NBER WORKING PAPER SERIES

TAXATION AND HOUSEHOLD PORTFOLIO COMPOSITION: U.S. EVIDENCE FROM THE 1980s AND 1990s

James M. Poterba
Andrew A. Samwick

Working Paper 7392
http://www.nber.org/papers/w7392

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
October 1999

We received helpful comments from Rochelle Antoniewicz, Alan Auerbach, Joel Dickson, Roger Gordon, Stefan Hochguertel, William Randolph, Karl Scholz, Doug Shackelford, Joel Slemrod, and seminar participants at Wharton, Dartmouth, Michigan, Kellogg, Tilburg, the NBER, and the AFA. Arthur Kennickell provided assistance with the use of the Surveys of Consumer Finances. We thank Dan Bergstresser for excellent research assistance and the National Science Foundation, the Smith-Richardson Foundation, and the Nelson Rockefeller Fund in Economics for research support. The views expressed herein are those of the authors and not necessarily those of the National Bureau of Economic Research.

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NBER Working Paper No. 7392
October 1999
JEL No. H24, G11

ABSTRACT

This paper explores the relationship between household marginal income tax rates, the set of assets that households own, and the portfolio shares accounted for by each of these assets. It analyzes data from the 1983, 1989, 1992, and 1995 Surveys of Consumer Finances and develops a new algorithm for imputing federal marginal tax rates to households in these surveys. The empirical findings suggest that a household's marginal tax rate has an important effect its asset allocation decisions. The probability that a household owns tax-advantaged assets is strongly related to its tax rate on ordinary income. In addition, the amount of investment through tax-deferred accounts such as 401(k) plans and IRAs is an increasing function of the household's marginal tax rate. Holdings of corporate stock, which is taxed less heavily than interest bearing assets, and of tax-exempt bonds are also increasing in the household's marginal tax rate. Holdings of heavily taxed assets, such as corporate bonds and interest-bearing accounts, decline as a share of wealth as a household's marginal tax rate increases.

James M. Poterba
Department of Economics
MIT
E52-350
50 Memorial Drive
Cambridge, MA 02142-1347
and NBER
poterba@mit.edu

Andrew Samwick
Department of Economics
Dartmouth College
6160 Rockefeller Hall
Hanover, NH 03755-3514
and NBER
samwick@dartmouth.edu

The federal income tax places different tax burdens on different types of capital income. Interest and dividends are included in ordinary income, while capital gains are taxed at a preferential rate, and then only upon realization. Interest on state and local government bonds is tax-exempt. Different individuals also face different federal marginal income tax rates, ranging in the late 1990s from 0 to just over 40 percent. The range was even larger prior to the Tax Reform Act of 1986. Taxation generates potentially significant differences between the pre-tax and the post-tax returns available to individual investors. It also creates variation in the relative tax burdens on different assets facing different investors.

There have been relatively few empirical studies of how taxation affects portfolio allocation, although a substantial body of research has considered the theory of household portfolio choice in the presence of differential taxation. The lack of research on portfolio structure is due in part to the relative scarcity of reliable information on the asset holdings of the high-wealth households who hold a significant share of financial assets. Since 1983, however, the Federal Reserve Board has sponsored a triennial Survey of Consumer Finances that provides high-quality information on asset holdings. This survey includes a substantial number of high net worth households. In this paper, we exploit these data to explore how taxes affect portfolio choice.

We classify all financial assets into one of eight categories and examine the effect of taxes on both the decision to own assets in each category and the decision of how much of the portfolio to allocate to each asset. We follow two empirical strategies. The first focuses on the cross-sectional relationship between marginal tax rates and portfolio structure in each of the Surveys of Consumer Finances. Theoretical models of differential taxation and portfolio structure yield their clearest predictions with respect to such cross-sectional patterns. Unfortunately, because marginal tax rates are a function of a household's taxable income, which in turn is a function of its labor income and its income from assets, it can be difficult to disentangle income effects from tax rate effects in the cross-section.

For this reason, we also develop a second empirical approach that uses the repeated cross-sections of the Survey of Consumer Finances. While the theoretical basis for interpreting how systematic

changes in the structure of marginal tax rates affect household portfolio structure is less solid than that for analyzing cross-sectional patterns, the source of the identifying variation in tax rates is much clearer. Using repeated cross sections also provides us with a much larger data set than any one cross-section, and it offers more variation in marginal tax rates than any single cross-section.

This paper is divided into seven sections. The first summarizes existing models of portfolio choice in the presence of differential capital income taxation. It provides the conceptual basis for our subsequent empirical work. This section includes a discussion of the tax treatment of assets held in tax-deferred accounts, such as Individual Retirement Accounts and 401(k) plans. These accounts break the traditional link between a financial asset's characteristics, such as a bank deposit, a corporate bond, or an equity mutual fund, and its tax treatment. Section two summarizes previous empirical work on how taxes affect portfolio composition, and places our empirical strategy in context.

Section three describes the Survey of Consumer Finances data that we analyze, explains our procedure for imputing marginal tax rates to households in the survey, and presents some information on the changing pattern of marginal income tax rates over our sample years. The fourth section outlines our econometric framework for analyzing which assets households own and the portfolio shares allocated to each of these assets. Section five presents our empirical findings on the discrete decisions households make about whether to hold particular asset categories. Section six presents parallel results on the amounts that households choose to invest in different asset categories. In each of these sections, we present findings from both the 1995 SCF cross-section and the repeated cross-sections database. We also develop illustrative results that describe how changes in marginal tax rates might affect the structure of household portfolios. There is a brief conclusion.

1. Portfolio Choice with Differential Taxation

If all assets are riskless, and if different investors face different marginal tax rates on different assets, then investors should segregate into asset clienteles. Miller (1977) builds on this simple but

powerful point in his model of corporate leverage decisions. He assumes that there are only two portfolio assets, corporate debt and corporate equity. He further assumes that investors are not taxed on the income of corporate equities, but that they are taxed on interest payments from corporate bonds. In this setting, investors facing high tax rates should specialize in equity, while investors in lower tax brackets should hold only corporate debt. In Miller's (1977) equilibrium, the supply of debt and equity adjusts so that those households with marginal tax rates above (below) the corporate rate hold only equity (debt).

The basic insight of clientele formation generalizes to the many-asset case, provided all assets have the same risk characteristics. The highest tax bracket investors should hold only the most tax-advantaged assets and the lowest tax bracket investors should hold only the least tax-advantaged assets.

The insight of clientele formation still influences portfolio choice in the presence of uncertain returns, but under plausible assumptions, strict clienteles no longer arise. Auerbach and King (1983), Brennan (1970), and McDonald (1983) are the theoretical studies that provide the most direct analysis of equilibrium portfolio choice in the presence of differential taxation. Auerbach and King (1983) show that if investors can obtain all possible pre-tax return streams from assets with their own most-preferred tax treatment, then strict portfolio clienteles will emerge. The condition that leads to this result is very strong. Consider what it requires there are two classes of securities, stocks and bonds, which are taxed differently. It must be possible for an investor who prefers bonds to be able to obtain any pre-tax return stream that is available on an equity security from a portfolio of bonds as well. This condition seems unlikely to be satisfied in practice, even with more than two asset categories.

If investors cannot span the set of pre-tax returns with assets from the asset class that they prefer for tax reasons, then they will hold portfolios determined by both their tax preferences and their risk preferences. The simplest case to consider is that of the capital asset pricing model (CAPM). Equilibrium portfolio allocations in the CAPM without taxes are such that every investor holds a combination of the market portfolio and the riskfree asset. Every investor owns every asset, and all investors hold the same share of their risky asset portfolio in each risky asset. When the CAPM framework is expanded to allow for

differential taxation of ordinary income and capital gains, and to allow for investor heterogeneity in tax rates, as in Auerbach and King (1983), investors hold a combination of two portfolios of risky assets. One is the market portfolio, which still represents the most efficient means of diversifying risk, and the other is a portfolio of assets on which the investor is lightly taxed compared to other investors. That is, investors who face high tax rates deviate from the market portfolio toward lightly taxed assets, and those with low tax rates deviate into more heavily taxed assets.

While our empirical work does not develop tests of the structural equations generated by the after-tax CAPM, the predictions of this model motivate our empirical work. We investigate whether households' deviations from the average portfolio are systematically related to their marginal tax rates.

The foregoing discussion assumes that specific assets have immutable tax and return characteristics. Bonds, for example, generate highly taxed income, and offer less risky returns than corporate equities. Recent institutional changes in the tax environment confronting savers in the United States and many other nations has eroded the plausibility of this assumption. The rise of tax-deferred retirement saving accounts has expanded the set of investment options available to most investors. Many households can now choose not only whether to hold a particular asset, but also whether to hold such an asset in their taxable account or in a tax-deferred account. Because investments in tax-deferred accounts are taxed differently than the same investments would be if they were not held in these accounts, this results in an expanded set of individual investment options.

The two most popular tax-deferred saving vehicles in the United States are Individual Retirement Accounts and 401(k) plans. Poterba, Venti, and Wise (1998) explain that both became widely available beginning in the early 1980s. Both types of accounts allow investors to defer taxes on accruing capital income until the account balances are drawn down, typically in retirement. Withdrawals from these accounts are taxed as ordinary income, and are subject to an additional 10 percent penalty tax if they are made before age 59 1/2. 401(k) plans frequently offer an additional rate-of-return enhancement: employers may match worker contributions to these plans, often at rates as high as 50 or 100 percent.

Investing through tax-deferred accounts is one way that investors who face otherwise high marginal tax rates may be able to reduce the tax burden on their capital income. It also raises a new set of issues, which Shoven (1998) labels the "asset location problem." This concerns where assets with different risk and tax characteristics should be located: in a taxable account, or in the tax-deferred account? The asset location problem has only started to receive attention from researchers, and it is not clear what guidelines investors use in choosing which assets to hold in their tax-deferred accounts.

The Survey of Consumer Finances provides some information on asset allocation patterns in tax-deferred accounts. In 1995, for example, 50.3 percent of assets in IRAs and 62.7 percent of assets in defined contribution pension plans were held in corporate stocks or mutual funds investing primarily in corporate stocks. These fractions suggest that many households hold relatively low-tax assets, such as corporate stock, in their tax-deferred accounts. It is possible that some households face constraints on the set of assets that they can hold in their tax-deferred accounts. For example, some employers may invest their matching contributions only in corporate stock. The importance of such constraints, however, is not clear.

For our purposes, the key point about tax-deferred accounts is that the incentive to invest through these accounts is an increasing function of an investor's marginal tax rate on investment income outside the tax-deferred account. Consider an investor who faces an ordinary income tax rate of τ, and who has an investment horizon of T. If this investor holds a taxable bond, which yields an annual (continuously compounded) return of r, then after T years, his after-tax wealth per dollar of initial investment is $e^{r(1-\tau)T}$.

Now consider what happens if the same investor allocates $1/(1-\tau)$ dollars to a tax-deferred account. This is the amount of before-tax income that would generate one dollar of after-tax income. If the investor's marginal tax rate at the time of retirement were the same as that when the dollar was earned, then at retirement he would have e^{rT}. The ratio of wealth in the tax-deferred investment to that in the taxable investment is $e^{r\tau T}$, which is clearly increasing in the investor's marginal tax rate. In our empirical work, we test whether households facing higher marginal tax rates invest more through tax-deferred accounts.

2. Empirical Evidence on Taxation and Portfolio Choice

Several previous studies have developed empirical evidence on how taxes affect portfolio choice. Feldstein (1976), King and Leape (1998), Hubbard (1985), Scholz (1994), and Samwick (forthcoming) are the studies that are most directly related to our analysis. Each of these studies examines how taxation affects the portfolio decisions of U.S. households.

Feldstein (1976) analyzed portfolio data from the 1962 Survey of Financial Characteristics of Consumers, which was conducted when the top marginal tax rate in the federal income tax code was 91 percent. He found that a household's income had a substantial effect on the mix of assets it held, conditional on household net worth. His primary finding was that equity-holding was more common among higher income than lower-income households. In essence, this study used the pattern of asset holdings by income class, along with the link between income and tax rates, to conclude that tax rates affect portfolio choice. However, these results do not uniquely identify a model in which taxes affect portfolio choice. Any other model in which income, or a characteristic of households that is correlated with income, directly affects portfolio choice is also consistent with this evidence.

King and Leape (1998) present related evidence on the relationship between marginal tax rates and portfolio choice. They find that tax variables affect the set of assets that investors decide to hold, but they find very limited support for a link between tax rates and the fraction of the household's portfolio that is held in different assets. They analyze data from a 1978 survey conducted by SRI International, and find that many investors have zero holdings of many broad asset categories such as corporate stock, corporate bonds, and tax-exempt bonds. They also find that most investors who hold tax-favored assets such as equity or tax-exempt bonds also hold more heavily taxed assets, contrary to the prediction of simple clientele models.

Hubbard's (1985) study of data collected by the U.S. President's Commission on Pension Policy also finds a strong effect of taxes on asset allocation. The estimates in this study of the marginal tax rates facing different households, which are based on the NBER TAXSIM program, are substantially better than

those in other studies, and they are more like the estimates that form the basis for our analysis. This study moves beyond Feldstein's (1976) analysis by including marginal tax rates, as well as income, as explanatory variables for portfolio structure. The results suggest that variation in marginal tax rates, conditional on income, helps to explain differences in portfolio structure across households.

Scholz (1994) examines changes in portfolio structure over time and the potential role of taxation in driving these changes. His analysis, based on the 1983 and 1989 Surveys of Consumer Finances, finds relatively small changes in portfolio structure between these two years even though the Tax Reform Act of 1986 significantly affected marginal tax rates for many households. One notable exception is some restructuring of household debt into the tax-favored mortgage category. Maki (1996) provides further evidence of the shift toward mortgage borrowing. Yet as Gordon's (1994) comments suggest, the long-term nature of many investments, particularly those in real estate, personal businesses, and common stock, may make it difficult to find portfolio adjustments only three years after a major tax reform such as that in 1986. (A similar argument can be raised with respect to our analysis. Since we relate cross-sectional portfolio patterns to current tax rates, we may not capture potentially important dynamic adjustments.) The other difficulty with evaluating Scholz' (1994) findings is that when there are systematic changes in the tax structure, it can be difficult to determine how the portfolio of a given household should vary as a function of its tax rate. The predicted portfolio change can depend on the tax changes facing all households.

Samwick's (forthcoming) analysis is also concerned with changes in portfolio structure that may have been induced by the tax reforms of the last two decades. This study uses an earlier version of the tax imputation algorithm that we apply in the current paper, along with a less detailed econometric specification than the one used here, to examine time-series changes in both real and financial portfolio holdings. Despite the clear cross-sectional relationship between marginal tax rates and portfolio structure that we find below, the main result of Samwick's (forthcoming) analysis is that changes in the portfolio composition of different net worth groups over time are not primarily due to changes in their marginal tax rates.

In addition to these five studies of the broad issue of household portfolio structure, a number of

other studies, summarized in Poterba (1999), have examined specific aspects of the link between taxation and investor behavior. Two sorts of studies are particularly notable in the current context. The first are those that explore whether investor marginal tax rates affect the dividend yield on investor portfolios. Most of these studies, most recently Scholz (1992), suggest that taxpayers facing higher dividend tax burdens hold lower-yield stocks, although this effect is substantively small.

The second set of related studies are those that explore which households hold tax-exempt bonds. Feenberg and Poterba (1991) find that in 1988, roughly 85% of tax-exempt debt was held by taxpayers with marginal tax rates of 28% or above. Slightly less than ten percent of individual holdings of tax-exempt debt were reported by taxpayers with marginal rates of less than 20%. This suggests that even the lowest-taxed assets in the financial spectrum are in some cases held by taxpayers with relatively low marginal tax rates, in contrast to the predictions of simple clientele models. This may be the result of inertia in portfolio choice, transitory fluctuations in marginal tax rates, or other factors.

Our summary has focused on previous work that explores the structure of household portfolios in the United States. There is less work on taxation and household portfolio structure in other nations, largely because of data limitations. Agell and Edin's (1990) study of taxes and portfolio structure in Sweden and Hochguertel's (1998) work on household portfolios in the Netherlands are notable exceptions.

3. Data Summary

This section presents the empirical background for our data analysis. It begins by describing the Survey of Consumer Finances (SCF), along with summary information on the households in this survey and the structure of their portfolios. It also describes the algorithm that we use to impute marginal tax rates to households in the SCF, and shows how the distribution of marginal tax rates changed between the 1983 and 1995 surveys.

3.1 The Survey of Consumer Finances, 1983-1995

The Surveys of Consumer Finances are a series of triennial surveys of the United States

population designed to collect comprehensive data on household wealth. The 1983 survey was designed to be the first of a panel, but the re-interview surveys yielded only two thirds of the original sample in 1986 and one third in 1989. New households supplemented the "panel" households in the 1989 sample, and all waves since 1989 have been conducted as unrelated cross-sections using the same survey questionnaire and sample design. The years of the surveys span the major tax reform in 1986, and the more modest reform in 1993. Because of the small sample size and limited detail on asset categories in the 1986 SCF, we do not use this survey in our analysis.

A key aspect of the SCFs is the oversampling of high-income households. Each SCF sample is comprised of an area-probability sample of the United States population and a sample of households drawn from an Internal Revenue Service file of high-income returns. Oversampling based on income helps to equalize the probability of each dollar of wealth in the economy—rather than each household in the population—appearing in the sample.[1] The distinction is important when analyzing the distribution of assets and liabilities that are highly concentrated. One drawback of the SCF is that to preserve the anonymity of the high-income households in the sample, the household's state of residence is not reported. This precludes the calculation of the household's state income tax rate.

To study how taxes affect the allocation of financial assets, we classify the financial assets enumerated in the SCF into eight categories based on their tax treatment. These categories are taxable equity held directly, taxable equity held in mutual funds, equity held in tax-deferred accounts, bonds held in tax-deferred accounts, tax-exempt bonds, taxable bonds, interest bearing accounts, and other financial assets. We now present a more detailed description of each component and its general tax treatment:

Taxable Equity Held Directly. This category includes all holdings of stocks outside of mutual funds and tax-deferred retirement accounts, including brokerage accounts, investment trusts, investment clubs, and shares in a company where a household member is employed. Dividend payments to

[1] The sampling design and construction of the sample weights that allow the two samples to be used together is discussed in Avery, Elliehausen, and Canner (1984a, b), Heeringa, Conner and Woodburn (1994), Kennickell and Woodburn (1992, 1997), and Kennickell, McManus, and Woodburn (1995).

households are taxed each year at the household's marginal tax rate on ordinary income. Capital gains and losses are taxed at the household's capital gains tax rate when the gains are realized, not when they accrue. This results in an effective tax rate below the statutory rate.

Taxable Equity Held in Mutual Funds. This category includes all holdings of stocks in mutual funds. Tax treatment is the same as in directly held equity, with the exception that mutual funds generate both short- and long-term capital gains in the course of normal operations, even if households do not sell or redeem their shares. Short-term capital gains are subject to the household's ordinary income tax rate.

Assets Held in Tax-Deferred Accounts. This category includes all assets held in Individual Retirement Accounts (IRAs), Keogh plans for the self-employed, and defined contribution (DC) pension plans, including 401(k) plans and employee stock ownership plans (ESOPs). Equity holdings include all of the specific assets listed under taxable equity above. Bond holdings include all of the forms listed under taxable bonds and tax-exempt bonds below, as well as all responses not specifically coded as equity.[2] As explained in the previous section, income on assets held in tax-deferred accounts is not taxed until money is withdrawn from the account. Withdrawals are taxed at the household's ordinary income tax rate.

Tax-Exempt Bonds. This category includes all state and municipal bonds, whether held directly, in money market accounts, or in mutual funds, but not in tax-deferred retirement accounts. Interest from these assets is tax-exempt. Capital gains or losses resulting from sales prior to maturity are taxed at the household's marginal tax rate on capital gains.

Taxable Bonds. This category includes federal government bonds, corporate bonds, and foreign bonds, whether held directly or in mutual fund accounts, but not in tax-deferred retirement accounts. Interest payments on these assets are taxed each year at the household's marginal tax rate on ordinary income. Capital gains and losses on these assets are taxable at the household's capital gains tax rate only if the assets are sold before maturity. This category also includes savings bonds, which generate interest

[2] Retirement account asset allocations were not reported in the 1983 SCF, so we impute them based on 1989 data.

income that is taxed as ordinary income but only when the bonds are redeemed.

Interest Bearing Accounts. This category includes checking accounts, saving accounts, certificates of deposit, and money market accounts (except those that are invested in tax-exempt assets). Income from these accounts is taxed each year at the investor's marginal ordinary income tax rate.

Other Financial Assets. This category consists primarily of the cash value of whole life insurance policies and trust accounts. These assets generally receive some form of tax-preferred treatment, since the annual appreciation in the value of these assets is not taxed, but is deferred to a future date.

3.2 Summary Information on Portfolio Holdings

Table 1 presents summary information on the ownership probabilities for the asset categories in each of the SCF data sets that we analyze. There are several clear patterns in the data. First, the ownership of tax-deferred accounts increases substantially between 1983 and 1995. Less than one household in five had a tax-deferred account with equities in 1983, compared with nearly one household in three by 1995. The ownership of tax-deferred accounts with bond investments also rises, but not as sharply, over this period. Second, there is considerable variation in the distribution of assets across households. For example, less than half of the households hold stock in any form. This variation suggests that motives other than diversification are required to explain household portfolio choice. The limited degree of stock market participation has generated substantial recent research interest; see Vissing-Jorgensen (1999) for an overview of this literature.

Table 2 shows the probability of a household holding each of the various asset categories, conditional on positive holdings of the other asset categories. For all asset categories except taxable stocks and stock mutual funds, we combine ownership of assets directly with ownership through intermediaries such as mutual funds. The table does not suggest the presence of strong, tax-related asset clienteles. For example, about thirteen percent of the households who hold taxable bonds also hold tax-exempt bonds, and 56 percent of the households who own tax-exempt bonds also own taxable bonds. Over half of the households who own equity either directly or through taxable mutual funds also own equity in tax-deferred

accounts, and nearly half of those who hold bonds in their tax-deferred accounts also hold some equity in their tax-deferred accounts.

Table 2 reveals interesting portfolio patterns that may not be directly linked to tax-motivated behavior. More than forty percent of the households who hold stock through a mutual fund also own stock directly, while only one quarter of those who report direct equity holdings also report indirect holdings. This may reflect the presence of substantial numbers of small investors who directly own stock in only one or two firms, and are not using equity investment as an important part of a long-term financial plan.

Tables 3 and 4 provide additional information on the structure of household portfolios. The first panel of Table 3 shows the average household's portfolio share for each asset category. The average portfolio share for directly held equity is 4.46 percent in 1995, and this share declines during our sample period. The average share of interest bearing accounts, by contrast, is 56 percent. It is important to remember that these are averages that weight all households equally; they differ from the dollar-weighted share of each asset class in total portfolio value.

These statistics change dramatically when we compute conditional portfolio shares by averaging the portfolio shares for each asset only across those households that report positive holdings of the asset. In this case, the average share of directly held corporate stock rises to 25 percent, and the average share of tax exempt bonds, which are held by relatively few investors, rises from 1.3 percent to 22.5 percent. The dramatic difference between the conditional and the unconditional statistics is explained by the fact that many households report zero holdings of many asset categories.

Table 4 presents a different measure of the role of each asset in the portfolio: the fraction of the aggregate household portfolio that is accounted for by each asset category. These numbers are weighted average household portfolio shares, with each household weighted by the product of its sample weight and its total financial assets. The share of interest bearing accounts in the aggregate portfolio, 25 percent, is significantly smaller than the household-weighted average portfolio share of these assets. In 1995, 25 percent of household financial assets was in tax-deferred accounts.

Table 4 tracks the decline indirect ownership of corporate stock and the rise in equity mutual fund ownership over our sample period. In 1983, directly-held corporate stock accounted for more than 26 percent of total household financial assets. By 1992, this share had fallen to 17.6 percent. Partly as a result of rising share prices, it climbed to 19 percent by 1995. At the same time, the share of equity mutual funds in household financial assets rose from less than one percent in 1983 to 8.5 percent in 1995. This growth in mutual fund ownership does not include the coincident growing ownership of equity mutual funds through tax-deferred accounts. The table shows that "other financial assets," primarily the cash value of whole life insurance and the value of assets in trust accounts, account for almost 15 percent of the total assets of the household sector.

3.3 Marginal Tax Rates on Investment Income, 1983-1995

To understand the empirical basis for our cross-sectional studies of tax rates and asset holding, it is important to understand the shifting patterns over time in marginal tax rates for U.S. households. In 1983, the top marginal tax rate on interest and dividend income was 50 percent. This represented a substantial decline from the pre-1981 tax regime, when the top tax rate on such capital income flows was 70 percent. In 1983, long-term capital gains were taxed at a marginal tax rate equal to 40 percent of the statutory marginal tax rate on dividends and interest. This implied a top rate of 20 percent for high-income taxpayers. The decline in top marginal income tax rates that resulted from the Economic Recovery Tax Act of 1981 is potentially important, because the structure of portfolio holdings in 1983 may partly reflect choices made under an earlier tax regime with higher marginal tax rates on dividend and interest income.

The first major tax reform during the time period spanned by our survey data is the Tax Reform Act of 1986. TRA86 continued the reduction in top marginal tax rates that had been part of ERTA, but it also eliminated the capital gains tax preference for most taxpayers. For very high-income taxpayers, TRA86 reduced marginal tax rates from 50 percent in 1986 to 39 percent in 1987 to 28 percent in 1988. TRA86 also introduced a hump-shaped pattern in marginal tax rates, with some taxpayers below the highest income

groups facing a 33 percent marginal tax rate.[3]

TRA86 eliminated the tax preference for realized capital gains that had been in effect in earlier years, although the tax rate on such gains was capped at 28 percent. This resulted in an increase in the statutory tax rate on gains for many high-income taxpayers with realized gains. For some high-income taxpayers, the post-1986 tax code retained an advantage for capital gains relative to dividend or interest income, but the statutory rate differential was only 5 percent in the early post-reform years.[4]

A minor tax reform in 1990, and a more substantial change in 1993, partially reversed the changes in the top marginal tax rate that had been enacted in 1986. The 1990 tax reform, which affected tax returns for 1991 and subsequent years, replaced the "hump shaped" distribution of marginal tax rates under the 1986 law, 15-28-33-28, with an alternative 15-28-31 structure. Thus, it raised the top marginal tax rate on the highest income households to 31 percent. The 1993 reform, enacted as part of the Omnibus Budget Reconciliation Act of 1993 (OBRA93), was a further step in this direction. It raised the top marginal tax rate to 36 percent for joint filers with incomes above $140,000 ($115,000 for single filers), and to 39.6 percent (36 percent plus a 10 percent surtax) for individual or married taxpayers with taxable incomes of more than $250,000. Many high-income taxpayers face tax rates above this statutory maximum of 39.6 percent as a result of the phase-out provisions governing various deductions. OBRA93 also further increased the share of Social Security benefits that could be subjected to tax from 50 to 85 percent.

Neither the 1990 nor the 1993 tax reforms affected the top marginal tax rate on capital gains. By 1993, the tax rate differential between ordinary income, including dividends and interest, and realized capital gains, exceeded 12 percent for many high-income taxpayers. The Taxpayer Relief Act of 1997, which was enacted after the final year of SCF data that we analyze was collected, reduced the top capital gains tax rate from 28 percent to 20 percent.

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[3] TRA86 also included up to 50 percent of Social Security benefits in taxable income for high-income recipients. Since investment income is a component of taxable income, this change raised the marginal tax rate on investment income for this group. Our tax calculator incorporates this.

[4] Even when the statutory rate on capital gains equals that on dividends, the effective tax rate on capital gains can be less than that on dividends as a result of tax deferral for unrealized but accrued gains.

The effects of these various reforms can be summarized as follows. First, TRA86 reduced the incentive for high-income taxpayers to receive portfolio income in the form of capital gains rather than dividend or interest. These incentives for holding investments that generate capital gains rather than ordinary income should be greatest in the 1983 SCF. After 1993, the incentive for receiving capital gains increased, although it did not return to pre-1986 levels. Second, TRA86 reduced the incentive for high-income taxpayers to hold tax-exempt debt. It should have resulted in less concentrated ownership of municipal bonds and tax-exempt bond funds, simply as a result of the overall reduction in marginal tax rates. Third, TRA86 raised the capital gains tax rate, and thereby increased the benefit from tax-efficient management of capital gains and losses. Ceteris paribus, this should have discouraged high-income taxpayers from owning mutual funds, which do not necessarily optimize their tax liabilities, and encouraged direct ownership of gains-producing assets. Finally, TRA86 reduced the incentive for high-income taxpayers to invest through tax-deferred accounts, although OBRA93 partly reversed this. TRA86 also reduced the tax benefits of IRAs by eliminating the possibility of pre-tax contributions for households with incomes above certain thresholds. It also reduced the contribution limits on 401(k) plans from $30,000 (unindexed) to $7,245 (indexed).

Two notes of caution are important when considering how the personal tax reforms of the last two decades have affected the incentives for portfolio investments. First, the foregoing discussion does not consider tax changes on firms that might, in general equilibrium, affect the structure of household portfolios. For example, the reduction in corporate tax rates in 1986 placed the top personal tax rate (28 percent) below the top corporate tax rate (34 percent) and changed the incentives for organizing both investment and other activities in corporate vs. individual form. Fluctuation in the corporate tax rate also should have changed the incentives for corporations to finance their activities with debt versus equity securities, thereby altering the supply of assets to the household sector. Our empirical strategy asks whether, at a given point in time, those households with higher marginal tax rates are more likely to hold tax-favored assets. This is not affected by the potential presence of corporate tax changes, but it is important to recognize that these

changes can also have important effects on portfolio structure. Analyzing how major tax reforms affect portfolio structure requires a general equilibrium framework that considers asset supplies as well as asset demands.

Second, our analysis of cross-sectional patterns in portfolio structure and tax rates provides information on how a change in a household's marginal tax rate might affect its portfolio structure. It does not necessarily provide information on the consequences of major changes in the tax system, since such changes affect the marginal tax rates of many households, and relative tax burdens can be a critical factor in portfolio choice.

3.4 Estimating Marginal Tax Rates for SCF Households

To assess each household's tax incentive for holding different assets, we estimate each SCF household's marginal tax rate on ordinary investment income. Although this tax rate is not the only relevant aspect of tax policy for portfolio decisions, many of the tax incentives, especially the differences in these incentives across households, are the direct result of cross-sectional variation in this tax rate. Our algorithm, which is described in the appendix, uses information on household income and demographic structure to estimate marginal tax rates.

One difficulty with using a household's marginal tax rate on another dollar of investment income to measure tax incentives is that this marginal tax rate measure may itself be affected by portfolio choices. To avoid this problem, we calculate marginal tax rates as the difference in a household's tax liability at a base level of income, $T(Y_B)$ and that base level of income (Y_B) plus an increment Δ. The tax liability at the incremented income level is $T(Y_B + \Delta)$. Given our two estimates of total tax liability, we calculate the household's marginal tax rate as $[T(Y_B + \Delta) - T(Y_B)]/\Delta$.

The marginal tax rate is a non-decreasing function of base income, which can in turn be affected by a household's portfolio choices. A household that allocates its entire portfolio to tax advantaged assets reduces its taxable income and, consequently, it may face a lower marginal tax rate than a household that holds a portfolio of the same value invested in more heavily taxed assets.

To purge the marginal tax rate calculation of this endogeneity, the base amount and the increment must be unrelated to the household's portfolio allocation decision. We define the base level of income for a household by artificially setting its investment income from interest, tax-exempt interest, dividends, and capital gains to zero. This choice of the base amount generates a "first dollar" marginal tax rate on investment income. The increment to income that we use to calculate the household's marginal tax rate is five percent of the household's total financial assets or $100, whichever is greater. We choose five percent to approximate the nominal return on taxable interest bearing assets over the sample period. If this increment to taxable income moves the household from one tax bracket to another, the estimated marginal tax rate will be an average of the marginal tax rates corresponding to each of the two income brackets.

Figure 1 summarizes our estimates of the marginal tax rate pattern in 1983, 1989, and 1995. We do not present 1992 because the tax code is very similar to that in 1989, and adding a fourth line makes the figure more difficult to read. The horizontal axis represents the percentiles of the distribution of the marginal tax rate on ordinary income in each year. The vertical axis represents the value of the marginal tax rate, in percentage points. The distribution of marginal tax rates in each year is the result of applying the tax-calculating algorithm to each household in the SCF sample, and then weighting each SCF household by its sampling weight.

The figure shows that in each year, roughly 25 percent of the households face a zero marginal tax rate. These are households whose current income is low enough that they do not have to pay tax. Beyond this point, the 1983 schedule is substantially different from that of the other three years, with many short, flat portions denoting tax brackets, on the way up to a top rate of 50 percent. The effect of TRA86 in compressing the tax brackets is shown by the long, flat portions of the 1989 schedule, first at 15 percent and then at 28 percent, rising up to a top rate of 33 percent. The 1995 distribution is quite similar to that for 1989, except at the highest percentiles. There, the marginal tax rates in 1995 are higher than the comparable rates in 1989.

Summary statistics can further document the changing pattern of marginal tax rates. The average marginal tax rate in 1983 was 17.4 percent, compared with 14.1 percent in 1989 and 14.8 percent in 1995. The tax changes for high-income households that were enacted in 1990 and 1993 raised the marginal tax rates at the top of the distribution, and these changes resulted in an increase in the average for all households. The 1990 and 1993 reforms had little effect, however, on households in the bottom two thirds of the taxable income distribution.

Figure 2 is similar to Figure 1, but it does not weight households by sampling probabilities. The presence of the high-income sample (which has low sample weights) is evident in the expansion of the tax brackets at the top of the distribution. The difference between Figures 1 and 2 highlights the oversampling of high-income households in the SCF. It is precisely this oversampling that makes the SCF more attractive than other surveys for studying how taxes affect portfolio decisions by high-income households.

4. Econometric Framework

We analyze two aspects of the household portfolio problem: the decision of whether or not to allocate any funds to a given asset category, and the decision of how much to allocate to each asset category. We estimate probit models for asset ownership and tobit models for portfolio shares as a function of the marginal tax rate, controlling for a range of income, wealth, and demographic variables discussed below. A statistically significant coefficient estimate on the variable measuring the household's marginal tax rate supports the view that taxes affect portfolio behavior.

To formalize our analysis, we denote positive holdings of asset j by household i with an indicator variable, D_{ij}, set equal to unity if household i holds asset j and to zero otherwise. Analogously, we define S_{ij} as the share of asset j in household i's portfolio of financial assets. In each of these cases, we define a latent variable that indicates the household's preferred choice. In the probit case, the latent variable D^*_{ij} indicates the desire to own the asset:

(1) $$D^{*}_{i,j} = X_i \beta_j + e_{i,j} .$$

In the tobit case, the latent variable indicates the share of the household's portfolio that would notionally be allocated to the asset:

(2) $$S^{*}_{i,j} = X_i \gamma_j + u_{i,j}$$

Each tobit is estimated allowing for censoring both at zero—when the household does not hold the asset—and at one—when the household invests its entire portfolio in one asset class. Censoring at zero is much more common than censoring at one. The standard deviation of $u_{i,j}$ is denoted by σ_j.

Equilibrium models of portfolio choice and taxation, as we noted above, predict which households in a cross-section should hold particular assets, and how much of their portfolio they should allocate to these assets, as a function of the household's position in the marginal tax rate distribution. In any equilibrium, households with high marginal tax rates are predicted to hold portfolios that are skewed toward tax advantaged assets.

Unfortunately, it is difficult to compare marginal tax rates across years because the entire distribution of tax rates changes over time. For example, a marginal tax rate of 33 percent is the maximum in 1989 but only the 80th percentile in 1983. We therefore take a two-part approach to analyzing the SCF data. First, we estimate probit and tobit models on each cross-section data set. We present full results for the 1995 sample year and subsequently compare the effects of marginal tax rates across cross-sectional estimates for all sample years. Second, both to increase the precision of the estimated coefficients and to exploit the variation in tax rates that is due to tax reform, we also present results for all four SCF sample years pooled. When we estimate probit or tobit models on the pooled data, we include dummy variables for the sample year, so that the marginal tax rate variable (like all explanatory variables) is rescaled to reflect its deviation from the year-specific mean. The pooled data set provides a larger data sample than the sample from any single year.

We estimate these models for eight different asset classes in each sample. One potential difficulty

with our approach is that the errors in the latent variable models that generate asset demand are correlated across equations. In our specifications, however, the set of explanatory variables, X_i, is the same for all asset classes. If the specifications were linear, they would form a system of seemingly unrelated regressions in which the coefficient estimates, β_j and γ_j, would not depend on the cross-equation correlation matrix. Due to the nonlinearity of the probit and tobit functional forms, however, the value of the likelihood function can be improved by maximizing jointly over these coefficients and the parameters of the correlation matrix.

Estimating eight-variate probit and tobit models is a non-trivial computational problem. When we experimented with smaller four-dimensional systems, we either had difficulties avoiding numerically unstable regions of the parameter space, or achieving convergence in reasonable time frames. To obtain some information on the nature and importance of these cross-correlations, however, we estimated a set of bivariate probits and bivariate tobits, considering each possible pair of asset classes. There were very few substantial changes in the coefficients in either of the probit or tobit models relative to the coefficients that we estimated in the univariate models. We therefore present estimates of the coefficients under the assumption that the correlation matrices for the errors in the latent variable equations, (1) and (2), are diagonal. We also report our estimates of the correlation matrices from the bivariate equations.

Two complications arise in the tobit specifications for portfolio shares but not in the discrete choice probit equations. The first is that the marginal effect of each explanatory variable on the portfolio share in asset j must sum to zero across all assets. These restrictions need not apply to the marginal effects in the ownership probits, because ownership of one financial asset does not preclude ownership of any other. In a system of linear regressions, this condition is true of the coefficients because it is true in the data. Due to the nonlinearity in the tobit, this restriction must be imposed for every variable.

As shown in Greene (2000, p. 909), the marginal effect of explanatory variable k on the expected portfolio share is given by:

$$(3) \qquad \frac{dE(S_{i,j})}{dX^k} = \sum_i \left[\Phi\left(\frac{1-\gamma_j' X_i}{\sigma_j} \right) - \Phi\left(\frac{-\gamma_j' X_i}{\sigma_j} \right) \right] \gamma_j^k$$

where Φ denotes the cumulative standard normal distribution function, the summation on the right hand side of (3) is over households in the sample, and X^k is the kth element of the vector of explanatory variables that we use to explain portfolio holdings. Intuitively, the marginal effect of the variable X^k on the amount that household I holds in asset j is simply the product of its coefficient in the equation for the jth asset, and the probability that the latent variable for a given observation falls between the upper and lower limits associated with the Tobit. The constraint that a change in explanatory variable k has no effect on the sum of all portfolio shares therefore requires:

$$(4) \qquad \sum_j \frac{dE(S_{i,j})}{dX^k} = \sum_j \sum_i \left[\Phi\left(\frac{1-\gamma_j' X_i}{\sigma_j} \right) - \Phi\left(\frac{-\gamma_j' X_i}{\sigma_j} \right) \right] \gamma_j^k = 0.$$

Imposing these restrictions (one for each explanatory variable k) on the coefficients requires estimating the system of eight equations jointly because the restriction for each explanatory variable depends on all of the parameters in all of the equations. However, when we assume that the errors in different equations are uncorrelated, the log-likelihood function is the sum of the log-likelihood functions for each separate asset demand equation. This simplifies the estimation problem, because we can evaluate eight univariate normal integrals, rather that the eight-dimensional normal integral that would be associated with the problem assuming correlated errors.

The second complication in the portfolio share tobits is that 1,170 households (7.57 percent of the 15,451 total) report no holdings of any financial assets.[5] We assume, for estimating the tobits but not the probits, that these households have some holdings of interest bearing accounts that are not reported in the survey. We therefore assume that these households are censored at 1 for interest bearing accounts and 0 for all other assets. The estimated coefficients are similar in size and significance when these households are

[5] There are 390 such households (9.51 percent) in 1983, 238 (7.57 percent) in 1989, 268 (6.86 percent) in 1992, and

excluded from the sample and when we adopt this crude data fix.

We control for many other explanatory variables that might also influence household portfolio decisions through their correlation with household risk aversion or investment opportunities. These include categorical variables for household income, net worth, and basic demographic attributes, such as age, gender, marital status, and education of the household head. We defined the head of a married household to be the spouse with the higher labor income or, if both spouses earn the same income (usually zero), the older spouse. We also include dummy variables for the occupation and industry of the head of household. The occupation categories are Executives or Professionals; Clerical, Technical, and Sales; Service Workers; Crafts; Laborers; Farmers; Retired; and Not in the Labor Force. The industry categories are Agriculture and Forestry; Mining, Construction, and Manufacturing; Services; and Public Administration.

Table 5 shows the proportions of the sample respondents in each of the discrete categories for each cross-sectional survey. These proportions are not weighted by sample weights and hence do not necessarily reflect the overall population. All income and net worth categories are reported in thousands of constant 1995 dollars. Comparing sample years, the income tabulations show movement toward higher real income categories, away from income levels under $50,000 and toward income levels over $75,000. Most of the change occurred between the 1983 and 1989 surveys, as the distributions for 1989 and 1995 are quite similar. There was also movement toward higher net worth categories, with categories under $250,000 losing observations and categories over $250,000 gaining observations. These changes partly reflect the increase in real incomes, and especially real net worth, over the period that we study.

5. Empirical Findings: Asset Ownership Patterns

This section presents our estimates of probit models of asset ownership. Table 6 shows the coefficients and standard errors for each of the eight asset categories for the 1995 survey year. The

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274 (6.37 percent) in 1995.

coefficient for the marginal tax rate is positive and statistically significant in the equations for taxable equity mutual funds, tax-deferred equity, tax-deferred bonds, and tax-exempt bonds. All of these assets are taxed less heavily than interest bearing accounts. Among the assets that are taxed at less than the ordinary marginal tax rate, only taxable equity held directly has a statistically insignificant coefficient. The asset categories that generate income that is taxed at the ordinary income tax rate, such as taxable bonds, interest bearing accounts, and other financial assets, have positive but statistically insignificant coefficients. These results suggest that higher marginal tax rates are associated with greater ownership of tax-advantaged assets.

The coefficients on the income and wealth categories are also informative. Most asset categories show an increasing probability of ownership at higher income and wealth levels. For the income coefficients, most of the increase occurs in moving from income under $15,000 (the omitted category) to income levels up to $50,000. Similarly, for the net worth coefficients, most of the increase occurs in moving from net worth under $50,000 to net worth levels up to $250,000. Beyond those levels, there is little additional effect of income or wealth on the ownership probabilities. The exceptions in both cases are for taxable equity held directly and tax-exempt bonds, which show steady increases in ownership probabilities as income and wealth increase, even at high income and wealth levels and even after controlling for the household's marginal tax rate.

The remaining rows of the table show the coefficients for the demographic variables. Higher education, at least through the level of a college degree, is associated with a higher probability of ownership for each of the assets. There are a variety of patterns of ownership by age across assets. For households over age 25, the probability of owning tax-deferred equity decreases with age. The same is true for taxable bonds, up to age 65. For tax-exempt bonds, households over age 65 have much higher probabilities of ownership, other things equal. Poterba and Samwick (1997) present a more detailed analysis of the age profiles of asset ownership and portfolio allocation, along with tests for the differences in portfolio composition across birth cohorts. None of the coefficients on the gender of the household head are statistically significant. Married households are significantly more likely than

unmarried households to own equity and bonds in tax-deferred accounts. They are significantly less likely to own tax-exempt bonds and more likely to own taxable bonds.

The next two tables show the effect of including additional years of data in the analysis. Table 7 presents the results for the eight probits for asset ownership estimated on all four waves of the SCF pooled together. The coefficient for the marginal tax rate in all of the specifications for assets that are taxed more heavily than interest bearing accounts is again positive in all equations. The coefficient is statistically significant in all equations except for that for other financial assets. Ownership probabilities continue to be increasing functions of income, net worth, and education, especially when moving up the first two or three categories. The coefficients on age and other demographic variables are also similar to those in Table 6.

Table 8 presents the marginal effects of the marginal tax rate in each equation when estimated on each sample year separately and on all sample years pooled together.[6] Asterisks next to a number indicate that the coefficient on which the marginal effect is based is statistically significant at the 5 percent level. For example, the value of 0.4076 for taxable equity mutual funds in the pooled sample indicates that increasing a household's marginal tax rate by 0.1, or 10 percentage points, would increase the probability of ownership by 0.04076, or about 4 percentage points. The second panel of the table shows that this increment is 57.2 percent of the baseline ownership probability (7.12 percent) that we reported in Table 1.

When expressed as a percentage of the baseline ownership probabilities, the effect of a 10-percentage point increase the marginal tax rate varies considerably across asset categories. Both tax-exempt bonds and taxable equity mutual funds show large effects of the marginal tax rate. The increases are 49.7 and 37.5 percent in 1995, respectively, and the effects are even larger in the pooled sample. In contrast, the three categories taxed as ordinary income—taxable bonds, interest bearing accounts, and other financial assets—show smaller percentage effects. The same is true of taxable equity held directly. The percentage effects of a 10 percentage point change in the marginal tax rate on holdings of tax-deferred accounts were about 20 percent for both equity and bonds in 1983. Over time, the absolute effects (shown in the top panel)

have fallen and the baseline ownership probabilities have increased, resulting in substantially smaller percentage effects, approximately 8 percent of baseline, by 1995.

The econometric results presented in Tables 6 through 8 show that ownership decisions for different financial assets are correlated through the effects of observable variables such as the marginal tax rate, income, and wealth. Ownership decisions may also be correlated through the presence of unobservable factors, which are captured in the error terms in the latent variable equations. To investigate the nature of these correlations, Table 9 shows the correlation matrix of the residuals from all possible pairs of bivariate probits for pairs of asset classes. These estimates are based on the pooled sample. All of the correlations are positive, indicating that once a household owns assets in any one asset class, it is more likely to own assets in each of the other asset classes as well, even conditioning on income and wealth. The of the correlations involving tax-deferred bonds, tax-deferred equity, and other financial assets are smaller than those involving tax-exempt bonds and equity mutual funds.

The positive correlations may have several explanations. One is that establishing ownership of one asset, such as an equity mutual fund, reduces the marginal cost of establishing ownership of other assets. For example, once an investor does enough research and pays the fees to own a stock index fund, it may be easier for to establish ownership of a municipal bond fund at the same fund family. Another possibility is that potential investors differ in their costs—out of pocket, psychic, and otherwise—of researching investment options and making investments. Those who face lower costs, for example because they are more skilled at library or internet research, may be more likely to invest in not just one, but many, asset categories.

6. Empirical Findings: The Allocation of Household Portfolios

We now turn to our findings for household portfolio shares, which correspond to our estimates of tobit models. Our estimation procedure accounts for the censoring of portfolio shares at both zero and one

[6] The marginal effect of x^k in the probit equation for asset j equals the sample average value of $\phi(\beta_j' x_i)\beta_j^k$.

and constrains the sum of the marginal effects of each explanatory variable across the eight portfolio shares to be zero. As in the previous section, we first present results for the 1995 survey year, followed by results for the pooled sample. We then discuss the marginal effects of tax rate changes on the structure of household portfolios.

Table 10 shows the coefficients and standard errors for each of the eight tobit equations for the 1995 survey year. An increase in the marginal tax rate leads to statistically significant increases in the share of the portfolio allocated to taxable equity in mutual funds and to tax-exempt bonds. It leads to a significant decrease in the portfolio share allocated to interest bearing accounts. The coefficients for both equity and bonds in tax-deferred accounts are positive but insignificant. Taxable equity held directly, taxable bonds, and other financial assets have negative coefficients that are not statistically significant.

Marginal effects are presented in Table 11, with asterisks indicating statistical significance of the coefficient at the 5 percent level. Once again the estimates describe the effect of a ten percentage point increase in the marginal tax rate of a single household, holding constant the marginal tax rates of all other households. A 10 percentage point increase in the marginal tax rate increases the household's portfolio share in taxable equity mutual funds by 0.1*0.0495 = 0.00495, or 0.495 percentage points. This is approximately 17 percent of the underlying unconditional average portfolio share of 2.87 percent, repeated (from Table 3) in the top row of the table. The same tax rate increase would induce a 0.334 percentage point (28 percent) increase in the share in tax-exempt bonds and a 0.926 percentage point (2 percent) reduction in the share allocated to interest bearing accounts.

Tables 10 and 11 also show the effects of income, net worth, and demographics on portfolio shares. Higher levels of income are associated with higher portfolio shares of taxable equity held directly, tax-exempt bonds, and taxable bonds and lower portfolio shares of interest bearing accounts and other financial assets. Higher levels of net worth are associated with lower portfolio shares of tax-deferred equity, tax-deferred bonds, and interest bearing accounts and with higher portfolio shares of all other financial assets. Higher levels of education are associated with lower portfolio shares of interest bearing accounts and other

financial assets and with higher portfolio shares of all other assets except tax-deferred bonds. There is little systematic effect of age and gender. Married households tend to have greater portfolio shares of tax-deferred equity and bonds and lower portfolio shares of interest bearing accounts, taxable equity held directly, and tax-exempt bonds.

Tables 12 and 13 present estimates analogous to those in Tables 10 and 11, but now for the pooled SCF sample. For the marginal tax rate, there are some differences in the results for the pooled sample and those for the 1995 sample. The coefficients on directly held equity and taxable bonds are positive, but still statistically insignificant, in the pooled sample. The marginal effect on tax-deferred bonds is nearly twice as large in the pooled as in the 1995 sample. The marginal effect on interest bearing accounts is about 50 percent larger in magnitude. Despite these differences, the overall patterns are similar in the two cases. A 10-percentage point increase in the marginal tax rate is predicted to result in about 1.7 percent of the portfolio shifting from interest bearing accounts and other financial assets to taxable equity mutual funds, tax-deferred equity and bonds, and tax-exempt bonds. [7]

As in the probit models in the previous section, we also consider the correlation matrix for the residuals from the eight separate tobit equations. To estimate the correlation matrix, we fix the coefficients at the values estimated from the pooled sample, i.e. at the coefficients shown in Table 12. For each pair of tobit models, we then maximize the joint likelihood function as a function of the correlation between the residuals in the two latent variable equations. Table 14 presents the resulting correlation estimates. There are two groups of assets. The first group consists of interest bearing accounts, other financial assets, and tax-deferred bonds. With one exception, namely the correlation between tax-deferred equity and tax-deferred bond holdings, the correlations between these assets and all other asset categories are negative. The second group consists of all three types of equity, tax-exempt bonds, and taxable bonds. These

[7] Recall that in our estimation procedure, the marginal effects of each variable are constrained to sum to zero across the eight equations. This involves 36 (33) constraints in the pooled (annual) sample. No single Lagrange multiplier on these constraints is estimated to be statistically significantly different from zero, and the p-value for the joint significance of the multipliers is 0.1068 for the 1995 sample year. For the pooled sample and for the cross-sectional estimates for all other years, the p-value exceeds 0.6.

categories are positively correlated with each other, suggesting that when households decide to allocate their portfolio to any one of these assets, they are also likely to increase their portfolio shares for other assets in this group. This may reflect underlying differences in the financial sophistication that investors need to participate in each of these asset markets, or it may reflect other factors.

Finally, we consider what our estimates suggest about the marginal effects of the tax rate on portfolio choices. Table 15 shows these marginal effects for all sample years. As in the ownership probits summarized in Table 8, the largest percentage effects are for equity mutual funds and tax-exempt bonds. This is in part because the unconditional average shares for these assets are fairly low. The effect of the marginal tax rate on the share in tax-deferred accounts is positive in all sample years. In the 1995 estimation, we estimate that a ten percentage point increase in the marginal tax rate increases the portfolio shares of tax-deferred bonds and equity by about 4 percent of baseline. The effect on interest bearing accounts is always negative and significant, and the effect on other financial assets is negative and significant in all years except 1983.

7. Conclusions and Future Directions

A household's marginal tax rate on ordinary income displays a substantial correlation both with the set of assets that the household owns and with the share of the household's portfolio that is allocated to various asset categories. The results are broadly consistent with simple theoretical models of portfolio selection in the presence of taxes. Households with higher marginal income tax rates are more likely to own tax-advantaged assets such as publicly traded stock and tax-exempt bonds than are comparable households with lower marginal tax rates. They are also more likely to hold assets in tax-deferred accounts such as IRAs, Keoghs, and defined contribution pension plans. These findings emerge in our analysis both of ownership decisions and of the allocation of portfolio shares. They also emerge even after we control for differences in income and net worth across households; these are factors that may have confounded some previous studies of taxation and portfolio choice. While we find that higher marginal tax rate households are

more likely to hold equities, which are tax favored relative to bonds, we also find that they are likely to hold equity mutual funds, rather than directly held stocks. Dickson and Shoven (1995) note that many equity mutual funds impose much higher taxes on their investors than the investors would face if they purchased stocks directly.

The findings presented here suggest several directions for further research. One of the most important concerns the efficiency cost of tax-induced distortions in portfolio structure. We have not yet estimated a structural model of household portfolio behavior. A natural next step would involve specifying and estimating such a model, and using it to calculate the deadweight loss imposed by the tax system.

A second potential extension concerns asset supply. Our results suggest that a tax change like that in 1993, which increased the marginal tax rate on households at the top of the income distribution, should increase the demand among these households for tax-exempt bonds and for investments through tax-deferred accounts. The move from taxable to tax-deferred accounts can be accomplished without any changes in the supplies of assets in the economy. To increase the holdings of tax-exempt bonds among high-income households, however, it is necessary to either reduce the holdings among lower-income households, or to increase the supply of these bonds. Combining our demand-side analysis with a plausible model of asset supply, and studying the resulting patterns of asset allocation in general equilibrium, is a natural direction for additional work.

Another set of issues that we have not explored concerns non-portfolio risks, nontraded assets, and the structure of portfolio demands. A substantial recent literature, particularly Heaton and Lucas (1997), has considered the link between risky human capital and household demand for common stock. There is some evidence that households with greater risk exposure through their labor income are less likely to hold risky corporate equities. While our control variables for income, net worth, and demographics proxy for the risk in human capital, combining a detailed analysis of tax incentives with information on other factors that may influence household demands for risky assets seems like a natural venue for future exploration.

Finally, we have not considered the speed and method of portfolio adjustment in the aftermath of a

tax change. Our analysis cannot shed light on whether investors sell existing asset holdings to adjust their portfolios when tax reform shifts the relative after-tax returns on different assets, or whether adjustment takes place primarily through differential purchasing patterns for new assets. This distinction could have important implications for the time horizon over which household portfolios adjust. Kennickell and Starr-McCluer (1996) present descriptive statistics on the panel of the SCF covering 1983 and 1989. These data may yield further insight on the dynamics of portfolio adjustment. The role of tax changes in stimulating asset sales and in portfolio adjustment more generally is another direction for extending this work.

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APPENDIX: ESTIMATING MARGINAL TAX RATES IN THE SCF

Our algorithm for estimating marginal tax rates proceeds line-by-line down the Form 1040 and other relevant tax schedules. Filing status is determined by the household's marital status, with all married households assumed to file a joint return. Personal exemptions are estimated based on marital status and the number of dependents in the household under age 18. The SCF reports information on many of the components of total income. Wages and salaries, taxable interest, tax-exempt interest, dividends, alimony received, rents and royalties, business income, and farm income are all straightforward and similarly defined in the SCF and for tax purposes.

Other components of income required for the 1040 are not reported in the SCF, or are not reported in as much detail on the survey. We have no data on refunds of state and local income taxes, other gains, and IRA distributions, so we set these income components to zero. All pension and unemployment compensation that is reported is assumed to be taxable. Another approach would be to impute aggregate amounts or taxable shares based on reports of analogous quantities in the IRS Statistics of Income. Refining the precise calculations of marginal tax rates is the subject of work in progress. Social Security benefits are taxed according to the formula appropriate to each year.

The remaining component of adjusted gross income (AGI) is adjustments to total income. The self-employment tax is applied to all business and farm income. Households are assumed to claim the maximum IRA deductions consistent with their reported balances and individual earnings. The SCF also includes data on alimony paid, and this is an adjustment to income. There is no data on any other adjustments that are allowed on form 1040, such as moving expenses, so we set these items to zero. Subtracting the total adjustments from total income gives the household's AGI.

The next step in the computations is to estimate the household's possibility of itemizing deductions on Schedule A. The SCF reliably reports information on interest payments and charitable contributions. Deductions for local taxes are based on the reported value of real estate and personal property subject to tax. Itemization is determined by comparing the sum of these deductions to the standard deduction appropriate for the household's age and filing status. The lack of reported information on other possible deductions, such as medical expenses, state and local income taxes, casualty losses, and job expenses is the biggest handicap in calculating tax rates in the SCF. The household's exemptions and deductions are then subjected to the limits based on income in the later survey years. Subtracting them from AGI yields the household's taxable income. Applying the appropriate tax rate schedule to taxable income gives the household's tax liability. Total taxes include this amount plus self-employment and alternative minimum taxes. We did not compute tax credits such as the Earned Income Credit, since the SCF does not contain the information needed to evaluate many of the credits.

The household's marginal tax rate on any type of income can be calculated by running this algorithm twice—once with a base amount and then with the base amount plus an increment. The difference in the total taxes divided by the increment.

Figure 1: Marginal Tax Rates by Year, Weighted

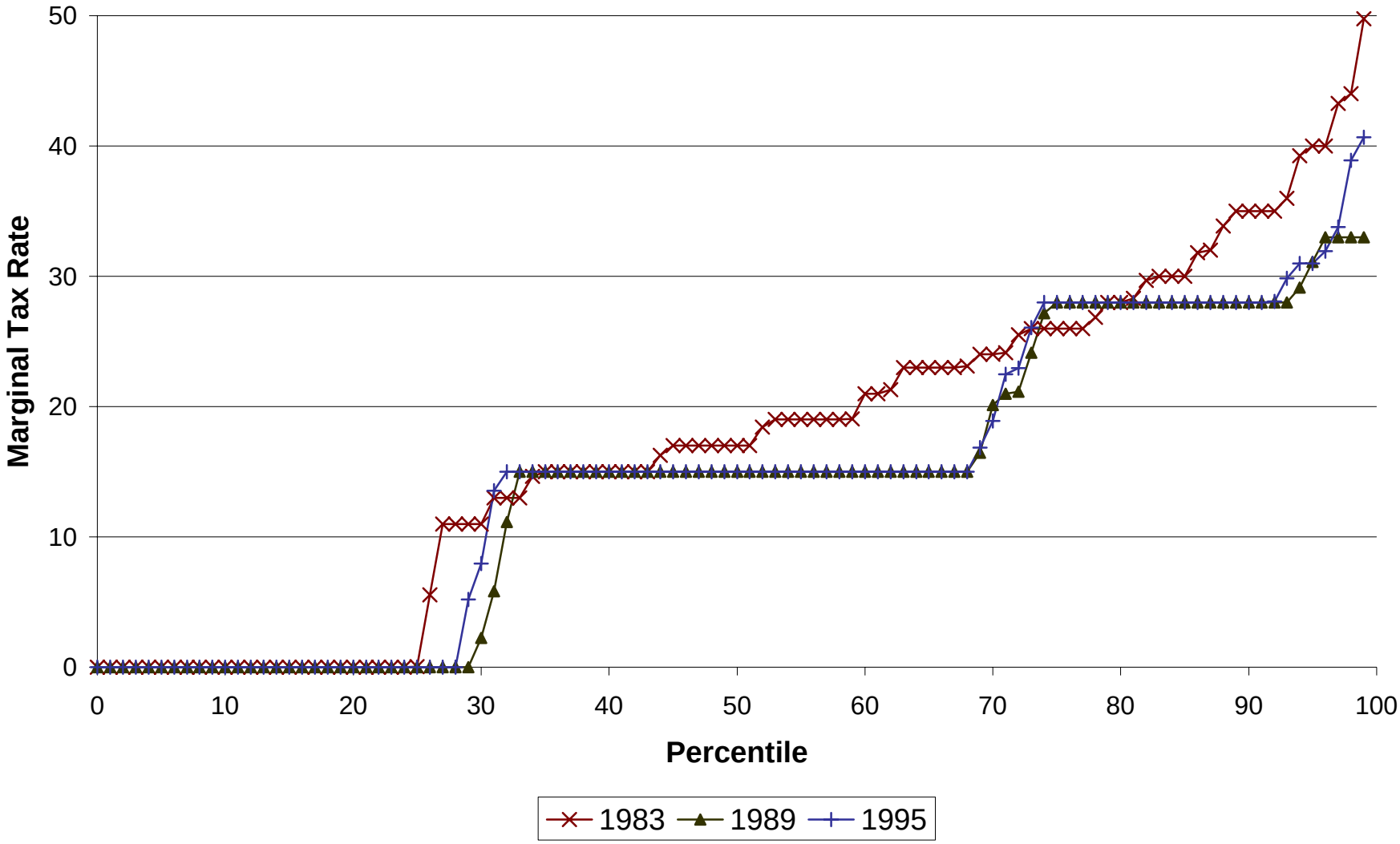

Figure 2: Marginal Tax Rates by Year, Not Weighted

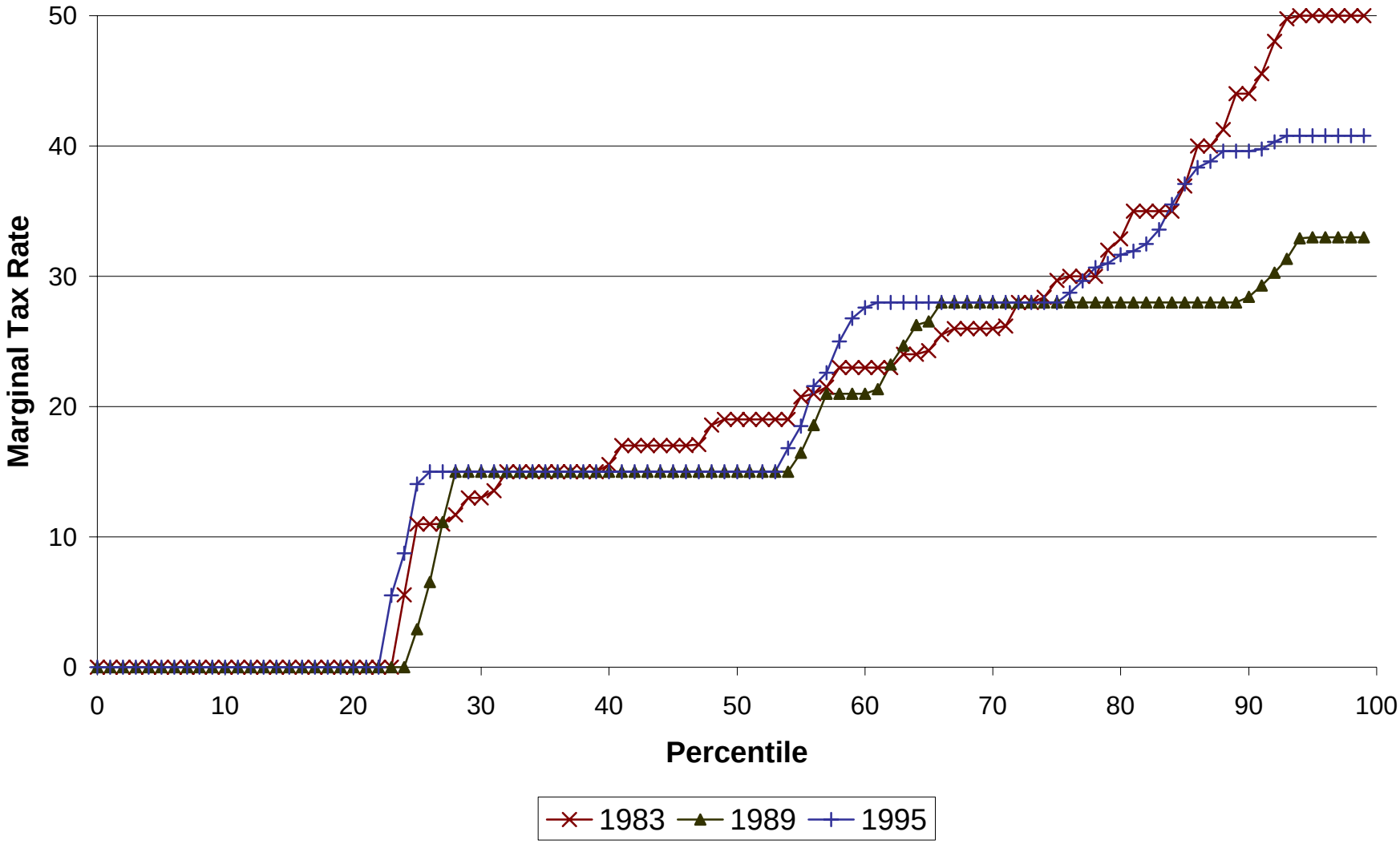

Table 1: Ownership Probabilities, by Year

	Pooled	1995	1992	1989	1983
Directly Held Equity	17.88	16.41	18.13	17.91	19.08
Equity Mutual Funds	7.12	11.26	8.35	5.86	3.03
Tax-Deferred Equity	24.00	30.40	25.67	20.42	19.51
Tax-Deferred Bonds	29.38	30.54	30.35	30.54	26.10
Tax-Exempt Bonds	5.74	6.44	6.79	6.40	3.31
Taxable Bonds	26.40	26.17	27.29	28.14	23.99
Interest Bearing Accounts	86.90	87.22	87.24	85.52	87.63
Other Financial Assets	43.08	42.96	44.56	48.29	36.52

Source: Author's tabulations from the Surveys of Consumer Finances, 1983-1995.
Notes:
1) Households are weighted by sample weights in each year.
2) Sample years are equally weighted in the pooled sample.

Table 2: Conditional Probabilities of Asset Ownership, SCF 1995

	Directly Held Equity	Equity Mutual Funds	Tax Deferred Equity	Tax Deferred Bonds	Tax Exempt Bonds	Taxable Bonds	Interest Bearing Accounts	Other Financial Assets
Directly Held Equity	100.00	28.23	52.61	45.38	19.27	49.65	99.72	60.10
Equity Mutual Funds	41.13	100.00	58.86	45.85	29.36	57.08	99.56	57.28
Tax-Deferred Equity	28.40	21.81	100.00	54.36	11.26	41.58	97.63	53.13
Tax-Deferred Bonds	24.38	16.91	54.10	100.00	9.68	39.66	96.96	52.96
Tax-Exempt Bonds	49.11	51.35	53.14	45.92	100.00	55.60	98.84	67.27
Taxable Bonds	31.13	24.56	48.30	46.28	13.68	100.00	98.00	58.10
Interest Bearing Accounts	18.76	12.86	34.03	33.95	7.30	29.41	100.00	46.33
Other Financial Assets	22.96	15.02	37.60	37.66	10.09	35.40	94.08	100.00

Notes:

1) Each entry is the probability that a household owns the asset in the column, conditional on owning the asset in the row.

2) Households are weighted by sample weights in each year.

Table 3: Average Portfolio Shares, by Year

Unconditional Averages

	Pooled	1995	1992	1989	1983
Directly Held Equity	4.46	4.15	4.34	4.40	4.94
Equity Mutual Funds	1.36	2.87	1.48	0.84	0.25
Tax-Deferred Equity	7.83	11.77	8.10	5.76	5.70
Tax-Deferred Bonds	10.04	10.78	10.92	10.57	7.89
Tax-Exempt Bonds	1.29	1.19	1.74	1.54	0.68
Taxable Bonds	3.70	3.75	3.90	3.89	3.24
Interest Bearing Accounts	55.97	49.71	54.41	56.99	62.76
Other Financial Assets	15.36	15.78	15.11	16.00	14.54

Conditional Averages

	Pooled	1995	1992	1989	1983
Directly Held Equity	24.93	25.28	23.94	24.58	25.89
Equity Mutual Funds	19.13	25.53	17.78	14.39	8.23
Tax-Deferred Equity	32.64	38.73	31.55	28.21	29.22
Tax-Deferred Bonds	34.16	35.30	35.97	34.60	30.22
Tax-Exempt Bonds	22.45	18.45	25.55	24.13	20.60
Taxable Bonds	14.00	14.34	14.28	13.83	13.52
Interest Bearing Accounts	64.40	56.99	62.37	66.64	71.62
Other Financial Assets	35.65	36.73	33.91	33.14	39.81

Source: Author's tabulations from the Surveys of Consumer Finances, 1983-1995.
Notes:
1) Households are weighted by sample weights in each year.
2) Sample years are equally weighted in the pooled sample.
3) The unconditional average refers to all households. The conditional average refers to only those households who have positive amounts of the asset.

Table 4: Aggregate Portfolio Shares, by Year

	Pooled	1995	1992	1989	1983
Directly Held Equity	20.61	18.99	17.61	19.39	26.43
Equity Mutual Funds	3.84	8.48	3.57	2.44	0.88
Tax-Deferred Equity	10.23	14.76	12.36	8.02	5.80
Tax-Deferred Bonds	11.35	11.17	13.66	11.72	8.86
Tax-Exempt Bonds	8.01	6.93	8.91	9.06	7.15
Taxable Bonds	6.40	6.75	6.01	6.59	6.27
Interest Bearing Accounts	24.81	19.31	24.38	27.84	27.73
Other Financial Assets	14.73	13.61	13.49	14.95	16.87
Financial Assets (Billions of 1995 $)		8,840	7,082	7,088	5,391

Source: Author's tabulations from the Surveys of Consumer Finances, 1983-1995.
Notes:
1) Households are weighted by sample weights in each year.
2) Sample years are equally weighted in the pooled sample.

Table 5: Sample Composition, by Year

	Pooled	1995	1992	1989	1983
Income					
0 - 15	19.11	16.70	18.23	19.66	22.06
15 - 25	14.10	13.63	13.88	11.61	16.70
25 - 50	24.89	24.80	21.97	23.19	29.08
50 - 75	12.64	12.63	12.03	13.27	12.75
75 - 100	6.11	6.65	6.63	6.65	4.63
100 - 250	10.30	11.51	11.88	11.20	6.82
250 +	12.85	14.07	15.39	14.41	7.97
Net Worth					
0 - 50	36.12	33.68	35.33	31.72	42.80
50 - 100	12.43	11.89	10.14	11.17	16.13
100 - 250	16.41	14.82	15.03	17.31	18.72
250 - 1000	15.00	16.14	15.23	17.72	11.48
1000 +	20.04	23.47	24.27	22.08	10.87
Education					
Some High School	18.82	13.63	15.31	20.24	26.52
High School Diploma	25.83	25.08	24.17	25.61	28.37
Some College	19.60	21.75	19.64	18.14	18.43
College Degree	17.66	20.28	20.61	16.99	12.60
Post College	18.10	19.26	20.28	19.03	14.09
Age					
Under 25	4.67	4.65	4.63	3.05	5.95
25 - 34	17.07	16.00	16.18	14.70	20.86
35 - 44	21.25	21.66	21.79	22.05	19.72
45 - 54	19.54	21.63	19.92	19.85	16.74
55 - 64	15.93	14.96	14.90	17.66	16.62
65 +	21.53	21.10	22.58	22.69	20.11
Female	34.86	36.01	35.23	34.97	33.22
Married	66.14	66.85	65.69	68.22	64.22
Households (Millions)		99.01	95.92	93.02	83.92
Observations	15451	4299	3906	3143	4103

Source: Author's tabulations from the Surveys of Consumer Finances, 1983-1995.
Notes:
1) Tabulations are not weighted.
2) Income and Net Worth are reported in thousands of 1995 dollars.
3) Demographic characteristics pertain to the head of household.
4) Occupation and Industry categories are included in regressions but not reported.

Table 6: Probit Estimates for Financial Asset Ownership, 1995

	Taxable Equity (Directly Held)		Taxable Equity (Mutual Funds)		Tax-Deferred Equity		Tax-Deferred Bonds	
Parameter	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error
Constant	-2.2745	0.3680	-2.3369	0.3856	-1.9020	0.3290	-1.7500	0.3333
MTR	0.0352	0.2394	1.0932	0.2492	0.6063	0.2319	0.6964	0.2267
Income								
15 - 25	0.3472	0.1150	0.1728	0.1416	0.4770	0.1093	0.3722	0.0961
25 - 50	0.5930	0.1080	0.4258	0.1294	0.7521	0.1023	0.6378	0.0921
50 - 75	0.6934	0.1247	0.3877	0.1446	0.8578	0.1202	0.5632	0.1111
75 - 100	0.8196	0.1390	0.4093	0.1570	0.9632	0.1367	0.4666	0.1272
100 - 250	0.8127	0.1360	0.3872	0.1528	0.9154	0.1366	0.5681	0.1258
250 +	1.1706	0.1499	0.3258	0.1641	0.8807	0.1509	0.2901	0.1397
Net Worth								
50 - 100	0.3011	0.0951	0.3890	0.1068	0.3095	0.0776	0.4445	0.0744
100 - 250	0.6247	0.0866	0.6013	0.0996	0.3912	0.0777	0.5372	0.0731
250 - 1000	0.8842	0.0919	1.0895	0.1022	0.4717	0.0852	0.5803	0.0809
1000 +	1.3438	0.1083	1.1749	0.1174	0.3965	0.1056	0.4666	0.0992
Education								
High Schl	0.3329	0.1089	0.2104	0.1208	0.1776	0.0930	0.2325	0.0824
Some Col	0.4272	0.1116	0.2748	0.1222	0.3150	0.0952	0.2349	0.0862
Col Deg	0.6461	0.1138	0.5141	0.1233	0.4653	0.1003	0.2815	0.0926
Post Col	0.6711	0.1165	0.6406	0.1260	0.4948	0.1032	0.2760	0.0962
Age								
25 - 34	0.0574	0.1700	-0.2160	0.1746	0.3868	0.1372	0.1399	0.1317
35 - 44	-0.0686	0.1686	-0.2366	0.1715	0.2889	0.1376	0.2597	0.1299
45 - 54	-0.1170	0.1700	-0.2966	0.1736	0.2062	0.1402	0.1737	0.1322
55 - 64	-0.0350	0.1754	-0.2693	0.1777	0.1118	0.1471	0.3276	0.1376
65 +	0.1236	0.1778	-0.2963	0.1812	-0.3321	0.1542	0.1903	0.1422
Female	-0.0103	0.0569	-0.0003	0.0598	0.0122	0.0523	0.0795	0.0505
Married	-0.0395	0.0637	0.0870	0.0663	0.1626	0.0566	0.2080	0.0550

Table 6: Probit Estimates for Financial Asset Ownership, 1995, Continued

	Tax-Exempt Bonds		Taxable Bonds		Interest Bearing Accounts		Other Financial Assets	
Parameter	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error
Constant	-3.5558	0.4709	-2.5103	0.3436	1.4014	0.4697	-0.7415	0.3084
MTR	0.8311	0.2629	0.0894	0.2253	0.6534	0.5050	0.1673	0.2246
Income								
15 - 25	-0.2267	0.1701	0.3300	0.0993	0.5557	0.0970	0.0427	0.0791
25 - 50	0.1269	0.1423	0.6067	0.0936	1.0198	0.1194	0.1738	0.0776
50 - 75	0.4507	0.1540	0.6477	0.1101	1.2520	0.2185	0.1198	0.0976
75 - 100	0.2345	0.1710	0.7162	0.1269	1.0093	0.3013	0.0657	0.1162
100 - 250	0.4280	0.1630	0.6140	0.1238	1.1886	0.3447	0.0818	0.1143
250 +	0.7312	0.1757	0.6925	0.1366	0.6474	0.4823	0.2270	0.1329
Net Worth								
50 - 100	0.3202	0.1553	0.3769	0.0775	0.5002	0.1196	0.3396	0.0702
100 - 250	0.6628	0.1348	0.5897	0.0760	0.9932	0.1586	0.5295	0.0690
250 - 1000	1.1019	0.1333	0.7602	0.0831	1.0104	0.2053	0.7256	0.0780
1000 +	1.4560	0.1442	0.8404	0.1000	0.9944	0.3827	0.8997	0.0982
Education								
High Schl	0.4524	0.1508	0.2983	0.0860	0.3164	0.0903	0.3394	0.0734
Some Col	0.6489	0.1501	0.3675	0.0899	0.5044	0.1017	0.3983	0.0776
Col Deg	0.7178	0.1498	0.4427	0.0937	1.0693	0.1729	0.4165	0.0845
Post Col	0.8249	0.1511	0.5438	0.0980	0.9048	0.2282	0.3932	0.0900
Age								
25 - 34	0.0328	0.3452	0.0750	0.1358	-0.0208	0.1268	0.0689	0.1102
35 - 44	-0.0255	0.3382	0.0599	0.1353	-0.0009	0.1298	-0.0205	0.1098
45 - 54	-0.0546	0.3382	-0.1899	0.1391	-0.1136	0.1445	0.1156	0.1128
55 - 64	0.0593	0.3392	-0.3062	0.1440	0.3461	0.1674	0.1991	0.1191
65 +	0.3843	0.3385	-0.0721	0.1472	0.9345	0.1718	0.2923	0.1238
Female	-0.0248	0.0684	-0.0108	0.0511	0.0871	0.0856	-0.0703	0.0482
Married	-0.1432	0.0790	0.2744	0.0556	-0.0006	0.0913	0.0060	0.0525

Table 7: Probit Estimates for Financial Asset Ownership, Pooled Sample

	Taxable Equity (Directly Held)		Taxable Equity (Mutual Funds)		Tax-Deferred Equity		Tax-Deferred Bonds	
Parameter	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error
Constant	-2.1486	0.1174	-3.3175	0.1608	-2.3522	0.1124	-2.0053	0.1032
MTR	0.3371	0.1418	1.0394	0.1667	0.8172	0.1378	1.0033	0.1320
Income								
15 - 25	0.3481	0.0597	0.2494	0.0880	0.3910	0.0615	0.3888	0.0527
25 - 50	0.5281	0.0582	0.3707	0.0830	0.6601	0.0585	0.6110	0.0514
50 - 75	0.6513	0.0686	0.3067	0.0933	0.7864	0.0684	0.6448	0.0620
75 - 100	0.7662	0.0787	0.3972	0.1014	0.7508	0.0788	0.6629	0.0731
100 - 250	0.8727	0.0781	0.3535	0.0998	0.8721	0.0798	0.6622	0.0737
250 +	1.0933	0.0867	0.3521	0.1065	0.8664	0.0875	0.5204	0.0814
Net Worth								
50 - 100	0.2708	0.0488	0.3422	0.0697	0.2588	0.0427	0.3119	0.0404
100 - 250	0.5826	0.0442	0.5570	0.0640	0.3978	0.0411	0.4863	0.0387
250 - 1000	0.9258	0.0487	0.9958	0.0659	0.4440	0.0472	0.5935	0.0445
1000 +	1.3257	0.0607	1.0926	0.0764	0.3157	0.0599	0.4717	0.0572
Education								
High Schl	0.3441	0.0496	0.2686	0.0707	0.1961	0.0465	0.2733	0.0412
Some Col	0.4794	0.0524	0.3584	0.0727	0.2898	0.0490	0.2837	0.0444
Col Deg	0.6910	0.0546	0.5359	0.0733	0.4381	0.0517	0.3182	0.0482
Post Col	0.6454	0.0561	0.6348	0.0743	0.4328	0.0532	0.3804	0.0498
Age								
25 - 34	-0.0323	0.0846	-0.0933	0.1232	0.2977	0.0792	0.1938	0.0734
35 - 44	-0.1153	0.0849	-0.0396	0.1210	0.2878	0.0795	0.2645	0.0734
45 - 54	-0.1038	0.0857	-0.0996	0.1219	0.2977	0.0809	0.2945	0.0746
55 - 64	-0.0257	0.0875	0.0037	0.1232	0.3223	0.0832	0.3994	0.0767
65 +	0.1282	0.0905	0.0142	0.1254	-0.1344	0.0885	0.1152	0.0805
Female	-0.0202	0.0314	0.0560	0.0371	0.0323	0.0298	0.0642	0.0286
Married	-0.0739	0.0344	0.0606	0.0410	0.1280	0.0319	0.1866	0.0304
Year 1989	-0.0369	0.0459	0.3506	0.0648	0.1756	0.0463	0.2186	0.0414
Year 1992	-0.1403	0.0370	0.5359	0.0502	0.2669	0.0356	0.1208	0.0330
Year 1995	-0.1992	0.0358	0.7417	0.0477	0.4375	0.0339	0.0589	0.0321

Table 7: Probit Estimates for Financial Asset Ownership, Pooled Sample, Continued

	Tax-Exempt Bonds		Taxable Bonds		Interest Bearing Accounts		Other Financial Assets	
Parameter	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error
Constant	-3.2979	0.2028	-1.8348	0.0973	0.2921	0.1402	-1.0424	0.0862
MTR	1.1312	0.1667	0.4159	0.1314	1.1809	0.2695	0.1523	0.1304
Income								
15 - 25	0.1152	0.1020	0.2712	0.0495	0.4915	0.0509	0.1183	0.0407
25 - 50	0.3683	0.0900	0.5403	0.0486	0.8338	0.0648	0.2450	0.0416
50 - 75	0.5432	0.1003	0.6008	0.0595	1.0421	0.1162	0.2624	0.0536
75 - 100	0.5881	0.1070	0.6541	0.0704	0.6692	0.1735	0.1613	0.0660
100 - 250	0.7406	0.1056	0.5663	0.0703	0.6813	0.1901	0.1828	0.0664
250 +	1.0356	0.1118	0.6660	0.0778	0.3905	0.3064	0.3243	0.0766
Net Worth								
50 - 100	0.3955	0.0891	0.3710	0.0406	0.5827	0.0615	0.3837	0.0363
100 - 250	0.5672	0.0787	0.5638	0.0391	0.9269	0.0771	0.5517	0.0355
250 - 1000	0.9898	0.0781	0.7054	0.0445	0.9096	0.1135	0.7122	0.0420
1000 +	1.3945	0.0851	0.7267	0.0563	1.1655	0.2605	0.9612	0.0565
Education								
High Schl	0.2872	0.0769	0.3267	0.0409	0.4754	0.0447	0.1936	0.0350
Some Col	0.4226	0.0780	0.4193	0.0441	0.7023	0.0572	0.2790	0.0388
Col Deg	0.5552	0.0768	0.4793	0.0474	1.0530	0.0947	0.2906	0.0433
Post Col	0.6208	0.0772	0.5188	0.0493	1.1044	0.1258	0.2395	0.0458
Age								
25 - 34	-0.1604	0.1810	0.0096	0.0675	-0.0895	0.0677	0.0069	0.0579
35 - 44	-0.2071	0.1788	-0.0866	0.0680	-0.1177	0.0707	0.0222	0.0583
45 - 54	-0.2257	0.1788	-0.2486	0.0698	-0.0803	0.0776	0.0737	0.0599
55 - 64	0.0282	0.1789	-0.2498	0.0716	0.3032	0.0855	0.1393	0.0621
65 +	0.2722	0.1797	-0.1348	0.0745	0.8937	0.0907	0.2071	0.0651
Female	0.0338	0.0402	0.0057	0.0279	-0.0421	0.0451	-0.0418	0.0264
Married	-0.1323	0.0443	0.1516	0.0300	0.0694	0.0473	0.0908	0.0280
Year 1989	0.3230	0.0621	0.0426	0.0419	-0.1033	0.0578	0.3342	0.0384
Year 1992	0.3391	0.0497	0.0699	0.0331	-0.0340	0.0503	0.2412	0.0309
Year 1995	0.3147	0.0481	0.0380	0.0319	-0.0855	0.0495	0.1593	0.0301

Table 8: Probit Marginal Effects for MTR, by Year

	Pooled	1995	1992	1989	1983
Directly Held Equity	0.1246 *	0.0130	0.2455	0.1414	0.1263
Equity Mutual Funds	0.4076 *	0.4221 *	0.3462 *	0.6510 *	0.0110
Tax-Deferred Equity	0.3048 *	0.2196 *	0.1934	0.4957 *	0.3729 *
Tax-Deferred Bonds	0.3686 *	0.2571 *	0.2720 *	0.2087 *	0.5693 *
Tax-Exempt Bonds	0.4378 *	0.3200 *	0.4245 *	0.6382 *	0.2324
Taxable Bonds	0.1552 *	0.0331	0.2770 *	0.1155	0.2546
Interest Bearing Accounts	0.3122 *	0.1716	0.3306 *	0.3181	0.5638 *
Other Financial Assets	0.0526	0.0575	0.0689	0.0688	0.1480

Effect of a 10 Percentage Point MTR Increase on Ownership
(Percent of Baseline Ownership Probabilities)

	Pooled	1995	1992	1989	1983
Directly Held Equity	7.0%	0.8%	13.5%	7.9%	6.6%
Equity Mutual Funds	57.2%	37.5%	41.5%	111.2%	3.6%
Tax-Deferred Equity	12.7%	7.2%	7.5%	24.3%	19.1%
Tax-Deferred Bonds	12.5%	8.4%	9.0%	6.8%	21.8%
Tax-Exempt Bonds	76.3%	49.7%	62.5%	99.7%	70.1%
Taxable Bonds	5.9%	1.3%	10.2%	4.1%	10.6%
Interest Bearing Accounts	3.6%	2.0%	3.8%	3.7%	6.4%
Other Financial Assets	1.2%	1.3%	1.5%	1.4%	4.1%

Notes:

1) Marginal tax rates and ownership probabilities are measured on a scale of 0 - 1.
2) The top panel is the marginal effect of a unit increase in the marginal tax rate on the expected probability of ownership.
3) The bottom panel divides 10 percent of the estimate in the top panel by the corresponding ownership probabilities reported in Table 1.
4) Asterisks indicate statistical significance of the corresponding coefficient at the 5 percent level.

Table 9: Estimated Correlation Matrices from Bivariate Probits, Pooled Sample

	Directly Held Equity	Equity Mutual Funds	Tax Deferred Equity	Tax Deferred Bonds	Tax Exempt Bonds	Taxable Bonds	Interest Bearing Accounts	Other Financial Assets
Directly Held Equity								
Equity Mutual Funds	0.2825							
Tax-Deferred Equity	0.2064	0.2136						
Tax-Deferred Bonds	0.0832	0.0261	0.2964					
Tax-Exempt Bonds	0.3250	0.3966	0.1599	0.0928				
Taxable Bonds	0.2604	0.4355	0.1134	0.1054	0.3484			
Interest Bearing Accounts	0.3263	0.3648	0.2077	0.1476	0.3589	0.2780		
Other Financial Assets	0.1205	0.0938	0.0829	0.0699	0.0935	0.1426	0.2164	

Note: The entry for each cell is the estimated correlation parameter from a bivariate probit estimated on the assets listed in the corresponding row and column of the table.

Table 10: Tobit Estimates of Financial Asset Shares, 1995
Adding Up Constraints Imposed on Marginal Effects

	Taxable Equity (Directly Held)		Taxable Equity (Mutual Funds)		Tax-Deferred Equity		Tax-Deferred Bonds	
Parameter	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error
Constant	-0.5681	0.1132	-0.5688	0.1299	-0.4481	0.1082	-0.4737	0.1408
MTR	-0.0786	0.0790	0.2897	0.0795	0.1265	0.0769	0.1125	0.0850
Income								
15 - 25	0.0811	0.0335	0.0154	0.0384	0.1110	0.0307	0.1179	0.0346
25 - 50	0.1496	0.0324	0.0651	0.0361	0.1883	0.0291	0.1752	0.0328
50 - 75	0.1638	0.0397	0.0556	0.0428	0.2459	0.0366	0.1432	0.0400
75 - 100	0.2139	0.0443	0.0460	0.0476	0.3021	0.0417	0.1047	0.0445
100 - 250	0.2086	0.0438	0.0386	0.0460	0.2623	0.0407	0.1395	0.0446
250 +	0.3243	0.0475	0.0077	0.0494	0.2120	0.0448	0.0011	0.0476
Net Worth								
50 - 100	0.0510	0.0309	0.0788	0.0345	0.0520	0.0279	0.1128	0.0287
100 - 250	0.1418	0.0282	0.1303	0.0320	0.0268	0.0272	0.1068	0.0267
250 - 1000	0.2174	0.0301	0.2454	0.0312	-0.0042	0.0294	0.0777	0.0294
1000 +	0.3947	0.0351	0.2573	0.0358	-0.0866	0.0346	0.0080	0.0355
Education								
High Schl	0.0536	0.0314	0.0365	0.0325	0.0432	0.0268	0.0495	0.0305
Some Col	0.0797	0.0330	0.0672	0.0331	0.0807	0.0273	0.0349	0.0316
Col Deg	0.1166	0.0341	0.1231	0.0345	0.1225	0.0291	0.0385	0.0345
Post Col	0.1221	0.0344	0.1563	0.0349	0.1213	0.0300	0.0465	0.0357
Age								
25 - 34	0.0305	0.0445	-0.0658	0.0514	0.1422	0.0398	0.0425	0.0427
35 - 44	-0.0309	0.0427	-0.0542	0.0510	0.1498	0.0404	0.1095	0.0415
45 - 54	-0.0381	0.0434	-0.0564	0.0520	0.1275	0.0407	0.0826	0.0418
55 - 64	-0.0234	0.0452	-0.0413	0.0530	0.0805	0.0426	0.1437	0.0443
65 +	0.0395	0.0451	-0.0583	0.0533	-0.0614	0.0445	0.0864	0.0451
Female	-0.0075	0.0184	0.0046	0.0190	-0.0005	0.0174	0.0220	0.0179
Married	-0.0598	0.0212	0.0168	0.0215	0.0346	0.0194	0.0607	0.0204
σ	0.3633	0.0082	0.3254	0.0113	0.4019	0.0075	0.4163	0.0090

Table 10: Tobit Estimates of Financial Asset Shares, 1995, Continued
Adding Up Constraints Imposed on Marginal Effects

	Tax-Exempt Bonds		Taxable Bonds		Interest Bearing Accounts		Other Financial Assets	
Parameter	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error
Constant	-0.8438	0.0918	-0.4782	0.0688	1.2831	0.1311	0.0218	0.1060
MTR	0.2253	0.0762	-0.0097	0.0478	-0.1402	0.0699	-0.1044	0.0711
Income								
15 - 25	-0.0586	0.0406	0.0597	0.0255	-0.1499	0.0372	-0.0369	0.0353
25 - 50	0.0074	0.0397	0.0889	0.0228	-0.2956	0.0343	-0.0353	0.0335
50 - 75	0.0709	0.0449	0.0999	0.0262	-0.3056	0.0383	-0.0726	0.0383
75 - 100	0.0268	0.0501	0.1012	0.0279	-0.2901	0.0414	-0.1204	0.0416
100 - 250	0.0728	0.0472	0.0767	0.0274	-0.2741	0.0418	-0.1295	0.0400
250 +	0.1562	0.0502	0.1197	0.0296	-0.2687	0.0458	-0.1058	0.0432
Net Worth								
50 - 100	0.0456	0.0423	0.0468	0.0181	-0.2271	0.0282	0.0841	0.0296
100 - 250	0.1145	0.0353	0.0817	0.0177	-0.2945	0.0267	0.0869	0.0280
250 - 1000	0.2324	0.0367	0.1072	0.0187	-0.3541	0.0278	0.0779	0.0288
1000 +	0.3321	0.0392	0.1273	0.0206	-0.4102	0.0330	0.1184	0.0336
Education								
High Schl	0.0585	0.0379	0.0495	0.0210	-0.1805	0.0335	0.0813	0.0321
Some Col	0.0981	0.0382	0.0696	0.0222	-0.2277	0.0337	0.0769	0.0324
Col Deg	0.1071	0.0395	0.0731	0.0221	-0.2610	0.0342	0.0428	0.0329
Post Col	0.1274	0.0405	0.0964	0.0235	-0.2741	0.0344	0.0212	0.0332
Age								
25 - 34	-0.0064	0.0567	-0.0153	0.0371	-0.1007	0.0539	0.0123	0.0532
35 - 44	-0.0355	0.0542	-0.0210	0.0366	-0.0693	0.0540	-0.0391	0.0525
45 - 54	-0.0491	0.0546	-0.0663	0.0371	-0.0493	0.0547	0.0054	0.0536
55 - 64	-0.0155	0.0557	-0.0919	0.0375	-0.0661	0.0554	0.0121	0.0547
65 +	0.0666	0.0554	-0.0173	0.0382	-0.0524	0.0564	0.0429	0.0565
Female	-0.0079	0.0197	0.0016	0.0117	0.0136	0.0170	-0.0288	0.0179
Married	-0.0435	0.0229	0.0433	0.0137	-0.0181	0.0192	-0.0299	0.0198
σ	0.2996	0.0118	0.2552	0.0090	0.4019	0.0052	0.4381	0.0082

Table 11: Marginal Effects from Tobits, 1995

Parameter	Directly Held Equity	Equity Mutual Funds	Tax Deferred Equity	Tax Deferred Bonds	Tax Exempt Bonds	Taxable Bonds	Interest Bearing Accounts	Other Financial Assets
Uncond. Avg Share	0.0415	0.0287	0.1177	0.1078	0.0119	0.0375	0.4970	0.1578
Constant	-0.1584 *	-0.0971 *	-0.1689 *	-0.1666 *	-0.1250 *	-0.1427 *	0.8478 *	0.0110
MTR	-0.0219	0.0495 *	0.0477	0.0396	0.0334 *	-0.0029	-0.0926 *	-0.0526
Income								
15 - 25	0.0226 *	0.0026	0.0418 *	0.0415 *	-0.0087	0.0178 *	-0.0991 *	-0.0186
25 - 50	0.0417 *	0.0111	0.0710 *	0.0616 *	0.0011	0.0265 *	-0.1953 *	-0.0178
50 - 75	0.0457 *	0.0095	0.0927 *	0.0504 *	0.0105	0.0298 *	-0.2019 *	-0.0366
75 - 100	0.0596 *	0.0079	0.1139 *	0.0368 *	0.0040	0.0302 *	-0.1917 *	-0.0607 *
100 - 250	0.0582 *	0.0066	0.0988 *	0.0491 *	0.0108	0.0229 *	-0.1811 *	-0.0653 *
250 +	0.0904 *	0.0013	0.0799 *	0.0004	0.0231 *	0.0357 *	-0.1776 *	-0.0533 *
Net Worth								
50 - 100	0.0142	0.0135 *	0.0196	0.0397 *	0.0068	0.0140 *	-0.1500 *	0.0424 *
100 - 250	0.0395 *	0.0223 *	0.0101	0.0376 *	0.0170 *	0.0244 *	-0.1946 *	0.0438 *
250 - 1000	0.0606 *	0.0419 *	-0.0016	0.0273 *	0.0344 *	0.0320 *	-0.2340 *	0.0392 *
1000 +	0.1100 *	0.0439 *	-0.0327 *	0.0028	0.0492 *	0.0380 *	-0.2710 *	0.0597 *
Education								
High Schl	0.0149	0.0062	0.0163	0.0174	0.0087	0.0148 *	-0.1193 *	0.0410 *
Some Col	0.0222 *	0.0115 *	0.0304 *	0.0123	0.0145 *	0.0208 *	-0.1504 *	0.0388 *
Col Deg	0.0325 *	0.0210 *	0.0462 *	0.0135	0.0159 *	0.0218 *	-0.1725 *	0.0216
Post Col	0.0340 *	0.0267 *	0.0457 *	0.0163	0.0189 *	0.0288 *	-0.1811 *	0.0107
Age								
25 - 34	0.0085	-0.0112	0.0536 *	0.0150	-0.0010	-0.0046	-0.0665	0.0062
35 - 44	-0.0086	-0.0093	0.0564 *	0.0385 *	-0.0053	-0.0063	-0.0458	-0.0197
45 - 54	-0.0106	-0.0096	0.0481 *	0.0291 *	-0.0073	-0.0198	-0.0326	0.0027
55 - 64	-0.0065	-0.0070	0.0303	0.0506 *	-0.0023	-0.0274 *	-0.0437	0.0061
65 +	0.0110	-0.0100	-0.0232	0.0304	0.0099	-0.0052	-0.0346	0.0216
Female	-0.0021	0.0008	-0.0002	0.0077	-0.0012	0.0005	0.0090	-0.0145
Married	-0.0167 *	0.0029	0.0130	0.0214 *	-0.0065	0.0129 *	-0.0120	-0.0151

Notes:

1) Marginal tax rates and portfolio shares are measured on a scale of 0 - 1.

2) The first row is the unconditional average share as reported in Table 3.

3) Each cell is the marginal effect of a unit increase in the marginal tax rate on the expected portfolio share.

4) Asterisks indicate statistical significance of the corresponding coefficient at the 5 percent level.

Table 12: Tobit Estimates of Financial Asset Shares, Pooled Sample, Continued
Adding Up Constraints Imposed on Marginal Effects

	Tax-Exempt Bonds		Taxable Bonds		Interest Bearing Accounts		Other Financial Assets	
Parameter	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error	Coeff.	Std Error
Constant	-0.7967	0.0458	-0.3438	0.0248	1.3234	0.0374	-0.0573	0.0352
MTR	0.2836	0.0513	0.0111	0.0305	-0.2117	0.0420	-0.1089	0.0423
Income								
15 - 25	0.0128	0.0255	0.0566	0.0132	-0.1638	0.0196	-0.0071	0.0183
25 - 50	0.0532	0.0244	0.1007	0.0125	-0.2807	0.0187	0.0008	0.0179
50 - 75	0.0900	0.0293	0.1160	0.0149	-0.3157	0.0214	-0.0286	0.0210
75 - 100	0.1205	0.0321	0.1233	0.0168	-0.3091	0.0236	-0.0784	0.0234
100 - 250	0.1611	0.0309	0.0971	0.0166	-0.3094	0.0241	-0.0894	0.0235
250 +	0.2447	0.0326	0.1478	0.0180	-0.3374	0.0258	-0.0679	0.0251
Net Worth								
50 - 100	0.0531	0.0247	0.0494	0.0101	-0.1898	0.0154	0.0948	0.0156
100 - 250	0.0902	0.0216	0.0739	0.0094	-0.2578	0.0142	0.0856	0.0146
250 - 1000	0.2141	0.0219	0.0919	0.0103	-0.3124	0.0154	0.0597	0.0156
1000 +	0.3382	0.0245	0.1002	0.0122	-0.3700	0.0185	0.1294	0.0190
Education								
High Schl	0.0405	0.0208	0.0601	0.0105	-0.1457	0.0160	0.0349	0.0153
Some Col	0.0689	0.0220	0.0842	0.0114	-0.1941	0.0168	0.0441	0.0161
Col Deg	0.0913	0.0217	0.0798	0.0117	-0.2219	0.0172	0.0141	0.0167
Post Col	0.1070	0.0221	0.0897	0.0122	-0.2168	0.0172	-0.0188	0.0167
Age								
25 - 34	-0.0484	0.0375	-0.0313	0.0197	-0.0509	0.0291	0.0038	0.0276
35 - 44	-0.0639	0.0368	-0.0524	0.0195	-0.0619	0.0290	0.0050	0.0276
45 - 54	-0.0802	0.0367	-0.0854	0.0198	-0.0582	0.0293	0.0044	0.0280
55 - 64	-0.0162	0.0368	-0.0772	0.0201	-0.0881	0.0296	-0.0046	0.0284
65 +	0.0598	0.0370	-0.0332	0.0206	-0.0555	0.0303	0.0115	0.0291
Female	0.0032	0.0123	0.0047	0.0067	0.0046	0.0098	-0.0149	0.0101
Married	-0.0468	0.0135	0.0115	0.0074	-0.0287	0.0108	0.0160	0.0109
Year 1989	0.0779	0.0182	0.0098	0.0101	-0.1014	0.0149	0.0369	0.0147
Year 1992	0.0933	0.0147	0.0150	0.0079	-0.1125	0.0118	0.0277	0.0117
Year 1995	0.0703	0.0139	0.0116	0.0075	-0.1436	0.0112	0.0245	0.0115
σ	0.3265	0.0070	0.2582	0.0051	0.4218	0.0027	0.4491	0.0044

Table 13: Marginal Effects from Tobits, Pooled Sample

Parameter	Directly Held Equity	Equity Mutual Funds	Tax Deferred Equity	Tax Deferred Bonds	Tax Exempt Bonds	Taxable Bonds	Interest Bearing Accounts	Other Financial Assets
Uncond. Avg Share	0.0446	0.0136	0.0783	0.1004	0.0129	0.0370	0.5597	0.1536
Constant	-0.1501 *	-0.0863 *	-0.1864 *	-0.1821 *	-0.1003 *	-0.0960 *	0.8285 *	-0.0274
MTR	0.0065	0.0242 *	0.0415 *	0.0735 *	0.0357 *	0.0031	-0.1325 *	-0.0520 *
Income								
15 - 25	0.0240 *	0.0037	0.0249 *	0.0360 *	0.0016	0.0158 *	-0.1026 *	-0.0034
25 - 50	0.0355 *	0.0055 *	0.0463 *	0.0534 *	0.0067 *	0.0281 *	-0.1757 *	0.0004
50 - 75	0.0444 *	0.0036	0.0647 *	0.0549 *	0.0113 *	0.0324 *	-0.1976 *	-0.0137
75 - 100	0.0552 *	0.0063 *	0.0640 *	0.0558 *	0.0152 *	0.0344 *	-0.1935 *	-0.0374 *
100 - 250	0.0601 *	0.0045	0.0734 *	0.0511 *	0.0203 *	0.0271 *	-0.1937 *	-0.0427 *
250 +	0.0797 *	0.0034	0.0646 *	0.0239 *	0.0308 *	0.0413 *	-0.2112 *	-0.0324 *
Net Worth								
50 - 100	0.0112 *	0.0070 *	0.0142 *	0.0207 *	0.0067 *	0.0138 *	-0.1188 *	0.0453 *
100 - 250	0.0306 *	0.0116 *	0.0160 *	0.0304 *	0.0114 *	0.0206 *	-0.1614 *	0.0409 *
250 - 1000	0.0582 *	0.0221 *	0.0085	0.0256 *	0.0270 *	0.0257 *	-0.1956 *	0.0285 *
1000 +	0.0951 *	0.0233 *	-0.0189 *	-0.0003	0.0426 *	0.0280 *	-0.2317 *	0.0618 *
Education								
High Schl	0.0189 *	0.0055 *	0.0078	0.0205 *	0.0051	0.0168 *	-0.0912 *	0.0167 *
Some Col	0.0293 *	0.0083 *	0.0148 *	0.0159 *	0.0087 *	0.0235 *	-0.1215 *	0.0211 *
Col Deg	0.0451 *	0.0127 *	0.0238 *	0.0167 *	0.0115 *	0.0223 *	-0.1389 *	0.0067
Post Col	0.0397 *	0.0157 *	0.0235 *	0.0273 *	0.0135 *	0.0250 *	-0.1357 *	-0.0090
Age								
25 - 34	-0.0065	-0.0030	0.0314 *	0.0230 *	-0.0061	-0.0087	-0.0318	0.0018
35 - 44	-0.0145 *	-0.0002	0.0365 *	0.0372 *	-0.0080	-0.0146 *	-0.0388 *	0.0024
45 - 54	-0.0123	-0.0015	0.0388 *	0.0433 *	-0.0101 *	-0.0238 *	-0.0364 *	0.0021
55 - 64	-0.0069	0.0015	0.0354 *	0.0509 *	-0.0020	-0.0216 *	-0.0551 *	-0.0022
65 +	0.0106	0.0018	-0.0038	0.0224 *	0.0075	-0.0093	-0.0347	0.0055
Female	-0.0056 *	0.0015	0.0019	0.0047	0.0004	0.0013	0.0029	-0.0071
Married	-0.0147 *	0.0009	0.0081 *	0.0187 *	-0.0059 *	0.0032	-0.0179 *	0.0077
Year 1989	-0.0104 *	0.0093 *	0.0115 *	0.0228 *	0.0098 *	0.0027	-0.0635 *	0.0177 *
Year 1992	-0.0152 *	0.0149 *	0.0234 *	0.0182 *	0.0118 *	0.0042	-0.0704 *	0.0133 *
Year 1995	-0.0174 *	0.0228 *	0.0470 *	0.0138 *	0.0089 *	0.0032	-0.0899 *	0.0117 *

Notes:

1) Marginal tax rates and portfolio shares are measured on a scale of 0 - 1.

2) The first row is the unconditional average share as reported in Table 3.

3) Each cell is the marginal effect of a unit increase in the marginal tax rate on the expected portfolio share.

4) Asterisks indicate statistical significance of the corresponding coefficient at the 5 percent level.

Table 14: Estimated Correlation Matrices from Bivariate Tobits, Pooled Sample

	Directly Held Equity	Equity Mutual Funds	Tax Deferred Equity	Tax Deferred Bonds	Tax Exempt Bonds	Taxable Bonds	Interest Bearing Accounts	Other Financial Assets
Directly Held Equity								
Equity Mutual Funds	0.0825							
Tax-Deferred Equity	0.0207	0.0740						
Tax-Deferred Bonds	-0.0898	-0.0877	0.0481					
Tax-Exempt Bonds	0.0481	0.2114	0.0091	-0.0494				
Taxable Bonds	0.0493	0.2597	-0.0305	-0.0362	0.1568			
Interest Bearing Accounts	-0.3527	-0.2435	-0.4175	-0.4032	-0.2879	-0.3108		
Other Financial Assets	-0.0900	-0.0707	-0.1069	-0.1101	-0.0906	-0.0458	-0.5734	

Note: The entry for each cell is the value of the correlation parameter that maximizes the likelihood function for a bivariate tobit for the assets listed in the corresponding row and column of the table when the coefficients are fixed at their values in Table 12.

Table 15: Tobit Marginal Effects for MTR, by Year

	Pooled	1995	1992	1989	1983
Directly Held Equity	0.0065	-0.0219	0.0192	0.0048	-0.0151
Equity Mutual Funds	0.0242 *	0.0495 *	0.0177	0.0355 *	-0.0010
Tax-Deferred Equity	0.0415 *	0.0477 *	0.0419	0.0509	0.0637 *
Tax-Deferred Bonds	0.0735 *	0.0396 *	0.0720	0.0052	0.1080 *
Tax-Exempt Bonds	0.0357 *	0.0334 *	0.0423 *	0.0636 *	0.0094
Taxable Bonds	0.0031	-0.0029	0.0279	-0.0148	0.0020
Interest Bearing Accounts	-0.1325 *	-0.0926 *	-0.0631	-0.0926	-0.1835 *
Other Financial Assets	-0.0520 *	-0.0526 *	-0.1579 *	-0.0528	0.0165

Effect of a 10 Percentage Point MTR Increase on Portfolio Share
(Percent of Baseline Unconditional Average Share)

	Pooled	1995	1992	1989	1983
Directly Held Equity	1.5%	-5.3%	4.4%	1.1%	-3.1%
Equity Mutual Funds	17.8%	17.2%	11.9%	42.1%	-4.0%
Tax-Deferred Equity	5.3%	4.1%	5.2%	8.8%	11.2%
Tax-Deferred Bonds	7.3%	3.7%	6.6%	0.5%	13.7%
Tax-Exempt Bonds	27.7%	28.1%	24.4%	41.2%	13.8%
Taxable Bonds	0.8%	-0.8%	7.2%	-3.8%	0.6%
Interest Bearing Accounts	-2.4%	-1.9%	-1.2%	-1.6%	-2.9%
Other Financial Assets	-3.4%	-3.3%	-10.4%	-3.3%	1.1%

Notes:

1) Marginal tax rates and portfolio shares are measured on a scale of 0 - 1.
2) The top panel is the marginal effect of a unit increase in the marginal tax rate on the expected portfolio share.
3) The bottom panel divides 10 percent of the estimate in the top panel by the corresponding unconditional average portfolio shares reported in Table 2.
4) Asterisks indicate statistical significance of the corresponding coefficient at the 5 percent level.

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