1992), we allocate government consumption among three age-specific components, compute per capita consumption in 1992, and assume that the per capita values will remain constant in future years except for an adjustment for economic growth. Future aggregate consumption is

¹² Off-budget authorities include the German Unity Fund, the Debt Liquidation Fund, the Trust Fund, the European Recovery Program, and publicly owned postal, telecommunication, railway, and housing companies.

¹³ In calculating government consumption, we subtracted transfers, subsidies, and net investment expenditures from the sum of total revenue plus the budget deficit (see table 2).

projected by multiplying together these per capita values with future age-specific population projections.

E. Discount and Growth Rates

Baseline calculations use a 5 percent rate of interest for discounting all future receipts and payments.¹⁴ The choice of 5 percent was made to reflect the fact that public receipts and expenditures, while uncertain, are not as volatile as the return on risky assets. Annual productivity growth is set at 1.25 percent in the baseline simulations to approximate the rate of productivity growth in West Germany in the past two decades.

F. Capital Income Taxes

Investment incentives like accelerated depreciation allowances imply a higher tax burden on old capital relative to new capital. This difference in treatment is reflected in the current market evaluation of existing capital. Hence, current owners of capital assets ultimately bear the burden of the tax, due to the differential tax treatment of old and new capital. Following Auerbach, Gokhale, and Kotlikoff (1991) we estimate this tax burden to equal 18 percent of the value of western physical capital, and impose this amount as a one-time tax on living western generations. Our estimation makes use of recent findings on German capital taxation by Leibfritz (1993).

Correspondingly, an adjustment is required for the flow of capital income taxes, since the current flow overstates the burden on future generations. The adjustment is necessary to account for the difference between the marginal tax rate on new capital and the observable average tax rate over both old and new capital. In fact, our estimate of the

¹⁴ Strictly speaking, we should use different discount rates for different taxes and transfers to account for their different risk characteristics (Haveman [1994]). We omitted this adjustment from our calculations, however, because we lack information on the riskiness of these transactions.

adjustment suggests a 36.9 percent downward revision of the flow of western capital income taxes.¹⁵ Since the eastern capital stock is estimated to be largely obsolete, we refrain from similar explicit capital income tax adjustments for the East. Nevertheless, since we assume that the flow of eastern capital income tax payments will adjust to western levels in the future, they include a correction for the difference between marginal and average tax rates, as for the West.

V. Findings

As outlined earlier, unification was initiated with the extension of the social insurance and welfare programs to cover eastern residents, and is being financed through a combination of tax increases and higher public deficits. Because of their lower incomes, however, eastern residents' per capita taxes and transfers are currently lower than in the West. They will approximate western levels only as eastern per capita income and consumption expenditures approach those of western residents. When this will occur depends upon the length of the transition period, which is uncertain. To fix a reference point, our baseline simulations assume that the transition will be completed by the year 2010.¹⁶ During the transition, eastern tax payments and transfer receipts are assumed to rise uniformly, so that equality with western per capita values is achieved in the year 2010. Since the income tax surcharge is supposed to be eliminated upon completion of the transition, the surcharge is removed after the year 2010 in the baseline simulations.

¹⁵ This adjustment seems large but is the result of the rather high rates of marginal capital income taxation in Germany, recently estimated to be over 50 percent.

¹⁶ Brücker and Raffelhüschen (1993) simulate an overlapping generations model for estimating the time required for the catching-up process to be completed. Our choice of the year 2010 is in line with their findings.

A. The Stance of German Fiscal Policy

Tables 3a and 3b show the components of generational accounts as of 1992 for selected male and female German generations. The first item to note is that the “net payment” column shows a significant life-cycle pattern: Younger generations make positive net payments to the government over their remaining lifetimes, while older generations are net recipients. Under the baseline scenario, a 30-year-old male is expected to pay over \$300,000 to the government in present value. A similarly aged female will pay about \$130,000. This is because 30-year-olds currently pay high amounts of labor, payroll, value added, and excise taxes, but will not receive much in social insurance and other transfers for a number of years in the future. On the other hand, a 65-year-old male will receive about \$150,000 from the government, and a female of the same age \$90,000, because of their low present values of tax payments but high present values of transfer receipts, especially from social insurance.

Newborn male generations of 1992 will pay an estimated \$183,000 in present value over their entire lifetimes. The growth-adjusted value of this payment for future male generations is \$224,000, which is about 22 percent larger. The corresponding figures for newborn and future female generations are \$94,300 and \$111,000.¹⁷ This 22 percent differential implies that if our baseline representation of German fiscal policy is correct, future German generations will have to hand over to the government net taxes that are 22 percent larger, on average and after adjusting for growth, than the net payments that current newborns are estimated to make if their fiscal treatment is

¹⁷ The calculations assume that the ratio between the net payments of male and female generations born in the future is the same as that between the net payments of newborn male and female generations.

maintained as under current policy.¹⁸ Thus, a significant generational imbalance remains, despite the income tax surcharge, higher gasoline taxes, and other recent revenue-increasing measures.

Table 4 reports the differential between newborn and future generations' net payments for alternative interest rate (3, 5, and 7 percent) and growth rate (0.75, 1.25, and 1.75 percent) combinations. The differentials range from 6 percent to 23 percent. Thus, the imbalance resulting from postunification fiscal policy in Germany is sustained for a wide range of growth and discount rates.

B. Isolating the Impact of Unification

Table 5 indicates net payments for the western residents alone under baseline assumptions, with and without taxes for unification. Compared to the figures in tables 3a and 3b, western net payments of unification-related taxes are generally higher for younger generations (those whose net payments are positive). This is because similarly aged eastern generations pay less per capita during the transition. Western male generations 65 and older, however, receive relatively more than the overall German average. Again, this occurs because older eastern generations receive lower per capita transfers during the transition. The same is not true for older western women.

To isolate the burden of unification on western residents, we calculated hypothetical generational accounts for the West under a "no unification" scenario, where no unification-related tax increases are imposed on western residents, and government

¹⁸ Note that our baseline assumes that the transition will be completed by 2010. Prolonging the period of transition would imply that only eastern living generations' tax and transfer payments would grow more slowly, and the net impact on the imbalance could go either way. Our calculations indicate that if the transition is assumed to end in 2020 or 2030 (instead of 2010), the imbalance would be 32.4 or 40.2 percent, respectively (instead of 22.4 percent).

spending on goods and services excludes spending on the eastern region. The “without taxes” columns in table 5 show the net payment burdens for western residents for this case. Table 5 also shows the differences in net payments of western residents with and without taxes. Thus, these columns indicate the changes in western net payments due to unification. Western residents of all ages will share in the burden of unification, but the burdens on those age 55 or less are especially large. For example, 25-year-old men and women in the West will contribute an estimated \$30,000 and \$20,000, respectively, toward the costs of unification. Generally, working-age and younger generations (those who will soon enter the workforce) are expected to contribute significantly more than those retired or close to retirement.

Table 6 shows the components of the burden on western residents due to various tax amendments that were adopted for funding German unification.¹⁹ In particular, it reflects the additional burdens resulting from the income tax surcharge that was in place until July 1992 and will be reintroduced in 1995 (shown under “labor income taxes” and “capital income taxes”). The increases in gasoline taxes in 1991, in tobacco taxes in 1992, and in insurance taxes in 1991, 1993, and 1995 are responsible for the large increases in present value burdens (shown under “excise taxes”). Furthermore, we included the 1993 change in the VAT and the 1991 and 1994 increases in payroll taxes for unemployment insurance and social security (shown under “social insurances”).²⁰ Table 6 indicates that

¹⁹ See Raffelhüschen (1994) for a detailed discussion.

²⁰ Changes in burdens due to tax amendments unrelated to unification -- that is, the gasoline tax increase in 1994 and the additional income tax allowances in 1993 -- are not reflected in table 6.

most of the additional net payment burdens arise from indirect taxes for both male and female western generations.²¹

C. Evaluating the Impact of the Income Tax Surcharge

Although the income tax surcharge is expected to be introduced in 1995 and to last as long as is “deemed necessary” for facilitating the process of adjustment, a range of possibilities exists with regard to its adoption and longevity. We explore the consequences of the income tax surcharge by examining the consequences of 1) not enforcing the surcharge at all, 2) adopting the surcharge in 1995 and eliminating it “prematurely” in the year 2000 and 3) adopting and maintaining the surcharge indefinitely. In each case the transition process is assumed to last until 2010.

Table 7 shows the changes in net payment burdens from the three experiments, relative to the baseline. Not adopting the surcharge reduces net payment burdens on 30-year-old males by about \$5,400 and on 30-year-old females by \$2,200. The burdens on future generations rise, as a result of this policy, by \$10,200 for males and \$5,000 for females, implying a net payment burden that is 28 percent larger than that of newborn generations. The results from ending the surcharge prematurely in the year 2000 are qualitatively similar. Adopting and permanently maintaining the surcharge, however, imposes losses on living generations amounting, for example, to \$3,200 for 30-year-old males and \$1,300 for 30-year-old females. Future male generations’ net payments decline by \$9,200 and female generations’ net payments fall by \$4,500. This policy would reduce

²¹ The fact that most of the burden of unification on western generations arises from indirect taxes rather than income taxes may reduce the progressivity of the German tax system. However, intragenerational distribution issues are not the subject of this paper.

the generational imbalance in current German fiscal policy (as approximated in our baseline scenario) from 22 percent to 14 percent.

Introducing and forever maintaining the income tax surcharge only partially reduces the imbalance. Fully eliminating the imbalance will require a permanent 9.3 percent increase in income taxes. Increasing income taxes is, of course, not the only means of removing the imbalance. A 10.5 percent permanent increase in indirect taxes (VAT and excise taxes) or, alternatively, a lowering of social security benefits by 10.4 percent would also restore a balanced fiscal policy. Another method of restoring balance would be to permanently reduce government spending on goods and services by 6.0 percent.

The earlier description of methodology mentioned the usefulness of generational accounting for evaluating the impact on living generations of policies that involve changes in taxes and transfers alone. Table 8 shows the generational distribution of net payment burdens from three of the policies described earlier that equalize the growth-adjusted net payments of newborn and future generations. The policy of increasing income taxes, for example, imposes large burdens on the currently young and working-age male generations, relatively moderate burdens on younger female generations, and very small burdens on all generations aged 60 or more. The table shows that, compared to income taxes, higher indirect taxes distribute the burden with relative equality among younger male and female generations. Also, under indirect taxation, older generations' burdens would be somewhat larger than under income taxation. In contrast, a policy of reducing social security benefits would mainly affect older generations whose burdens rise

considerably more than under the previous two policies. Furthermore, the decline in future male and female generations' net payment burdens is the largest under this policy. It should be noted that under the three policies involving tax increases or benefit reductions, the time profile of annual revenue increases will be different. Because the time path of total government expenditures is kept the same in each case, the pattern of future annual deficits will be different for the three policies. Hence, restoring generational balance in fiscal policy can be consistent with a different time profile of budget deficits. Focusing on deficits alone may, therefore, be a poor and perhaps a misleading method for gauging the stance of German fiscal policy (as noted by Kotlikoff [1993]).

VI. Comparison of Germany and the United States

Table 9 shows broad budgetary aggregates for the United States and Germany as a percentage of their respective GDPs. It is apparent that, relative to the size of the economy, the German government's budget was considerably larger in 1992 than that of the United States on both the revenue and outlay sides. As a fraction of GDP, for example, the sum of the major categories of taxes stood about 14 percentage points higher, and transfer expenditures relative to GDP were 6 percentage points larger, in Germany compared to the United States in the same year.

Table 10 shows current and projected population shares of young, working-age, and elderly groups for Germany and the United States. The table indicates that the proportion of the elderly in Germany has already reached the level that is projected to occur in the United States in the year 2015 and later. Thus, in terms of population aging,

Germany is about 20 years ahead of the United States. Until the year 2025, a larger proportion of Germans than of Americans will be of working age. Early in the next century, however, the share of the elderly in Germany is projected to rise significantly, while that of working-age individuals is expected to decline. Hence, the burden on German workers of supporting the elderly is expected to increase over the next several decades. A similar, though less pronounced, trend is evident for the United States. In both countries, the share of the youngest individuals -- participants in future labor forces -- declines over time.

An aging population, high pension, social security, and health-care benefit levels, and a declining share of working-age and younger generations, all contribute toward producing generationally imbalanced fiscal policies. Table 11 shows generational accounts for the United States and Germany for the year 1992. The columns for Germany are the same as the net payment columns in tables 3a and 3b. Baseline generational accounts for the United States are shown in columns 3 and 4 in table 11. These are computed using baseline revenue and spending projections as described in the Budget of the United States Government, Fiscal Year 1995. To maintain comparability with the German accounts, a discount rate of 5 percent and a growth rate of 1.25 percent are used in the calculations.²² The accounts for both countries indicate imbalanced fiscal policies, but they differ in several respects.

First, younger male and female German generations are slated to pay about one-third more in present value net taxes than do similarly aged generations in the United States. Second, recently retired male generations in Germany receive much more by way

²² See Budget of the United States Government, Analytical Perspectives, Fiscal Year 1995, chapter 3.

of net present value transfers than do those in the United States. All older female generations and the over-75 male generations in the United States receive more in present value, on net, than do their German counterparts. Third, per capita net payment burdens on future American and German generations are roughly similar for both males and females. Fourth, the degree of policy imbalance is much more severe in the United States than in Germany. This result can be explained by noting that direct government spending in the two countries is roughly similar (see table 9), but current policies tax living generations in the United States to a much lesser extent than is the case in Germany. In addition, net payment burdens, especially of females and very old male generations, are much higher in the United States than in Germany, primarily because of the projected rapid increase in U.S. public health insurance outlays. Thus, U.S. fiscal policy favors living generations, especially older ones, far more than German fiscal policy does.

A rapid increase in German health-care outlays is unlikely to occur because such outlays are strictly regulated in Germany. As mentioned earlier, current U.S. policy projections incorporate a high growth rate for federal health insurance outlays.²³ However, if some of the recent proposals for reforming the U.S. health-care system are adopted, growth in public health-care outlays may be significantly reduced. The precise amount and timing of health-care spending reductions is uncertain. However, for

²³ Until the year 2005, annual aggregates for Medicare were taken from projections provided by the United States Office of Management and Budget. Between the years 2005 and 2030, the growth rates for Medicare are based on projections made by the United States Health Care Financing Administration (HCFA). In these projections, Medicare grows between 3 and 4 percentage points faster than the baseline rate of future productivity growth. For Medicaid, HCFA's growth rate projections are used from 1993 on. Growth in Medicaid is especially high in the near term (about 9 percentage points faster than the assumed rate of future productivity growth). Between the years 2005 and 2030, this expenditure grows by between 1 and 3 percentage points faster than productivity. After 2030, the growth rates of both of these expenditures are set equal to the rate of productivity growth.

illustrative purposes, we recompute U.S. generational accounts under the assumption that growth in per capita federal health-care outlays is stabilized, beginning in 1994, to match the rate of population plus productivity growth. As the last two columns in table 11 show, the imbalance in the United States under such a policy (16.3 percent) would be roughly similar to the baseline German level. Compared to the baseline, this policy reduces the U.S. imbalance significantly because it increases the net payments of all living generations and reduces the size of the present-value spending that must be financed through net payments of future generations. Notwithstanding a stabilization of U.S. health-care outlays, elderly females and very old males still receive larger benefits per capita than do their German counterparts, and the net payments of younger generations remain lower than those of similarly aged German generations.

VII. Conclusion

The passage of the last four years has made the economic prospects facing postunification Germany much clearer. This paper focuses on prevailing German fiscal policies, particularly on the fiscal effects of unification for current and future generations. Current (unified) German fiscal policy contains an imbalance in that future generations will be required to make net payments that are, on average and after adjusting for growth, 22.4 percent larger than those of current newborns, if the latter continue to be treated as they are under current policies. Much of the burden of unification is likely to be borne by young and working-age West German males. This burden can be traced to the recent hikes in indirect taxes and to the imminent reintroduction of the income tax surcharge in 1995. If the surcharge is maintained beyond the completion of the transition period early

in the next century, the overall imbalance in German fiscal policy will be substantially lower, although it will not be eliminated entirely. The imbalance can be eliminated through alternative combinations of higher taxes and spending cuts, although the precise incidence of additional burdens among living generations can be very different for different combinations of policies.

Under current policy projections, the imbalance in German fiscal policy is much smaller than the imbalance in the United States because the net payment burdens on younger living generations are considerably higher in Germany.²⁴ Under a policy of stabilizing U.S. public spending on health care, however, the imbalances in the two countries' fiscal policies are similar. Finally, the influence of fiscal policy on the economy may be better gauged by its generation-specific incidence than by focusing on the government's annual budget deficits, since different policies that produce a generational balance can be associated with a different time profile of deficits.

²⁴ Since the generational accounting exercise is based on current policies and current projections of budgetary aggregates, the negative net payments for the elderly in the United States are affected by the currently high rate of growth projected for Medicare and Medicaid. Fiscal policies will, obviously, be altered in the future. Therefore, generational accounting should be viewed as a projection based on current policies, not as a forecast that current policies will remain in place indefinitely.

References

Akerlof, George A., Andrew K. Rose, Janet L. Yellen, and Helga Hessenius (1991): "East Germany in from the Cold: The Economic Aftermath of Currency Union," *Brookings Papers for Economic Activity*, No. 1, Washington, D.C.: The Brookings Institution.

Auerbach, Alan J., Jagadeesh Gokhale, and Laurence J. Kotlikoff (1991): "Generational Accounts: A Meaningful Alternative to Deficit Accounting," NBER Working Paper No. 3589, Cambridge, Mass.: National Bureau of Economic Research.

Auerbach, Alan J., Jagadeesh Gokhale, and Laurence J. Kotlikoff (1992): "Generational Accounting: A New Approach for Understanding the Effects of Fiscal Policy on Saving," *Scandinavian Journal of Economics*, 94, 303-318.

BMF -- Bundesministerium für Finanzen (1991a, 1991b, 1992, 1993): *Finanzbericht 1991, 1992, 1993, 1994*, Bonn.

Bröcker, Johannes, and Bernd Raffelhüschen (1993): "Fiscal Aspects of German Unification: Who Is Stuck with the Bill?" Working Paper of the Department of Economics, University of Bergen, No. 0593, Bergen, Norway.

Budget of the United States Government, *Analytical Perspectives, Fiscal Year 1995*, Office of Management and Budget, Washington D.C.

Deutsche Bundesbank: *Monatsbericht der Deutschen Bundesbank*, current issues, Frankfurt a.M.

Haveman, Robert (1994): "Should Generational Accounts Replace Public Budgets and Deficits?" *Journal of Economic Perspectives*, 8, No. 1, pp. 95-111.

Henke, Klaus-Dieter, and Claudia S. Behrens (1989): *Umverteilungswirkungen der gesetzlichen Krankenversicherung, Eine empirische Analyse der differentiellen Einnahmewirkungen*. Bayreuth: TCO-Verlag.

Kotlikoff, Laurence J. (1993): "From Deficit Delusion to the Fiscal Balance Rule: Looking for a Sensible Way to Measure Fiscal Policy," *Journal of Economics*, suppl. 7, 17-41.

Kotlikoff, Laurence J., and Jagadeesh Gokhale (1994), "Passing the Intergenerational Buck," *The Public Interest*, 114, pp. 73-81.

Leibfritz, Willi, (1993): "Germany," in Dale W. Jorgenson and Ralph Landau (eds.), *Tax Reform and the Cost of Capital: An International Comparison*, Washington D.C.: The Brookings Institution, pp. 166-190.

Lipschitz, Leslie, and Donogh McDonald (1990): "German Unification: Economic Issues," International Monetary Fund Occasional Paper No. 75, Washington D.C.

Raffelhüschen, Bernd (1994): "Migration in Germany after Unification," Mimeo, University of Kiel, Germany.

SVR (1991): Die wirtschaftliche Integration in Deutschland, Perspektiven - Wege - Risiken, Jahrgutachten 1991/92, Stuttgart.

SVR (1992): Für Wachstumsorientierung - gegen lähmenden Verteilungsstreit, Jahrgutachten 1992/93, Stuttgart.

SVR (1993): Zeit zum Handeln - Antriebskräfte stärken, Jahrgutachten 1993/94, Stuttgart.

Siebert, Horst (1991): *The New Economic Landscape in Europe*, Oxford: Blackwell.

Sinn, Gerlinde and Hans-Werner Sinn (1992): *Jumpstart: The Economic Unification of Germany*, Cambridge, Mass.: MIT Press.

Statistisches Bundesamt (1994): Volkswirtschaftliche Gesamtrechnungen, Fachserie 18, Stuttgart: Metzler-Poeschel.

Table 1: West-East Transfer, Additional Public Receipts,
and Public Debt in Transition (billions of dollars)

| | <u>1991</u> | <u>1992</u> | <u>1993</u> | <u>1994</u> | <u>1995</u> |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|
| Net Transfers | | | | | |
| Total | 83.8 | 96.0 | 94.2 | | |
| Percent of Western GDP | 5.0 | 5.4 | 5.3 | | |
| Additional Public Receipts | | | | | |
| Federal, State, and Local | 9.3 | 12.5 | 11.5 | 28.9 | 52.4 |
| Social Insurance | 7.0 | 6.7 | 6.8 | 7.0 | 7.2 |
| Total | 16.3 | 19.2 | 18.3 | 36.0 | 59.6 |
| Percent of Western GDP | 0.8 | 1.1 | 1.0 | 1.9 | 3.1 |
| Public Debt (*) | | | | | |
| Total | 801.9 | 958.7 | 1078.4 | 1161.6 | |
| Percent of Western GDP | 47.6 | 53.6 | 59.7 | 62.5 | |
| Percent of Total GDP | 44.5 | 49.5 | 54.4 | 56.9 | |

(*) without publicly owned postal, telecommunication, and railway companies

Source: Council of Economic Advisors, SVR (1991, 1992, 1993),
Ministry of Finance, BMF (1991a, 1991b, 1992, 1993), and
authors' calculations.

Table 2: Public Receipts and Expenditures in Germany in 1992
(billions of dollars)

| <u>Receipts</u> | | <u>Expenditures</u> | |
|------------------------|--------------|------------------------|--------------|
| Labor Income Taxes | 208.1 | Social Security | 171.5 |
| Capital Income Taxes | 57.6 | Health Insurance | 127.5 |
| Seigniorage | 4.5 | Unemployment Insurance | 36.5 |
| Value Added Tax | 131.5 | Accident Insurance | 9.0 |
| Excise Taxes | 19.7 | Maternity Assistance | 5.1 |
| Gasoline Tax | 35.3 | Welfare Benefits | 19.6 |
| Insurance Tax | 5.2 | Housing Benefits | 4.4 |
| Vehicle Tax | 8.5 | Youth Support | 10.9 |
| Other Taxes | 2.4 | Child Allowances | 10.7 |
| Social Security | 148.2 | Net Investment | 40.0 |
| Health Insurance | 108.0 | Subsidies | 37.8 |
| Unemployment Insurance | 49.1 | Interest Payments | 64.7 |
| Accident Insurance | 11.1 | Government Consumption | 382.6 |
| Other Revenues | 60.9 | | |
| Public Deficit | 70.0 | | |
| Total | 920.1 | | 920.3 |

Source: *Statistisches Bundesamt* (1993), Ministry of Finance BMF (1993), and *Monatsbericht der Deutschen Bundesbank*, recent issues.

Table 3a: Adjustment and Income Tax Surcharge Removed in 2010 (Baseline)

The Composition of Male Generational Accounts (r= .05, g= .0125)

Present Values of Receipts and Payments

(thousands of dollars)

| Generation's Age in 1992 | Net Payment | Tax Payments | | | | | | Transfer Receipts | | | | | |
|-----------------------------|----------------|--------------------------|----------------------------|------------------|------|-------------------------|---------------------------|------------------------------|------|------|--------------------|---------|---------------------------|
| | | Labor Income Taxes | Capital Income Taxes | Seign- iorage | VAT | Excise Taxes a.o. | Social Insur- ances | Social Security and AI | HI | UI | General Welfare | Housing | Youth & Mater- nity |
| 0 | 183.0 | 72.5 | 10.6 | 1.2 | 48.9 | 37.1 | 93.2 | 23.9 | 28.7 | 6.9 | 3.8 | 0.6 | 16.6 |
| 5 | 214.4 | 87.2 | 12.6 | 1.5 | 48.8 | 39.8 | 111.9 | 28.7 | 30.9 | 8.4 | 4.5 | 0.8 | 13.9 |
| 10 | 252.0 | 103.7 | 14.6 | 1.8 | 49.9 | 43.2 | 133.4 | 34.2 | 33.6 | 10.3 | 5.3 | 1.0 | 10.3 |
| 15 | 308.0 | 124.0 | 26.8 | 2.1 | 51.8 | 47.9 | 160.1 | 41.4 | 36.7 | 13.0 | 6.2 | 1.3 | 6.0 |
| 20 | 346.9 | 140.9 | 30.9 | 2.1 | 52.3 | 51.3 | 181.3 | 49.4 | 39.2 | 14.8 | 5.6 | 1.1 | 1.9 |
| 25 | 343.1 | 146.1 | 28.7 | 2.0 | 50.4 | 49.2 | 184.5 | 57.7 | 40.5 | 13.8 | 4.8 | 1.0 | 0.0 |
| 30 | 312.1 | 138.8 | 31.1 | 2.0 | 47.4 | 45.6 | 174.3 | 68.1 | 41.3 | 12.6 | 4.1 | 1.0 | 0.0 |
| 35 | 263.5 | 125.6 | 30.5 | 1.9 | 45.6 | 41.6 | 157.5 | 80.9 | 41.8 | 11.5 | 4.1 | 0.9 | 0.0 |
| 40 | 193.4 | 103.3 | 29.9 | 1.8 | 43.0 | 36.8 | 132.5 | 96.0 | 41.9 | 11.3 | 3.8 | 0.8 | 0.0 |
| 45 | 131.6 | 83.1 | 38.2 | 1.6 | 41.4 | 32.9 | 106.2 | 114.7 | 42.4 | 10.5 | 3.6 | 0.7 | 0.0 |
| 50 | 29.4 | 52.7 | 30.7 | 1.3 | 35.8 | 27.6 | 72.1 | 135.2 | 41.6 | 9.7 | 3.6 | 0.5 | 0.0 |
| 55 | -66.0 | 26.5 | 27.3 | 1.0 | 30.6 | 22.7 | 38.2 | 158.8 | 40.5 | 9.1 | 3.4 | 0.5 | 0.0 |
| 60 | -140.0 | 7.5 | 18.9 | 0.7 | 25.6 | 18.3 | 11.5 | 178.8 | 36.5 | 4.3 | 2.7 | 0.3 | 0.0 |
| 65 | -153.5 | 0.7 | 14.9 | 0.6 | 21.0 | 14.5 | 1.2 | 173.1 | 31.2 | 0.3 | 1.6 | 0.1 | 0.0 |
| 70 | -124.7 | 0.0 | 14.3 | 0.4 | 15.7 | 10.8 | 0.2 | 140.3 | 25.5 | 0.0 | 0.3 | 0.2 | 0.0 |
| 75 | -94.3 | 0.0 | 11.3 | 0.3 | 11.5 | 8.0 | 0.0 | 105.1 | 20.2 | 0.0 | 0.0 | 0.2 | 0.0 |
| 80 | -63.9 | 0.0 | 11.0 | 0.3 | 8.1 | 5.7 | 0.0 | 73.6 | 15.1 | 0.0 | 0.0 | 0.2 | 0.0 |
| 85 | -36.9 | 0.0 | 11.1 | 0.2 | 5.1 | 3.7 | 0.0 | 46.5 | 10.2 | 0.0 | 0.0 | 0.1 | 0.0 |
| 90 | 2.2 | 0.0 | 11.6 | 0.1 | 1.2 | 1.0 | 0.0 | 8.9 | 2.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| Future Generations | 224.0 | | | | | | | | | | | | |
| Percentage Difference | 22.4 | | | | | | | | | | | | |

Source: Authors' calculations.

Table 3b: Adjustment and Income Tax Surcharge Removed in 2010 (Baseline)

The Composition of Female Generational Accounts (r= .05, g= .0125)

Present Values of Receipts and Payments

(thousands of dollars)

| Generation's Age in 1992 | Net Payment | Tax Payments | | | | | | | Transfer Receipts | | | | |
|-----------------------------|----------------|--------------------------|----------------------------|------------------|------|-------------------------|---------------------------|------------------------------|-------------------|-----|--------------------|---------|---------------------------|
| | | Labor Income Taxes | Capital Income Taxes | Seign- iorage | VAT | Excise Taxes a.o. | Social Insur- ances | Social Security and AI | HI | UI | General Welfare | Housing | Youth & Mater- nity |
| 0 | 94.3 | 34.7 | 8.4 | 1.0 | 49.9 | 37.8 | 42.3 | 15.6 | 32.7 | 3.6 | 6.4 | 0.8 | 20.6 |
| 5 | 108.0 | 41.6 | 9.9 | 1.2 | 50.0 | 40.6 | 50.7 | 18.6 | 35.7 | 4.3 | 7.6 | 1.0 | 18.6 |
| 10 | 124.6 | 49.0 | 11.5 | 1.4 | 51.2 | 44.2 | 60.0 | 22.3 | 39.1 | 5.5 | 9.0 | 1.3 | 15.6 |
| 15 | 154.7 | 58.3 | 22.4 | 1.7 | 53.3 | 49.0 | 71.8 | 26.9 | 43.2 | 7.5 | 10.6 | 1.6 | 12.0 |
| 20 | 171.5 | 64.7 | 26.5 | 1.6 | 54.0 | 52.4 | 79.6 | 31.7 | 45.9 | 9.1 | 10.5 | 1.6 | 8.3 |
| 25 | 149.1 | 59.9 | 20.6 | 1.5 | 51.6 | 50.0 | 74.9 | 36.6 | 46.6 | 9.3 | 10.2 | 1.5 | 5.1 |
| 30 | 129.4 | 54.1 | 20.0 | 1.5 | 49.6 | 47.1 | 68.5 | 43.1 | 46.9 | 8.3 | 9.4 | 1.5 | 2.2 |
| 35 | 110.1 | 47.9 | 23.4 | 1.5 | 48.2 | 43.5 | 61.4 | 51.1 | 46.8 | 7.8 | 8.3 | 1.3 | 0.6 |
| 40 | 77.5 | 39.3 | 22.7 | 1.5 | 46.2 | 39.0 | 51.5 | 60.1 | 46.2 | 7.5 | 7.8 | 1.1 | 0.1 |
| 45 | 48.4 | 29.6 | 31.0 | 1.3 | 45.0 | 35.4 | 38.4 | 71.4 | 46.0 | 6.6 | 7.3 | 1.0 | 0.0 |
| 50 | -9.3 | 17.8 | 20.9 | 1.1 | 39.3 | 30.0 | 24.8 | 84.8 | 44.4 | 6.6 | 6.5 | 1.0 | 0.0 |
| 55 | -55.7 | 8.3 | 17.1 | 1.0 | 34.5 | 25.4 | 12.1 | 99.7 | 42.6 | 4.2 | 6.5 | 1.0 | 0.0 |
| 60 | -84.6 | 1.3 | 18.3 | 0.9 | 29.3 | 20.9 | 2.7 | 110.4 | 39.7 | 1.4 | 5.7 | 0.9 | 0.0 |
| 65 | -88.9 | 0.1 | 17.1 | 0.8 | 24.0 | 16.7 | 0.3 | 106.0 | 35.8 | 0.1 | 5.2 | 0.9 | 0.0 |
| 70 | -78.7 | 0.0 | 16.4 | 0.7 | 18.3 | 12.6 | 0.1 | 91.5 | 30.1 | 0.0 | 4.3 | 0.9 | 0.0 |
| 75 | -61.2 | 0.0 | 15.3 | 0.5 | 13.4 | 9.4 | 0.0 | 71.4 | 23.8 | 0.0 | 4.1 | 0.6 | 0.0 |
| 80 | -37.8 | 0.0 | 15.3 | 0.4 | 9.2 | 6.5 | 0.0 | 50.4 | 17.3 | 0.0 | 1.2 | 0.2 | 0.0 |
| 85 | -19.4 | 0.0 | 12.7 | 0.2 | 5.5 | 4.0 | 0.0 | 30.0 | 11.1 | 0.0 | 0.6 | 0.2 | 0.0 |
| 90 | 4.6 | 0.0 | 12.9 | 0.1 | 1.3 | 1.0 | 0.0 | 7.7 | 2.7 | 0.0 | 0.2 | 0.0 | 0.0 |
| Future Generations | 111.0 | | | | | | | | | | | | |

Source: Authors' calculations.

Table 4: Sensitivity Analysis
Percentage Differential in Net Payment Burden between Newborn and Future Generations

| | Interest Rates (r) | 3.0 | 5.0 | 7.0 |
|------------------|--------------------|------|------|------|
| Growth Rates (g) | | | | |
| 0.75 | | 22.9 | 20.8 | 5.9 |
| 1.25 | | 21.5 | 22.4 | 11.3 |
| 1.75 | | 19.4 | 23.3 | 15.6 |

Source: Authors' calculations.

Table 5: The Burden of Unification on Western Residents (r= .05, g= .0125)

Present Values of Receipts and Payments

(thousands of dollars)

| | Male Net Payments | | | | Female Net Payments | | | |
|--------------------------|-------------------|------------|-----------------|-------------------------------|---------------------|------------|-------------------|-------------------------------|
| | Without Taxes | With Taxes | Burden on Males | Percent Increase ^a | Without Taxes | With Taxes | Burden on Females | Percent Increase ^a |
| Generation's Age in 1992 | | | | | | | | |
| 0 | 170.6 | 187.6 | 17.0 | 10.0 | 83.1 | 97.9 | 14.8 | 17.8 |
| 5 | 205.1 | 224.6 | 19.5 | 9.5 | 99.1 | 115.8 | 16.8 | 17.0 |
| 10 | 243.5 | 266.2 | 22.7 | 9.3 | 116.9 | 135.9 | 19.0 | 16.3 |
| 15 | 303.1 | 329.9 | 26.8 | 8.8 | 150.2 | 171.8 | 21.6 | 14.4 |
| 20 | 344.0 | 373.6 | 29.7 | 8.6 | 167.4 | 190.1 | 22.7 | 13.6 |
| 25 | 338.8 | 368.6 | 29.7 | 8.8 | 143.1 | 164.5 | 21.5 | 15.0 |
| 30 | 316.2 | 345.0 | 28.7 | 9.1 | 122.1 | 142.5 | 20.4 | 16.7 |
| 35 | 271.7 | 298.6 | 26.9 | 9.9 | 106.2 | 125.2 | 19.0 | 17.9 |
| 40 | 206.0 | 229.9 | 23.8 | 11.6 | 76.4 | 93.5 | 17.1 | 22.3 |
| 45 | 134.0 | 153.8 | 19.8 | 14.8 | 45.3 | 59.9 | 14.6 | 32.2 |
| 50 | 36.4 | 51.3 | 14.9 | 40.9 | -6.6 | 5.4 | 12.0 | 181.8 |
| 55 | -63.6 | -53.4 | 10.2 | 16.0 | -52.5 | -43.1 | 9.4 | 17.9 |
| 60 | -145.5 | -138.6 | 6.9 | 4.7 | -80.4 | -72.9 | 7.4 | 9.2 |
| 65 | -159.8 | -154.7 | 5.1 | 3.2 | -86.0 | -80.1 | 6.0 | 7.0 |
| 70 | -129.3 | -125.5 | 3.8 | 2.9 | -75.9 | -71.3 | 4.6 | 6.1 |
| 75 | -97.7 | -94.9 | 2.8 | 2.9 | -59.2 | -55.8 | 3.4 | 5.7 |
| 80 | -65.8 | -63.8 | 2.0 | 3.0 | -35.0 | -32.7 | 2.4 | 6.9 |
| 85 | -37.9 | -36.6 | 1.3 | 3.4 | -16.9 | -15.5 | 1.4 | 8.3 |
| 90 | 3.8 | 4.0 | 0.3 | 7.9 | 6.9 | 7.2 | 0.3 | 4.3 |
| Future Generations | 237.0 | 147.8 | -89.2 | | 115.4 | 77.1 | -38.3 | |

a. Percent Increase numbers refer to increases in burden or decreases in receipts relative to the levels without taxes.

Source: Authors' calculations.

Table 6: Sources of the Burden of Unification on Western Residents (r= .05, g= .0125)

Present Values of Receipts and Payments

(thousands of dollars)

| Generation's Age in 1992 | <u>Males</u> | | | | | | <u>Females</u> | | | | | |
|-----------------------------|------------------------------|--------------------------|----------------------------|-----|-------------------------|---------------------------|------------------------------|--------------------------|----------------------------|-----|-------------------------|---------------------------|
| | Changes in Net Payment | Changes in Tax Payments | | | | | Changes in Net Payment | Changes in Tax Payments | | | | |
| | | Labor Income Taxes | Capital Income Taxes | VAT | Excise Taxes a.o. | Social Insur- ances | | Labor Income Taxes | Capital Income Taxes | VAT | Excise Taxes a.o. | Social Insur- ances |
| 0 | 17.0 | 0.1 | 0.2 | 3.0 | 9.4 | 4.3 | 14.8 | 0.0 | 0.2 | 3.1 | 9.6 | 1.9 |
| 5 | 19.5 | 0.6 | 0.3 | 3.2 | 10.2 | 5.2 | 16.8 | 0.5 | 0.3 | 3.2 | 10.4 | 2.3 |
| 10 | 22.7 | 1.8 | 0.5 | 3.3 | 11.0 | 6.2 | 19.0 | 1.3 | 0.4 | 3.3 | 11.2 | 2.8 |
| 15 | 26.8 | 3.5 | 0.6 | 3.4 | 12.0 | 7.4 | 21.6 | 2.2 | 0.5 | 3.5 | 12.2 | 3.3 |
| 20 | 29.7 | 5.0 | 0.6 | 3.4 | 12.6 | 8.1 | 22.7 | 2.5 | 0.4 | 3.5 | 12.8 | 3.4 |
| 25 | 29.7 | 6.0 | 0.6 | 3.2 | 11.9 | 8.0 | 21.5 | 2.5 | 0.4 | 3.3 | 12.2 | 3.1 |
| 30 | 28.7 | 6.5 | 0.7 | 3.0 | 11.0 | 7.5 | 20.4 | 2.5 | 0.5 | 3.2 | 11.4 | 2.8 |
| 35 | 26.9 | 6.5 | 0.7 | 2.9 | 10.1 | 6.7 | 19.0 | 2.5 | 0.5 | 3.1 | 10.5 | 2.4 |
| 40 | 23.8 | 5.9 | 0.7 | 2.8 | 9.0 | 5.5 | 17.1 | 2.2 | 0.5 | 3.0 | 9.5 | 2.0 |
| 45 | 19.8 | 4.6 | 0.6 | 2.6 | 7.8 | 4.2 | 14.6 | 1.6 | 0.4 | 2.8 | 8.4 | 1.4 |
| 50 | 14.9 | 2.8 | 0.5 | 2.3 | 6.7 | 2.6 | 12.0 | 0.9 | 0.4 | 2.5 | 7.3 | 0.9 |
| 55 | 10.2 | 1.1 | 0.4 | 1.9 | 5.5 | 1.2 | 9.4 | 0.3 | 0.4 | 2.2 | 6.2 | 0.3 |
| 60 | 6.9 | 0.2 | 0.3 | 1.6 | 4.5 | 0.2 | 7.4 | 0.0 | 0.4 | 1.9 | 5.1 | 0.1 |
| 65 | 5.1 | 0.0 | 0.2 | 1.3 | 3.5 | 0.0 | 6.0 | 0.0 | 0.3 | 1.5 | 4.1 | 0.0 |
| 70 | 3.8 | 0.0 | 0.2 | 0.9 | 2.7 | 0.0 | 4.6 | 0.0 | 0.3 | 1.1 | 3.2 | 0.0 |
| 75 | 2.8 | 0.0 | 0.1 | 0.7 | 2.0 | 0.0 | 3.4 | 0.0 | 0.2 | 0.8 | 2.4 | 0.0 |
| 80 | 2.0 | 0.0 | 0.1 | 0.5 | 1.5 | 0.0 | 2.4 | 0.0 | 0.2 | 0.5 | 1.7 | 0.0 |
| 85 | 1.3 | 0.0 | 0.1 | 0.3 | 1.0 | 0.0 | 1.4 | 0.0 | 0.1 | 0.3 | 1.0 | 0.0 |
| 90 | 0.3 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| Future Generations | -89.2 | | | | | | -38.3 | | | | | |

Source: Authors' calculations.

Table 7: Changes in Accounts from Alternative Income Tax Surcharge Policies
Present Values of Receipts and Payments
 (thousands of dollars)

| Generation's Age in 1992 | Income Tax Surcharge | | | | | |
|-------------------------------|----------------------|----------------|-------------------|----------------|---------------|----------------|
| | Not Enforced in 1995 | | Ends in Year 2000 | | Lasts Forever | |
| | <u>Males</u> | <u>Females</u> | <u>Males</u> | <u>Females</u> | <u>Males</u> | <u>Females</u> |
| 0 | -0.1 | -0.1 | -0.1 | -0.1 | 5.5 | 2.7 |
| 5 | -0.6 | -0.5 | -0.6 | -0.5 | 6.0 | 2.8 |
| 10 | -1.5 | -1.2 | -1.4 | -1.1 | 6.2 | 2.7 |
| 15 | -2.9 | -1.9 | -2.2 | -1.2 | 6.0 | 2.5 |
| 20 | -4.2 | -2.1 | -2.9 | -1.3 | 5.4 | 2.2 |
| 25 | -5.2 | -2.1 | -3.4 | -1.3 | 4.3 | 1.8 |
| 30 | -5.4 | -2.2 | -3.4 | -1.4 | 3.2 | 1.3 |
| 35 | -5.4 | -2.2 | -3.2 | -1.3 | 2.0 | 0.9 |
| 40 | -4.8 | -1.9 | -2.7 | -1.0 | 1.0 | 0.5 |
| 45 | -4.1 | -1.5 | -1.9 | -0.7 | 0.3 | 0.2 |
| 50 | -2.3 | -0.8 | -0.7 | -0.3 | 0.2 | 0.2 |
| 55 | -0.9 | -0.4 | -0.2 | -0.1 | 0.1 | 0.1 |
| 60 | -0.3 | -0.2 | -0.1 | -0.1 | 0.0 | 0.1 |
| 65 | -0.1 | -0.2 | -0.1 | -0.1 | 0.0 | 0.0 |
| 70 | -0.1 | -0.2 | 0.0 | -0.1 | 0.0 | 0.0 |
| 75 | -0.1 | -0.1 | 0.0 | -0.1 | 0.0 | 0.0 |
| 80 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 85 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Future Generations | 10.2 | 5.0 | 6.1 | 3.0 | -9.2 | -4.5 |

Source: Authors' calculations.

Table 8: Changes in Accounts from Alternative Policies to Restore Generational Balance

Present Values of Receipts and Payments
(thousands of dollars)

| Generation's Age in 1992 | Increase Income Taxes | | Increase Indirect Taxes | | Reduce Social Security Benefits | |
|-------------------------------|--------------------------|----------------|----------------------------|----------------|------------------------------------|----------------|
| | <u>Males</u> | <u>Females</u> | <u>Males</u> | <u>Females</u> | <u>Males</u> | <u>Females</u> |
| 0 | 7.7 | 4.0 | 6.8 | 6.9 | 2.3 | 1.5 |
| 5 | 9.3 | 4.8 | 7.1 | 7.3 | 2.8 | 1.8 |
| 10 | 11.0 | 5.6 | 7.6 | 7.8 | 3.3 | 2.2 |
| 15 | 13.2 | 6.7 | 8.3 | 8.5 | 4.0 | 2.7 |
| 20 | 14.7 | 7.3 | 8.7 | 8.9 | 4.8 | 3.1 |
| 25 | 15.2 | 6.7 | 8.3 | 8.5 | 5.6 | 3.7 |
| 30 | 14.5 | 6.2 | 7.8 | 8.1 | 6.7 | 4.3 |
| 35 | 13.2 | 5.6 | 7.3 | 7.7 | 7.9 | 5.2 |
| 40 | 11.0 | 4.8 | 6.7 | 7.1 | 9.4 | 6.1 |
| 45 | 9.0 | 3.8 | 6.2 | 6.7 | 11.3 | 7.2 |
| 50 | 5.9 | 2.5 | 5.3 | 5.7 | 13.5 | 8.6 |
| 55 | 3.2 | 1.5 | 4.4 | 4.9 | 16.0 | 10.2 |
| 60 | 1.2 | 0.8 | 3.6 | 4.1 | 18.0 | 11.3 |
| 65 | 0.5 | 0.6 | 2.9 | 3.3 | 17.3 | 10.9 |
| 70 | 0.3 | 0.5 | 2.1 | 2.4 | 14.3 | 9.4 |
| 75 | 0.3 | 0.4 | 1.5 | 1.8 | 11.0 | 7.4 |
| 80 | 0.2 | 0.3 | 1.1 | 1.2 | 7.7 | 5.3 |
| 85 | 0.1 | 0.2 | 0.7 | 0.7 | 4.9 | 3.2 |
| 90 | 0.0 | 0.0 | 0.2 | 0.2 | 0.9 | 0.8 |
| Future Generations | -33.3 | -16.3 | -34.3 | -13.5 | -38.8 | -18.8 |

Source: Authors' calculations.

Table 9: Comparative Fiscal Ratios for the United States and Germany, 1992

| | <u>United States</u> | <u>Germany</u> |
|------------------------------------|----------------------|----------------|
| Taxes/GDP ^a | 30.7 | 44.4 |
| Total Outlays/GDP ^b | 35.4 | 48.0 |
| Direct Spending/GDP ^c | 18.7 | 21.8 |
| Direct Spending Per Capita (\$) | 4435.0 | 5192.0 |
| Transfers/GDP ^d | 14.4 | 20.4 |

a. Direct taxes, indirect taxes, and social insurance contributions

b. Purchases on current account

c. Government consumption plus investment

d. Includes Social Security benefits, excludes subsidies

Source: OECD and Statistisches Bundesamt (1993).

Table 10: Population Distributions by Selected Age Groups
for Germany and the United States

| Age Group | Germany | | | United States | | |
|-------------|---------|-------|------|---------------|-------|------|
| | 0-18 | 19-65 | 66+ | 0-18 | 19-65 | 66+ |
| Year | | | | | | |
| 1992 | .204 | .658 | .138 | .273 | .610 | .116 |
| 1995 | .207 | .652 | .141 | .274 | .607 | .119 |
| 2000 | .206 | .646 | .147 | .270 | .611 | .119 |
| 2005 | .198 | .636 | .166 | .261 | .620 | .119 |
| 2010 | .186 | .628 | .186 | .249 | .627 | .124 |
| 2015 | .179 | .635 | .186 | .240 | .625 | .136 |
| 2020 | .178 | .627 | .195 | .235 | .612 | .153 |
| 2025 | .185 | .609 | .207 | .232 | .595 | .173 |
| 2030 | .193 | .580 | .227 | .228 | .581 | .191 |
| 2040 | .204 | .546 | .251 | .222 | .578 | .200 |
| 2050 | .213 | .564 | .222 | .220 | .580 | .200 |

Sources: United States: Social Security Administration.
Germany: German Bureau of the Census (*Statistisches Bundesamt*[1994]) and authors' calculations.

Table 11: Net Payment Burdens in the United States and Germany, 1992

(present values in thousands of dollars)

| Age | Germany | | United States (baseline) | | United States (Health-Care Stabi- lized after 1994) | |
|----------------------------------|--------------|--------------|-----------------------------|--------------|---|-------------|
| | Males | Females | Males | Females | Males | Female |
| 0 | 183.0 | 94.3 | 119.1 | 62.3 | 129.3 | 72.2 |
| 5 | 214.4 | 108.0 | 141.7 | 73.0 | 153.3 | 84.5 |
| 10 | 252.0 | 124.6 | 167.3 | 84.7 | 180.3 | 97.8 |
| 15 | 308.0 | 154.7 | 198.3 | 98.0 | 213.0 | 113.1 |
| 20 | 346.9 | 171.5 | 224.3 | 109.1 | 240.0 | 125.8 |
| 25 | 343.1 | 149.1 | 233.0 | 109.3 | 249.6 | 127.8 |
| 30 | 312.1 | 129.4 | 224.1 | 100.1 | 241.6 | 120.5 |
| 35 | 263.5 | 110.1 | 207.2 | 86.0 | 226.5 | 109.0 |
| 40 | 193.4 | 77.5 | 177.6 | 62.0 | 199.3 | 88.7 |
| 45 | 131.6 | 48.4 | 131.6 | 27.9 | 156.0 | 58.3 |
| 50 | 29.4 | -9.3 | 73.9 | -13.5 | 100.9 | 21.0 |
| 55 | -66.0 | -55.7 | 8.1 | -58.6 | 37.1 | -21.0 |
| 60 | -140.0 | -84.6 | -56.7 | -104.9 | -28.5 | -67.2 |
| 65 | -153.5 | -88.9 | -105.4 | -138.6 | -81.5 | -105.2 |
| 70 | -124.7 | -78.7 | -107.2 | -136.9 | -88.8 | -110.1 |
| 75 | -94.3 | -61.2 | -98.8 | -126.5 | -85.9 | -107.1 |
| 80 | -63.9 | -37.8 | -83.1 | -105.6 | -75.1 | -93.6 |
| 85 | -36.9 | -19.4 | -71.2 | -81.5 | -67.5 | -76.4 |
| 90 | 2.2 | 4.6 | -11.6 | -11.3 | -11.6 | -11.3 |
| Future Generations | 224.0 | 111.0 | 219.0 | 114.6 | 150.4 | 84.0 |
| Percentage Difference | 22.4 | | 83.9 | | 16.3 | |

Source: Authors' calculations.