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IN ANNUITIES

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ABSTRACT

Recently, the U.S. private annuity market has grown dramatically with aggregate annuity purchases reaching $159.3 billion in 1995. While many annuities are job-related, by 1994 individual annuity purchases outside of job-related retirement plans had grown to $51 billion. This paper uses state-level data on annuity premiums for 1984-93 to explore the expansion of the annuity market and how taxes have affected this market. Annuities are tax-advantaged investments because income taxes are deferred. Higher tax rates can affect annuity purchases by affecting the overall level of saving, by inducing a switch towards tax-advantaged investments, or by encouraging investors to buy annuities at younger ages to increase the value of tax deferral. Both state-level variation in income tax rates and time-series variation in federal tax policy help identify differences in tax incentives to buy annuities. In our benchmark econometric specification using year and state fixed effects, a one percentage point increase in the marginal tax rate increases per capita individual annuity purchases by 4.3 percent. However, this result is somewhat sensitive to the econometric specification. Estimates controlling for year fixed effects but not state fixed effects suggest the overall effect of taxes on annuity purchases is negative and statistically significant. Furthermore, the effect of tax rates on annuity purchases depends on the age composition within the state. The effect of tax rates on annuity purchases increases with the fraction of the population between the ages 50 and 59.

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Taxes and Investment in Annuities

Recently, the U.S. private annuity market has grown dramatically with aggregate annuity considerations (the equivalent term to insurance premiums) growing from $83.7 billion in 1986 to $159.3 billion in 1995.[1] While many of these purchases are pension assets administered by life insurance companies, the fastest growing segment of the annuity market is direct purchases by individuals.[2] Individual annuities (as opposed to group annuities) grew from 28 percent of the market in 1986 to 52 percent of the market in 1994 (see Mayewski, et al., 1996). In turn, this growth of individual annuities encompasses the rise of both qualified annuity purchases (i.e., annuities bought through 401(k) plans, IRAs, or similar plans) and non-qualified annuity purchases. Despite the growth of 401(k) plans in the last decade, Gareis (1995) reports the share of individual annuity purchases that were non-qualified annuities rose from 30 percent in 1986 to a steady 50 percent in the 1990s; by 1994, total non-qualified individual annuity purchases had grown to $51 billion.

This paper explores the recent expansion of annuity markets and how taxes have affected this market. While taxes have played a prominent role in previous research on pension saving and tax-advantaged savings accounts,[3] annuity purchases outside of these plans have received little attention because, in part, the non-qualified annuity market is a rather recent phenomenon and data on annuity purchases are scarce. This paper attempts to fill this gap. We examine state-level aggregate data on annuity premiums from 1984-1993. Both state-level variation in income tax rates and time-series variation in federal tax policy help identify differences in tax incentives to buy annuities. –

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[1] These data are from the 1996 Life Insurance Fact Book. Due to accounting differences, comparisons with pre-1986 data are not possible.

[2] See Hoffman and Mondejar (1992) for estimates in the growth of pension assets held by insurance companies. For 1989, insurance companies held 31.2 percent of private pension assets with the remainder held by pension funds.

[3] For a review of research on pension saving, see Gale (1995). Gale, Engen and Scholz (1996), Hubbard and Skinner (1996) and Poterba, Venti, and Wise (1996) extensively review the literature on tax-advantaged savings plans.

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Taxes can affect the decision to purchase annuities in three ways. First, for a given level of total wealth, high tax rates encourage investors to shift assets into tax-advantaged savings vechicles, including annuities. Second, higher tax rates encourage investors to buy annuities at younger ages to increase the advantages of tax deferral; this affect may lead to purchases actually being lower in high tax states even though retirement wealth held in annuities is the same (or greater) in high tax states than low tax states. Third, higher income tax rates may discourage saving which can lower the flow of funds with which to purchase annuities and the stock of wealth which is relevant for annuity purchases if investors buy annuities by selling other assets.

In our benchmark econometric specification using year and state fixed effects, the overall effect of tax rates on annuity purchases is positive. A one percentage point increase in the marginal tax rate increases per capita individual annuity purchases by 4.3 percent. However, this result is somewhat sensitive to econometric specification. Estimates controlling for year fixed effects but not state fixed effects suggest the overall effect of taxes on annuity purchases is negative and statistically significant. In both econometric models, the effect of tax rates on annuity purchases depends on the age composition within the state. Tax rates have a larger positive effect on annuity purchases in states with a larger fraction of their population between the ages 50 and 59 than in states with a larger fraction of their population in other age groups.

The paper is organized as follows. The next section describes the U.S. annuity market, clarifies some of the terminology associated with annuities, and compares annuities with similar investment opportunities. Section II reviews previous research on annuity markets. Section III discusses how recent tax changes may have affected the annuity market. Section IV presents our empirical methodology and data for testing whether taxes affect annuity markets. In section V, we present our empirical results. Section VI offers some concluding remarks and directions for further research.

I.   Background Information on Annuity Markets[4]

Annuities are sold by life insurance companies through insurance agents, stockbrokers, financial planners and, in some states, banks. Compared with life and health insurance, annuities are a growing part of life insurers' business. In 1995, annuities accounted for 47.2 percent of life insurance company premiums and 66.9 percent of their policy reserves. In 1971, these figures were only 12.1 percent of premiums and 27.9 percent of policy reserves reflecting the increased role of life insurers in pension funding.[5] The vast majority of annuity contracts are for retirement, ranging from individual purchases to business purchases of Guaranteed Investment Contracts (GICs).

Annuity contracts can have two phases, accumulation and liquidation (or payout). In the accumulation phase, asset values grow depending on how the assets are invested. The liquidation phase is the annuitization of wealth into periodic payments, either for a fixed number of years or until the annuitant dies. Individuals need not participate in both phases. An individual can accumulate wealth in an annuity and subsequently make a lump-sum withdrawal. Alternatively, an immediate annuity converts a lump-sum of wealth into a stream of payments without an accumulation phase.

In both phases, money can be invested in assets with variable returns in the case of variable annuities (VAs) or fixed returns in the case of fixed annuities. Variable annuities are similar to mutual funds with investments in portfolios of assets, such as equity funds. The insurance company can manage the assets underlying VAs or invest the money in underlying mutual funds. Recently, leading mutual fund companies (e.g., Vanguard) have combined with insurance companies to offer VAs that are

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[4] See Williamson (1993) and Institute of Financial Education (1988) for a basic explanation of annuities. Poterba (1997) provides an historical overview of private annuity markets in the U.S.

[5] These data are from the 1996 Life Insurance Fact Book. A change in the accounting rules for annuity premiums in 1986 may lead to these figures overstating the increase in the relative importance of annuity premiums.

similar to their mutual funds.[6] Like a family of mutual funds, VAs have sub-accounts each with a different portfolio. Since some investors in variable annuities may want to keep part of their assets in a fixed return asset, most variable annuities have a fixed return sub-account. One advantage of a variable annuity over a fixed annuity is that the underlying equity returns offer some hedge against inflation.

The insurance industry separates annuities along several dimensions. One distinction is between group and individual annuities (see McGill, 1984, for a discussion of group and individual annuities in the context of private pensions). Group annuities include employer-provided pensions and are almost entirely qualified retirement accounts. Individual annuities, accounting for 52 percent of annuity purchases in 1994 (Mayewski, et al., 1996), include both qualified and non-qualified annuities where the insured retains the right to control future investments or terminate the contract. For example, a professor contributing to a tax-sheltered annuity through a 403(b) plan is considered to have an individual annuity despite the purchase requiring a university affiliation. Annuities can also be classified as single or periodic premium (e.g., flexible-premium retirement annuities). With a single premium annuity, the investor only makes one payment. For example, an immediate annuity is a single premium annuity in which benefits begin immediately.

While VAs and mutual funds have similar underlying assets, VAs provide two types of insurance not offered by investing in mutual funds. The first type of insurance is that VAs have a guaranteed death benefit during their accumulation phase. If the owner of the annuity dies during the accumulation phase, then the beneficiaries of the investor's estate are guaranteed to receive at least as much money as was originally invested in the annuity. Many insurers offer annuities with enhanced death benefits that insure that the estate will receive a minimum amount that exceeds the original investment. For example, some contracts guarantee a death benefit that equals the original contributions

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[6] Technically, insurers cannot buy the same mutual funds offered to the general public; instead, they buy "clone" funds offered by mutual fund companies (see Conning & Company, 1992).

compounded at an annual interest rate of 4 percent. In part, since VAs give investors this form of

portfolio insurance in case of death, they have higher fees than mutual funds.

The Black-Scholes option pricing formula provides estimates of the value of this insurance since

the death benefit gives the investor a put option in the event of dying during the accumulation phase.

The Black-Scholes formula requires assumptions about the risk-free interest rate, the volatility of the

underlying assets and the expiration date of the option (in this case, the time of death). For the

following calculations, the risk-free nominal rate of interest is 7.5 percent and the underlying asset

returns are assumed to have a standard deviation of 0.15 (approximately the standard deviation of the

return on the U.S. stock market). In the extreme case that the investor knows he will die with certainty

one year after buying the annuity, the standard death benefit is worth 2.85 percent of the value of the

amount invested. This value is the fair market value of the "put option" if the insurer charged the

investor a one-time upfront charge for the death benefit. If the investor knows he will die exactly ten

years after buying the deferred annuity, the standard death benefit is worth only 0.77 percent of the value

of the amount invested. More realistically, death is uncertain. The case of a 55 year old man buying a

deferred annuity and planning to begin liquidating at age 65 provides a simple illustration of the value of

the death benefit with uncertainty. Using life tables to construct the probability that the investor dies

during any year, we calculate that the expected value of the standard death benefit is 0.25 percent of the

original amount invested.[7] In general, unless an investor has a high probability of dying in the near

future, the guaranteed death benefit has little value as a put option.

The second type of insurance, offered by both fixed and variable annuites, occurs when

investors annuitize wealth: the insurer provides insurance against "living too long" by pooling the risk

of when an annuitant will die across many investors. In providing this insurance, the insurer has

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[7] We use the discrete time approximation that the investor can only die at the end of the year in order to take this expected value. Our calculation does not allow for adverse selection in who buys annuities.

administrative costs and possibly costs created by adverse selection (see Friedman and Warshawsky, 1988 and 1990, discussed below). Insurance companies charge for both types of insurance through the mortality and expense charges that lower the investor's returns both during the accumulation and liquidation phases of the annuity.

Taxes are an important feature of annuity contracts.[8] For tax purposes, annuities are either qualified or non-qualified. While both qualified and non-qualified annuities defer taxes on capital income, qualified annuities (e.g., those purchased through employer-provided 401(k) or 403(b) plans) also defer taxes on the money used to purchase the annuity. For qualified annuities, all withdrawals are subject to income tax. For non-qualified annuities, only the capital income portion of the withdrawal is taxable. If the individual withdraws the money from a non-qualified annuity contract as a lump-sum, the difference between the withdrawal and the contributions is taxable income. If the individual annuitizes wealth through an annuity contract, a portion of the periodic payment is taxable income. For both qualified and non-qualified annuities, the tax code imposes penalties for early (before age 59.5) lump-sum withdrawals. Unlike 401(k) and similar tax-advantaged (qualified) savings plans with annual contribution limits, investors do not face limits on non-qualified annuity purchases.

Although VAs and mutual funds invest in the same assets, they are taxed differently. Mutual fund investors pay taxes on capital gains generated by transactions made by the fund manager or dividends received by the mutual fund regardless of whether the investor receives any cash. In addition, selling a mutual fund (or switching mutual funds) can result in a capital gain or loss. In contrast, investors in VAs are only subject to taxation when they withdraw money from the VA. Thus, neither transactions made by the fund manager nor the investor switching between VA subaccounts creates the recognition of taxable income. While the recognition of income is deferred through an annuity, the

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[8] For a complete description of the taxation of annuities and similar investment-oriented life insurance products, see the U.S. Government Accounting Office's (1990) Tax Treatment of Life Insurance and Annuity Accrued Interest.

income is eventually taxed as ordinary income. For investors who face lower tax rates on capital gains than ordinary income, investing through mutual funds rather than VAs has the advantage of part of the income being classified as capital gains.[9]

Investors do not get these insurance and tax advantages of annuities for free. Insurance companies charge for both types of insurance through the mortality and expense charges and administrative fees that lower the investor's returns during both phases of the annuity. These annual charges are typically about 1.25 percent of the value of the invested assets. Lump sum withdrawals are often subject to surrender charges but these charges often decline with the length of the time the investor holds the annuity typically falling to zero if the investor waits more than six years.[10] These surrender charges are analogous to declining back-end loads charged by some mutual funds. Unlike many mutual funds, annuities do not have fron-end loads. As with mutual funds, annuities charge management fees that differ by type of fund or sub-account; however, Savitz (1992) reports evidence of the mutual funds underlying VAs having slightly lower operating expenses than ordinary mutual funds possibly because the insurance fees cover marketing costs. VAs may also have lower transactions costs than mutual funds because redemptions from VAs are more predictable than for mutual funds. The differences in services offered by the two investments and the form of their fees complicates comparing the returns to investing in mutual funds and VAs; however, returns for VAs appear to be about 1.0 - 1.5 percentage points less than those for mutual funds with similar assets.

Two surveys of annuity owners help shed light on the clientele for annuities. A February 1997 Gallup Poll commissioned by the Committee of Annuity Insurers surveyed 1,361 owners of non-qualified annuities. Since this poll reports statistics on owners, rather than buyers, the respondents can

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[9] For comparisions of the after-tax returns to investing in VAs and mutual funds under different assumptions about taxes, see Toolson (1991) and Cunningham (1994).

[10] Some companies, such as Scudder (see Lavine, 1993), offer VAs with no surrender charges to cater to older investors who can use annuities as a liquid form of investing.

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vary greatly in their circumstances. For example, some investors could be starting their retirement

planning but others could have been receiving annuity benefits for many years. The average age of the

annuity owners is 66 but 17 percent of owners are under age 54. Over 80 percent of non-qualified

annuity owners have annual household incomes under $75,000, with nearly two-thirds having annual

income below $50,000.[11] In response to why they purchased an annuity, respondents overwhelmingly

cited taxes as an advantage of annuities (73 percent reported taxes as very important; 17 percent reported

taxes as somewhat important).[12] Individuals purchase annuities with regular savings, current income

and proceeds from other investments. One-time events, such as an inheritance, are also a common

source of funds.

The second survey is the U.S. Individual Annuity Buyer Survey by the Life Insurance Marketing

and Research Association (LIMRA) from the summer of 1990. This survey included 9,625 records of

purchases of individual annuities from 26 insurance companies.[13] This survey captures the flow of

purchases rather than the stock of owners. Relative to the Gallup Poll, the LIMRA report has less

information on household demographics but more detail on the annuity contracts. Overall, 65 percent of

contracts are qualified with 38 percent of the qualified market being IRAs and 32 percent being 403(b)

accounts.[14] Sixty-four percent of annuity buyers are under the age of 55. Older buyers are more likely

to buy fixed annuities and also buy non-qualified annuities. For example, 54 percent of non-qualified

buyers are over the age of 60 compared to only 12 percent of qualified buyers. Since qualified accounts

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[11] Since only 25 percent of the sample is employed full-time, annual income is not necessarily a good measure of household economic status.

[12] While multiple responses complicate the interpretation of the answers to this question, taxes were the most popular response in the "very important" category. Other common responses were to earn a good rate of return, safety, guaranteed lifetime income and an "easy way to save."

[13] While the data are representative of these twenty-six companies, they might not be representative of the market since the participating firms were not a random sample of insurance companies.

[14] The 403(b) figure also includes some 501(c)(3) accounts for employees of non-profit organizations.

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are typically tied to employment, this pattern is sensible. Seventy-seven percent of non-qualified contracts are single premium annuities suggesting that much of the non-qualified market is the annuitization of existing wealth rather than a plan for future saving. However, 96 percent of single premium annuities are deferred rather than immediate. Also, non-qualified annuities tend to have larger initial considerations than qualified annuities: 70 percent of non-qualified annuities have an initial consideration of at least $10,000 compared with 25 percent of qualified annuities.

II.   Previous Research on Annuity Markets

Previous research on annuity markets focuses on the puzzle of why so few Americans annuitize their wealth despite the simple lifecycle model prediction that annuities should be instrumental in insuring against an uncertain time of death.[15] Friedman and Warshawsky (1988 and 1990) examine whether the pricing of annuities can explain the lack of privately-purchased annuities. Market annuity prices are less than actuarially fair for a person with average life expectancy due to administrative expenses and adverse selection. They find that the yield differences between annuities and alternative assets are 4.2 to 6.1 percentage points before adjusting for adverse selection and 2.4 to 4.4 percentage points after correcting for adverse selection. Alternatively, this yield difference can be expressed as a load factor of between 18¢ and 33¢ per dollar of premium in a privately-purchased contract even after controlling for adverse selection. Of course, the alternative assets do not provide insurance against outliving one's assets. Friedman and Warshawsky's simulations suggest that these differences are large enough to discourage most people from buying annuities. Brugiavini (1993) presents a model in which the combination of adverse selection and individuals' learning about their survival probability leads to a thin market for the purchase of annuities by the aged.

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[15] For a discussion of the importance of the presence or absence of annuity markets for saving decisions, see Kotlikoff, Shoven and Spivak (1989).

Information on the interaction between the demand for private pension annuities and publicly-provided annuities (Social Security) has been used as evidence in the debate over the importance of bequest motives in national saving. Using data from the Longitudinal Retirement History Survey, Bernheim (1991) finds that Social Security annuity benefits increase life insurance holdings and decrease private annuity benefits of the elderly. This finding is consistent with bequest motives being important for national saving. Bernheim focuses on pension annuities and excludes privately-purchased annuities since his benchmark year of 1975 was well before the growth in non-qualified annuities.

A missing element in research on annuities is whether taxes affect annuity purchases. For example, since Friedman and Warshawsky do not distinguish between taxable and non-taxable interest rates; thus, they do not capture the value of tax-deferral of investing through annuities. In contrast, taxes have played a prominent role in research on other parts of the household saving decision. The efficacy of tax incentives for private saving has been much debated in the literature (see cites in footnote 3 for summaries of this debate). Relative to these qualified tax incentives, non-qualified annuity premiums were smaller than 401(k) contributions but larger than IRA or Keogh contributions in 1991. Engen, Gale and Scholz report that overall contributions to these programs were $69 billion in 1991 with over $50 billion in 401(k) plans. In contrast, Gareis (1995) reports $51 billion in non-qualified annuity premiums for 1994.

III.   Taxes and the Demand for Annuities

Tax policy can affect both how much people save and the form in which they save. In a simple model of savings with only one asset and form of ownership for saving (or borrowing), higher income tax rates lower the return to saving which increases the price of future consumption relative to the price

of current consumption.[16] This change in relative prices has the usual income and substitution effects. The substitution effect from the lower net return to saving tends to reduce the level of saving and the income effect tends to raise the level of saving (under the common assumption that both current and future consumption are normal goods). In addition, Summers (1981) points out that changes in the net rate of return can also have a human wealth effect on the level of savings: lower income tax rates increase the net rate of return which decreases the present value of future earnings and by lowering the value of human wealth causes individuals to increase their level of saving. By affecting the level of savings, income taxes can affect the level of annuity purchases since how much individuals invest in deferred annuities may depend on the level of their savings. For example, suppose that taxes affect the level of savings but do not affect the composition of savings (i.e., the choice of savings vehicles). Then, if investors allocate the same share of their wealth to different types of savings regardless of the level of their wealth, then changes in tax rates would cause deferred annuity purchases to rise or fall in the same percentage as the level of saving.

These simple models miss the complex effects of taxes on how individuals choose between assets and different ownership forms for these assets when tax rules and non-tax attributes vary across assets and across ownership forms of the same asset. The comparison between VAs and other savings vehicles exemplifies this complexity. As discussed above, VAs and mutual funds offer similar underlying assets but different tax treatment and non-tax costs. Also, one would expect access to pension plans and 401(k) plans to affect the demand for non-qualified VAs. For a given level of savings, one would expect investors to allocate their savings according to the tax and non-tax attributes of the different assets and ownership forms. Since higher income tax rates increase the value of the tax

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[16] The discussion in the text assumes that changes in tax rates do not affect the pre-tax rate of return. In general, changes in tax rates can also affect the pre-tax rates of return. For the purposes of our empirical work, the assumption that income tax rates do not affect the pre-tax rate of return is plausible since much of the identifying variation arises from differences in state income tax rates while assets are sold on national markets.

deferral offered by annuities, one would expect high tax rates would increase how much wealth

individuals hold in annuities.

The prediction that higher income tax rates encourage investors to hold wealth in annuities has

an ambiguous effect on the flow of annuity purchases. One way to have more wealth in annuities is to

purchase more annuities at a given age (e.g., all investors annuitize their wealth at age 60) which would

increase the flow of purchases. Alternatively, investors can increase the share of their wealth in

annuities by purchasing deferred annuities at a younger age. By purchasing annuities when young,

investors maximize the advantage of tax deferral by lengthening their holding period. If investors worry

about the illiquidity of investing in an annuity, they may postpone their annuity purchases until they

know they can avoid the penalties for early withdrawals. Since the survey data reported above suggests

that many investors buy annuities with accumulated savings, these transactions costs could be important.

This suggests a three-period model in which a person works and saves in the first two periods and retires

in the third period.[17] In the first two periods, the individual must decide on the level of saving and the

form of saving (regular, taxable savings vs. a tax-deferred annuity).[18] Taxable savings has the advantage

of being liquid. The higher the income tax rate, the more likely investors are to invest in annuities

despite their illiquidity.

As an extreme example, compare two investors who want to annuitize the same amount of

wealth for retirement. One investor has a marginal tax rate of zero and the other has a high marginal tax

rate. Suppose the investor with the zero marginal tax rate saves outside of an annuity and buys an

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[17] Gale and Scholz (1994) and Venti and Wise (1990) discuss models of how individuals might decide between taxable, liquid forms of saving and tax-advantaged, illiquid forms of saving.

[18] Income taxes may also affect the labor-leisure choice. If higher income taxes discourage work, then people in high income tax states will have less after-tax income with which to purchase annuities. To a large degree, these interstate differences in the distortion of state income tax rates on labor supply are offset by differences in other taxes, especially consumption taxes, that also discourage labor supply. That is, the low income tax states may have high sales taxes which would also discourage labor supply.

annuity at retirement but the investor with the high tax rate buys deferred annuities to take advantage of

tax deferral. While the present value of their annuity purchases may be the same, the investor with the

high tax rate will appear to buy fewer annuities since the purchases are made earlier and do not include

capital income. With individual level data, the test of this prediction would be whether high tax rates

encourage investors to buy annuities at younger ages. As discussed below, with aggregate data it is

difficult to control for the timing of annuity purchases across the lifecycle.

In summary, income tax rates can have three effects on annuity purchases.[19] First, income tax

rates can affect the level of savings. While theoretically the effect of taxes on the level of savings is

ambiguous, a common assumption is that savings increases with the net rate of return although the

magnitude of this response is controversial. Second, for a given level of savings, high income tax rates

encourage investors to shift into tax-favored investments. Third, for a given level of wealth held in

annuities at retirement, higher tax rates encourage investors to buy annuities at a younger age. In

addition to these effects of tax rates, annuity purchases may also respond to other tax rules that affect the

availability of alternative tax-advantaged forms of investing.

The Tax Reform Act of 1986 decreased marginal tax rates for many high income families,

reducing the value of tax deferral through annuities. While the lower marginal tax rates may have

discouraged annuity purchases, two parts of the Tax Reform Act of 1986 (TRA86) may have stimulated

the non-qualified variable annuity market. First, by tightening the limits on deductible contributions to

IRAs and 401(k)s, TRA86 increased the likelihood of an investor wanting more tax-deferred savings

than allowed by the qualified account limits. Investors who reached their limits in qualified plans after

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[19] The discussion in the text ignores the effects of tax rates that change over time. In general, the value of tax deferral is higher if tax rates fall over time and is lower if tax rates at withdrawal are higher than the tax rates during the accumulation period. Tax rates may change over time for a number of reasons. First, future legislation has an uncertain effect on future tax rates. Second, since the tax system has graduated rates, if income is lower during retirement, then tax rates may be lower during retirement (although the current U.S. tax system provides some examples where marginal tax rates decrease with higher income due to phase-out rules). Third, people can move from high income tax jurisdictions to low income tax jurisdictions.

TRA86 may have bought non-qualified annuities.

Second, TRA86 increased the taxation of long-term (i.e., gains on assets held longer than one year) capital gains relative to other types of income by eliminating the exclusion of 60 percent of long-term capital gains from taxable income.[20] This tax change increased the tax burden on directly owning equity and on owning equities through mutual funds since they allocate taxable gains even if the investor does not receive any cash. Through VAs, investors defer taxes but income is taxed as ordinary income upon withdrawal. Thus, investing in equities through a VA never benefited from the long-term capital gains exclusion. By eliminating this exclusion, TRA86 favored owning equity through annuity contracts rather than mutual funds or directly.

In addition to the TRA86 changes that affected the relative taxation of VAs and alternative savings vehicles, the Technical and Miscellaneous Revenue Act (TAMRA) of 1988 restricted some of the tax advantages of single premium life (SPL) insurance policies. The tax advantages of these policies are similar to the advantages of annuities. However, before TAMRA, investors could borrow money from their SPL policies without recognizing taxable income. TAMRA eliminated the ability to borrow from these contracts. Subsequent to the tax law change, SPL premiums dropped precipitously and some investors may have switched to annuity markets.[21]

IV.   Data and Empirical Methodology

One problem for studying annuity markets and taxes is the lack of data on individual purchases and the characteristics of buyers. Since micro-level data are unavailable, we use data on state-level aggregate annuity premiums for 1984-1993. These data are from insurance company reports to the

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[20] Subsequent tax changes have reinstated a smaller differential between capital gains and ordinary income tax rates for high income taxpayers.

[21] See U.S. Government Accounting Office (1990) for more details on the changes in the market for SPL policies.

National Association of Insurance Commissioners (NAIC). Since the annuity market is regulated as part of the insurance industry, these reports provide almost comprehensive coverage of annuity premiums.[22] They have each company's annuity premiums by state. We aggregate the company-level data into state-level observations for each year. In our sensitivity analysis, we exclude some companies that write only qualified annuities.

As determinants of state-level annuity purchases, we include both tax and non-tax explanatory variables. The interstate variation in income tax rates created by differences in state income tax codes helps identify econometrically the effect of taxes on annuity purchases. As detailed below, we construct combined state and federal marginal tax rates for specific income levels. This interstate variation in tax rates is independent of household income. Thus, the interstate variation in tax rates helps overcome the common problem of separating the effects of income and tax rates on behavior when tax rates are determined by income.[23] In addition to income taxes, several states impose premium taxes on annuities which may discourage purchases. The non-tax determinants of annuity purchases include income, wealth, the age composition of the population, education, pension coverage, and regulation of bank annuity sales. Our basic empirical specification is:

$$
\begin{aligned}
\text{LOG(ANNUITY PREM)}_{it} = {}& \alpha + \beta_1 * \text{MTRDI}_{it} + \text{AGE STRUCTURE}_{it} * \text{MTRDI}_{it} * Z \\
& + \beta_2 * (\text{MTRDI}_{it} - \text{MTRCG}_{it}) + \beta_3 * \text{PREMTAX}_{it} \\
& + \beta_4 * \text{BANKREG}_i + \beta_5 * \text{LOG(INCOME)}_{it} + \text{AGE STRUCTURE}_{it} * \Delta \\
& + X_i * \Gamma + \epsilon_{it}
\end{aligned}
\tag{1}
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[22] One exception would be annuities written between individuals. For example, children can sell annuities to their parents (in an arms-length transaction) as part of the family's estate tax planning.

[23] Of course, if individual-level data are available, then the variation in state income tax rates can also be used to identify tax effects with data on a cross-section of individuals. See Burman and Randolph (1994) for an instrumental variables technique using state-level tax rates as instruments.

where the dependent variable is the logarithm of one of several measures of per capita annuity premiums in state i in year t; $MTRDI_{it}$ is the marginal tax rate on dividends and interest at a specific income level in state i in year t; $AGE\ STRUCTURE_{it}$, which enters the equation separately and interacted with $MTRDI_{it}$, is a vector of state and year specific variables that measures the age structure within the state; $MTRCG_{it}$ is the marginal tax rate on realized capital gains at the same income level in state i in year t; $PREMTAX_{it}$ is the state-level tax rate on non-qualified annuity premiums in state i in year t; $BANKREG_i$ is a discrete variable that captures the state regulation of the insurance powers of state-chartered banks; $INCOME_{it}$ is per capita personal income in state i in year t; X_i is a vector of other state-specific (though time-invariant) characteristics; and ϵ_{it} is a random error term for state i in year t. The α and β terms are scalar coefficients; Z, Δ and Γ are vectors of coefficients. We control for other year-specific though state-invariant information (e.g., a national trend) with fixed year effects.[24]

In our main empirical specification, the dependent variable is per capita individual annuity premiums in each state for each year. Unfortunately, the NAIC data are not separated into qualified and non-qualified annuities. The NAIC data separates group and individual annuity premiums by firm at the state-level. Since group premiums are almost entirely for qualified employer-provided pensions and we want to emphasize non-qualified annuities, we focus on individual annuities. To check whether this approximation affects the results, we also use total (group plus individual) annuity premiums as the dependent variable.

We construct state-level total marginal tax rates on dividend and interest income by making several assumptions. (See the appendix for details on our tax rate calculations.) First, we construct the tax rates at two specific levels of taxable income, $50,000 and $100,000. Thus, we ignore differences in the definition of taxable income across states and between states and the federal tax code. These

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[24] Hausman tests between the fixed effects model and the alternative random effects specification consistently favor the fixed effects specification.

differences are likely to be unimportant for measuring marginal tax rates since most state tax systems reach their top tax brackets by $30,000 of taxable income. Second, we assume that individuals deduct their state taxes from their federal taxable income (i.e., they itemize their deductions rather than take the standard deduction) and their federal taxes from their state taxable income when allowed by the state tax code. This assumption that people itemize may understate the interstate variation in tax incentives but is probably reasonable for most people (at least if we weight by the size of purchase) considering investing in an annuity. Third, we add local income taxes when a common rate applied to most of the state.

We characterize state tax systems as one of three types depending on how state tax liabilities are calculated. First, in 1993, nine states allow federal taxes to be deducted from state taxable income. Second, in 1993, three states calculate state taxes as a percentage of the taxpayer's federal tax liability. Third, the remainder of states either do not have an income tax or do not allow federal taxes to be deducted from state taxable income. Each of these types of states has a different formula for calculating the total federal and state marginal tax rate. We construct marginal tax rates on realized capital gains in a similar fashion but also include information on federal and state tax rules that provide for excluding part of long-term capital gains from taxable income for each year. See Bogart and Gentry (1995) for more details on these formulae.

In 1993, thirteen states and the District of Columbia levied premium taxes on annuities. The administration of these taxes varies by state but typically the tax applies to both principal and interest upon withdrawal (see Conning and Company, 1992). The taxes usually are lower (or zero) for qualified annuities than non-qualified annuities. The tax rates range up to 3.5 percent in Nevada. For most states, the premium tax rate is constant between 1984 and 1993 but several states changed their premium tax rates during the period.

In addition to state taxation, state regulation of insurance companies and who can sell annuities may also affect the level of annuity sales within a state. In 1992, 32 states and the District of Columbia

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allowed state-chartered banks to sell annuities and other insurance products (see Conning & Company, 1992). BANKREG$_i$ measures existing state regulation for 1991. The variable can take one of three values: the 32 states (plus D.C.) that allow banks to act as insurance agents have a value of 1; three states that do not specify regulations have a value of 0; and the 15 states that prohibit banks from acting as insurance agents have a value of -1. Allowing banks to sell annuities may increase consumer awareness of and opportunities to buy annuities and, thus, increase investment through annuities. However, since regulation may be endogenous, this variable may capture effects other than just increased consumer opportunities. States in which insurance companies (and insurance agents) have a strong political presence may be less likely to permit competition from banks. Thus, the predicted sign for the coefficient on the regulation variable is ambiguous.

Since annuity purchases may be quite sensitive to income and demographics across states, we control for interstate differences in average income and the age structure of the population. Our income measure is per capita personal income from the Regional Economic Information System of the Bureau of Economic Analysis. As measures of the age structure, we include the fraction of the population that is in the following age ranges: 30-49, 50-59, 60-69, and 70 years old or older. We omit the fraction of people under age 30 to avoid multicollinearity. The age-tax rate interaction terms provide a test of the hypothesis that high tax rates are associated with purchasing annuities at younger ages. Under this hypothesis, the coefficients for the interactions should be relatively more negative for older age groups. That is, high taxes should be associated with purchases of younger groups and low taxes should be associated with purchases by older groups.

We also control for the following state-characteristics with time-invariant variables: (1) the percent of the population with at least a bachelor's degree in 1990 from the 1990 U.S. Census; (2) the

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fraction of the civilian, nonagricultural work force covered by an employer-provided pension for 1988;[25] and (3) the fraction of the population that had net worth greater than $600,000 in 1989, calculated from estimates created by the Internal Revenue Service (see the Spring 1993 issue of the SOI Bulletin). Unfortunately, these data are not available for other years. These variables capture differences in preferences towards saving. In addition, the pension coverage variable may reflect the demand for annuities to fund employer-provided pensions (either group or individual annuities depending on the type of pension plan). Since pension coverage may be endogenous to the demand for annuities, we also estimate the regression without the pension coverage variable.

Since taxes can affect the timing of annuity purchases over the lifecycle, state-level annual purchases may not accurately reflect wealth held in annuities. As a separate measure of wealth held in annuities, we examine per capita annuity benefits received. Relative to annuity purchase data, benefits data more accurately reflects the wealth that investors funnel through the liquidation phase of annuities. Since benefits received depend on the amount of wealth annuitized regardless of the timing of purchases, benefits data are less susceptible to the timing issues of high income tax rates decreasing the age at which people invest in annuities. If income taxes encourage investors to substitute tax-advantaged forms of savings for taxable forms of savings, then high income tax rates should increase the level of annuity benefits received. On the other hand, if high income tax rates discourage saving, then high income tax rates would be associated with lower levels of wealth and, hence, lower levels of annuity benefits received. These two opposing effects lead to an ambiguous overall effect of income taxes on annuity benefits.

While annuity purchases reflect a current saving or investment decision, annuity benefits received depend on prior decisions about the level of saving, the allocation of this savings across

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[25] Our source was the EBRI Databook on Employee Benefits, 1992, which tabulated the data from the May 1988 Current Population Survey.

annuities and other assets, and the decision of when to annuitize one's wealth. Thus, benefits received

may depend on previous tax policy and historical expectations of future tax rates.[26] However, the

interstate variation in current state tax rates is correlated with past incentives because the relative

ranking of state income tax rates has been fairly constant. To estimte how interstate differences in tax

policy affect annuity benefits, we estimate the following model:

$$
\begin{aligned}
\text{LOG(ANNUITY BENEFITS)}_{it} = {} & \alpha + \beta_1 * \text{MTRDI}_{it} + \beta_2 * (\text{MTRDI}_{it} - \text{MTRCG}_{it}) \\
& + \beta_3 * \text{PREMTAX}_{it} + \beta_4 * \text{BANKREG}_i + \beta_5 * \text{LOG(INCOME)}_{it} \\
& + \text{AGE STRUCTURE}_{it} * \Delta + X_i * \Gamma + \epsilon_{it} \, .
\end{aligned} \tag{2}
$$

The dependent variable is the logarithm of either individual or total (individual plus group) annuity

benefits received per capita in state i from 1984 - 1993. The explanatory variables are the same as in

equation (1); however, annuity benefits are not a function of the interaction terms between tax rates and

the age variables. Given the dependency of annuity benefits on past tax rates and behavior, annuity

benefits received probably respond slowly to changes in tax rates. Thus, to focus solely on the cross-

sectional differences in state tax policy, we also estimate a model using the time-series averages of all

variables for each state (a "between" estimator).

Table 1 presents summary statistics for the variables used in the analysis.

V.   Results

Annuity purchases. Table 2 presents results for three versions of our basic specification for

annuity purchases. In each regression, the dependent variable is the logarithm of state-level per capita

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[26] In contrast, annuity purchases depend on current tax rates and future expected tax rates. However, since investments in annuities during the accumulation phase are reversible, albeit at some cost depending on tax penalties and surrender charges, investors can adjust their annuity positions in response to unexpected changes in the tax rate. Once investors decide to annuitize their wealth and begin to receive benefits, they cannot reduce their annuity position in response to taxes; obviously, they can always choose to increase their annuity benefits by annuitizing more wealth.

individual annuity premiums. The first specification includes year effects to control for any national trends in annuity purchases. The second specification simplifies the tax effect relative to this base case by only including the direct effect of the marginal tax rate without the interactions with the age groups. The third specification includes both state and year fixed effects; the state fixed effects capture any time-invariant differences in propensities to buy annuities. To avoid multicollinearity, the state fixed effects model excludes time-invariant state characteristics.

With respect to income taxes, four conclusions emerge from table 2. First, the interstate variation in marginal tax rates is statistically important for explaining differences in annuity considerations. Second, the interaction terms between the tax rate and the age composition of the population are statistically significant. For example, using the third specification, an increase in marginal tax rates will increase annuity purchases in a state with a higher fraction of its population aged 50 to 59 by more than it would in a state with either more younger or older residents. The hypothesis that high tax rates encourage individuals to purchase annuities earlier in life to maximize the value of tax deferral would suggest a declining series of coefficients as people progress from the beginning of their retirement planning through the eventual annuitization of wealth. The statistically significant negative coefficients for the interaction between the tax rate and the fraction of the population age 30 to 49 seem to contradict this hypothesis. However, savings decisions by many families in the 30 to 49 age range may be dominated by housing and education concerns so serious retirement planning does not begin until after age 50. Among households over age 50, the coefficients suggest high tax rates tend to encourage annuity purchases at younger ages rather than possibly saving outside the annuity and purchasing annuities later.

Third, the estimated overall effect of a change in the tax rate depends critically on the econometric specification. In the specifications with age-tax rate interaction terms, the overall effect of the tax rate depends on the coefficients on the tax rate variable and the interaction terms. Evaluated at

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the weighted average of the population variables, the specification with year effects implies a one percentage point increase in the marginal tax rate decreases annuity purchases by 2.2 percent. Evaluated at the weighted average means of the tax rate and per capita annuity purchases, the elasticity of annuity purchases with respect to the tax rate is -0.8. The negative effect of tax rates on annuity purchases could reflect higher tax rates (a) discouraging the overall level of saving which reduces saving in all forms, (b) encouraging substitution into other more tax-favored forms of saving (e.g., qualified retirement savings controlled outside life insurance companies or as part of group annuities) or (c) encouraging annuity purchases earlier in the life-cycle. As discussed above, the pattern of coefficients for the interactions between tax rates and age composition offers some support for the idea of taxes affecting the timing of annuity purchases over the life-cycle. In contrast to the year effects specification, the model with both state and year fixed effects implies a one percentage point increase in the marginal tax rate increases annuity purchases by 4.3 percent (an elasticity with respect to the tax rate of 1.5).

These differences across specifications can arise because the two econometric models identify the tax effects using different sources of variation. The year fixed effects specification identifies the tax effects from interstate differences in the time-series average of total marginal tax rates and the intertemporal variation (relative to annual national averages) within states. In contrast, the model with state and year effects relies only on the intertemporal variation within states, generated by state tax policy changes or the differential effects of federal policy changes across states. By including state fixed effects, the third specification controls for state characteristics, such as a savings propensity, that do not change over time; alternatively, if such charactersitics change over time, the state fixed effects control for differences in the time-series averages of these characteristics. The differences in the results across the two specifications suggest these characteristics captured by the state fixed effects are correlated with both the tax rates and annuity purchases.

Several possible state characterisics could cause these differences. State tax policy could be

correlated with either how households save or how much they save. For example, if high state taxes increase the number of households with qualified pension plans, then these households may be less likely to buy individual annuities. Similarly, if high state tax rates increase the fraction of wealth held as housing, then for a given level of wealth, households in high tax states would have less wealth with which to buy annuities. In our sensitivity analysis, we estimate a between states estimator using the time-series averages for each state. This estimator relies only on average differences across states to identify the tax effects. While the estimates are imprecise, the overall tax effect is negative, consistent with the differences between permanent state characteristics and transitory changes in tax incentives creating the differences between the econometric specifications in table 2.

The fourth conclusion regarding how income taxes affect annuity purchases from table 2 is that the difference between the marginal tax rates on dividends and capital gains income does not affect annuity purchases. In fact, contrary to our prediction, the coefficient on this difference is positive in models with year effects. Much of the existing variation in the spread between tax rates comes from changes in the federal tax treatment of capital gains which mainly creates time series variation. Since the regressions control for national trends with year effects, it is difficult to disentangle whether the spread between the two tax rates affects the decision to buy annuities. If we do not control for year effects, the coefficient on the spread between dividends and capital gains is negative and statistically significant (as reported in our sensitivity analysis in table 3); however, without year effects, this specification does not control for other possible explanations for why annuity premiums may have increased after 1986 when the spread between tax rates fell.

While the effects of income taxes on annuity purchases are somewhat ambiguous from the results in table 2, the results clearly imply premium taxes discourage annuity purchases. Across the three specifications, a one percentage point increase in premium taxes lowers annuity purchases by about 9 percent. Since only five of the thirteen states with premium taxes changed their tax rates during the

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sample (though they made a total of 11 changes), it is somewhat surprising the estimates from the state fixed effects model are so similar to the year effects model.

Several of the coefficients on the control variables are noteworthy. The banking regulation variable is consistently negative and statistically significant. The results in the first specification suggest a state switching from prohibiting to allowing bank sales of annuities would decrease annuity premiums per capita by 13 percent (since the switch would change the discrete variable by two units from -1 to 1). These results favor the hypothesis of the prohibition on bank sales resulting from a strong insurance industry presence in the state over the hypothesis of an increase in the number of sellers increasing consumer awareness and demand for annuities. Higher pension coverage is associated with more individual annuity purchases; a one percentage point increase in pension coverage increases annuity purchases by 2.2 percent. The relationship between individual annuities and pension coverage probably reflects our inability to separate completely qualified and non-qualified annuities. In the year effects specification, the income elasticity of annuity considerations is 0.69 and statistically different than zero at the 99% confidence level; however, the addition of state fixed effects reverses this result. The overall effect of differences in the age composition of the population depends on the direct effect and the interaction with the tax rate. Evaluated at the mean tax rate, the specification in column (3) suggests states with older populations tend to buy more annuities.

Sensitivity Analysis for Annuity Purchases. Table 3 presents the tax rate coefficients for some alternative ways to estimate the relationship between annuity premiums and taxes. Overall, the results of the sensitivity analysis confirm the main themes of table 2. The first part of the table explores alternative definitions of the dependent variable. As in the third specification in table 2, each regression includes year and state fixed effects. The first row of table 3 examines the key coefficients for regressions using the logarithm of total individual and group annuity premiums as the dependent variable. Including group annuity premiums does not change the overall pattern of the results, except

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the premium tax variable is no longer statistically significant.[27] Since this broader measure of annuity premiums leads to similar conclusion, the results are not sensitive to the possibility of taxes encouraging the substitution of qualified group annuities for individual purchases.

Under some qualified retirement plans, some insurance companies record unallocated payments from employers as fund deposits rather than as annuity premiums (see Noback, 1969, p. 146). The second row of table 3 expands the definition of annuity premiums to include these fund deposits. With this broader definition of annuity sales, the income tax variables are not statistically significant suggesting the timing of these employer contributions are not sensitive to employee tax rates. While the first two rows of table 3 broaden the definition of annuity sales, the third row narrows the focus by returning to individual annuity considerations and excluding data from several insurers that specialize in qualified retirement annuities even though much of their business is individual annuities. The most prominent example is the Teacher's Insurance & Annuity Association (TIAA-CREF); the data appendix has a complete list of excluded firms. Excluding these firms' data yields similar coefficients to the results in table 2 suggesting a similiar pattern for non-qualified and qualified annuities.

The second part of table 3 examines different econometric specifications for the third column of table 2. The first of these alternatives excludes the state and year fixed effects. By omitting the year effects, this specification allows any national trend which may coincide with changes in federal tax policy to affect the tax rate coefficients. Relative to the first specification in table 2, the only major change in the results is the coefficient on the spread between the tax rates on dividends and capital gains becomes negative and statistically significant. This negative relationship is consistent with the elimination in 1986 of the sixty percent exclusion for long-term capital gains increasing the popularity of variable annuities.

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[27] Regressions with year effects but not state effects yield similar results to the first specification in table 2; however, unlike the reported results, the coefficient on the premium tax variable remains statistically significant and of similar magnitude.

The second alternative specification uses the marginal tax rates at $100,000 of taxable income rather than $50,000. This specification checks whether the results are sensitive to how we constructed our tax rate variables. Since these tax rates are highly correlated, the similarity with the results in table 2 is not surprising.

Since tax rates on dividends and interest fell and the federal exclusion and many state exclusions for capital gains were eliminated simultaneously, the intertemporal variation in MTRDI and MTRDI - MTRCG may be correlated across states. To focus on the effects of the level of tax rates without the differential between the rates on dividend and capital gains income, the third alternative specification excludes the difference between the types of tax rates. Excluding the spread between the tax rate on dividends and capital gains does not affect the other tax coefficients.

The last alternative specification is the between estimator which uses state average values across the ten years. The between estimator helps separate the importance of changes over time from differences across states. We omit MTRDI - MTRCG since its average is highly correlated with the average level of MTRDI. In this specification, the overall tax rate coefficient is negative but the coefficients are not significantly different from zero. As mentioned above, this negative coefficient suggests that the relatively permanent interstate differences associated with high income tax rates tend to discourage annuity purchases.

Annuity Benefits Received. The first two columns of table 4 report the results of estimating per capita annuity benefits received (equation (2)). Since annuity benefits come from annuitizing wealth or as part of a pension, the tax rate effects on the annual flows do not depend on the age composition of the population. Thus, relative to premiums, benefits are more directly tied to annuitized wealth. However, annuitized wealth only accounts for wealth inside annuity contracts after annuitization; hence, the benefits data do not reflect saving done through the accumulation phase of annuities. Furthermore, if investors withdraw funds from a deferred annuity without annuitizing, the withdrawal is recorded as a

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surrender rather than as a benefit. These types of withdrawals are more frequently associated with individual annuities than with group annuities.

Unlike the annuity premiums regressions, the tax rate coefficients differ between individual and total annuity regressions. For individual annuities, the coefficient for the income tax rate is not statistically significant but, for total annuities, a one percentage point increase in the tax rate implies a 1.4 percent increase in annuity benefits received. The statistically significant positive effect of tax rates on total annuities but not individual annuities is consistent with the hypothesis of higher tax rates encouraging the creation of qualified group annuities through employers.

Consistent with the annuity premium regressions, the coefficient on the premium tax variable is negative and statistically significant suggesting that premium taxes discourage the use of annuity markets. Again, the bank regulation variable has a statistically significant negative coefficient, the income and pension coverage variables have statistically significant positive coefficients. Increasing the fraction of the population between the ages of 55 and 59 has a statistically significant negative effect on annuity benefits received, but increasing the fraction of the population over age 70 has a statistically significant positive effect on benefits received.

Since benefits received depend on past annuitization decisions, the intertemporal variation in tax rates is not relevant for most benefits. To focus on the long-term interstate variation in tax rates, the last two columns of table 4 present estimates from between regressions for individual and total annuities. The estimates are similar to those in the first two columns of the table but less statistically significant. Overall, the table is consistent with high tax rates increasing total annuity benefits received (a combination of qualified and non-qualified annuities).

VI.   Conclusion

By relying on the interstate variation in income tax and premium tax rates, our research provides

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evidence that tax policy plays a role in saving through annuity markets. The estimated effects of tax rates on investing in annuities are sensitive to both age composition within the state and the choice of econometric specification. The interactions with age composition provide some support for the hypothesis that high tax rates encourage investors to invest in annuties early in their retirement planning to maximize the value of tax deferral. Econometric specifications with year fixed effects suggest the overall effect of higher income tax rates is to discourage investing in annuities. However, these specifications do not control for time-invariant state characteristics that might be correlated with both the tax rate and buying annuites. When state fixed effects are used to control for such characteristics, higher income tax rates have the overall effect of increasing annuity purchases.

While our results suggest that taxes play an important role in annuity markets, our work also highlights the need for further research. The importance of the state fixed effects in determining the overall effect of tax policy on annuity investing suggests trying to model explicitly what state level factors are important for savings allocation decisions. One possible explanation is taxes affect the availability of substitutes to investing in annuities. A formal model of the taxes, the timing of annuity purchases, and the role of alternative savings vehicles would be useful though individual-level data would be needed for testing a more structural model.[28]

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[28] See Behzad, Lee and Vora (1991) for a discussion of the problem facing investors for how to allocate investment across various tax-deferred forms of saving.

Data Appendix

1. *Construction of marginal tax rates.* We characterize state tax systems as one of three types based on how the state tax liability is calculated. Denote the various Federal and state tax rates as follows:

f = Federal marginal tax rate on earned income
s = state marginal tax rate on earned income (or state surtax rate for Type 3 states)
f_d = Federal marginal tax rate on dividends and interest income
s_d = state marginal tax rate on dividends and interest income
t = combined state and Federal tax rate.

The state tax rates on dividend and interest income can differ from the tax rate on earned income when states impose different tax rates on earned and unearned income (e.g., Massachusetts) or when states only tax capital income. The combined state and Federal tax rate for each type of state tax system can be written:

Type 1 $\quad t = f_d + s_d - s_d f$ $\qquad\qquad$ (Federal tax not deductible from state tax)
Type 2 $\quad t = (f_d + s_d - s_d f - s f_d) / (1 - sf)$ $\qquad$ (Federal tax deductible from state tax)
Type 3 $\quad t = f_d(1 + s) / (1 + sf)$ $\qquad\qquad$ (state income tax a fraction of Federal tax liability)

States without a state income are a special case of type 1 states. The *1989 State Tax Guide* by Commerce Clearing House (Chicago: Author) provides details on state tax systems and *Significant Features of Fiscal Federalism* (1984-1991) by the Advisory Commission on Intergovernmental Relations (Washington, D.C.: Author) has tax rates and rules for deductibility of Federal taxes.

We include local income taxes for Maryland, Iowa, and Indiana since they are fairly uniform and widespread. Also, a number of states provide the taxpayer with choices in calculating taxes (e.g., either a fraction of the Federal tax liability or a separate state tax form). The rate reported in the table is the lowest marginal tax rate available to the taxpayer.

2. *Qualified vs. non-qualified annuities.* In part of the sensitivity analysis, we exclude several firms that sell primarily qualified annuities. These firms were: Aetna Life and Annuity, Teachers' Insurance and Annuity Association - College Retirement Equity Fund (TIAA-CREF), the Variable Annuity Life Insurance Company (VALIC), Safeco, Mutual of America Life Insurance, and American United Life. We constructed this of firms from information in Contract Data Profiles compiled by the Variable Annuity Research & Data Service reported in The VARDS Report.

3. *Bank regulation.* We obtain information on state regulation of whether state chartered banks can sell insurance from Conning & Company (1992). This data does not include historical changes in regulation.

4. *Premium taxes.* See Conning & Company (1992) for recent information on premium taxes. Commerce Clearing House's State Tax Handbook also has information on state premium taxes. In some cases, we called state insurance commissions for historical information.

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Table 1: Summary Statistics

	Mean	Standard deviation
(1) Ind. Ann. Premiums	106.65	58.42
(2) Ind. + Group Ann. Prem.	152.88	73.72
(3) (1) w/o "TIAA"	94.06	54.07
(4) (2) + Fund deposits	284.89	174.49
Ind. Annuity Benefits	37.63	17.50
Total Annuity Benefits	91.69	44.83
MTRDI @ $50,000	0.354	0.0496
MTRCG @ $50,000	0.271	0.0680
MTRDI @ $100,000	0.389	0.0719
MTRCG @ $100,000	0.279	0.0579
Premium Tax (Non-qual.)	0.0045	0.0083
Per capita Income ($000s)	16.380	3.599
Education	20.02	4.16
Fraction Rich	0.0125	0.0050
Pension coverage	58.24	5.46
Fraction 30 - 49	0.286	0.0234
Fraction 50 - 59	0.0900	0.0063
Fraction 60 - 69	0.0831	0.0105
Fraction 70 +	0.0837	0.0165

The annuity premium variables are in dollars per capita. Marginal tax rates combine both federal and state rates.

Table 2: Individual Annuity Considerations Per Capita Regressions

	Year Fixed Effects	No Age Interactions Year Fixed Effects	State and Year Fixed Effects
MTRDI @ $50,000	-4.53	-2.83**	12.83*
	(6.98)	(0.71)	(5.16)
MTRDI * Frac. 30-49	-47.64**	--	-40.12**
	(18.45)		(11.56)
MTRDI * Frac. 50-59	200.29**	--	109.06*
	(60.38)		(43.28)
MTRDI * Frac. 60-69	5.06	--	-37.37
	(70.05)		(46.18)
MTRDI * Frac. 70 +	-30.05	--	-45.32
	(39.26)		(24.52)
MTRDI - MTRCG	1.41	2.33*	-0.081
	(1.01)	(1.02)	(0.86)
PREMTAX	-8.44**	-9.52**	-9.36**
	(1.76)	(1.80)	(3.30)
Bank Reg.	-0.065**	-0.073**	--
	(0.013)	(0.013)	
Log(Income)	0.69**	0.46*	-0.85**
	(0.22)	(0.22)	(0.33)
Education 1990	0.0052	0.010	--
	(0.0073)	(0.007)	
Fraction Rich 1989	1.93	5.70	--
	(4.66)	(4.68)	
Pension Coverage 1988	0.022**	0.022**	--
	(0.003)	(0.003)	
Frac. 30-49	20.60**	3.41*	0.56
	(6.49)	(1.61)	(5.86)
Frac. 50-59	-103.47**	-27.19**	-30.27
	(22.41)	(4.28)	(16.71)
Frac. 60-69	-2.91	1.76	27.41
	(25.42)	(4.14)	(18.76)
Frac. 70 +	24.81	14.61**	21.98*
	(14.13)	(2.35)	(10.70)
Adj. R^2	0.81	0.80	0.95

The dependent variable is the logarithm of per capita individual annuity considerations. Population-weighted least squares regressions for fifty states plus D.C. for 1984-1993 (510 observations). * denotes coefficients that are significant at the 95% confidence level (two-tailed test). ** denotes coefficients that are significant at the 99% confidence level (two-tailed test).

	MTRDI	MTRDI* Frac 30-49	MTRDI* Frac 50-59	MTRDI* Frac 60-69	MTRDI* Frac 70 +	MTRDI - MTRCG	PREMTAX
I. Alternative Dependent Variables							
Individual + Group Annuities	3.610	-28.29*	204.13**	-100.25	-49.02	-0.35	-1.94
Individual + Group Annuities + Fund Deposits	103.64	-411.38	-865.07	3819.7	-2522.9	12.37	97.39
Ind. Annuities less "TIAA-CREF"	17.16**	-42.00**	51.813**	-4.49	-53.16*	0.29	-12.22**
II. Alternative Specifications							
No year effects or state effects	-13.31**	-18.55	237.45**	-77.62	29.03	-1.27**	-9.77**
MTR at $100,000	10.49**	-33.38**	106.90**	-48.93	-22.85	0.028	-9.72**
Exclude MTRDI - MTRCG	12.70*	-39.90**	108.79*	-37.69	-44.72*	--	-9.36**
Between estimator (51 obs.)	92.28	-306.37	-6.54	90.49	-160.71	--	-0.070

Each regression, except the model without year or state effects, is the same as the third column of table 2 except as noted. The model without year or state effects has the same explanatory variables as the first specification in table 2. The between estimator excludes (MTRDI - MTRCG) since the within state average of this difference is highly correlated the within state average of MTRDI. * denotes coefficients that are significant at the 95% confidence level (two-tailed test). ** denotes coefficients that are significant at the 99% confidence level (two-tailed test).

Table 4: Per Capita Annuity Benefits Received Regressions

	Panel Regressions With Year Effects		Between Estimates (51 observations)	
	Individual Annuities	Total Annuities	Individual Annuities	Total Annuities
MTRDI	-0.45 (0.56)	1.36* (0.54)	-0.49 (1.32)	1.80 (1.30)
MTRDI - MTRCG	1.11 (0.81)	0.59 (0.77)	--	--
PREMTAX	-7.03** (1.43)	-10.00** (1.36)	-8.09* (4.06)	-10.66* (4.02)
Bank Reg.	-0.057** (0.011)	-0.047** (0.010)	-0.058 (0.029)	-0.043 (1.49)
Log(Income)	1.09** (0.18)	2.07** (0.17)	1.61** (0.51)	2.48** (0.51)
Education 1990	0.012* (0.0059)	-0.0083 (0.0056)	-0.0026 (0.017)	-0.017 (0.016)
Fraction Rich 1989	1.50 (3.72)	-3.54 (3.53)	-3.47 (10.39)	-7.63 (10.29)
Pension Coverage 1988	0.012** (0.0026)	0.0068** (0.0025)	0.012 (0.007)	0.0051 (0.0070)
Frac. 30-49	-1.52 (1.28)	-0.74 (1.21)	-0.63 (3.65)	-1.10 (3.61)
Frac. 50-59	-18.23** (3.40)	-13.09** (3.24)	-29.99** (10.28)	-18.23 (10.18)
Frac. 60-69	2.86 (3.29)	5.49 (3.13)	6.55 (9.70)	7.18 (9.61)
Frac. 70 +	11.54** (1.86)	5.97** (1.77)	11.36* (5.45)	5.31 (5.40)
Constant	--	--	-11.29* (4.28)	-19.17** (4.24)
Adj. R^2	0.81	0.82	0.73	0.78

The dependent variable is the logarithm of either individual or total annuities per capita. The estimates are from population-weighted least squares regressions for fifty states plus D.C. for 1984-1993 (510 observations). * denotes coefficients that are significant at the 95% confidence level (two-tailed test). ** denotes coefficients that are significant at the 99% confidence level (two-tailed test).