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Fiscal Policy, Debt Neutrality, and Savings Behavior: Evidence from Life Insurance Holdings

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Abstract

This paper provides a direct examination of the relationship between bequests and government debt. Specifically, we use state-level panel data on life insurance in force in the United States and find that a one dollar increase in debt, at either the state or federal level, is associated with a $1 increase in the face value of life insurance holdings per capita for the average state. We find, in addition, that this response occurs mainly on the intensive margin, meaning that the size of the average life insurance policy increases when government debt increases. Along the extensive margin, we find the number of policies in force falls slightly with federal debt, and rises slightly with state debt increases. The results show an altruistic response to changes in government debt that are consistent with Ricardian Equivalence and the long-run neutrality of government debt.

JEL Codes: E01,E21,E50,E52,E62

Keywords: Government debt, Life insurance, bequests, Ricardian Equivalence, Savings

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1 Introduction[1]

The macroeconomic effects of government debt hinge, in large part, on the time horizon of households. In a standard over-lapping generations framework, increases in government debt lead to a crowding out of investment and a smaller steady state capital stock due to the finite time horizon of households. Barro (1974) shows, in contrast, that even if all individuals are finitely-lived they may act as if they have an infinite time horizon due to altruism towards future generations. If so, households perceive no difference between tax and debt financed government spending, and government debt is neutral in the long run. This indifference to the method of government financing is typically referred to as Ricardian Equivalence.

If Ricardian Equivalence holds, we should observe altruistic bequests responding positively to changes in government debt, as households transfer resources in anticipation of higher future taxes. Existing studies of the immediate consumption response to changes in taxes are informative about the short-run stimulative ability of fiscal policy, but they do not provide information on the behavior of bequests and so do not necessarily provide evidence on the long-run neutrality of government debt.[2] Looking at overall bequests directly, which make up as much as 80 percent of wealth (Kotlikoff and Summers, 1981 and 1988; Kotlikoff, 1988), is also problematic in that these can be driven by several different motives, and may simply be the accidental result of poor planning or early death.[3]

In this study we look at the response of a specific means of making bequests, life insurance, to changes in government debt. Life insurance is an ideal mechanism to study the existence of the altruistic motives behind Ricardian Equivalence, as it has no other function than to pass resources on to future states of the world for people other than the insured. In addition, the purchase of life insurance is not accidental, and hence reflects an explicit desire to pass on resources to the future. We use state-level data from 1970–2006 in the United States and estimate the relationship between life insurance holdings and both state and federal government debt, and find that in aggregate households act to completely neutralize government debt.

Although life insurance does not represent the totality of savings, holdings are large enough that these decisions are a significant portion of aggregate savings behavior. Over the period 1970–2006, life insurance in force (the face value of policies that can potentially be paid out) was equal to roughly 28 percent of total

[1]We thank Bent Sorensen for helpful advice, but absolve him of all errors. We are also thankful to Jiangmei Wang at the American Council of Life Insurers for kindly providing the life insurance data.

[2]Poterba (1988) found that 75–82% of a 1975 tax rebate was saved, a number similar to the high-end estimate of Johnson, Parker, and Soules (2006) with respect to the 2001 tax cut. Souleles (1999) documents a savings rate of about 36% out of income tax refunds, while Gale and Orszag (2004) find that households save 54-70% of a decrease in federal taxes. Parker (1999) finds that household expenditures had an elasticity of around one-half with respect to expected changes in Social Security taxes.

[3]See Seater (1993) for a summary of several studies of bequests, finding no clear evidence pointing towards their motivation.

household assets.[4] Life insurance per policy increased, on average, from $16,529 in 1970 to $48,665 by 2006 (in 1998 dollars). Life insurance does not provide a complete picture of altruistically motivated savings, but it provides the only direct view as other savings vehicles potentially provide benefits to the saver herself as well as to future generations. Life insurance thus provides a clear test of altruistic savings, which in turn has clear implications for the neutrality of government debt in the long-run.

There are two potential margins that may provide further information on the response of life insurance to government debt, the intensive margin represented by the face value of total life insurance in force per policy, and the extensive margin, which is the number of policies per person. Models of heterogeneity in altruism, such as in Michel and Pestieau (1998), Smetters (1999), or Mankiw (2000), suggest that only the most altruistic people will end up leaving bequests (e.g. buy life insurance). These models imply that savings by altruists are sufficiently high to offset the entire increase in government debt (or future tax increases). Thus part of our investigation into the response of life insurance to federal and state debt is to examine both the intensive and extensive margins.

Figure 1 provides an introduction to the relationship between government debt and aggregate life insurance holdings. In this figure, the solid line tracks the ratio of federal and state government debt to GDP, with federal debt representing about 80% of the total. The dotted line tracks the ratio of life insurance in force to GDP over time. The figure shows that government debt grew steadily during the 1980s after a relatively flat period, and peaked in the early 1990s. A relatively steep decline followed in the mid 90s, until 2000, when government debt resumed its growth as a share of the economy. While the face value of life insurance is roughly three times total government debt, the changes in the two ratios track relatively closely. As can be seen, as debt rises in the 1980's, the face value of life insurance increases just as rapidly after the relatively flat period in the late 1970s. The growth in life insurance flattens out as debt growth stops in the 1990's, and growth in life insurance in force does not resume until the growth in government debt picks up after the year 2000. Figure 1 thus suggests the relationship that our empirical work will examine more carefully, which is that life insurance purchases by households respond to the levels of government debt.

Our econometric model to capture whether life insurance purchases by households are partially a function of federal and state government debt starts with a model of life insurance in force, which is the face value to be paid in the future. To capture aggregate behavior we will use a panel of life insurance in force by each state over the time period 1970-2006, and model that as a function of government debt. Our primary method is to use long panels, so that we estimate the change in life insurance over five years as a function

[4] Authors calculations using data from the American Council of Life Insurers and the Federal Reserve Flow of Funds report

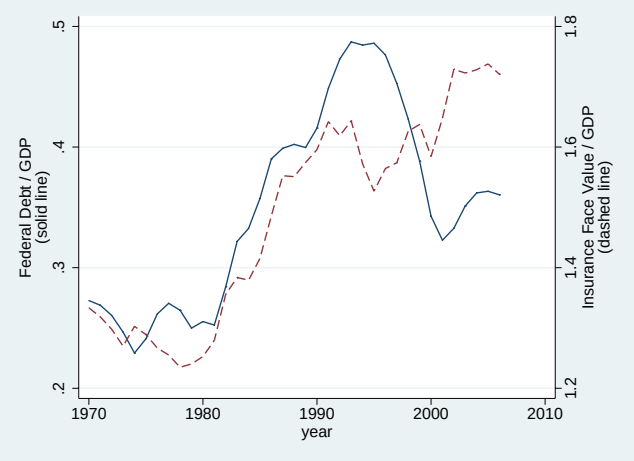

Figure 1: **Government Debt and Life Insurance, Relative to GDP, 1970–2006**

NOTE: Government debt data is from the CBO, in nominal terms, relative to nominal GDP, reported by the Bureau of Economic Analysis. The face value of all life insurance is from the American Council of Life Insurers (ACLI), in nominal terms, relative to nominal GDP.

of the change in debt over the same time frame. In this way we are able to capture long-run responses to changes in debt, and do not necessarily rely on households responding immediately. We also confirm our results using shorter time periods, finding that the response of life insurance is smaller as the periods become shorter, and our estimates are often less precise.

Our regression results show that for a 10% increase in federal debt per capita, life insurance in force increases by approximately 2.3% per capita. A similar 10% increase in state debt is associated with a smaller but still statistically significant increase in life insurance holdings of 0.9% per capita. When these results are translated to dollar terms, however, they suggest that a $1 increase in federal debt per capita is associated with a $0.96 increase in the face value of life insurance holdings per capita for the mean state. Similarly, for the mean of state debt, our results imply that life insurance holdings rise by $1.01 when state government debt increases by $1. The face value represents the bequest that will be made when the policy pays off, so this shows a $1 increase in the assets available to the beneficiaries in the event that the insured dies, even though the actual cost of the additional $1 in insurance may only be around three cents.[5] These results are consistent with the work of Bernheim (1991) who found altruistic behavior in life insurance purchases, but goes beyond by establishing that the aggregate response of life insurance is consistent with the neutrality of government debt in the long run. Thus we show that life insurance holdings respond in a manner entirely

[5]The three cent figure is from the American Council of Life Insurers, and is an approximation of the typical cost of $1 in coverage.

consistent with Ricardian Equivalence and the neutrality of government debt. The key insight provided by the provision of life insurance is that individuals will not benefit directly from the transfer represented by insurance, thus allowing a measure of the extent to which behavior is motivated by altruism, consistent with models using an infinite time horizon. An interesting aspect of these results is that households build assets in response to increases in federal and state government debt equally, there is virtually no impact of offsetting state government purchased assets.

While in households in aggregate are found to build real assets to offset increments to governmental debt, we attempt to determine the extent to which this aggregate response is borne by a subset of households, and whether the number of households that save to offset government debt is also responsive to that debt. We thus break down the aggregate response of life insurance into an intensive margin (the size of the average policy) and an extensive margin (the number of policies held per capita). There are some data issues that render this disaggregation somewhat more tentative than our aggregate results, but nonetheless we find that the positive response of life insurance is due entirely to the intensive margin, with a 10% increase in debt leading to an increase of 3.4% in the size of the average policy (which is sufficient to offset the entire debt). On the other hand, we find the extensive margin is actually negative, with an increase in federal debt of 10% leading to a 0.5% decline in the number of policies per capita. The aggregate amount of life insurance thus appears not only to increase with response to federal debt, but to become more concentrated into a smaller set of policies.[6] With respect to state debt, there is a similar positive effect on the intensive margin, but in contrast we find some evidence of a positive effect on the extensive margin.

Section 2 of the paper presents the life insurance industry, and discusses the data available by state that we use to build our panel estimates. Section 3 presents the empirical model, which includes a discussion of how heterogeneity among households in the degree of altruism will lead to an expectation that the aggregate economy may offset the total government debt by savings, but that not all individual households will necessarily save. Section 4 presents the empirical results in aggregate, including both the intensive and extensive margins. We also discuss the implications that households save as much to offset additional state and local government debt as they save to offset federal debt. A final section summarizes and concludes.

[6]There are data issues with respect to whether more individuals are covered, and there appear to be secular trends in the life insurance industry of fewer but larger policies on average.

2 Life Insurance Data for the United States

Table 1 presents the means of the raw data we use in the analysis of how government debt affects life insurance purchases. State-level panel data on life insurance in force for the years 1970–2006 come from the Life Insurance Fact Book published by the American Council of Life Insurers (ACLI). These reports provide information on the number of life insurance policies as well as their face value, broken down into several broad categories. Individual life insurance encompasses standard term life policies, which pay off upon the death of the insured, but do not accumulate any savings that are available if the term expires with the insured still alive.[7] In addition to the term life policies, whole, variable, and universal policies are included in the category of individual life insurance. The distinction from term life is that whole, variable, and universal policies contain accumulated savings available at the end of the term even if the insured has not died. The other main category is group life insurance, which is generally provided in term policies, and is made available to members of the specified group, which is typically employees of a firm where enrollment by employees may or may not be voluntary. A final minor category is credit life insurance, which in the event of death of the insured pays off a given debt, typically a mortgage, as opposed to making a direct transfer to a beneficiary. This category is extremely small relative to the others, has declined rapidly in recent years, and is not discussed separately.

The life insurance industry has been changing over the time period of our study. Specifically, the face value of the average policy has been getting larger, but there are fewer numbers of policies, and their composition has changed somewhat. In 1970 individual life insurance policies of all types (term, whole, variable, and universal) were very prevalent, with nearly one policy outstanding for every person in the U.S.[8] The number of individual policies declined steadily through the period under review, dropping to roughly 0.5 per capita. At the same time, the number of policies issued through group insurance has grown, from about 0.4 per capita in 1970 to 0.55 in 2006.[9] Unfortunately, there is no data on the number of unique people or households covered by the set of these policies. Individuals may have more than one policy, and may be covered by both an individual and a group policy. Nonetheless, the Life Insurance and Market Research Association (LIMRA International) is reported to have found that 78% of individuals were covered by some type of life insurance in 2004 (ACLI, 2010).

[7] Even if households allow their term insurance to expire, we believe it is a good indicator of the intent to save, where the accumulation of real assets is what allows households to allow their term insurance to expire.

[8] This does not necessarily imply that every individual was insured. People may have several policies outstanding at once, but data is not available on the number of insured individuals.

[9] Strictly, it is possible that some policies, especially in groups, are paid by employers rather than households. Presumably, however, firms would only do so if households benefit (excepting a small share where households are not even aware insurance has been bought). We nonetheless treat all life insurance as benefitting individual households

A separate issue with the ACLI data is that they stopped reporting the number of group policies by state after 1993, although they continue to report the national total for this policy. To study the intensive and extensive margins, we use an extrapolation procedure to obtain the state-level number of total policies which encompasses group policies after 1993. To construct this extrapolated measure, we use the predicted values of a regression of the state-level number of total policies on state fixed effects, a time trend and a quadratic time trend, state-level individual policies and credit policies, national total policies and the national total numbers of individual policies, group policies and credit policies.[10]

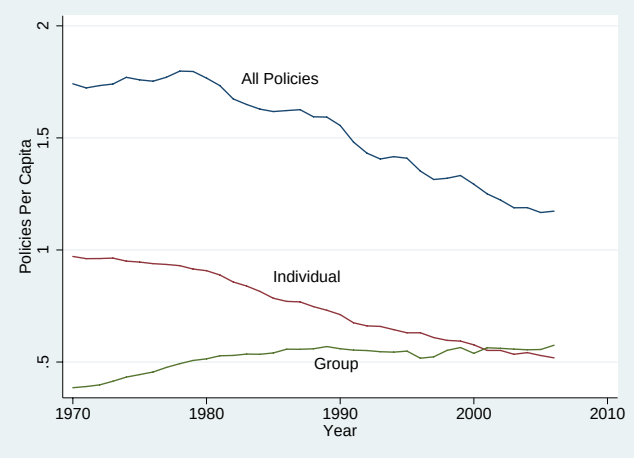

Figure 2: **Life Insurance Policies per capita, 1970–2006**

NOTE: Figure 3 is based on data on the state aggregate number of total policies (individual + group + credit) covering the years 1970–2006, obtained from the ACLI (2010). Each policy type is available by state and year, with the exception of group policies where state details are not reported after 1993. State level data for all policies and group policies is thus extrapolated based on the procedure explained in Appendix B).

While the number of policies was not rising relative to the population, the actual face value of life insurance – the value that is paid on the event of death – rose substantially over this period. Figure 3 plots the nominal face value of life insurance by type relative to nominal GDP over the years 1970–2006. Over the entire period, the face value of all life insurance has been at least 125% of GDP, and this has risen to a value of nearly 172% of GDP by 2006. Much of this increase was driven by an increase in individual policy face values relative to GDP, which increased from about 70% of GDP to over 100% of GDP by 2006. Group policies, reflecting their smaller absolute number of policies, have remained at about 60% of GDP for much of the period under study.

[10](see appendix B for further details.)

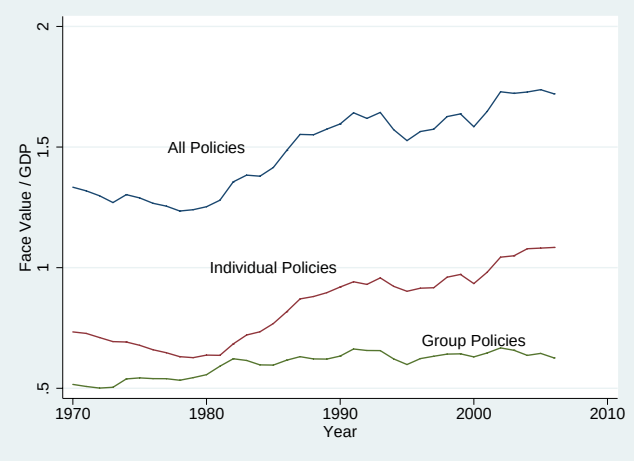

Figure 3: **Face Value of Life Insurance relative to GDP, by type, 1970–2006**

NOTE: GDP data is in nominal terms, from the BEA. The face value of both individual and group life insurance is from the ACLI, both are in nominal terms. All policies is the combination of the individual and group data, along with an additional category, credit insurance, that is not shown in the graph due to it's very small size.

3 Life Insurance and Fiscal Policy

The model we test is whether in aggregate, households in the economy desire additional savings to offset increases in government debt. We look at the face value of life insurance in force as our indicator of the demand for bequests. Life insurance purchases are an intentional action with a view towards bequests, and hence are indicative of long run demand by households for assets that will be available to the next generation.

While there have been many reasons advanced for why or why not households might offset government debt with the accumulation of assets, prior research has not discussed the potential role of life insurance in shaping a household's response to government debt (see Elmendorf and Mankiw, 1999). The advantage of new empirical research into this issue using life insurance, though, is that intentions to hold life insurance reflect long run behavior. As noted in figure 3, and as documented in Appendix Table A.6, life insurance purchases are quite substantial (the face values are larger than GDP), the amounts vary over time, and they vary considerably by state as well. Thus, if households in aggregate have concern over future tax burdens, life insurance is a potentially viable way of setting aside assets for the next generation given any intergenerational altruism.

One concern which arises in our panel model of aggregate behavior is whether households would respond with saving to changes in federal government debt only, or whether they may also be concerned by the level

of state and local government debt. Most states are prohibited from borrowing for current account deficits (Poterba, 1994), and so to a great extent state government borrow to purchase real assets. Hence households may not change their savings in response to state debt, as the state governments have created assets that offset that debt. Another reason why state and local debt may have no effect on life insurance is if households assume they can escape state debt by moving to another state for retirement.

On the other hand, households may respond to state debt if that debt does not create assets that households value, or equivalently if households believe the debt is used to pay current expenses irrespective of the law. Alternatively, households may treat state debt as similar to federal debt if households believe all other states are also raising debt without creating valuable assets, in which case mobility will not succeed in allowing households to escape state and local government future taxes. Thus, our model includes a measure of combined state and local debt, as well as federal debt, as a potential explanation for life insurance purchases.[11]

Another potential part of the financial environment that may affect life insurance purchases, as suggested by Bernheim (1991), is the provision of Social Security. The idea is that an increase in expected Social Security benefits may distort the optimal household allocation of assets between annuities as represented by Social Security, and actual assets. To achieve their optimal asset mix, therefore, households may purchase increased life insurance to offset the additional annuity holdings represented by Social Security, a prediction which Bernheim confirms in his data.

Variation by state in current Social Security taxes paid and in current benefits received, however, reflects primarily demographic variation by state as it is translated by the Social Security tax and benefit schedules. These current taxes and benefits do not necessarily reflect the perception of Social Security wealth. Thus we include Social Security taxes and benefits in each state to capture national policy variation over time, as well as the demographic components represented by the Social Security variables. Nonetheless, we include additional demographic variables in an attempt to fully include household asset allocation demands. Unfortunately, this procedure precludes using our model to understand Social Security's impact on private life insurance purchases, as demographic differences not only capture differences in expected Social Security wealth, but other differences in savings, income, and private wealth.

[11] Adding local government debt avoids complications with the different assignment of public expenditures between state and local governments, and with different accounting conventions as to whether it is the state or local government which backs repayment.

The empirical analysis is based around the following specification:

$$\Delta \log LIF_{it} = \beta_1 \Delta \log D_t^F + \beta_2 \Delta \log D_{it}^S + \beta_3 \Delta X_{it} + \gamma_1 t + \gamma_2 t^2 + \delta_i + \epsilon_{it}. \quad (1)$$

The dependent variable is the difference in log life insurance in force ($\log LIF_{it}$) in state i at time t. Life insurance in force is the face value of all policies, which is the payout if the person insured becomes deceased. Our initial model includes all types of life insurance, including individual, group, and credit, although we run our model for individual life insurance alone as well.

In our baseline specification, we use observations for each state at five-year intervals to smooth over short-run fluctuations, and to allow for the idea that life insurance holdings may adapt to changes in fiscal policy with some lag. These lags may arise because households base their decisions on a multi-year framework, because of the cost of adjustment for life insurance, or because of the possibility federal policy will reverse itself. Using five-year intervals means that we have 336 total observations over 48 states, excluding Alaska and Hawaii for a lack of certain data during the time-frame under consideration.[12] We present the results below using each of the five potential starting years for the empirical analysis. We also present results for shorter time differencing, with the advantage of more data being offset by whether there is sufficient time for households to adjust in aggregate.

The difference in log life insurance is regressed on the difference in logs of combined state and local debt (D_{it}^S) and the difference in logs of federal debt (D_t^F). As federal debt is not state specific, we do not include time dummies in the specification.[13] Instead, we have included both linear and quadratic time trends to control for common changes in both life insurance and the government debt variables. We have experimented with using higher-order polynomial terms for time as well, but these do not yield results that are significantly different from the above. We further include national GDP, which does not vary by state but only over time. In addition to the common time trend, the inclusion of a state dummy, δ_i, in the differenced specification allows for state-specific time trends in life insurance.

The set of additional control variables, X_{it}, include various measures to capture factors influencing the demand for life insurance, as well as potential estimates of Social Security wealth. We include the fraction of population under the age of 18, the fraction over 64, the fraction of the population over 24 with at least a high-school degree, the poverty rate, and the percentage of the population that is white. Gross State Product

[12] Using data at five year intervals has the additional advantage of avoiding induced autocorrelation in the first differences as could occur if we combine the data for all years in one regression.

[13] We explored allocating out the federal debt to individual states based on their share of the tax burden, and then including time dummies, but this specification did not change the qualitative results markedly.

(GSP) is included to capture all potential sources of state income. We deflate all of the dollar values to 1998 dollars using the CPI. All of the data is described in more detail in appendix A.

4 Results: The Effect of Government Debt on Life Insurance

Table 2 presents the baseline results showing the impact of federal and state government debt on aggregate life insurance purchases. The first four columns show the results of estimating the model with a single source of government debt, while the results presented in columns (5) and (6) show that life insurance purchases respond to both changes in debt by state and local governments, and by the federal government. These results indicate that for every 1% change in federal debt over five years, the face value of life insurance by households also increases by 0.23% over the same period. Similarly, for every 1% change in state and local government debt over the five year earlier period, households increase their life insurance in force by 0.09%.[14] The results showing that life insurance changes over the five year earlier period in response to changes in government debt over the previous five years are statistically significantly different from zero at the 1% level.

We use the five year differencing to accentuate that household behavior with respect to life insurance is a long run decision. For sensitivity analysis about the extent to which long differencing is needed to illustrate adjustment by households to changes in government debt, however, equation 1 is reestimated with both three and one year differences in both government debt and life insurance. Table 3 presents results from using single year differences in column (1), and from using three year differences in column (2). We find that differencing over shorter time periods results in smaller, although nonetheless statistically significant, changes in life insurance in force in response to changes in government debt relative to the five year differencing shown in column (3). Looking only at the results for one-year changes in debt in column (1), we now see only a 0.09% increase in life insurance associated with a 1% increase in federal government debt, and a 0.06% increase in response to a 1% increase in state and local debt. The three year differencing produces effects that are between the one and five year differencing, a 1% change in federal debt is found to cause a 0.17% change in life insurance compared to the 0.23% change in five year differencing, while changes in state debt are found to have about equivalent effects to the 0.09% five year differencing result in column (3), although greater than the one year differencing results in column (1). We thus interpret these results as saying that adjustment to government debt in the demand for bequests is not instantaneous, but instead takes between three and five years to fully manifest itself.[15]

[14] We discuss below how estimates of these percentage effects are translated into dollar terms.

[15] Longer term differencing did not produce results statistically different from five year differencing, although in part the

The other result to note in both table 2 and 3 is that the coefficients on the Social Security contributions (taxes) and benefits are essentially zero. As discussed above, we do not believe that current values paid out to current residents correspond very well to expected Social Security wealth, and thus the coefficients are probably more reflective of the demographic characteristics of the population.

4.1 The Marginal Effect of Debt on Life Insurance

While the estimated elasticities above are less than 1, the dollar value changes on the margin illustrate that changes in government debt are completely neutralized by households through obtaining greater life insurance. Table 4 uses the results of the baseline regression from column (6) in Table 2 to represent the response of life insurance holdings in dollars per capita. The results in Table 4 are of course dependent on the levels, but show the dollar changes in life insurance associated with a $1 change in government debt at the means of the data.

Based on the mean per capita life insurance in our sample of ($42,140), the mean level of federal debt per capita ($10,074), and the mean level of state and local debt per capita ($3,764), the first row of the table illustrates the dollar change in life insurance for a $1 change in debt for the average state. As can be seen, if the federal government increases its issuance of debt by one dollar per person over a five-year period, resident households will adjust the face value of their life insurance policies by $0.96 per person over the same five year interval. For a dollar per capita increase in state government debt, the effect is similar at $1.01 in increased life insurance holdings per capita over the same five year period. These results arise due to the estimated relative size difference in the coefficient estimates on federal and state debt in the regressions in table 2, combined with the different base levels of debt.

The bottom two panels of Table 4 show the marginal dollar effects for three states near the bottom of the ranking of states by life insurance per capita, consisting of Arkansas, Mississippi, and West Virginia, and for three states near the top of the ranking: Connecticut, Illinois, and New Jersey. The point of this panel is in part to show the range of debt and life insurance by state, and in part to show the range of potential results as the log difference results are translated into absolute dollar values. Even for these states at the extreme ends, the dollar values show almost complete neutrality of government debt.

Figure 4 provides a summary of how the different coefficient estimates translate into dollar changes in insurance holdings for $1 increases in either federal or state and local debt for the average household in this period. When we examine short-term responses as estimated with the one year differencing, our results

reduction in the number of observations causes the standard errors to rise substantially.

indicate that households respond to one-year changes in federal debt by approximately 40 cents in increased life insurance, while the response to one-year changes in state and local government debt is approximately 65 cents in the face value of life insurance per person. Using the three year differencing the household response is estimated to be larger, as the response to federal government debt is estimated to be about $0.65, while the household response to state and local government debt is estimated at about the entire $1 increase. In contrast, however, the five-year differencing windows show that households increase their life insurance holdings by very close to the full $1 response to an increase in either source of government debt. It would appear that, in the aggregate, the response of bequests in the form of life insurance is consistent with the existence of inter-generational altruism and the long-run neutrality of government debt.

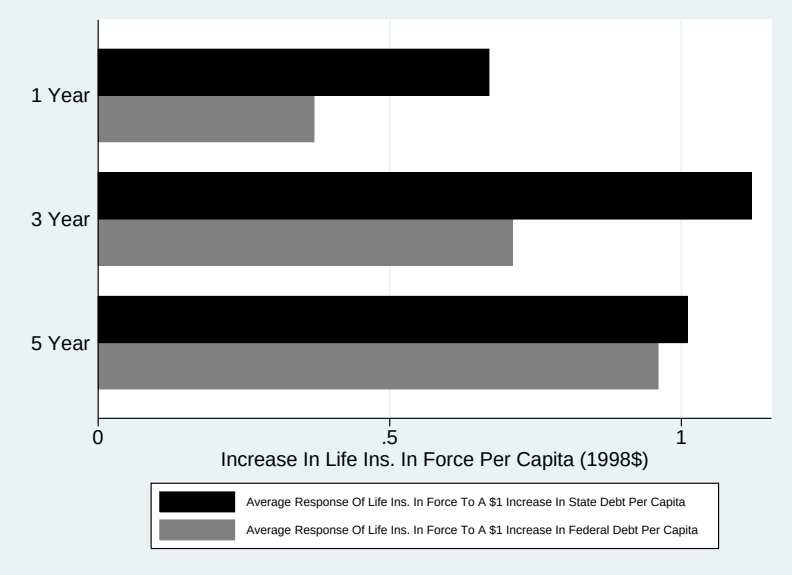

Figure 4: **The Effect of Government Debt on Life Insurance in Force in Dollars ($) for 1, 3 and 5 year differences.**

NOTE: The black bars indicate the average response of life insurance in force per capita to a $1 dollar increase in state government debt per capita for 1, 3 and 5 year difference intervals for all US states excluding Alaska and Hawaii. The gray bars indicate the average response of life insurance in force per capita to a $1 dollar increase in federal government debt per capita for 1, 3 and 5 year difference intervals for all US states excluding Alaska and Hawaii. Calculations are based on the results obtained in Table 3.

A separate issue is that, in order to maximize the number of observations we have begun our analysis with data from 1970, but we could alternatively begin in any of the years from 1971- 1974. This simply shifts the lags forward, but at the cost, given our end date of 2006, of losing observations when using a start date of 1972, 1973, or 1974. In results that can be found in appendix tables A.1 and A.2, we report coefficients from using alternative start dates while maintaining the five-year differencing used in the baseline analysis.

Converting these results to dollar values, as was done above, shows for federal debt that we cannot reject the hypothesis that the response of life insurance to a $1 increase in federal debt is equal to $1 at any common significance level. For state debt, the results are similar, although the results using 1972 as the start date do show a statistically significant difference from a $1 response in life insurance to a $1 increase in debt.

Note that these results do not mean that households holding insurance actually spend one dollar immediately on new life insurance premiums. The results are for life insurance in force, meaning that the death benefit has increased by $0.96 or $1.01 for each dollar of either federal or state government debt. As of 2006, according to the ACLI, one dollar in coverage costs on average approximately three cents, which reflects the average life expectancy of the insured. The important fact is that the amount of resources households have transferred to the future is almost identical to the increase in government debt.

The results show that life insurance responds in a similar manner to both federal and state government debt. One may have expected that state debt would have led to smaller responses, both because state debt is often used for funding capital projects that may actually increase future income (e.g. schools and transportation projects), but also because individuals are mobile and so can potentially avoid future state taxation by moving. Houghwout, Inman, Craig, and Luce (2004) find that local governments, which presumably are more attuned to residents' demands than the state or federal governments, nonetheless set tax rates close to the expenditure maximizing level. If state governments behave similarly for capital spending, then the marginal benefit of the last unit of capital goods built by states will have approximately zero marginal benefit, and individuals will not perceive any distinct change in future income from changes in debt.[16]

4.2 The Intensive and Extensive Margins

We have established a general relationship of life insurance holdings to changes in fiscal policy, but this has been in terms of aggregate life insurance in force over the whole population. The adjustments in life insurance, though, can operate on both an intensive margin (changes in the life insurance in force for those insured) and an extensive margin (changes in the number of people with life insurance). While the ACLI data is imperfect, in this section we present results to show that the observed aggregate adjustments are primarily on the intensive margin by savers rather than on the extensive margin of people switching in and out of life insurance.

Models of population heterogeneity such as by Michel and Pestieau (1998), Smetters (1999), and Mankiw

[16]Note that the results here imply no difference in perception from state and local or federal debt, but do not say anything about the mechanism which would lead to zero marginal benefits.

(2000) do not analyze the extensive margin. Their work suggests a subset of the population, consisting of the most altruistic households, will be induced to save by other changes in the economy such that the reduced form results are that the long-run aggregate steady state capital stock is unchanged by changes in government debt. On the other hand, however, it can be imagined that changes in the perceived long run rate of return to saving could change the extensive margin through the number of households who decide to exercise their demand for bequests. The data we use to investigate the two margins consists of the state aggregate number of total life insurance policies (individual + group + credit) for the extensive margin compared to the level of life insurance per policy.[17] We therefore compare how the dollars per policy and the number of policies per capita explain the aggregate changes shown above, using the specification in equation (1).

Table 5 shows the regression results for how the aggregate outcomes presented above can be disaggregated into changes in dollars per life insurance policy, and changes in policies per capita.[18] The first column panel uses data from 1970-1993, the second column panel uses solely individual policies while excluding group and credit policies, but data over the entire period, 1970-2006. The final column panel uses the extrapolated data over the entire 1970-2006 period, and thus consists of all three types of policies (individual, group, and credit). As previously discussed, we extrapolate the total number of policies because of missing group policy data, using the predicted values of a regression of the state-level number of total policies on state fixed effects, a time trend and a quadratic time trend, state-level individual policies and credit policies, national total policies and the national total numbers of individual policies, group policies and credit policies (see appendix B for details).[19] When we added this new series to the existing data we have on individual, credit and group policies, the estimates obtained using this alternative extrapolated measure are similar to those reported in columns (1–3) and (4–6) in Table 5. The first column in each panel is the aggregate result presented above, which is the aggregate change in dollars per capita for life insurance in force. The next two columns present respectively the change in dollars per policy, the intensive margin, and the change in policies per capita, the extensive margin.

The results in Table 5 consistently show that the preponderance of household response to government debt occurs on the intensive margin, through the size of the life insurance policies held by households. For

[17] As discussed earlier, this investigation involves using the extrapolated number of group policies after 1993.

[18] Due to the 5 year differencing approach and the low number of observations, we exclude linear and quadratic time trends but include state fixed effects in the specifications used to estimate columns 1-3. For columns 4-9, however, we include linear and quadratic time trends along with state fixed effects in the specifications.

[19] We experimented with other forecasting methods, such as only extrapolating the state-level number of group policies after 1993 based on the national figures on group policies. When we used this series in the estimations we found the results to be essentially identical.

example, the coefficient on federal debt in column (1) suggests that using data through 1993, each 1% of federal government debt growth is met by a weakly significant 0.09% of growth in dollars per capita. This amount, however, is shown in column (2) to be comprised of a large (0.31%) increase in dollars per policy, and an actual decrease in policies per capita as shown in column (3) of -0.22%. This same pattern holds when we use the individual policy data in the second vertical panel, despite the longer panel data. The 0.38% increase in life insurance per capita is comprised of a 0.48% increase in dollars per policy, and a decrease of 0.11% in policies per capita. While the first vertical panel does not exploit data over the entire time period, and the second panel does not exploit data from all types of insurance, the final vertical panel nonetheless demonstrates the same pattern of results. We see that the change in dollars of life insurance per capita, which increases in aggregate by 0.23% for each 1% growth in federal debt per capita, consists of growth in dollars per policy of 0.34%, while the number of policies is actually shrinking by 0.12% in response to a 1% increase in federal debt per capita.

Table 5 shows a slightly different pattern of results for life insurance responses to state and local government debt, although the main conclusion still holds. Specifically, we see in all three panels that the aggregate results are quite similar for all three data sets. In all cases for increases in state debt, life insurance per capita is found to increase by about 0.09% for each 1% increase in state and local government debt. While the total change is generally concentrated in dollars per policy as shown in the second column of each vertical panel, we also see that the number of policies per capita is more likely to grow as debt increases. In contrast, the top row has shown that growth in federal debt is more likely to result in a decline in the number of policies, despite that the change in dollars per capita of life insurance in force is sufficient to offset the entire increase in government debt. The growth in the number of policies in response to state debt is not statistically very precise, nor is it as large as the growth in dollars per policy. Thus we conclude that, in contrast to federal debt, state debt is likely to be partially neutralized by an increase in the number of savers with an apparent bequest motive, although the dollars per policy owned by savers grows more quickly.

It is interesting to speculate why the extensive margin is estimated to be positive with increases in state and local government debt, and negative with respect to federal debt. It is possible that our controls to isolate the time series and cross sectional variation are inadequate in some way, although we estimate the model in changes with state effects, we control for a time trend and time squared, and we include other demographic controls. We speculate that one possible explanation is that there are different expectations about the long run return to savings based on changes in debt at each level of government. In the federal case, increased debt may be seen as implying a lower long-run return to capital, due to distortionary taxation

on capital and/or a tendency for future taxes to be more progressive. Alternatively, savers may believe state governments use more regressive consumption taxes, and hence the rate of return to capital may even rise, at least relative to the return to labor.

4.3 Differential Effects of Taxes and Spending

The estimation results in Table 6 takes the basic results in Table 2 and disaggregates the debt variables separately into taxes and spending. The key part of this test is whether the positive impact of government expenditures on life insurance purchases is equivalent to the negative of the impact of government taxes. We use our baseline five-year differencing model for all the regressions in this table, as well as the 1970 start date.[20] As can be seen, the estimated effects on the federal fiscal variables are, as expected, opposite in sign, with increased spending being associated with greater life insurance holdings, and greater taxes associated with lower life insurance in force. Further, the t-statistic shows that the federal tax coefficient is statistically indistinguishable from the negative of the federal expenditure coefficient.[21] The only slight anomaly in the results is that the coefficients on both federal taxes and spending result in a point estimate marginally greater (10% level of significance) than a $1 response in life insurance for a $1 change in either federal taxes or federal spending. Speculatively, our only conclusion from this result is that household behavior is not strongly motivated by independent changes in tax and expenditures, and thus the net effects as measured by actual changes in government debt are what motivate long run response in life insurance purchases.[22]

The results in Table 6 for state government fiscal variables are essentially equivalent to the federal variables. The difference in the state spending and state tax coefficients are about the same as for the federal fiscal variables, although unlike the federal coefficients the state government tax coefficient is smaller in magnitude than the expenditure coefficient. Nonetheless, the t-statistic shows that the two coefficients are essentially the negative of each other. Also similar to the federal fiscal variables, the dollar changes implied by the point estimates at the data means are much larger than $1, although nonetheless similar. While the federal government does not report capital separated from current expenditures, state governments do so. In results that are available from the authors upon request, we find smaller elasticities for capital spending

[20] The results for the alternative start dates vary in the same way as those in Table Appendix A.1

[21] Note that in addition to deleting Social Security expenditures, we deleted other retirement and disability and other program spending from total federal spending, since these categories include life insurance for government workers and the VA. While we do not have state specific values, including the national values had no effect at all on the results.

[22] There are two additional possibilities. One is that the federal government follows relatively arcane budgeting rules, but that government debt is actual data, in which case debt would be a more precise variable to which households would respond compared to recorded taxes or expenditures. Further, it is possible that expectations about the duration of changes in expenditures may be different than for changes in taxes, due to the well-known difficulty in ending government programs.

compared to current spending, but very similar dollar values at the means of the variables. Thus residents do not seem to view capital and current spending differently when determining how to adjust their life insurance holding in response to government behavior.[23]

5 Summary and Conclusion

Our paper offers the first explicit look at long run behavior that is potentially motivated by inter- generational altruism, and thus allows an empirical test of whether household savings neutralize government debt (Barro, 1974). Specifically, we use a panel of US states from 1970-2006 to examine how the changes in the level of life insurance in force varies in response to changes in government debt at both the federal and state levels. Life insurance has the advantage that it benefits others besides the insured, and that it is an intentional savings behavior. We find that households fully neutralize federal government debt in aggregate by purchasing life insurance equal to the additional debt issued over a five year period. Additionally, we find that households also neutralize state government debt fully, which suggests households do not value the purported increase in government owned capital stock.

The aggregate response in our data occurs despite that not all households appear to hold life insurance. Further, we find that all of the additional savings resulting from federal debt occurs from holders of life insurance increasing the amount per policy, compensating for a small decrease in the number of savers that is associated with rising debt. The response to state debt seems to be slightly different, in that there is a small addition to the number of holders of life insurance. In both cases, however, we find a full $1-for-$1 aggregate offset through life insurance for additions to government debt by either the federal, or state, governments. The increase in savings implies that changes in government debt are rendered neutral in the long run.

The most recent papers to test for Ricardian Equivalence have looked at temporary rebates, such as Poterba (1988) and Gale and Orszag (2004), or looked at consumption responses to tax cuts (Johnson, Parker, and Soules, 2006) or income tax refunds (Gale and Orszag, 2004). These findings do not provide any direct evidence of whether government debt is neutralized in the long run through additional bequests, both because they do not analyze bequests, and because they concentrate on observing short run behavioral responses. Our results provide direct evidence of neutrality by showing long run responses through five year

[23]Our results apparently reject the distinction between capital and current spending as explaining the large magnitude of the separate tax and spending coefficients, but our previous footnote alludes to other possibilities that could cause expectations of actual debt to exceed the debt implied by independent changes in either taxes or expenditures.

differencing, and by directly observing the intention to transfer assets to future generations through life insurance. Our direct examination of these aspects of household behavior finds, surprisingly in light of the earlier work, that government debt is completely neutralized by household saving of real assets.

Appendices

A: Data

The data used covers 48 states (Alaska and Hawaii are excluded) and spans the years 1970–2006. The variables and their sources are the following:

- **Life insurance in force** consists of individual insurance, group insurance and credit insurance. Data is available for the years 1970–2006. Data on the total number of life insurance policies is available for the years 1970–1993. The number of individual and credit policies are available for the years 1970–2006 but the number of group policies is available for the years 1970–1993. Data have been taken from the American Council of Life Insurers (ACLI).
- **Federal government debt** is defined as debt held by the public. Data have been taken from Congressional Budget Office's "Revenue, Outlays, Deficits, Surpluses, and Debt Held by the Public."
- **Federal government tax** is defined as federal government receipts. Data have been taken from the Congressional Budget Office's "Revenue, Outlays, Deficits, Surpluses, and Debt Held by the Public."
- **Federal government spending** is defined as federal government outlays net of social security spending, other retirement and disability and other programs. Data have been taken from the Congressional Budget Office's "Revenue, Outlays, Deficits, Surpluses, and Debt Held by the Public."
- **State government debt** is defined as state and local government long term outstanding debt. Data have been taken from the Census Bureau State and Local Government Finance. Data on local government debt for the years 2001 and 2003 have been interpolated since the Census Bureau only reports state government data for those years.
- **State government tax** is defined as state and local government total tax. Data have been taken from the Census Bureau State and Local Government Finance. Data on local government taxes for the years 2001 and 2003 have been interpolated since the Census Bureau only reports state government data for those years.
- **State government spending** is defined as state and local government general expenditure. Data have been taken from the Census Bureau State and Local Government Finance. Data on local government general expenditure for the years 2001 and 2003 have been interpolated since the Census Bureau only reports state government data for those years.

- **Gross Domestic Product (GDP)** data have been taken from the Bureau of Economic Analysis.
- **Gross State Product (GSP)** data have been taken from the Bureau of Economic Analysis.
- **Poverty rate** is defined as the fraction of families or individuals with income below the poverty threshold as defined by the Census Bureau. Data have been taken from Census Bureau and IPUMS–CPS. Data for the years 1971–1973 and 1975–1976 have been interpolated.
- **Fraction of the population under the age of 18** data have been taken from the Census Bureau.
- **Fraction of the population over the age of 64** data have been taken from the Census Bureau.
- **Fraction of the population which is white** data have been taken from the Census Bureau.
- **Fraction of the population which is at least 25 years old and has a high school degree** data have been taken from the Census Bureau and IPUMS–CPS. Data for the years 1971–1973 and 1975–1976 have been interpolated.
- **Social Security Contributions** are defined as Old Age, Survivors and Disability Insurance (OASDI) contributions from taxable earnings have been taken from table 4.B10 in the Annual Statistical Supplement to the Social Security Bulletin. The author only had access to the Annual Statistical Supplement to the Social Security Bulletin for the years 1970–1974, 1977–1979, and 1982–2006. Data for the years 1975–1976 and 1980–1981 have been interpolated.
- **Social Security Benefits** are defined as Old Age, Survivors and Disability Insurance (OASDI) estimated benefits distributed have been taken from table 5.J1 in the Annual Statistical Supplement to the Social Security Bulletin. The author only had access to the Annual Statistical Supplement to the Social Security Bulletin for the years 1970–1975 and 1979–2006. Data for the years 1976–1978 have been interpolated.

B: Extrapolation Procedure for Group Policies

The total number of life insurance policies consists of individual, group and credit policies and was obtained from the American Council of Life Insurers (ACLI). This series covers the 48 states (Alaska and Hawaii are excluded) and spans the period from 1970-1993. ACLI reports the number of individual and credit policies for the 48 states and for the entire period from 1970-2006 but discontinues reporting the number of group policies after 1993.

The data used to estimate columns (8)–(9) in Table 5 is based on an extrapolated measure of the total number of life insurance policies for the 48 states and spanning the years 1970-2006. Data on the state level total number of life insurance policies was extrapolated using the following regression:

$$POL_{it} = \beta_1 IND_{it}^S + \beta_2 CRD_{it}^S + \beta_3 IND_t^N + \beta_4 GRO_t^N + \beta_5 CRD_t^N + \beta_6 POL_t^N + \gamma_1 t + \gamma_2 t^2 + \delta_i + \epsilon_{it}. \quad (1)$$

POL_{it} is state level total life insurance policies, IND_{it}^S is state level individual policies, CRD_{it}^S is state level credit policies, IND_t^N is national individual policies, GRO_t^N is national group policies, CRD_t^N is national credit policies, POL_t^N is national total policies, t and t^2 are the linear and quadratic time trends and δ_i is a state fixed effect.

Based on (1), the predicted values were obtained then the year to year percentage change in the predicted values was computed. For each state, the percentage change in the predicted values of the total number of life insurance policies from 1993-1994 was used to compute the extrapolated total number of life insurance policies in 1994 using existing data in 1993. This process is reiterated for each of the following years until 2006 and the new created data series extends directly from 1993, the last year of the existing data.

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Table 1: Summary Statistics

Variable	Observations	Mean	Std.dev.
Dependent Variable:			
Life Insurance in Force Per Capita (1998$, 1970-2006)	1776	42,140	14,755
Life Insurance in Force Per Policy (1998$, 1970-1993)	1152	22,036	6,882
Life Insurance in Force Per Extrapolated Policy (1998$, 1970-2006)	1776	28,551	12,785
Individual Life Insurance in Force Per Policy (1998$, 1970-2006)	1776	38,717	22,882
Total Policies Per Capita (1970-1993)	1152	1.68	0.39
Extrapolated Total Policies Per Capita (1970-2006)	1776	1.58	0.39
Individual Policies Per Capita (1970-2006)	1776	0.75	0.31
Government Debt Variables:			
State (1998$)	1776	3,764	1,559
Federal (1998$)	1776	10,074	3,252
Government Tax Variables:			
State (1998$)	1776	2,270	617
Federal (1998$)	1776	5,035	857
Government Spending Variables:			
State (1998$)	1776	4,578	1,278
Federal (1998$)	1776	3,850	598
Controls:			
Gross Domestic Product Per Capita (1998$)	1776	28,250	4,198
Gross State Product Per Capita (1998$)	1776	26,342	5,968
Poverty Rate (%)	1776	13	42
Fraction of the population under the age of 18	1776	0.28	0.04
Fraction of the population over the age of 64	1776	0.12	0.02
Fraction of the population $\geq$ 25 yrs old w/ h.s. degree	1776	0.76	0.11
Fraction of the population that is white	1776	0.87	0.10
Social Security:			
Contributions Per Capita (1998$)	1776	1,397	459
Benefits Per Capita (1998$)	1776	1,186	290

Note.—Panel data for U.S. states (excluding Alaska and Hawaii) covers 37 years from 1970–2006. Life Insurance Per Policy and Policies Per Capita only cover the years 1970–1993. The number of total policies consist of individual, group and credit policies. However, the number of group policies is unavailable after 1993. The total number of policies for the period 1970–2006 is extrapolated using a method described in the appendix. Each variable and their source are discussed in the appendix.

Table 2: Benchmark Results for Change in Log Life Insurance in Force

	Dependent variable: $\Delta \log LIF_{it}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Government Debt						
$\Delta \log D_t^F$ Federal Debt	0.27***	0.27***	–	–	0.23***	0.23***
	(0.03)	(0.03)	–	–	(0.03)	(0.03)
$\Delta \log D_{it}^S$ State Debt	–	–	0.13***	0.14***	0.09***	0.09***
	–	–	(0.02)	(0.02)	(0.02)	(0.02)
Control Variables						
Δ log Gross Domestic Product	2.80***	2.80***	2.04***	2.12***	2.56***	2.57***
	(0.19)	(0.19)	(0.21)	(0.20)	(0.18)	(0.18)
Δ log Gross State Product	0.22***	0.22***	0.39***	0.35***	0.26***	0.26***
	(0.06)	(0.07)	(0.07)	(0.08)	(0.06)	(0.07)
Δ log Poverty rate	-0.03	-0.03	-0.004	-0.004	-0.04*	-0.04*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Δ log Fraction of population under 18	0.30*	0.32*	0.16	0.17	0.29*	0.30*
	(0.17)	(0.17)	(0.17)	(0.17)	(0.16)	(0.16)
Δ log Fraction of population over 64	0.13	0.14	0.63***	0.58***	0.22	0.23
	(0.17)	(0.17)	(0.15)	(0.16)	(0.17)	(0.17)
Δ log Fraction of population which is white	-0.23	-0.22	0.52***	0.47***	-0.18	-0.17
	(0.15)	(0.15)	(0.17)	(0.17)	(0.15)	(0.15)
Δ log Fraction of population ≥ 25 w/ h.s.	-0.16*	-0.15	-0.35***	-0.36***	-0.20**	-0.20**
	(0.09)	(0.09)	(0.10)	(0.10)	(0.09)	(0.09)
Δ log Social Security contrib	–	-0.003	–	0.05	–	0.004
	–	(0.02)	–	(0.04)	–	(0.02)
Δ log Social Security benefits	–	-0.02	–	-0.03	–	-0.02
	–	(0.02)	–	(0.02)	–	(0.02)
R-squared	0.58	0.58	0.53	0.53	0.61	0.61

Note.—Robust standard errors in parenthesis. Significance levels: *: 10%; **: 5%; ***: 1%. 336 total observations. All variables are differenced over five years and span the years 1970–2006. All nominal variables have been converted to real per capita terms using the CPI. Life insurance in force is the face value of all individual, group, and credit policies, as reported by the ACLI. State fixed effects, linear and quadratic time trends are included in the specification.

Table 3: Benchmark Specification Using Difference Intervals of 1, 3, and 5 Years

	Dependent variable: $\Delta \log LIF_{it}$		
	(1)	(2)	(3)
Interval:	1 Yr	3 Yr	5 Yr
Government Debt			
$\Delta \log D_t^F$ Federal debt	0.09***	0.17***	0.23***
	(0.03)	(0.03)	(0.03)
$\Delta \log D_{it}^S$ State debt	0.06***	0.10***	0.09***
	(0.01)	(0.02)	(0.02)
Control Variables			
Δ log Gross Domestic Product	0.37***	0.18**	2.57***
	(0.06)	(0.09)	(0.18)
Δ log Gross State Product	0.11***	0.15***	0.26***
	(0.04)	(0.05)	(0.07)
Δ log Poverty rate	-0.01	-0.02*	-0.04*
	(0.01)	(0.01)	(0.02)
Δ log Fraction of population under 18	-0.14	-0.19	0.30*
	(0.14)	(0.16)	(0.16)
Δ log Fraction of population over 64	0.17	0.03	0.23
	(0.14)	(0.16)	(0.17)
Δ log Fraction of population which is white	0.46***	-0.60	-0.17
	(0.12)	(0.64)	(0.15)
Δ log Fraction of population $\geq$ 25 w/ h.s.	-0.01	-0.02	-0.20**
	(0.05)	(0.08)	(0.09)
Δ log Social Security contrib	0.01	0.01	0.004
	(0.01)	(0.02)	(0.02)
Δ log Social Security benefits	0.003	0.02	-0.02
	(0.01)	(0.02)	(0.02)
R-squared	0.17	0.35	0.61
Observations	1728	576	336

Note.—Robust standard errors in parenthesis. Significance levels: *: 10%; **: 5%; ***: 1%. The benchmark specification is differenced over 1, 3, and 5 years and spans the years 1970–2006. All nominal variables have been converted to real per capita terms using the CPI. Life insurance in force is the face value of all individual, group, and credit policies, as reported by the ACLI. State fixed effects, linear and quadratic time trends are included in the specification.

Table 4: The Effect of Government Debt on Life Insurance in Force in Dollars ($)

	Increase in Life Insurance Caused By A:	
	Dollar Increase in Federal Government Debt Per Capita	Dollar Increase in State Government Debt Per Capita
US	$0.96	$1.01
Below 10^{th} Percentile		
Arkansas	$0.69	$1.20
Mississippi	$0.71	$1.20
West Virginia	$0.69	$0.79
Above 90^{th} Percentile		
Connecticut	$1.43	$1.09
Illinois	$1.14	$1.19
New Jersey	$1.30	$1.13

Note.—This table uses cutoffs at the 10^{th} percentile ($33,233) and 90^{th} percentile ($49,165) of life insurance in force by state. Calculations are based on the results obtained in table 2, column (6). The means of life insurance in force per capita and state government debt capita for the entire sample are: ($42,140; $3,764). The mean of federal government debt capita is ($10,074). The means of life insurance in force per capita and state government debt capita for the states reported above are: (Arkansas: $30,212; $2,262); (Mississippi: $31,151; $2,341); (West Virginia: $30,060; $3,419); (Connecticut: $62,817; $5,182); (Illinois: $49,733; $3,751); (New Jersey: $56,897; $4,527). The variables are in real dollars per capita. The sample spans the years 1970–2006.

Table 5: Effects of Government Debt on Policy Size versus Population Coverage

Sample:	All policies, 1970–1993			Ind. Policies, 1970–2006			All policies (extr.), 1970–2006		
Dependent Variable:	Δ log LIF p.c.	Δ log LIF/Pol	Δ log Pol p.c.	Δ log LIF p.c.	Δ log LIF/Pol	Δ log Pol p.c.	Δ log LIF p.c.	Δ log LIF/Pol	Δ log Pol p.c.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Government Debt									
$\Delta \log D_t^F$ Federal Debt	0.09*	0.31***	-0.22***	0.38***	0.49***	-0.11**	0.23***	0.34***	-0.12***
	(0.05)	(0.05)	(0.06)	(0.03)	(0.05)	(0.05)	(0.03)	(0.04)	(0.03)
$\Delta \log D_{it}^S$ State Debt	0.09***	0.03	0.06***	0.07***	0.05**	0.03	0.09***	0.06**	0.03*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)
Control Variables									
Δ log Gross Domestic Product	2.16***	2.56***	-0.39	3.10***	4.03***	-0.93***	2.57***	3.14***	-0.57***
	(0.43)	(0.40)	(0.53)	(0.17)	(0.25)	(0.24)	(0.18)	(0.20)	(0.19)
Δ log Gross State Product	0.18**	0.12*	0.06	0.28***	0.15***	0.14*	0.26**	0.20***	0.06
	(0.09)	(0.07)	(0.10)	(0.06)	(0.07)	(0.08)	(0.07)	(0.06)	(0.07)
Δ log Poverty rate	-0.08***	-0.05*	-0.03	-0.02	0.01	-0.04*	-0.04*	-0.01	-0.03
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Δ log Fraction of pop. under 18	0.71***	1.08***	-0.37*	0.28*	0.80***	-0.52***	0.30*	0.98***	-0.68***
	(0.18)	(0.16)	(0.22)	(0.14)	(0.20)	(0.19)	(0.16)	(0.18)	(0.14)
Δ log Fraction of pop. over 64	0.01	-0.15	0.16	0.06	-0.18	0.24	0.23	0.01	0.22*
	(0.26)	(0.19)	(0.17)	(0.17)	(0.21)	(0.22)	(0.17)	(0.17)	(0.13)
Δ log Fraction of pop. white	-0.05	0.22	-0.27	-0.11	-0.11	0.01	-0.17	0.07	-0.23
	(0.12)	(0.17)	(0.18)	(0.17)	(0.18)	(0.21)	(0.15)	(0.20)	(0.18)
Δ log Fraction of pop. $\geq$ 25 w/ h.s.	-0.27***	-0.16	-0.11	-0.06	-0.15	0.10	-0.20**	-0.22**	0.02
	(0.08)	(0.09)	(0.10)	(0.11)	(0.12)	(0.10)	(0.09)	(0.10)	(0.09)
Δ log Social Security contrib	0.01	0.01	0.001	-0.02	0.01	-0.04	0.004	-0.01	0.02
	(0.02)	(0.02)	(0.01)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)
Δ log Social Security benefits	0.01	0.01	-0.01	0.01	0.01	0.002	-0.02	-0.02	-0.002
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.01)
R-squared	0.77	0.90	0.59	0.75	0.68	0.24	0.61	0.69	0.47
Observations	192	192	192	336	336	336	336	336	336

Note.—Robust standard errors in parenthesis. Significance levels: *: 10%; **: 5%; ***: 1%. 336 total observations. All variables are differenced over five years. Columns 1-3 use total life insurance policies (individual + group + credit) and span the years from 1970–1993. Columns 4-6 use individual life insurance policies and span the years 1970–2006. Columns 7-9 uses an extrapolated measure of total life insurance policies (individual + group + credit) and span the years 1970–2006. All nominal variables have been converted to real per capita terms using the CPI. Columns 1–3 are estimated from specifications using state fixed effects. Columns 4–9 are estimated from specifications using state fixed effects and linear and quadratic time trends.

Table 6: Differential Effects of Taxes and Spending on Change in Log Life Insurance in Force

Dependent variable: $\Delta \log LIF_{it}$	Coeff.	t-statistic[a] $\beta_{Spending} = -\beta_{Taxes}$	Dollars $	t-statistic[b] $\beta_{Dollars} = 1$
	(1)	(2)	(3)	(4)
Taxes and Spending				
$\Delta \log G_t^F$ Federal spending	-0.33***		2.76	[2.35]
	(0.09)	[0.35]	(0.75)	
$\Delta \log T_t^F$ Federal taxes	0.27***		2.96	[2.22]
	(0.08)		(0.88)	
$\Delta \log G_{it}^S$ State spending	-0.26***		4.83	[2.59]
	(0.08)	[0.89]	(1.48)	
$\Delta \log T_{it}^S$ State taxes	0.33***		3.07	[2.80]
	(0.08)		(0.74)	
Control Variables				
Δ log Gross Domestic Product	3.11***			
	(0.20)			
Δ log Gross State Product	0.30***			
	(0.08)			
Δ log Poverty rate	-0.04			
	(0.02)			
Δ log Fraction of population under	0.21			
	(0.21)			
Δ log Fraction of population over 64	0.21			
	(0.16)			
Δ log Fraction of population which is white	-0.30*			
	(0.15)			
Δ log Fraction of population $\geq$ 25 w/ h.s.	-0.20**			
	(0.10)			
Δ log Social Security contrib	-0.01			
	(0.02)			
Δ log Social Security benefits	-0.01			
	(0.02)			
R-squared	0.61			
Observations	336			

Note.—Robust standard errors in parenthesis. Significance levels: *: 10%; **: 5%; ***: 1%. 336 total observations. All variables are differenced over five years and span the years 1970–2006. All nominal variables have been converted to real per capita terms using the CPI. Life insurance in force is the face value of all individual, group, and credit policies, as reported by the ACLI. State fixed effects, linear and quadratic time trends are included in the specification. Federal spending is total federal spending net of expenditures on social security, other retirement and disability and other programs. (a) The *t-statistic* in column (2) is calculated and reported in brackets for the test of whether the coefficient on the spending variable is equal to the negative of the coefficient on the tax variable. Coefficients and standard errors on taxes and spending variables are expressed in real dollars and are reported in column (3). (b) The *t-statistics* in column (4) are calculated and reported in brackets for the test of whether the coefficients expressed in dollars are equal to 1.

Appendix Table A.1: Results for Change in Log Life Insurance in Force, Different Start Years

	Dependent variable: $\Delta \log LIF_{it}$				
	(1)	(2)	(3)	(4)	(5)
Start Year:	1970	1971	1972	1973	1974
Government Debt					
$\Delta \log D_t^F$ Federal Debt	0.23***	0.21***	0.46**	0.35***	0.40***
	(0.03)	(0.04)	(0.20)	(0.12)	(0.15)
$\Delta \log D_{it}^S$ State Debt	0.09***	0.10***	0.13***	0.11***	0.11***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
Control Variables					
Δ log Gross Domestic Product	2.57***	0.50***	-0.09	0.14	1.02***
	(0.18)	(0.18)	(0.39)	(0.14)	(0.24)
Δ log Gross State Product	0.26***	0.24***	0.13*	0.22**	0.25**
	(0.07)	(0.07)	(0.08)	(0.08)	(0.12)
Δ log Poverty rate	-0.04*	-0.05***	-0.02	-0.02	0.01
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Δ log Fraction of population under 18	0.30*	-0.21	-0.29	-0.13	-0.36*
	(0.16)	(0.21)	(0.26)	(0.22)	(0.20)
Δ log Fraction of population over 64	0.23	0.18	-0.16	-0.15	0.08
	(0.17)	(0.19)	(0.23)	(0.21)	(0.32)
Δ log Fraction of population that is white	-0.17	-2.18**	-3.58***	-1.43*	0.68
	(0.15)	(0.87)	(1.02)	(0.81)	(1.22)
Δ log Fraction of population $\geq$ 25 w/ h.s.	-0.20**	-0.01	-0.01	-0.28**	-0.03
	(0.09)	(0.13)	(0.17)	(0.12)	(0.19)
Δ log Social Security contrib	0.004	-0.21***	0.04	-0.01	-0.05
	(0.02)	(0.07)	(0.06)	(0.07)	(0.09)
Δ log Social Security benefits	-0.02	-0.001	-0.07	-0.02	-0.27**
	(0.02)	(0.03)	(0.07)	(0.02)	(0.11)
R-squared	0.61	0.49	0.63	0.57	0.57
Observations	336	336	288	288	288

Note.—Robust standard errors in parenthesis. Significance levels: *: 10%; **: 5%; ***: 1%. 336 total observations. All variables are differenced over five years and span the years 1970–2006. All nominal variables have been converted to real per capita terms using the CPI. Life insurance in force is the face value of all individual, group, and credit policies, as reported by the ACLI. State fixed effects, linear and quadratic time trends are included in the specification. Estimates in column (1) are the same results contained in column (6) in Table 2.

Appendix Table A.2: The Effect of Government Debt on Life Insurance in Force in Dollars ($), Different Start Years

	Increase in Life Insurance Caused By A:				
Start Year:	1970	1971	1972	1973	1974
Dollar Increase in Federal Government Debt Per Capita	$0.96	$0.88	$1.92	$1.46	$1.67
	(0.13)	(0.17)	(0.84)	(0.51)	(0.63)
	t-statistic (β=1)				
	[-0.31]	[-0.71]	[1.10]	[0.90]	[1.06]
Dollar Increase in State Government Debt Per Capita	$1.01	$1.12	$1.46	$1.23	$1.23
	(0.25)	(0.25)	(0.25)	(0.25)	(0.38)
	t-statistic (β=1)				
	[0.04]	[0.48]	[1.84]	[0.92]	[0.61]

Note.—Calculations are based on the results obtained in table A.1. The means of life insurance in force per capita and state government debt per capita for the entire sample are: ($42,140; $3,764). The mean of federal government debt per capita is ($10,074). Standard errors expressed in dollars in parenthesis. *t-statistics* are calculated and reported in brackets to test whether the coefficients expressed in dollars are equal to 1.

Appendix Table A.3: Results for Change in Log Total Life Insurance Policies Per Capita, 1970–1993, Different Start Years

	Dependent variable: $\Delta \log Polpc_{it}$				
	(1)	(2)	(3)	(4)	(5)
Start Year:	1970	1971	1972	1973	1974
Government Debt					
$\Delta \log D_t^F$ Federal Debt	-0.22***	-0.25***	-0.44**	-0.36*	0.02
	(0.06)	(0.06)	(0.18)	(0.22)	(0.39)
$\Delta \log D_{it}^S$ State Debt	0.06***	0.03	0.06	0.01	0.01
	(0.02)	(0.03)	(0.05)	(0.04)	(0.03)
Control Variables					
Δ log Gross Domestic Product	-0.39	0.78**	1.12***	1.13***	1.57*
	(0.53)	(0.36)	(0.36)	(0.27)	(0.86)
Δ log Gross State Product	0.06	0.13	0.14	-0.13	-0.17
	(0.10)	(0.10)	(0.12)	(0.23)	(0.44)
Δ log Poverty rate	-0.03	-0.03	0.02	0.02	-0.01
	(0.02)	(0.02)	(0.07)	(0.05)	(0.06)
Δ log Fraction of population under 18	-0.37*	-0.55**	-0.65*	-0.89***	-0.81
	(0.22)	(0.22)	(0.35)	(0.30)	(0.68)
Δ log Fraction of population over 64	0.16	0.20	0.16	-0.29	0.17
	(0.17)	(0.19)	(0.38)	(0.47)	(0.58)
Δ log Fraction of population that is white	-0.27	-0.28	0.22	2.77	1.61
	(0.18)	(1.45)	(2.08)	(2.10)	(2.43)
Δ log Fraction of population $\geq$ 25 w/ h.s.	-0.11	-0.08	-0.13	0.15	0.29
	(0.10)	(0.12)	(0.25)	(0.21)	(0.30)
Δ log Social Security contrib	0.001	-0.04	-0.07	-0.05	0.07
	(0.01)	(0.11)	(0.11)	(0.12)	(0.20)
Δ log Social Security benefits	-0.01	-0.01	0.06*	-0.01	-0.13
	(0.01)	(0.02)	(0.03)	(0.13)	(0.14)
R-squared	0.59	0.52	0.37	0.51	0.50
Observations	192	192	192	192	144

Note.—Robust standard errors in parenthesis. Significance levels: *: 10%; **: 5%; ***: 1%. Estimates are based on total life insurance policies (individual + group + credit) and span the years from 1970–1993. All nominal variables have been converted to real per capita terms using the CPI and specifications include state fixed effects. Estimates in column (1) are the same results contained in column (3) in Table 5.

Appendix Table A.4: Results for Change in Log Individual Life Insurance Policies Per Capita, 1970–2006, Different Start Years

	Dependent variable: $\Delta \log Polpc_{it}$				
	(1)	(2)	(3)	(4)	(5)
Start Year:	1970	1971	1972	1973	1974
Government Debt					
$\Delta \log D_t^F$ Federal Debt	-0.11**	-0.04	-0.17	-0.07	0.01
	(0.05)	(0.06)	(0.23)	(0.17)	(0.10)
$\Delta \log D_{it}^S$ State Debt	0.02	-0.02	-0.01	-0.02	0.001
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Control Variables					
Δ log Gross Domestic Product	-0.92***	-0.45	0.39	0.13	0.08
	(0.24)	(0.30)	(0.46)	(0.16)	(0.18)
Δ log Gross State Product	0.13*	0.10	-0.01	-0.16	0.24***
	(0.08)	(0.07)	(0.12)	(0.13)	(0.09)
Δ log Poverty rate	-0.04*	-0.02	-0.01	-0.02	-0.00
	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)
Δ log Fraction of population under 18	-0.52***	-0.27	-0.30	-0.11	-0.05
	(0.19)	(0.26)	(0.27)	(0.29)	(0.18)
Δ log Fraction of population over 64	0.24	-0.07	-0.33	-0.20	0.17
	(0.22)	(0.22)	(0.28)	(0.30)	(0.22)
Δ log Fraction of population that is white	0.01	3.47**	1.04	2.95**	1.93**
	(0.21)	(1.52)	(1.53)	(1.40)	(0.83)
Δ log Fraction of population $\geq$ 25 w/ h.s.	0.09	-0.09	0.12	0.19	0.29**
	(0.10)	(0.18)	(0.12)	(0.14)	(0.12)
Δ log Social Security contrib	-0.04	0.03	-0.08	-0.01	-0.08
	(0.03)	(0.06)	(0.07)	(0.04)	(0.05)
Δ log Social Security benefits	0.002	0.02	0.05	-0.10***	0.20
	(0.01)	(0.03)	(0.05)	(0.02)	(0.16)
R-squared	0.24	0.23	0.28	0.31	0.42
Observations	336	336	288	288	288

Note.—Robust standard errors in parenthesis. Significance levels: *: 10%; **: 5%; ***: 1%. Estimates are based on individual life insurance policies and span the years 1970–2006. All nominal variables have been converted to real per capita terms using the CPI and specifications include state fixed effects and linear and quadratic time trends. Estimates in column (1) are the same results contained in column (6) in Table 5.

Appendix Table A.5: Results for Change in Log Total Life Insurance Policies (Extrapolated), 1970–2006, Different Start Years

	Dependent variable: $\Delta \log Polpc_{it}$				
	(1)	(2)	(3)	(4)	(5)
Start Year:	1970	1971	1972	1973	1974
Government Debt					
$\Delta \log D_t^F$ Federal Debt	-0.12***	-0.13**	0.15	-0.02	-0.14
	(0.03)	(0.06)	(0.23)	(0.19)	(0.17)
$\Delta \log D_{it}^S$ State Debt	0.03*	0.05*	0.04	-0.01	-0.03
	(0.02)	(0.03)	(0.04)	(0.03)	(0.03)
Control Variables					
Δ log Gross Domestic Product	-0.57***	0.15	-0.20	0.70***	1.00***
	(0.19)	(0.22)	(0.46)	(0.17)	(0.26)
Δ log Gross State Product	0.06	0.12	0.07	-0.09	-0.18
	(0.07)	(0.09)	(0.12)	(0.14)	(0.19)
Δ log Poverty rate	-0.03	-0.05**	-0.03	-0.00	-0.04
	(0.02)	(0.02)	(0.06)	(0.02)	(0.03)
Δ log Fraction of population under 18	-0.68***	-0.57**	-0.38	-0.68***	-0.28
	(0.14)	(0.22)	(0.28)	(0.26)	(0.21)
Δ log Fraction of population over 64	0.22	0.50**	0.31	-0.12	0.08
	(0.13)	(0.20)	(0.30)	(0.24)	(0.22)
Δ log Fraction of population that is white	-0.23	-0.04	-0.06	2.58**	0.36
	(0.18)	(0.93)	(1.45)	(1.13)	(1.11)
Δ log Fraction of population $\geq$ 25 w/ h.s.	0.02	-0.14	-0.08	0.17	0.47**
	(0.09)	(0.15)	(0.22)	(0.18)	(0.19)
Δ log Social Security contrib	0.02	-0.04	0.03	-0.04	0.11
	(0.03)	(0.11)	(0.12)	(0.11)	(0.12)
Δ log Social Security benefits	-0.002	-0.04	0.02	-0.04***	-0.08
	(0.01)	(0.03)	(0.04)	(0.01)	(0.14)
R-squared	0.47	0.41	0.34	0.48	0.47
Observations	336	336	288	288	288

Note.—Robust standard errors in parenthesis. Significance levels: *: 10%; **: 5%; ***: 1%. Estimates are based on an extrapolated measure of total life insurance policies (individual + group + credit) and span the years 1970–2006. All nominal variables have been converted to real per capita terms using the CPI and specifications include state fixed effects and linear and quadratic time trends. Estimates in column (1) are the same results contained in column (9) in Table 5.

Appendix Table A.6: Aggregate Life Insurance

Year	POL (000) (1)	POL p.c. (2)	LIF ($000,000) (3)	LIF/GDP ($) (4)	LIF/POL ($) (5)	LIF p.c. ($) (6)
1970	350,843	1.74	1,384,669	1.33	3,947	6,873
1971	353,131	1.72	1,485,685	1.32	4,207	7,249
1972	359,498	1.73	1,606,785	1.30	4,470	7,748
1973	364,517	1.74	1,755,409	1.27	4,816	8,381
1974	374,271	1.77	1,953,528	1.30	5,220	9,240
1975	375,529	1.76	2,111,179	1.29	5,622	9,889
1976	377,881	1.75	2,311,530	1.27	6,117	10,723
1977	385,555	1.77	2,548,011	1.26	6,609	11,701
1978	395,733	1.80	2,832,489	1.23	7,158	12,869
1979	399,792	1.80	3,177,990	1.24	7,949	14,279
1980	396,736	1.77	3,492,583	1.25	8,803	15,554
1981	394,209	1.73	4,000,771	1.28	10,149	17,591
1982	384,308	1.67	4,410,675	1.36	11,477	19,211
1983	382,056	1.65	4,890,575	1.38	12,801	21,111
1984	380,462	1.63	5,421,824	1.38	14,251	23,205
1985	381,293	1.62	5,968,949	1.42	15,655	25,323
1986	385,869	1.62	6,627,436	1.49	17,175	27,858
1987	390,308	1.63	7,353,038	1.55	18,839	30,632
1988	386,203	1.59	7,910,287	1.55	20,482	32,654
1989	389,521	1.59	8,630,668	1.57	22,157	35,292
1990	384,497	1.56	9,256,689	1.60	24,075	37,447
1991	370,124	1.48	9,839,887	1.64	26,585	39,382
1992	361,889	1.43	10,267,104	1.62	28,371	40,628
1993	359,122	1.41	10,958,298	1.64	30,514	42,898
1994	365,425	1.42	11,139,465	1.57	30,484	43,178
1995	367,090	1.41	11,320,609	1.53	30,839	43,462
1996	355,443	1.35	12,262,674	1.56	34,500	46,644
1997	348,902	1.31	13,116,106	1.57	37,593	49,410
1998	353,647	1.32	14,301,072	1.63	40,439	53,378
1999	360,182	1.33	15,316,323	1.64	42,524	56,650
2000	361,884	1.29	15,766,344	1.58	43,567	56,347
2001	353,581	1.25	16,950,552	1.65	47,940	59,939
2002	349,291	1.22	18,401,820	1.73	52,683	64,416
2003	342,579	1.19	19,194,504	1.72	56,029	66,572
2004	346,108	1.19	20,510,378	1.73	59,260	70,448
2005	343,122	1.17	21,964,024	1.74	64,012	74,710
2006	348,281	1.17	23,055,698	1.72	66,199	77,665

Note.—Aggregate figures are reported for 48 U.S. states (excluding Alaska and Hawaii). POL is total policies per capita. POL p.c. is total policies per capita. LIF is nominal total life insurance in forece. LIF/GDP is total life insurance in force per gross domestic product. LIF/POL is nominal life insurance in force per policy. LIF p.c. is nominal total life insurance per capita. Total life insurance is the sum of Individual, Group and Credit policies. The total number of policies used to construct columns (1), (2), (5) and (6) are extrapolated for the period 1970–2006 using a method described in the Appendix B.