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Why Do Rich People Buy Life Insurance?:

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THE FLORIDA STATE UNIVERSITY

COLLEGE OF SOCIAL SCIENCES

WHY DO RICH PEOPLE BUY LIFE INSURANCE?

By

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ABSTRACT

Historically, life insurance has been purchased to replace the lost income of the deceased. However, economic research and modeling of life insurance purchase decisions based on this idea have resulted in outcomes that question the validity of this assumption. One of these outcomes is that men do not seem to buy more life insurance when they are married. The other outcome is that high wealth households buy too much life insurance while low wealth households buy too little life insurance to maintain the family standard of living. The difference between married and single individuals and between high and low wealth individuals are highlighted in the estate tax. Low wealth individuals are not subject to the estate tax while high wealth individuals are subject to the estate tax. However, transfers of wealth to a spouse and the death benefits of life insurance (under certain conditions) are exempt from the estate tax. Empirical evidence suggests that high wealth individuals may be using life insurance for estate planning purposes and the inclusion of these tax treatments is essential to understanding the life insurance purchase decision. The impact of the estate tax on individual decisions regarding asset accumulation is modeled to quantify the policy implications of changes to the estate tax. These ideas of life insurance and the estate tax are extended to address their impact on entrepreneurship.

CHAPTER 1

INTRODUCTION

The standard assumption in economics is that life insurance is purchased to replace the lost income of the deceased and maintain the family standard of living. However, most wealthy households hold a large quantity and variety of assets that are likely to maintain the household standard of living without the use of life insurance. In fact, approximately 50 percent of people covered by life insurance face little or no risk of a reduction in the family standard of living¹. This leads to the question: Why do rich people buy life insurance?

The answer is at least two fold: intentional bequests and the federal estate tax. According to a 2007 survey of estate planning professionals, one of the largest areas of growth is expected to be in planning for beneficiary inheritance and asset protection. The baby boomer generation is expected to be a large part of the near term growth. Sixty percent of estate planning clients have wealth between \$1 million and \$5 million, which makes most of them subject to the federal estate tax. These clients report being concerned with avoiding loss of their estate due to estate taxes (57 percent) and protecting their assets for their beneficiaries (31 percent)².

Over time, planning to transfer wealth from one generation to the next has grown more complicated. Historically there were three reasons for a family to pass on real estate. They were to provide for the family head in old age, provide settlement for as many heirs as possible, and to maintain the family farm as a viable economic unit³. More recently, wealthy families in the United States such as the Rockefellers have used bequests to protect family businesses as well as to manipulate the behavior of their children. The one constant in all this is that they all try to minimize the external claims on their estate⁴.

¹ Bernheim, Forni, Gokhale, and Kotlikoff (2003), *The Mismatch Between Life Insurance Holdings and Financial Vulnerabilities: Evidence from the Health and Retirement Study*.

² WealthCounsel (2007), *A Look Inside the Estate Planning Industry*.

³ Beaur (2004), *Land Transmission and Inheritance Practices in France During the Ancien Regime: Differences in Degree or Kind?*

⁴ Rose (2004), *Wealth, Gender, and Inheritance Among the US Elites: The Rockefellers and Bingham*.

In 2001, dramatic changes were made to the federal estate tax. The exemption increases progressively from \$1 million in 2001 to \$3.5 million in 2009 while the top marginal tax rate decreases from 55 percent in 2001 to 45 percent in 2007⁵. The estate tax is removed completely for 2010. However, without further legislation, these reforms will expire at the end of 2010 and the federal estate tax will return to the pre-reform level of a \$1 million exemption and 55 percent top marginal tax rate. Since the 2001 changes, there have been attempts to make additional changes to the estate tax. With a new president and the increasing number of baby boomer retirees there is likely to be significant debate and subsequent changes made to the estate tax in the near future.

According to the Internal Revenue Service (IRS), the portion of estates that owe federal estate taxes is around 2 percent of the deaths each year. This has been true since earlier changes to the estate tax in 1976. Although only a small portion of estates pay the federal estate tax, the IRS collected \$26.7 billion in tax revenue in 2006, which represents 1.06 percent of the total gross collections for the year⁶.

Despite the small portion of estates that pay a federal estate tax, the distribution of wealth in the United States is such that the top one percent (based on net worth) of people holds 33 percent of all the wealth in the United States, with each having a net worth in excess of \$5.9 million. The top five percent of people hold 58 percent of all the wealth in the United States with each having a net worth over \$1.3 million⁷. This means that if the 2001 estate tax reforms were allowed to expire, the portion of Americans that would be affected by the estate tax would increase to approximately five percent. More importantly, this five percent represents over half of the wealth in the United States being subject to the federal estate tax. Those subject to the estate tax face a potential loss of almost half of their wealth to estate taxes.

If estate planning, that is estate taxes or intentional bequests, is motivating the purchase of life insurance, there should be empirical evidence. Earlier work on life insurance supports the idea that wealthy individuals make intentional bequests while

⁵ Internal Revenue Service (2007), *Publication 950*.

⁶ Internal Revenue Service (2007), *Publication 55B*.

⁷ Kennickel (2003), *A Rolling Tide: Changes in the Distribution of Wealth in the U.S.*

low wealth individuals tend to make bequests by accident⁸. There are also studies that find that retirees hold life insurance for bequests or tax avoidance⁹. Using a unique data set from the insurance industry, there is evidence that suggests life insurance is being used for estate planning purposes. This data also confirms that the factors affecting the purchase of life insurance are very different for high and low wealth individuals.

Given the empirical evidence, it is important to understand how estate planning considerations affect individual decisions of labor, consumption, and asset accumulation. General equilibrium modeling for life insurance is usually based on the assumption that life insurance is used to maintain the family standard of living. As such, the goal is to maximize household utility. Additionally, most models only consider the term or “pure” insurance portion of life insurance. They do not consider the cash value or asset features of whole life insurance. While some models consider income taxes and social security, none of the papers found in the course of this research consider the estate tax in their models.

One such model by Chambers, Schlagenhauf, and Young (2003) employs a constant relative risk aversion utility function for the household where uncertainty enters primarily through the demographic factors of marital status and number of children. When compared to actual data, this model over predicts the demand for life insurance for consumption smoothing¹⁰. They also find that agents care more about their dependents than their spouse. These results are consistent with the idea that life insurance is purchased for reasons other than financing retirement. Because the estate tax allows for an unlimited tax free transfer of wealth to a spouse, these results are also consistent with estate planning motivations. Another problem with this model is that it is unable to match the peak ages of insurance ownership by approximately 20 years. However, estate planning tends to occur during the late 40's and 50's, therefore including estate planning is more likely to approximate the peak ages of insurance ownership.

⁸ Modigliani (1988), *The Role of Intergenerational Transfers and Life Cycle Saving in the Accumulation of Wealth*.

⁹ Chambers, Schlagenhauf, and Young (2003), *Husbands Might Really Be That Cheap*.

Another model by Hong and Rios-Rull (2004) also uses a household utility function but their function includes an altruism term. Unfortunately, they drop the altruism term if the individual does not have dependents. They also find that agents care more about their children but not about their spouse¹¹, which is consistent with the findings of Chambers, et al. and consistent with estate planning.

The model used here has two significant differences from most of the modeling on life insurance. The first difference is that the utility function is an individual utility function. Like Hong and Rios-Rull, the utility function includes a bequest term but unlike their altruism term, the bequest term does not require the presence of dependents. The second difference is that the estate tax, including the special tax treatment of life insurance, is included in the model.

The objective of this research is to explain why wealthy individuals purchase life insurance and to build a case for the importance of including estate planning in the life insurance purchase decision. The second chapter explores the history and nature of life insurance and the estate tax. This includes a description of the modern forms of life insurance and how they are commonly used. This chapter also includes a review of the relevant literature. The third chapter examines the empirical evidence related to life insurance purchases. The chapter begins with a simple comparison of life insurance and savings in the context of the federal estate tax. The results of this simple comparison provide a compelling reason for life insurance to be used in estate planning. The chapter then looks at a unique data set to examine the factors involved in the decision to purchase life insurance and the decision over the amount of life insurance to hold. The fourth chapter is concerned with the policy implications of the estate tax. The chapter begins with a discussion of how specific changes to the estate tax would theoretically influence decisions. Then a general equilibrium model is built that includes life insurance and the estate tax. This model is employed to test and quantify the theoretical results of changes to the estate tax and the estate tax treatment of life insurance. The fifth chapter explores an alternative reason for the purchase of life insurance, by rich and poor alike. This alternative is the use of life insurance to balance

¹⁰ Chambers, Schlagenhauf, and Young (2003)

the risks associated with entrepreneurship. The final chapter summarizes the contributions of this research to the understanding of the life insurance purchase decision.

¹¹ Hong and Rios-Rull (2004), *Life Insurance and Household Consumption*.

CHAPTER 2

HISTORY OF LIFE INSURANCE AND THE ESTATE TAX

Life insurance and the estate tax are topics that few people understand or care to discuss. As such, an introduction to the history and functions of both life insurance and the estate tax is a requisite starting point for any research in this area.

Life Insurance

Origins of Life Insurance

The earliest form of life insurance was established in seventeenth century Europe where the Protestant church developed a widow's fund for the wives of deceased clergy. Outside of the church, such practices were frowned upon. However, from the seventeenth to eighteenth century, Europe experienced great growth in urbanization and the development of a professional middle class. Before this, a middle class woman living in rural areas would be supported by the production of the farm despite the death of her husband. With urbanization, a middle class widow would be faced with no means of support upon her husband's death, as it was considered socially inappropriate for these women to take paid work. In an attempt to stem this tide of penniless urban widows, governments (particularly in Germany) developed "pension" funds for civil servants. In these plans, a man's life expectancy was used to calculate how much he had to deposit for a given pension to be paid to his widow. Thus was invented the first modern life insurance policy. The demand for these "pension" plans soon spread to other middle class occupations and throughout Europe¹². This is the origin of the concept that life insurance is used to replace lost income and maintain the household standard of living.

The transfer of wealth from one generation to the next has grown more complicated over time. According to Gerard Beaur, historically there were three reasons for a family to pass on real estate. They were to provide for the family head in old age,

¹² Rosenhaft (2004), *Did Women Invent Life Insurance? Widows and the Demand for Financial Services in Eighteenth Century Germany*.

provide settlement for as many heirs as possible, and to maintain the family farm as a viable economic unit¹³. More recently, wealthy families in the United States such as the Rockefellers, have used bequests to protect family businesses as well as to manipulate the behavior of their children. From the European family farm to the fortunes of modern American tycoons, the one thing that remains the same is that they all try to minimize external claims on their estates¹⁴.

Features of Life Insurance

Life insurance is different from any other type of insurance. In all other types of insurance, an individual insures against an event that may or may not occur. With life insurance, that event is death, which is guaranteed to happen. The only question about this event is when it will happen.

With this in mind, term life insurance is most like other types of insurance because term life insurance is purchased for a limited amount of time, in which one may or may not die. The policy may be renewed at the end of the term at the option of the insured¹⁵, generally at a higher premium because the probability of death has increased with age. This means that term life premiums are relatively low when one is young but increase as one grows older. This leads most people to stop renewing their term life policies after a certain age as the premiums become prohibitive.

Whole life insurance is more appropriately thought of as an asset, rather than insurance. The agreement is that the insurer offers a permanent policy with a guaranteed death benefit. In exchange, the insured pays premiums for a specified period and those premiums earn a return (after fees also known as loads), which accumulate into a cash value for that policy. For the insurer, the company knows that they are going to have to pay the death benefit at some point in the future, the only question is when.

¹³ Beaur (2004)

¹⁴ Rose(2004)

¹⁵ The annual renewal is at the option of the insured so long as they are within a guaranteed period. That is, a person may purchase a term life policy with a 20 year guaranteed renewal. This means that the insured can decide to renew the policy for 20 years and the insurance company must provide coverage. However, once the guaranteed period expires, the insurer may also determine whether the policy is renewed.

For the insured, the cash value that accumulates in the whole life policy is a negotiable asset. The cash value can be used to pay the policy premiums, borrowed from, used as collateral, or any other activity that is associated with a negotiable asset. The cash value within a whole life policy grows without income taxation for the individual. An additional benefit of life insurance compared to other assets is the tax treatment of the death benefits. Regardless of the type of life insurance policy, the death benefits are free from income tax¹⁶. More importantly for this research, the death benefits from a life insurance policy are not subject to estate taxes so long as a few conditions are met. These conditions are that the beneficiary may not be the estate and the insured cannot be the owner of the policy for at least three years before the insured's death¹⁷. This favorable tax treatment is the primary reason that whole life insurance has been used in estate planning in the United States for many years.

In addition to the favorable tax treatment, there are other benefits to whole life insurance. One benefit is that if an individual borrows against the cash value and dies before repaying the loan, the loan is automatically paid from the death benefits before being distributed to the beneficiaries. Another benefit is that if the cash value exceeds the face value of the policy at the time of death, the beneficiaries may receive the cash value rather than the face value¹⁸.

Uses of Life Insurance

The death benefit of a life insurance policy can be used in many ways. It may be used to pay final expenses such as burial, funeral, and hospital bills not covered by medical insurance. These types of policies, often referred to as "funeral policies" or "death policies", are usually whole life policies that have small face values of \$5,000 or

¹⁶ All proceeds from life insurance are free from income tax if the payout is made in a lump sum. If the payout is made over time, the interest earned after the insured's death is subject to income tax. The beneficiary is generally allowed to choose the payout method.

¹⁷ Life insurance proceeds are not subject to estate tax if they are left to a spouse, held in an insurance trust, or the policy is not owned by the insured for at least three years before their death. Additionally, if someone owns the policy other than the insured, there cannot be any legally binding restrictions on how the proceeds are used. Restrictions can be made through an insurance trust but the insured must make the trust the owner of the policy. The drawback of not being the owner of the policy is that you cannot change the beneficiaries or use the policy's asset features.

¹⁸ The difference between the cash value and the face value may be subject to income taxation. Depending on the life insurance contract, the cash value may be paid to the beneficiaries if it is in

\$10,000. In terms of the number of policies sold, this may be the fastest growing segment of the life insurance industry.

Life insurance policies can be used to pay off liabilities such as mortgages, car loans, or similar financial obligations. This type of policy is generally a decreasing face value, term life policy. The idea of this policy is that the face value decreases as the debt decreases and the policy will terminate once the debt is paid in full. Often these policies are purchased along with or as part of the credit agreement for these purchases.

The traditional goal of life insurance is to support family members after one's passing. This goal is often referred to as altruism, lost income replacement, or maintaining the family standard of living. The idea here is that an individual purchases the life insurance policy to replace the income they previously provided to their spouse, children, or other dependents. To accomplish this goal, either term or whole life insurance may be appropriate depending on the individual situation.

If the goal is simply to support children, then a term life policy is the most appropriate choice. This is because a term life policy would be purchased when an individual is relatively young, making the premiums lower than a whole life policy¹⁹ and leaving more money to spend on the children in the present. Once the children reach adulthood, the parent should choose not to renew the policy because the children no longer depend on the parents financially. However, there are trends in our society that may make the purchase of whole life insurance more appropriate for this purpose. Those trends include people having children at an older age, children returning or staying at home after reaching adulthood, adult dependents in the home, and people living longer.

Another separate consideration is whether one is looking to support their spouse after passing away. Since marriage is a relationship that is not expected to terminate prior to death, a whole life policy may be more appropriate. However, many papers report that the purchase of life insurance depends on the number of children in the

excess of the death benefit.

¹⁹ It is also important to note that older individuals may also opt for term life over whole life because the whole life premiums become prohibitive after a certain age.

household but not on the presence of a spouse. The reasons people may not be buying insurance to protect their spouse from lost income are numerous. Over half the marriages in the United States end in divorce. This means that, despite the best of intentions, an individual may not have the same spouse for the rest of their life. Even when a marriage ends, the children remain which could explain the observed effect of children but not marital status on life insurance purchases. A whole life insurance policy may also be considered part of the marital assets to be divided during a divorce.

Most families in the United States are two-income families. This paired with the ever-decreasing gender wage gap suggests that spouses should be able to take care of themselves in the event of an untimely passing in the absence of children. What may be the most important consideration in the purchase of life insurance is the tax status of transfers to a spouse. Transfers of wealth to a spouse, without limit, are free from estate taxes but transfers to children are subject to estate taxes if the estate exceeds the exemption limit.

This leads to a different motivation for purchasing life insurance. This motivation is known as the bequest motive. The difference between bequests and altruism is subtle. Altruism is concern for the welfare of others while bequests are planned transfers of wealth. Clearly, these two ideas are closely linked but they are not necessarily the same. If one wants to leave assets specifically to their children, charities, or some other beneficiary then estate taxes (and inheritance taxes to a much smaller extent) can have a significant impact on what is left to those beneficiaries. This is when a whole life policy can be used to plan and pay for those taxes²⁰. As estate taxes are only paid by those with high levels of wealth, only high wealth individuals should demonstrate this motivation for buying life insurance. This leads to the question: Do wealthy individuals use life insurance for estate planning purposes?

²⁰ A life insurance policy may also be used specifically to provide wealth for an individual that is not subject to estate taxes. The general effect is the same as buying life insurance to pay the estate tax on other assets that are transferred.

Estate Taxes in the United States

Federal Estate Taxes

Theodore Roosevelt proposed the first federal inheritance tax in 1906. In 1916, as part of the Emergency Revenue Act of 1916, a permanent federal estate tax was established. The tax was progressive from one percent to five percent with a \$50,000 exemption. That exemption is roughly equivalent to an \$850,000 exemption today²¹, which is what the estate tax exemption was until 2001. The Economic Growth and Tax Relief Reconciliation Act of 2001 raises the exemption significantly until 2009 and removes the federal estate tax completely in 2010. Historically, the marginal estate tax rate has been as high as 70 percent, which generated 11 percent of federal revenue in 1936. Today, estate tax generates little over one percent of federal revenue annually²².

As previously mentioned, the federal estate tax changed dramatically in 2001. The new estate tax laws are constructed with an increasing exemption from \$1 million in 2001 to \$3.5 million in 2009 while the tax rate decreases from 55 percent in 2001 to 45 percent in 2007²³. The estate tax is removed completely for 2010 but will return to the pre-reform level of \$1 million exemption and 55 percent tax rate in 2011, unless new legislation is passed. This research will use the \$1 million exemption and 55 percent tax rate for all assessments of estate tax planning. This exemption and rate are used because the scheduled return to the pre-reform estate tax for 2011 does not require any additional legislative action and is therefore a logical basis for estate planning into the future.

State Inheritance and Estate Taxes

On top of the federal estate tax, there are also state level inheritance and estate taxes. Ten states collect inheritance taxes: Indiana, Iowa, Kansas, Kentucky, Maryland, Nebraska, New Jersey, Oregon, Pennsylvania, and Tennessee. Eighteen states retain an estate tax after the 2001 federal changes. These include the District of Columbia, Illinois, Kansas, Maine, Maryland, Massachusetts, Minnesota, Nebraska, New Jersey,

²¹ United for a Fair Economy (2006), *America's Wealth Gap and the Case for Preserving the Estate Tax*.

²² U.S. Congress Joint Economic Committee (2006), *Cost and Consequences of the Federal Estate Tax*.

²³ Internal Revenue Service (2007), *Publication 950*.

New York, North Carolina, Ohio, Oregon, Rhode Island, Vermont, Virginia, Washington, and Wisconsin²⁴. Like the federal estate tax, transfers of wealth to a spouse are tax free while transfers to others, including children, are generally taxed at the state level²⁵.

The difference between an inheritance tax and an estate tax is that the estate tax is levied on the entire estate of the deceased while an inheritance tax is levied on the individual who receives the assets. This research does not include state level taxes as they are not generally applicable and they are relatively small compared to the federal estate taxes. The description of state level taxes is included here because they could be influential in decisions made by individuals in those states or relocation decisions, especially for retirees, and as such could be a focal point of future research.

Literature Review

Demand for Life Insurance Literature

A review of the literature regarding life insurance demand reveals that there are still many questions to be answered. Zietz (2003) compares the results of 26 published empirical studies regarding the demand for life insurance. The estimates for demographic variables such as age, education, number of children, and marital status are mixed. A majority of papers find age to be non-significant. For education and number of children, the majority of papers find these variables to be positive. With regard to marital status, there is no majority but none of the papers find the estimates to be positive. The estimates for financial characteristics also present mixed results. There is, however, a strong majority of papers that find home ownership, income, wealth, and professional occupation to have a positive effect on the demand for life insurance²⁶.

Zietz also looks at papers that focus on wealth and bequest motives in the purchase of life insurance. Most of the papers in this area are theoretical in nature. According to the model developed by Yaari (1965), life insurance allows individuals to

²⁴ Retirement Living Information Center (2007), *Taxes by State*.

²⁵ There are a few states that do not tax wealth transfers to immediate family members. Some states adjust the tax rate depending on the relationship to the deceased with the closest relatives paying the lowest rates.

²⁶ Zietz (2003), *An Examination of the Demand for Life Insurance*.

separate their consumption and bequest decisions. In addition, Fischer (1973) finds that insurance purchases depend on the importance an individual places on bequests. One of the few empirical papers, Bernheim (1991) finds that there is a strong correlation between life insurance purchases and wealth and that bequest motives explain a large portion of savings²⁷.

A more recent study by Hau (2000) combines both theory and empirical analysis to understand why retired singles hold life insurance. Since these people are retired and they are single, there is no reason to hold life insurance for the traditional purpose of replacing lost income or maintaining the household standard of living. Hau considers life insurance to add value to the estate by providing liquidity or bypassing probate. Hau finds that financial characteristics are more important than demographics in explaining life insurance holdings for single retirees. The results also suggest that life insurance is a good vehicle for bequests and rejects Bernheim's (1991) conclusion that the term component of life insurance is an inferior good²⁸. This paper comes closest to the question being asked here about estate planning which includes bequests. However, it still does not consider the impact of the estate tax, which could have a significant impact on the estates of Hau's single retirees and others.

Modigliani (1988) suggests that high wealth individuals plan to make bequests while low wealth individuals make bequests accidentally through precautionary savings. That is, low wealth individuals save for their retirement and if they do not use it all before they die, then the remaining savings is accidentally left to their descendants. Additionally, according to Aiyagari (1994), the savings rates of individuals is unaffected by the presence or lack of insurance markets. These two findings together seem to support the idea that people save for retirement but do not buy life insurance (or annuities) for retirement purposes. This result is bore out by many other studies.

Aiyagari (1994) also finds that high wealth individuals tend to hold high return assets with less liquidity while low wealth individuals tend to hold low return assets that

²⁷ Zietz (2003)

²⁸ Hau (2000). *Liquidity, Estate Liquidation, Charitable Motives, and Life Insurance Demand by Retired Singles*.

are highly liquid²⁹. This supports the idea that low wealth people keep their savings in simple assets like money market accounts or certificates of deposit while high wealth people are likely to hold more complex assets like stocks, bonds, or life insurance.

Bernheim, Forni, Gokhale, and Kotlikoff (2003) examine data from the Health and Retirement Study to compare actual insurance coverage with that needed to maintain the current standard of living. They find that approximately 50 percent of the people covered by life insurance faced little or no risk of a reduction in living standards³⁰. They also find that about half of the people facing the most risk are uninsured. This includes low-income households, couples with very different incomes, young households, couples with dependent children, and minorities. Another interesting finding is that the purchase of insurance is not correlated with self-perceived probability of dying³¹. This suggests that half of the life insurance policies purchased are purchased for some motive other than maintaining the family standard of living.

General Equilibrium Literature

Finally, a few papers look at overlapping generations models to predict insurance purchasing decisions made by families. These models are based on maximizing household utility and make several assumptions, which are necessary to calculate a solution. However, some of the assumptions are very strong and could account for the differences between the model predictions and actual data.

Chambers, Schlagenhauf, and Young (2003) use a model that employs a constant relative risk aversion utility function for the household. Uncertainty enters this model primarily through the demographic factors of marital status and number of children. When compared to actual data, this model over-predicts the demand for life insurance for consumption smoothing³². This finding is consistent with the idea that people do not treat life insurance the same as other assets. This means that they are not purchasing life insurance to finance retirement.

²⁹ Aiyagari (1994), *Uninsured Idiosyncratic Risk and Aggregate Savings*.

³⁰ Bernheim, Forni, Gokhale, and Kotlikoff (2003)

³¹ Bernheim, Forni, Gokhale, and Kotlikoff (2003)

³² Chambers, Schlagenhauf, and Young (2003)

At the same time, the results of Chambers, et al. are unable to match the peak ages of insurance ownership by approximately 20 years. The peak age of life insurance ownership starts in the mid to late 40's in the data while their model predicts peak ownership in the late 20's. They do find that agents care more about their dependents than their spouse, which is consistent with other studies. Additionally, they find that retirees hold insurance for bequest or tax avoidance³³.

Hong and Rios-Rull (2004) use a somewhat different approach to the household utility function. They include a term to capture altruism, but the term is dropped if there are no dependents. They find that agents care a lot about their children but not about their spouse³⁴, which is consistent with the findings of Chambers, et al. and others. They also find that there would be a welfare improvement if social security were removed. This is in contrast to Chambers, et al. who find that social security is an effective form of public insurance.

There are some assumptions in these models that may have significant implications. Chambers, et al. assume that females take all the responsibility for children. Both papers consider only the term portion of life insurance (the “pure” insurance portion) separate from the face value and cash value, sometimes ignoring these components of life insurance completely. Neither paper considers the buildup of cash value as an asset, nor do they consider the impact of income or estate taxes on the purchase of life insurance. If insurance policies are being used for bequest or tax avoidance, then it seems imperative to include estate taxes in the model.

Conclusion

This chapter provides background information about the estate tax and life insurance. Understanding these two topics is essential to understanding the relationship between them. Understanding this relationship is an important step in answering the question of why wealthy people purchase life insurance.

The next chapter examines a unique data set to determine if high wealth individuals purchase life insurance for the purpose of estate planning. If the data

³³ Chambers, Schlagenhauf, and Young (2003)

³⁴ Hong and Rios-Rull (2004)

supports this theory then a model of the life insurance decision process must include the estate tax and the special estate tax treatment of life insurance. The next chapter also explores how this model might look and attempts to address some of the concerns of earlier research.

CHAPTER 3

RICH PEOPLE, LIFE INSURANCE, AND THE ESTATE TAX

Given the information in the previous chapters, a theory develops that life insurance is used by high wealth individuals for estate planning purposes. Before developing a more detailed theoretical model, it is appropriate to determine if there is statistical evidence to support this theory.

Potential Impact of Estate Taxes

Implications of the Federal Estate Tax

The distribution of wealth in the United States is such that the top one percent (based on net worth) of the population holds 33 percent of all the wealth in the United States, having an average net worth in excess of \$5.9 million. The top five percent of the population holds 58 percent of all the wealth in the United States with each having an average net worth over \$1.3 million³⁵. This means that less than five percent of Americans are affected by the estate tax. However, this also means that over half the wealth in the United States is subject to the federal estate tax. Those subject to the estate tax face a potential loss of almost half of their wealth³⁶ to estate taxes.

The taxable estate is based on the fair market value of all assets owned by an individual that are not passed to their spouse. According to United for a Fair Economy, this resulted in \$21.5 billion in tax revenue in 2004 and was projected by the Joint Economic Committee to increase to approximately \$28 billion in 2006.

There has been a federal estate tax in the U.S. for almost 100 years and it does not seem likely that this tax will be repealed. However, changes to the estate tax appear to be imminent with the current reforms expiring at the end of 2010 and a new president who has advocated taxing the rich more. Given many of the comments made by President Obama, it seems likely that the current tax reforms will be allowed to

³⁵ Kennickel (2003)

³⁶ An estate valued at \$5.9 million would have a \$1 million exemption, leaving \$4.9 million taxed at a rate of 55 percent. This results in federal estate taxes of approximately \$2.7 million, which is 46 percent of the original estate value.

expire. With that in mind, the purpose of this research is to better understand decisions regarding life insurance, estate planning, and wealth accumulation in the presence of the federal estate tax.

The impact of the estate tax on decisions is the key question. If the estate tax does not influence the decisions individuals make, life insurance will not be related to the estate tax. The types of decisions that may be affected by the estate tax include the type of assets held, the accumulation or decumulation of wealth, and consumption among others.

Table 1: Comparison of Life Insurance and Savings³⁷

Initial Estate Value	Estate Tax	After-Tax Estate	Additional Savings to Maintain Estate	New Pre-Tax Estate Value	New Estate Tax	New After-Tax Estate
500,000	0	500,000	0	500,000	0	500,000
1,000,000	0	1,000,000	0	1,000,000	0	1,000,000
2,000,000	550,000	1,450,000	1,222,222	3,222,222	1,222,222	2,000,000
2,818,182	1,000,000	1,818,182	2,222,223	5,040,404	2,222,223	2,818,182
3,000,000	1,100,000	1,900,000	2,444,444	5,444,444	2,444,444	3,000,000
5,000,000	2,200,000	2,800,000	4,888,889	9,888,889	4,888,889	5,000,000
10,000,000	4,950,000	5,050,000	11,000,000	21,000,000	11,000,000	10,000,000
50,000,000	26,950,000	23,050,000	59,888,889	109,888,889	59,888,889	50,000,000
100,000,000	54,450,000	45,550,000	121,000,000	221,000,000	121,000,000	100,000,000
500,000,000	274,450,000	225,550,000	609,888,889	1,109,888,889	609,888,889	500,000,000
1,000,000,000	549,450,000	450,550,000	1,221,000,000	2,221,000,000	1,221,000,000	1,000,000,000
Savings calculation based on an annual return of 5 percent.						

A simple calculation of wealth accumulated through savings subject to the estate tax highlights the potential impact of the estate tax. Table 1 shows the impact of the estate tax on taxable assets at different levels of wealth. An estate that is initially valued at \$3 million would face estate taxes in excess of \$1 million. To be able to maintain an after tax estate of \$3 million, one would need to save an additional \$2.4 million. This is because the additional savings is also part of the taxable estate. The pre-tax estate would now be \$5.4 million and the estate tax would increase to \$2.4 million, leaving an after-tax estate of \$3 million.

³⁷ Full tables by starting age are included in Appendix A.

This simple example can be extended to demonstrate the impact of the estate tax on potential asset choices. Life insurance may be held in a manner which exempts the death benefit from the estate tax³⁸. Consider a comparison of savings that is subject to the estate tax versus a life insurance policy that is not. The comparison in Table 2 uses a \$1 million face value life insurance policy with a return of 4.35 percent annually³⁹. This is compared to taking the same premiums and putting them into savings, with an annual return of 5 percent, that would be subject to estate taxes. The individual always has a higher level of after-tax wealth at age 85 with the savings because the life insurance pays a lower return and charges loads, which further reduces the return.

Table 2: Comparison of Life Insurance and Savings with Estate Taxes

Starting Age	Face Value of Life Insurance	After-Tax Value of Premiums to Savings	Annual Savings Required for \$1 million After-tax Estate	Benefit of Savings Over Life Insurance (FV)	Annual Savings Required to Pay \$1 million in Estate Taxes	Benefit of Life Insurance Over Savings (FV)
20	\$1,000,000	\$1,263,218	\$2,360	\$584,929	\$5,244	\$637,294
30	\$1,000,000	\$1,304,204	\$4,173	\$304,204	\$9,273	\$918,019
40	\$1,000,000	\$1,236,076	\$7,897	\$236,076	\$17,548	\$986,147
50	\$1,000,000	\$1,209,384	\$17,466	\$209,384	\$38,813	\$1,012,839

So why would anyone ever buy life insurance? The most obvious reason may be risk reduction. If an individual dies before reaching their mid-seventies, the death benefit from life insurance exceeds the value of their savings. Another reason may be forced savings because the insurance contract requires regular payments. The contract can be cancelled but receiving a regularly occurring bill from an insurance company may incline an individual towards payment versus optionally putting money into a savings account at random intervals. A less obvious reason may be estate planning.

³⁸ Life insurance proceeds are not subject to the estate tax if they are left to a spouse, held in an insurance trust, or the policy is not owned by the insured for at least three years before their death. Additionally, if someone owns the policy other than the insured, there cannot be any legally binding restrictions on how the proceeds are used. Restrictions can only be made through a life insurance trust but the insured must make the trust the owner of the policy which means that the insured can no longer designate beneficiaries or access the policy's asset features.

³⁹ The life insurance illustrations include fees and loads that reduce the net return.

Instead of looking at the amount of savings required to generate an estate of \$1 million, consider the ability to pay \$1 million in estate taxes. Because an estate of \$1 million would not be subject to the estate tax, the savings required to accomplish this goal is far smaller than the insurance premiums. However, if one wants to accumulate enough wealth to pay \$1 million in estate taxes through savings, the savings required exceeds the insurance premiums to accomplish the same goal. The benefit of life insurance over savings for paying estate taxes increases as an individual grows older.

However, looking just at wealth does not tell the whole story. Economists assume that people maximize lifetime utility, not necessarily wealth. For life insurance decisions, a household utility function is often employed. While family circumstances do affect individual decisions, ultimately the individual makes choices and receives utility from those decisions. As a unit of analysis, it is possible to aggregate individuals into a household but difficult to break a household into individuals. Therefore, this research uses an individual utility function of the form:

$$U_t = \left(\frac{1 - \phi_t}{1 - \sigma} \right) c_t^{1-\sigma} + \left(\frac{\omega \phi_t}{1 - \gamma} \right) x_t^{1-\gamma}$$

The utility function is the combination of two constant elasticity of substitution (CES) utility functions with weights. The first portion of the function comes from consumption, c_t . This is subject to the standard risk aversion σ and the probability of living through the period $1 - \phi_t$. The second portion of the function comes from bequests of the after-tax estate, x_t . This is also subject to risk aversion, represented as γ , and the probability of dying before the end of the period ϕ_t . Additionally, the second portion of the equation is weighted by ω which captures the family influence or the importance the individual places on bequests.

Figure 1: Simulation of Life Insurance and Savings for a 20 Year Old with No Family

This utility function is based on the results of Yaari (1965) who finds that consumption and bequests can be separated in the presence of insurance and the work of Fischer (1973) who determines that life insurance purchases are dependent on the importance placed on bequests. The probability of dying increases with age. The weight given to bequests could be a function of age, marital status, number of dependents, age of dependents, etc. It is also a reasonable assumption that the risk aversion⁴⁰ for consumption and bequests are not necessarily the same.

⁴⁰ Although the equation is not written this way, the risk aversion could also change over time as people tend to become more risk averse with age, especially with regards to their estate.

Figure 2: Simulation of Life Insurance and Savings for a 20 Year Old with Family

It is also important to look at how bequests are determined in this utility function. As previously described, inclusion of the estate tax and the special tax treatment of life insurance are key elements to be included in this decision making process. The equation for the value of bequests is where these treatments are included.

$$x_t = a_t(1+r) - [a_t(1+r) - \eta]\tau + \pi$$

Here, the estate tax rate is represented by τ and the estate tax exemption is η . The taxable asset or savings is represented as a_t with a rate of return, r , so that $[a_t(1+r) - \eta]\tau$ is the estate tax. The life insurance face value (death benefit), which is

not subject to the estate tax, is represented by π . This equation assumes that the individual dies at the end of the year⁴¹.

Figure 3: Simulation of Life Insurance and Savings for a 50 Year Old with No Family

Using this utility function⁴², simulations of the lifetime utility for savings versus life insurance as previously described are presented in Figures 1 through 4. The bequest weight is 20 for the illustrations described as having a family and one for those with no family. This assumes that a single individual derives some utility from having an estate and making bequests but there is no additional family influence. Under the given scenario, life insurance has the higher lifetime utility (as demonstrated by the value

⁴¹ This assumption can be easily changed to a death at the beginning of the year by removing the $(1+r)$ term.

⁴² I use the standard value of 0.96 for β . The probability of death comes from the United States Life Tables (Anderson, 2001). Income is based on the median income reported in the 2000 census. The risk aversion for consumption is 0.7 while the risk aversion for the estate is 0.2.

function) for both a 20 year old and 50 year old regardless of the bequest weight. These results are sensitive to the bequest weight and particularly sensitive to the risk aversion values. This simple simulation demonstrates that there is some set of parameters where life insurance would be preferred to savings, regardless of age or family situation. It also demonstrates the potentially significant impact of the estate tax on decisions of consumption, wealth accumulation, and asset types.

Figure 4: Simulation of Life Insurance and Savings for a 50 Year Old with Family

Data

This section uses a unique data set to understand the factors that affect the holding of life insurance. More specifically, it is focused on the holding and face value of whole life insurance policies purchased by an individual. This is because individually purchased whole life is the most logical form of life insurance for estate planning purposes, as previously discussed. Term life and employer provided life insurance is

generally not used for estate planning because the policies are likely to be canceled prior to an individual's death. Term and employer provided life insurance also do not demonstrate intent by the individual to plan for estate taxes. The term policy is often canceled because the premiums become prohibitive as an individual ages while the employer provided life insurance is often terminated when the employee leaves the company for retirement or other employment.

Table 3: Select Variables from the SCFD

Variable	Observations	Minimum	Maximum	Mean*	Standard Deviation*
Total Income	2,608	200	1,661,000	84,576	91,558
Business Income	474	-47,921	500,000	34,574	60,458
Total Savings	3,780	0	1,600,000	28,197	77,751
Total Assets	3,780	0	19,358,000	545,569	1,091,627
Liabilities	3,780	0	3,147,637	84,450	136,791
Wealth	3,780	-829,488	19,358,000	461,120	1,044,108
Wealth without Home Value	3,780	-1,209,488	19,148,000	363,109	964,453
Primary Mortgage Value	3,780	0	925,000	52,391	81,126
Family Size	3,780	1	9	2.71	1.36
Number of Children	3,780	0	6	0.87	1.16
Age - Male	3,141	19	96	48.97	14.22
Age - Female	3,404	18	92	47.59	14.22
Whole Life Face Value - Male	912	1,000	3,100,000	149,482	237,106
Whole Life Face Value - Female	721	1,000	3,000,000	83,350	180,984
Cash Value - Male	705	0	574,468	19,688	42,621
Cash Value - Female	544	0	465,517	9,658	35,442
* Means and standard deviations reported here are not weighted.					

The data for this project comes from the November 1998 MacroMonitor Survey of Consumer Financial Decisions (SCFD). The data contains responses regarding demographics, assets, forms of income, retirement planning, financial attitudes, insurance, businesses, and the like from 3,780 respondents. This data is unique because it is a private data set that was collected for the insurance industry and contains a detailed breakdown of types of insurance policies, if loans have been taken, and whether the policies are employer purchased or not. This level of detail is due to the needs of the intended audience and provides a detailed picture of insurance holding that is not available in other data sets.

The SCFD does over-sample from higher income families. Comparing the SCFD to the 1998 Consumer Expenditure Survey (CES), the mean income in the SCFD is \$69,057 while the mean income in the CES is \$41,584. However, separating both data sets into quintiles by income shows that the top 20 percent of both surveys are relatively comparable. The average income in the top quintile of the SCFD is \$116,948 compared to \$101,602 in the CES. Comparisons of other measures yield similar relationships, including those of family characteristics. Despite the fact that the SCFD has a larger proportion of higher income families, the fact that the upper quintiles are similar suggest that the SCFD does not suffer from high-income outliers any more than the CES or other available data, which would bias the results. The SCFD also provides weights to make the data representative of the population. All empirical analysis using the SCFD employs these weights (unless otherwise specified).

The most important consideration is whether this data covers an array of people that will be useful in addressing the estate planning and life insurance questions posed by this research. The answer is definitively yes. Total assets range from \$0 to \$19.4 million while wealth ranges from negative values of almost \$1 million to positive values over \$19 million. These respondents also have liquid assets up to \$12.4 million and liabilities up to \$3 million. Additionally, these respondents hold a variety of assets and insurance policies and have family sizes that range from one to nine with the number of children ranging from zero to six.

Empirical Analysis

This section looks at both the determinant of the face value of an individual whole life policy and the probability of owning an individual whole life policy. It is important to understand what factors influence the face value of insurance an individual carries as well as the factors that influence the individual to purchase a whole life insurance policy. Because this research is concerned with estate planning, only observations with individually purchased whole life insurance will be considered as potentially carrying life insurance for this purpose.

The first part of the empirical analysis is focused on the determinants of the face value of life insurance. Previous work in this area has questioned the use of premiums paid, cash value, or face value for the dependent variable in analysis of the demand for

life insurance. The choice of which one to use really depends on the specific question one wants to address. For this research, and any case that looks at the value of an estate, the face value of the life insurance policy is the variable of interest. The second part of the analysis focuses on the probability of owning an individually purchased whole life policy by creating a binary variable based on the same criteria.

Face Value of Life Insurance Holdings

In most empirical analyses for the demand of life insurance, the dependent variable is censored because those who do not hold life insurance are included as having a value of zero. To correct for the censoring, the empirical analysis typically employs a Tobit model. With the focus here being on estate planning, the sample has been restricted to include only those who hold individually purchased whole life policies. To address the decision over purchasing this type of policy a separate probability analysis is conducted on the full sample. This means that there is not the same sort of censoring issue faced by other studies. However, this also means that these results are only applicable to face value decisions of individuals who have already decided to purchase whole life insurance. Since the focus here is estate planning, the loss of generality should be noted but does not negate the results.

Many factors influence estate planning and life insurance holdings. Demographic variables such as age, marital status, and number of children are obvious candidates from the literature previously discussed. The literature also indicates that financial variables may be more important factors in the life insurance decision. The role of financial factors is even more important in this setting, given that they help determine the estate planning options of an individual. The basic structural equation to be estimated is:

$$FaceValue = \beta_0 + \beta_1 Wealth + \beta_2 Liabilities + \beta_3 Age + \beta_4 Married + \beta_5 Children + u$$

There is generally assumed to be an endogeneity problem with this equation. Wealth is assumed to directly affect the face value of life insurance that individuals want to buy and whether they have sufficient funds to make that purchase. Additionally, wealth affects how much insurance coverage the insurance company is willing to

provide to the individual. If wealth and the face value of life insurance are determined simultaneously, there is an endogeneity problem which will bias Ordinary Least Squares (OLS) estimates. If instead, the relationship between wealth and the face value of life insurance is simply recursive, there is no endogeneity problem and OLS will be unbiased.

The timing of changes of the endogenous variables is what determines if a system is simultaneous or recursive. If changes are sequential, then the system is recursive. The relationship between wealth and life insurance is sequential. An individual accumulates a certain amount of wealth. That individual then considers the purchase of life insurance. The initial wealth ($W_0 = f(X)$) does not depend on life insurance, but the face value of life insurance ($F_1 = f(W_0, X)$) offered by the insurance company depends on wealth. When life insurance is purchased ($t = 1$), wealth is initially unchanged ($W_1 = W_0$) because there is simply an exchange of assets (cash exchanged for a policy). As time passes, the life insurance will increase in value which will increase wealth ($W_2 = f(F_1, W_1, X)$), assuming no other changes.

If there is an endogeneity problem then an instrument for wealth is needed. A good instrument for wealth must be correlated with wealth but uncorrelated with the error term of the structural equation⁴³. There are many possible instruments in the data set including education, trusts, margin accounts, illness, and inheritance. Many researchers would eliminate trusts, inheritance, and illness as potential instruments because these variables may influence the face value offered by the insurance company. However, if the face value of life insurance is not determined simultaneously with trusts, inheritance, and health then all of these are potentially valid instruments.

Most researchers would focus on education and margin accounts as possible instruments. Education is often used as an instrument for wealth and seems appropriate here as education directly influences income and wealth but does not

⁴³ Correlation of the instrument with wealth but not the error term implies that the instrument will be correlated with the dependent variable (face value) so long as the coefficient on wealth in the structural equation is non-zero.

directly affect the availability of life insurance⁴⁴. Previous literature has also proved contradictory on the influence of education on demand for life insurance⁴⁵. One drawback of using education in this analysis is that education in this data set is measured in categories and not in years of education, which could make education a weak instrument. Having a margin account is very clearly correlated with high levels of wealth but the value of the margin account could depend on many other factors. There is no direct connection between life insurance offerings and the value of a margin account⁴⁶. Each instrument is employed separately and then jointly to identify the strongest instrument. The joint use of education and margin account value as instruments provides the strongest instrumentation⁴⁷. The IV regression results are robust between the choices of instruments suggested here.

If the relationship between wealth and the face value of life insurance is simply recursive, there is no need for instruments as OLS will be efficient and unbiased. To determine whether this system is recursive or simultaneous, consider a simplified version of the model when a person is initially considering the purchase of life insurance:

$$FV = \beta_0 + \beta_1 W + BX + u$$

$$W = \alpha_0 + AX + e$$

⁴⁴ It has been argued that more education is associated with better financial planning and understanding. This could then be associated with higher educated people seeking out life insurance more often than less educated people. However, there are a large number of highly educated people in the sample who do not hold whole life insurance.

⁴⁵ Zietz (2003)

⁴⁶ Like education, it could be that those with margin accounts are more financially savvy and seek out assets like life insurance.

⁴⁷ Based on the use of the Davidson and MacKinnon (1993) test, which determines if there are gains over OLS estimation. Using education and margin account value generated the highest F-statistic (2.48) for this test, which is a p-value of 0.1160 which is marginally significant but far more significant than either of the instruments individually. There is no way to directly test if the instruments are valid. The Hausman (1978) test is the more commonly used test but the structure of this data failed to meet the asymptotic assumptions of the Hausman test.

Here, X is a matrix of uncorrelated exogenous variables. The reduced form equations are

$$FV = (\beta_0 + \beta_1 \alpha_0) + (\beta_1 A + B)X + (\beta_1 e + u)$$

$$W = \alpha_0 + AX + e$$

The equation for wealth is a function of exogenous variables that are uncorrelated with the error term by assumption. This equation can be estimated by OLS. The equation for the face value is a function of exogenous variables and the two error terms. Because wealth is not a function of the error term, u , if the error terms (e, u) are uncorrelated then OLS regression of face value on wealth will be consistent and unbiased⁴⁸.

The trend in the literature is to treat the relationship between wealth and life insurance as endogenous. This results in the use of instruments and IV regression to estimate the relationship. However, it is quite likely that the relationship between wealth and life insurance is merely recursive, in which case OLS is the appropriate estimation method. The next section will employ both techniques, IV and OLS, to estimate the structural equation.

Hypotheses and Expected Results

If life insurance is being used for estate planning then several distinctions should be observed in the data. Because only wealthy individuals are subject to the estate tax, there should be differences between the factors that affect high wealth and low wealth individuals. It has also been suggested by Gandolfini and Miners (1996) that gender may play a role in the demand for life insurance⁴⁹. For these reasons, the data is split by gender and wealth. For the wealth split, the \$1 million estate tax exemption is used to determine who falls in the high wealth group and would likely be subject to the estate tax. For the probability analysis a distinction will also be made between whole life policies with face values above and below \$10 thousand. This distinction is made to eliminate

⁴⁸ Johnston (1984). *Econometric Methods*.

⁴⁹ Gandolfini and Miners (1996), *Gender-Based Differences in Life Insurance Ownership*.

“funeral” policies that are small face value, whole life policies that are used to pay funeral or other final expenses.

In the full sample, a positive coefficient estimate on wealth should be observed. If these policies are being used for estate planning, more wealth increases the potential estate tax burden. Another expectation is a negative coefficient estimate on age for the entire sample. This is because the life insurance premiums increase with policy inception age. The number of children is also expected to have a positive coefficient estimate, as children are a primary focus of bequests. However, it is possible that the cost of raising children decreases disposable income to the point that life insurance is not affordable. For the other variables of liabilities and married, there are no clear expectations.

When the sample is split by wealth, there should be significant differences between the high and low wealth groups. For the high wealth group, marriage is expected to have a negative effect. This is because the estate tax allows an unlimited tax-free transfer of wealth to a spouse. However, transfers to children are subject to the estate tax, so the effect of children should be positive for the high wealth group. Since the sample is already split by wealth, it is likely that the effect of wealth will no longer be significant. Liabilities should not be significant in the high wealth group because this group should have significant assets, which are not affected by the liabilities. Additionally, the liabilities held by high wealth individuals are likely to be on businesses or extraneous assets. In addition, age is not expected to be significant because these individuals have high disposable incomes and the estate tax threat would likely outweigh any premium increases associated with age.

When the sample is split by gender, there are only a few differences expected between men and women. Marriage is expected to be positive for high wealth women because women are likely to outlive their husbands and not be able to take advantage of the estate tax spousal deduction. It is also expected that single, high wealth men will carry more life insurance because they also would not be able to take advantage of the estate tax spousal deduction. This expectation increases in magnitude for single, high wealth men with children. This means that a positive estimate on children and a negative estimate on married with children are expected for high wealth men.

For the low wealth group, liabilities are likely to be positive. This is because the largest liability of the low wealth group is usually their primary asset of a home. If they intend to make bequests, the home is the most likely bequest so insuring based on liabilities represents asset preservation for bequests. In the low wealth group it is likely that the number of children will have a negative affect on the face value because children are expensive and the low wealth group is likely to buy less insurance because they have less disposable income. The same is true for age, the sign should be negative because of the lower disposable income and increasing premiums by age.

There is no reason to think that marriage should be significant in the low wealth group. Since the low wealth group does not pay the estate tax, the spousal deduction should not affect their decisions. Despite splitting the sample by wealth, it may be that wealth has a positive effect in this group. The motivation for this idea is that as individuals accumulate more wealth, they may expect to accumulate enough wealth to become subject to the estate tax and may buy more insurance in preparation for that possibility. For the low wealth group, there are no obvious differences to expect between men and women.

Several interaction terms are also considered. The first interaction is married with children⁵⁰. Holding other things constant, a positive estimate on this interaction would signal the traditional use of life insurance to maintain the family standard of living. A second interaction to consider is the interaction of liabilities and children. This interaction, if positive, can be interpreted as capturing the preservation of assets specifically for bequest to children. The interaction of wealth and children, if positive, signifies that as people accumulate more wealth they buy more life insurance to facilitate the transfer of wealth to children. Finally, the interaction of married and liabilities, if positive, would signify the purchase of life insurance to preserve assets specifically for bequest to the spouse.

⁵⁰ The interactions with children are based on a binary for the presence of children, not the number of children.

Face Value Regression Results

The instruments of education and value of margin account previously described are employed to estimate the structural model using Two-Stage Least Squares (2SLS), also known as an instrumental variables regression (IV). Some of the results from the full sample do match expectations. Wealth and age effects match expectations except wealth is not statistically significant for women. Married is also estimated to be non-significant which is consistent with the inability to predict the effect. There are also many discrepancies from expectations for the full sample. The number of children was expected to have a positive effect but turns out to be non-significant. This is likely a result of the opposite signs expected in the high and low wealth groups.

The expectation for liabilities in the full sample was indeterminate. The regression results suggest that liabilities are not significant for women but they are for men. What is more interesting is that while liabilities have a positive effect for men, the interaction of married and liabilities is also significant but negative. This indicates that a single man with liabilities carries more insurance than a single man without liabilities (\$1.41 more for each \$1,000 of liabilities). At the same time, a married man with liabilities carries significantly less insurance than a married man without liabilities (\$1,370 less for each \$1,000 of liabilities⁵¹). Subsequently, a married man with liabilities carries far less insurance than a single man with liabilities while a married man and a single man without liabilities can be expected to carry approximately the same amount of life insurance, other things being equal.

Looking at the low wealth group, expectations are more closely matched. Wealth is positive and significant, age is negative and significant, and married is not significant. These all match expectations. The results also estimate the effect of the number of children to be negative, as predicted, but this effect is not significant. Similar to the results from the full sample, liabilities are not significant for women but the interaction of liabilities and children is positive and significant. As described earlier, this suggests that

⁵¹ The effect for a married man with liabilities is the sum of the effects for liabilities, married, and the interaction of married and liabilities. Since married is not significant, this simplifies to $1.4148 - 1371.358$ which is approximately -1370.

life insurance is being used to preserve assets to bequest to children in the low wealth group.

Table 4: IV Regression Results

Dependent Variable:	Full Sample		Wealth Below \$1 million		Wealth Above \$1 million	
Face Value of Whole Life Policies	Males	Females	Males	Females	Males	Females
Wealth	0.0924 (0.009)	0.0341 (0.342)	0.1963 (0.020)	0.1363 (0.008)	-0.0414 (0.468)	0.0149 (0.891)
Age	-2.9623 (0.000)	-1.6509 (0.000)	-3.3015 (0.000)	-1.9628 (0.000)	-2.1558 (0.340)	1.1123 (0.633)
Liabilities	1.4148 (0.002)	-0.0198 (0.872)	1.4530 (0.000)	-0.0815 (0.591)	0.1684 (0.911)	0.1806 (0.119)
Number of Children	1.7768 (0.865)	0.4171 (0.946)	-2.9242 (0.771)	-1.6009 (0.788)	194.7245 (0.014)	56.0644 (0.196)
Married	23.4168 (0.392)	-2.1779 (0.860)	18.6259 (0.468)	-24.3502 (0.122)	16.6792 (0.873)	134.8957 (0.035)
Married & Children	25.7482 (0.338)	-17.6797 (0.314)	49.4053 (0.056)	7.4678 (0.631)	-348.1705 (0.060)	-337.3622 (0.110)
Liabilities & Children	98.8505 (0.632)	120.9207 (0.441)	-137.0478 (0.427)	213.2792 (0.069)	-511.5793 (0.186)	86.9411 (0.890)
Wealth & Children	0.0063 (0.910)	0.0690 (0.253)	-0.0177 (0.851)	-0.0379 (0.566)	0.0900 (0.302)	0.1420 (0.259)
Married & Liabilities	-1,371.358 (0.005)	30.3307 (0.757)	-1,243.254 (0.002)	111.4506 (0.478)	329.5653 (0.819)	-145.1659 (0.815)
Constant	186.6289 (0.003)	122.6031 (0.000)	179.4173 (0.005)	131.4787 (0.000)	342.5992 (0.077)	-113.6175 (0.587)
F-Statistic	11.85	12.72	15.18	10.04	3.44	3.53
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0006	0.0010
R^2	0.2227	0.2390	0.2856	0.1166	0.1365	0.2906
N	908	715	728	625	180	90
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. All of the "& Children" variables are interactions with the presence of children, not the number of children. All results are based on 2SLS estimation with education and value of margin accounts as instruments for wealth. The estimations are weighted to be representative of the population and the test statistics are based on robust standard errors.						

Another similarity to the full sample is the effects of liabilities and the interaction of married and liabilities for men in the low wealth group. However, the men in this group also have a positive and significant effect for the interaction of married and children. This means that a single man with liabilities carries more insurance than a single man without liabilities (\$1.45 more for each \$1,000 of liabilities) while a married man with liabilities carries significantly less insurance than a married man without

liabilities (\$1,243 less for each \$1,000 of liabilities). In a similar vein, a married man with children carries more life insurance than a married man without children (\$49 more for each child) but a married man with children and liabilities carries far less insurance than his counterpart without liabilities (\$1,192 less for each \$1,000 of liabilities)⁵².

These results support the conjecture that liabilities reduce the disposable income of low wealth individuals, reducing the amount of insurance they are able to afford. Compared to other effects, this liability effect is quite large.

Looking at the high wealth group, almost all of the expected outcomes are present. Wealth, age, and liabilities are non-significant for both men and women in this group. The number of children has a large positive effect but the effect is not significant for women. What is significant for women is marriage, which is positive and matches expectations that high wealth women would carry more insurance because they are unlikely to be able to reduce their estate tax burden through the spousal deduction. For men, the expectation is that married will be negative for the opposite reason but instead marriage is found to be non-significant for men.

What is significant for men in the high wealth group is the interaction of married and children, which has a negative effect. This may be capturing the marriage effect that was expected on married men with children who plan to pass their assets first to their spouse and then to the children. This would also support the positive effect of marriage for women in this group. Overall, the results of the high wealth group strongly support the hypothesis that life insurance is being used for estate planning.

Robustness of Results

When instrumental variable methods are employed, there is always a question as to the quality of the results and instruments. The Hausman (1978) test is the most commonly used test for endogeneity. The structure of this data set, because of the use of population weights, does not allow for the accurate calculation of the Hausman test. Instead, the Davidson MacKinnon (1993) test is employed. The Davidson MacKinnon test determines if IV estimation provides gains over OLS estimation. Using education

⁵² Single man with liabilities = 1.4530, Married man with liabilities = -1243.254, Married man with children = 49.4053, Married man with children and liabilities $1.453 + 49.4053 - 1243.254 = -1192$.

and value of the margin account, this test generates an F-statistic of 2.48, which is a p-value of 0.1160. This p-value indicates that the IV estimation is providing some improvement over the OLS estimation but this improvement is not significant at the 10 percent level.

IV estimation is known to be less efficient and generate larger errors than OLS if there is not an endogeneity problem. However, if there is an endogeneity problem, OLS produces biased coefficient estimates. Table 5 reports the OLS estimation of this model for comparison purposes.

Table 5: OLS Regression Results

Dependent Variable:	Full Sample		Wealth Below \$1 million		Wealth Above \$1 million	
Face Value of Whole Life Policies	Males	Females	Males	Females	Males	Females
Wealth	0.0391 (0.000)	0.0401 (0.001)	0.1176 (0.000)	0.0143 (0.331)	0.0161 (0.241)	0.0482 (0.054)
Age	-2.3903 (0.002)	-1.6770 (0.000)	-2.9432 (0.000)	-1.5049 (0.000)	-2.3767 (0.264)	1.0773 (0.631)
Liabilities	1.4881 (0.001)	-0.0334 (0.703)	1.5007 (0.000)	0.0344 (0.795)	-0.3254 (0.789)	0.1813 (0.100)
Number of Children	1.7495 (0.867)	0.2749 (0.964)	-4.3936 (0.661)	-2.5778 (0.670)	193.813 (0.014)	56.1323 (0.192)
Married	17.9422 (0.515)	-4.3452 (0.632)	17.4713 (0.495)	-4.5099 (0.659)	-19.1855 (0.838)	121.4046 (0.011)
Married & Children	20.5301 (0.434)	-15.2702 (0.324)	39.7976 (0.114)	-11.7653 (0.319)	-251.623 (0.109)	-280.9735 (0.006)
Liabilities & Children	-80.0736 (0.576)	133.4997 (0.225)	-180.5336 (0.273)	159.3479 (0.094)	-197.2729 (0.317)	278.5206 (0.201)
Wealth & Children	0.0571 (0.150)	0.0631 (0.134)	0.0540 (0.358)	0.0782 (0.097)	0.0325 (0.591)	0.1088 (0.054)
Married & Liabilities	-1,264.099 (0.005)	30.3091 (0.763)	-1,249.405 (0.002)	42.8174 (0.756)	507.3152 (0.678)	-337.6137 (0.068)
Constant	173.1038 (0.006)	123.9653 (0.000)	179.2653 (0.005)	115.5073 (0.000)	295.9394 (0.095)	-155.0694 (0.346)
F-Statistic	13.39	12.98	15.99	12.84	3.26	3.72
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0011	0.0006
R^2	0.2544	0.2400	0.2941	0.2055	0.2056	0.3105
N	912	721	730	631	182	90

P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. All of the "& Children" variables are interactions with the presence of children, not the number of children. The estimations are weighted to be representative of the population and the test statistics are based on robust standard errors.

As expected, the OLS estimation identifies more coefficient estimates as statistically significant. For the full sample, OLS identifies wealth as being positive and statistically significant for women, which was not significant in the IV results. All of the other OLS significant coefficients are also significant in the IV results. Additionally, the signs and magnitudes of the significant OLS coefficients are the same as the IV results. When the sample is split by wealth, the OLS results are less consistent with the IV results. Since wealth is the endogenous explanatory variable in the IV regressions, these differences are not shocking.

Looking at the low wealth sample, there are three discrepancies in significant coefficients. Wealth for women, and married with children for men are statistically significant in the IV results but not OLS. However, the sign and magnitude of these variables are very similar in both sets of results. Another discrepancy is that the interaction of wealth and children is statistically significant in the OLS results at the 10 percent level. The coefficient estimates for this interaction also have different signs. Again, wealth is the endogenous explanatory variable so this difference is not unexpected.

For the high wealth sample, OLS identifies several more coefficients as statistically significant. Wealth and the interactions of married with children, wealth and children, and married with liabilities are all statistically significant in OLS. All of these estimates have the same sign and about the same magnitude as the IV results. The only other discrepancy for the high wealth group is that married with children is not statistically significant for men in the OLS results. However, married with children is very close to being significant at the 10 percent level and again the sign and magnitude are the same.

This comparison suggests that the IV results have larger errors than the OLS results while the coefficient estimates are very similar. IV estimation is known to produce larger errors when there is not an endogeneity problem. Additionally, the results of the Davidson MacKinnon test provide only weak evidence of simultaneity between wealth and life insurance. All of these observations are consistent with a recursive relationship. Thus, OLS estimates should provide efficient and unbiased results without the use of instruments.

Ideally, all of these results would also use bootstrapped errors because of the possible endogeneity problem. However, software limitations do not allow for the use of population weights in calculations of bootstrapped errors. To address this issue the same regressions are run without the population weights to get bootstrapped errors. The results of this process reveal that the statistically significant coefficients without bootstrapped errors are the same coefficients that are significant with bootstrapped errors, with few exceptions.

Probability of Owning Life Insurance

Looking at the face value of life insurance provides a great deal of empirical support for the idea that life insurance is used in estate planning. The same data can be used to analyze the probability of holding whole life insurance. The idea here is that there may be factors that affect the purchasing decision differently than the face value decision.

Two binary variables are created for this analysis. The first is for owning any individually purchased whole life policy and the second is for owning such a policy with a face value over \$10 thousand. This restriction is used to eliminate funeral policies described earlier. This analysis suffers from the same endogeneity problem as previously described so a linear probability model with instruments is employed. The linear probability model also suffers from heteroskedasticity so robust standard errors are used to correct this problem⁵³.

Probability Hypotheses and Expected Results

For the probability analysis, the sample is split by wealth and gender as before. In addition, the two binary variables are used to further split the sample to either include or exclude funeral policies. In the full sample, the same directional results as the face value analysis are expected with the exceptions of age and number of children. The effects of the number of children will likely be negative for the full sample again because the cost associated with children decreases disposable income and the ability to purchase life insurance. Because this sample includes all of the survey respondents, it

⁵³ This analysis could have also been completed with an IV probit. Since the primary concern is the

is likely that the number of children is a large factor in why many do not hold individual whole life policies. Age is also expected to be positive in the full sample because of the inclusion of the funeral policies that are marketed to and usually purchased by seniors and retirees.

When the sample is split by wealth, the expectation is that there will still be significant differences between the high and low wealth groups. For the high wealth group, the directional results are expected to be exactly the same as the expectations for the face value analysis with regards to wealth, age, liabilities, number of children, and marriage. For the low wealth group, the expectations are also very similar with the exception of age. In the low wealth group, age is expected to be positive to reflect the large number of funeral policies in this group.

A more interesting split may come from the removal of funeral policies. For the entire group, removing the funeral policies should change the sign on age to negative, as it was for the face value analysis. For the high wealth group it is not likely that any of their policies are funeral policies because they have no need for such a policy. This means that for the high wealth group there should be little or no difference between the samples with and without the funeral policies. The story is quite different for the low wealth group. It is likely that a large number of the policies in the low wealth group are funeral policies so the results may be quite different. Specifically, age is expected to be positive in the low wealth group that includes funeral policies but negative when the funeral policies are removed. The rest of the results for the low wealth group should be the same as predicted for the face value analysis.

When the sample excluding the funeral policies is split by gender, even fewer differences between men and women are expected compared to the face value analysis. Marriage is expected to be positive for high wealth women because women are likely to outlive their husbands. This is the same expectation as the face value analysis. There is no obvious difference to expect between men and women on any other variables.

direction and significance of the coefficient estimates, the simpler linear probability model is used.

Probability Regression Results

The analysis begins by first looking at the results for all policies in the full sample. The results suggest that wealth and age have positive and significant effects on the probability of owning an individually purchased whole life insurance policy. These results match expectations. The expected effect of liabilities was indeterminate and this is supported by the non-significant estimate result. Another result of note is that the number of children has a negative effect, as expected, but the effect is not significant. There is also no expectation over the effect of marriage but the results indicate that marriage has a positive and significant effect on the probability of owning a whole life policy.

There are also two interactions in the full sample that are significant. The interaction of liabilities and children is found to be positive and significant while the interaction of wealth and children is negative and significant. The positive effect of the liabilities and children interaction indicates that having both liabilities and children increases the probability of owning a whole life policy. This supports the idea of asset preservation with the intent to bequeath assets to children. The negative effect of wealth and children is small and is completely offset by the positive effect of wealth. This supports the idea that while you would like to buy insurance as your wealth increases, the ability to purchase may be decreased by the costs associated with having children. When the funeral policies are excluded, the only difference is that the interaction of married and liabilities, which has a negative effect, becomes significant. The implication of this result will be discussed later.

For the low wealth group, the results are very similar to the full sample results. Wealth and age are both positive and significant as expected. The effect of the number of children is negative but non-significant. However, in the low wealth group liabilities are expected to have a positive effect and marriage to be non-significant. While the effect of liabilities is positive, it is also not significant. Much like with the full sample, marriage is found to be positive and significant. This may suggest that in the low wealth group, some of the motivation for buying life insurance is the traditional argument of replacing lost income.

Table 6: IV Linear Probability Results

Dependent Variable:	Full Sample		Wealth Below \$1 million		Wealth Above \$1 million	
Owns a Whole Life Policy	All Policies	Face Value over \$10,000	All Policies	Face Value over \$10,000	All Policies	Face Value over \$10,000
Wealth	0.0004 (0.000)	0.0005 (0.000)	0.0006 (0.002)	0.0007 (0.000)	0.0004 (0.103)	0.0003 (0.105)
Age	0.0027 (0.015)	-0.0018 (0.0024)	0.0031 (0.006)	-0.0016 (0.024)	0.0032 (0.670)	0.0020 (0.778)
Liabilities	0.0004 (0.270)	0.0003 (0.333)	0.0006 (0.217)	0.0004 (0.275)	0.0009 (0.328)	0.0009 (0.307)
Number of Children	-0.0073 (0.500)	0.0032 (0.713)	-0.0033 (0.769)	0.0086 (0.337)	-0.1928 (0.005)	0.1492 (0.028)
Married	0.0956 (0.009)	0.1064 (0.00)	0.0812 (0.026)	0.0935 (0.001)	0.0797 (0.692)	0.0561 (0.770)
Married & Children	0.0164 (0.708)	-0.0015 (0.969)	-0.0048 (0.912)	-0.0304 (0.393)	0.4878 (0.221)	0.5574 (0.147)
Liabilities & Children	0.8641 (0.026)	1.2539 (0.001)	0.2733 (0.394)	0.7001 (0.017)	0.9676 (0.133)	0.9456 (0.127)
Wealth & Children	-0.0003 (0.003)	-0.0004 (0.000)	-0.0003 (0.152)	-0.004 (0.019)	-0.0004 (0.066)	-0.0004 (0.062)
Married & Liabilities	-0.7351 (0.145)	-0.8651 (0.079)	-0.1247 (0.780)	-0.1991 (0.619)	-1.7641 (0.089)	-1.7181 (0.094)
Constant	-0.0312 (0.448)	0.0808 (0.012)	-0.0611 (0.107)	0.0540 (0.048)	-0.5365 (0.295)	-0.4618 (0.352)
F-Statistic	20.33	17.96	26.68	22.28	1.89	1.79
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0524	0.0692
N	3,749	3,749	3,338	3,338	411	411
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. All of the "& Children" variables are interactions with the presence of children, not the number of children. All results are based on 2SLS estimation with education and value of margin accounts as instruments for wealth. The estimations are weighted to be representative of the population and the test statistics are based on robust standard errors.						

When the funeral policies are removed, the interactions of liabilities with children and wealth with children are significant in the low wealth group as they were in the full sample. The signs for the interactions are the same as the full sample and thus have the same interpretation. The only other difference, when the funeral policies are removed, is the sign on age switches to negative, which was expected.

For the high wealth group, many more of the expectations are met. Wealth, age, and liabilities are not significant, as expected. The number of children has a relatively

large, positive, and significant effect on the probability of owning life insurance. Marriage is expected to have a negative effect in this group but the results are not significant. Additionally, there are two interactions that are significant.

The interaction of wealth and children and the interaction of married and liabilities both have negative and significant effects on the probability of owning a whole life policy for the high wealth group. The interaction between wealth and children is very small but indicates that increases in wealth when children are present, decrease the probability of owning life insurance. This may be the result of owning other assets or putting money into trusts for children as wealth increases. This may also reflect that individuals increase the value of their life insurance policies but do not buy additional policies as their wealth increases. The negative effect on the interaction of married and liabilities may reflect that high wealth individuals do not purchase life insurance to preserve assets specifically for bequest to the spouse. As expected, there is very little difference between the results with and without the funeral policies in the high wealth group.

Another way to look at the results is by examining the results when the funeral policies are excluded. Excluding the funeral policies is an important distinction because this type of policy is not typically used for estate planning. Looking at the full sample, there are very few differences between men and women. Wealth and married have a positive significant effect while the number of children has a negative but non-significant effect for both men and women. One difference is that age has a negative effect for men but is non-significant for women. Another difference is that liabilities have a positive and significant effect for women, as does the interaction of married and liabilities. This shows that women are more likely than men to purchase life insurance if they have liabilities, whether married or not. Married women have an even greater probability of owning life insurance if they have liabilities. This again supports the idea that women are often left without the spousal deduction from the estate tax and buy insurance to plan for that occurrence.

The low wealth group and the full sample are very similar as almost 90 percent of the observations fall in the low wealth group. The primary differences are between the women in the low wealth group and the full sample. For women in the low wealth group, none of the interaction terms are significant. Comparing men to women in the

low wealth group, age again has a negative effect for men but is non-significant for women. Liabilities were expected to have a positive effect in this group but the effect is only significant for women. Finally, marriage was expected to be non-significant in this group but is found to be positive and significant for both men and women.

Table 7: IV Linear Probability Results without Funeral Policies

Dependent Variable:	Full Sample		Wealth Below \$1 million		Wealth Above \$1 million	
Owens a Whole Life Policy with Face Value over \$10,000	Male	Female	Male	Female	Male	Female
Wealth	0.0006 (0.000)	0.0002 (0.002)	0.0009 (0.000)	0.0005 (0.008)	0.0004 (0.088)	0.0002 (0.086)
Age	-0.0023 (0.069)	0.0003 (0.716)	-0.0020 (0.062)	-0.0002 (0.799)	0.0033 (0.687)	-0.0001 (0.984)
Liabilities	0.0001 (0.804)	0.0010 (0.011)	0.0002 (0.690)	0.0009 (0.061)	-0.0007 (0.482)	0.0018 (0.007)
Number of Children	-0.023 (0.829)	-0.0011 (0.903)	0.0032 (0.762)	0.0012 (0.899)	0.1339 (0.050)	0.1264 (0.041)
Married	0.0900 (0.018)	0.1449 (0.000)	0.0780 (0.024)	0.1134 (0.001)	-0.2813 (0.276)	0.3729 (0.000)
Married & Children	0.0254 (0.548)	-0.0259 (0.482)	0.0081 (0.841)	-0.0331 (0.395)	0.6528 (0.129)	0.2426 (0.298)
Liabilities & Children	1.3347 (0.002)	0.6033 (0.039)	0.6148 (0.048)	0.4724 (0.133)	0.9850 (0.095)	0.4863 (0.279)
Wealth & Children	-0.0005 (0.000)	-0.0002 (0.046)	-0.0005 (0.008)	-0.0002 (0.348)	-0.0004 (0.050)	-0.0002 (0.037)
Married & Liabilities	-0.7907 (0.305)	0.8492 (0.031)	0.0044 (0.994)	-0.4124 (0.358)	-0.1067 (0.919)	-2.2081 (0.007)
Constant	0.1027 (0.031)	-0.0023 (0.945)	0.0643 (0.117)	0.0055 (0.872)	-0.2446 (0.665)	-0.2978 (0.460)
F-Statistic	13.11	24.70	17.00	24.71	1.31	8.77
Prob > F	0.0000	0.0000	0.0000	0.0000	0.2283	0.0000
N	3,125	3,340	2,738	2,956	387	384
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. All of the "& Children" variables are interactions with the presence of children, not the number of children. All results are based on 2SLS estimation with education and value of margin accounts as instruments for wealth. The estimations are weighted to be representative of the population and the test statistics are based on robust standard errors.						

Once again, the high wealth group conforms more closely to expectations. The number of children has a positive and significant effect while age is non-significant. Wealth and liabilities were expected to be non-significant but wealth is found to be positive and significant for both while liabilities were found to be positive and significant

only for women. Marriage was expected to have a negative effect for men and positive effect for women. That is exactly what was found but the negative effect for men is not significant.

Table 8: Linear Probability Results without Funeral Policies

Dependent Variable:	Full Sample		Wealth Below \$1 million		Wealth Above \$1 million	
Owns a Whole Life Policy with Face Value over \$10,000	Male	Female	Male	Female	Male	Female
Wealth	0.00007	0.00004	0.0003	0.0002	0.000006	0.000005
	(0.003)	(0.011)	(0.000)	(0.000)	(0.767)	(0.807)
Age	0.0017	0.0014	0.0003	0.0007	0.0028	-0.0009
	(0.019)	(0.005)	(0.716)	(0.184)	(0.499)	(0.779)
Liabilities	0.0008	0.0013	0.0007	0.0011	-0.0005	0.0017
	(0.199)	(0.000)	(0.292)	(0.010)	(0.658)	(0.007)
Number of Children	-0.0062	-0.0005	-0.0034	-0.0007	0.1065	0.1168
	(0.557)	(0.954)	(0.742)	(0.938)	(0.108)	(0.044)
Married	0.1053	0.1660	0.0995	0.1353	-0.0950	0.4214
	(0.002)	(0.000)	(0.004)	(0.000)	(0.597)	(0.000)
Married & Children	-0.0215	-0.0501	-0.0350	-0.0588	0.0290	-0.0680
	(0.562)	(0.133)	(0.348)	(0.080)	(0.872)	(0.667)
Liabilities & Children	0.1600	0.2166	0.2278	0.3005	0.0579	0.0895
	(0.512)	(0.363)	(0.421)	(0.291)	(0.845)	(0.760)
Wealth & Children	-0.000004	0.00002	-0.00001	0.00007	-0.00006	-0.00005
	(0.903)	(0.572)	(0.909)	(0.473)	(0.150)	(0.194)
Married & Liabilities	-0.2964	-0.7901	-0.0864	-0.4880	0.5533	-1.6661
	(0.635)	(0.036)	(0.891)	(0.261)	(0.612)	(0.013)
Constant	-0.0127	-0.0445	0.0151	-0.0189	0.2814	0.0194
	(0.750)	(0.199)	(0.709)	(0.513)	(0.365)	(0.937)
F-Statistic	12.24	22.80	19.12	23.62	0.89	14.23
Prob > F	0.0000	0.0000	0.0000	0.0000	0.5353	0.0000
N	3,141	3,404	2,749	3,007	392	397
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. All of the "& Children" variables are interactions with the presence of children, not the number of children. The estimations are weighted to be representative of the population and the test statistics are based on robust standard errors.						

There are also interaction terms that are significant for the high wealth group. For both men and women, the interaction of wealth and children is negative and significant. However, this effect is very small and is completely offset by the positive effect of wealth. For men, the interaction of liabilities and children has a large, positive, and significant effect. This is again strong evidence for the preservation of assets with the intent to bequest to children. For women, the interaction of liabilities and married

has a large, negative, and significant effect. As suggested before, the negative effect on the interaction of married and liabilities may reflect that high wealth individuals do not purchase life insurance to preserve assets specifically for bequest to the spouse. Given that this result is observed only on women, the hypothesis is even stronger since women tend to outlive men.

These results are also checked for robustness versus OLS results. These results are presented in Table 8 and Appendix B. As with the face value analysis, the probability analysis using instrumental variables provides similar results to the OLS regressions. This lends further support to the conclusion that the relationship between wealth and life insurance is not simultaneous, but recursive.

Conclusion

Life insurance can be thought of as insurance against a loss of income or as an investment. Those with high wealth do not need to insure against a loss of income but as an investment, life insurance performs very poorly compared to other options of similar risk. This leads to the theory that high wealth individuals purchase life insurance for estate planning purposes because life insurance is not subject to the estate tax.

Data analysis supports this theory. Low wealth individuals are found to primarily purchase life insurance for the traditional purpose of insuring against the loss of income. High wealth individuals are shown to buy life insurance to bequeath assets to their children. This is especially true for high wealth women who are unlikely to be able to take advantage of the estate tax spousal deduction. An additional result of this analysis is that the relationship between life insurance and wealth has been shown to be recursive, despite the trend in literature to treat the relationship as simultaneous.

CHAPTER 4

WHAT IF THE ESTATE TAX WAS CHANGED?

The previous chapter demonstrates that the federal estate tax affects people's decisions about life insurance and the accumulation of other assets. With this in mind, it is important to consider the impact that changes to the estate tax might have. This chapter explores the impact of some possible changes to the estate tax.

Policy Implications

The previous chapters have demonstrated that estate planning is an important factor in individual decisions. It seems appropriate then to consider how changes to the estate tax would influence the decisions of individuals with regard to consumption, the accumulation of wealth, and the types of assets held. There are a number of changes to the estate tax that could be considered. This section considers six possible changes and their impacts. Those changes include changes to the total exemption, spousal deduction, charitable contribution deduction, marginal tax rate, treatment of life insurance, and elimination of the estate tax. Other changes that could be considered include the treatment of small or private businesses, methods or timing of estate valuation, and many others.

The Total Exemption

The total exemption acts much like a price ceiling. If equilibrium occurs above the ceiling, then the ceiling causes production to be decreased relative to the amount produced in the absence of the ceiling. For the estate tax, the implication is that people will accumulate wealth up to the tax exemption but not beyond. If the amount they would have accumulated in the absence of the estate tax is below the exemption, then there is no impact. However, if they would have accumulated wealth greater than the exemption, then the estate tax reduces the accumulation of wealth because of this artificial ceiling. Clearly, some people do accumulate wealth beyond the estate tax exemption, but the ceiling effect creates a disincentive to move beyond it. Reducing the exemption increases the probability that the exemption will affect individual wealth accumulation while increasing the exemption decreases that probability.

The decision to accumulate wealth affects many more people beyond the individual. Accumulation of wealth allows for investment, which is a key driver to productivity and GDP growth. Wealth accumulation also allows for another economic driver, entrepreneurship. Entrepreneurs create jobs and new products or services, which improve the quality of life for everyone. The impact of investment and entrepreneurs manifest themselves in higher productivity, higher wages, and so on. The subsequent increases allow others to consume more and accumulate more wealth. However, the exemption limit creates a strong disincentive to investment and a similarly strong incentive for entrepreneurs to divest or retire early. The relationship between life insurance, the estate tax, and entrepreneurs will be explored in greater detail in the next chapter.

Spousal Deduction

Currently, all transfers of wealth to a spouse are exempt from the estate tax. This means that estate tax planning is less important for married men than anyone else. This is because married men are more likely to die before their wives for two reasons. The first reason is that men tend to have shorter life spans than women and the second reason is that men tend to marry women who are younger than themselves. This means that the estate of a married man can be passed in its entirety to their spouse with no estate taxes. On average, approximately 70 percent of every estate is passed estate tax free to a spouse. The annual estate portions passed to a spouse are shown in Table 9. Widows, divorcees, and single people face a far greater estate tax burden because they do not have this deduction option. For those who are not allowed to legally marry, this exemption can be viewed as discriminatory. The spousal deduction clearly benefits married couples over unmarried individuals.

For those who wish to transfer wealth to their children, the incentive is to make these transfers before death, often through trust mechanisms. This reduces wealth in several ways. First, there is wealth wasted on the creation and maintenance of the trust. There is also the opportunity costs of lawyers, estate planners, accountants, trustees, etc. that could be engaged in other activities. Within a trust, the trustee has a fiduciary duty to the maintenance of the trust. This means that the wealth in a trust is

generally invested in low risk, low return assets. The money in these trusts could be put to more productive use during the life of the individual.

Table 9: Estate Transfers to Spouse⁵⁴

Year	Portion of Estate Transferred to Spouse According to IRS
1995	67.52%
1996	65.56%
1997	69.37%
1998	67.10%
1999	67.39%
2000	69.53%
2001	70.84%
2002	74.36%
2003	73.95%
2004	73.53%
2005	65.97%
2006	69.83%

Removal of the spousal deduction would remove the benefit to married couples. However, this would be politically unpopular. The image of a widow selling the family home to pay the estate taxes would not help politicians get re-elected. On the other hand, the extension of the deduction to an “immediate family” deduction would facilitate transfers to parents, spouse, or children. This could also, if written correctly, remove the discrimination against gay and lesbian couples who are not allowed to legally marry in most states. Additionally, this would reduce the need and use of trusts.

Charitable Contribution Deduction

One of the major arguments for keeping the estate tax is that it encourages charitable giving⁵⁵. There is a major flaw in this argument. The mere existence of the estate tax reduces the incentive to accumulate an estate greater than the estate tax exemption, as previously discussed. With less accumulation of wealth, there is less investment, which leads to lower growth and less wealth for future generations. This

⁵⁴ Internal Revenue Service (1995 – 2007), *Statistics of Income Tax Stats – Estate Tax Statistics*. Estate Tax Data Tables by Tax Status and Size of Gross Estate.

⁵⁵ U.S. Congress Joint Economic Committee (2006)

means there is also less wealth to be given to charities. The information in Table 10 demonstrates that charitable contributions did not drop off with the 2001 decreases in the estate tax. In fact, the charitable contributions in 2005 were the highest, as a percentage of the total estate, donations in recent history. Another fact to consider is that planned charitable giving is often reduced by the estate tax. In 1998, the estate tax reduced the planned giving of male estates by over 14 percent or more than \$1 billion⁵⁶.

Table 10: Estate Contributions to Charities⁵⁷

Year	Portion of Estate Contributed to Charities According to IRS
1995	39.52%
1996	41.42%
1997	50.81%
1998	36.01%
1999	43.96%
2000	44.52%
2001	43.25%
2002	51.75%
2003	40.25%
2004	42.21%
2005	54.95%
2006	42.85%

Another distortion introduced by the estate tax is the timing of charitable giving. Since the top marginal tax rate for income tax is significantly lower than the estate tax rate, there is an incentive to postpone charitable giving until death. Also, charitable donations do not create a dollar for dollar reduction in the annual income tax liability while under the estate tax, charitable donations decrease the taxable estate on a dollar for dollar basis. This again means there is more of a tax credit by postponing charitable giving until death instead of making annual donations. A change to the estate tax or the income tax to treat charitable donations more equally would reduce the timing distortion of charitable contributions by the estate tax.

⁵⁶ Johnson and Mikow (2002), *Federal Estate Tax Returns, 1998-2000*.

⁵⁷ Internal Revenue Service (1995 – 2007)

Marginal Tax Rate

An increasing marginal tax rate decreases the incentive to accumulate wealth. Each level where the tax increases acts as another artificial ceiling, much like the total exemption. People are penalized for creating and accumulating more wealth. A single tax rate is simple to understand; requires less time to calculate, file, and check; and reduces the expenses involved in filing. The current estate tax is so complicated that the compliance cost is estimated to be a dollar for each dollar collected, which is five times the compliance costs of the income tax⁵⁸. Changing to a single tax rate would reduce a portion of the complexity and compliance costs.

A reduction in the marginal tax rate would also have a positive impact on wealth accumulation. A lower rate would reduce the penalty to wealth accumulation. This would encourage more accumulation and reduce the incentive to engage in tax avoidance activities. A reduction in the rate would also encourage entrepreneurship and reinvestment. According to a 1994 study by the Tax Foundation⁵⁹, an estate tax rate of 55 percent creates the same disincentive as doubling the income tax rate. That is, with an estate tax of 55 percent and an income tax rate of 30 percent, the entrepreneur makes decisions as if the income tax rate were 60 percent.

Treatment of Life Insurance

The special tax treatment of death benefits from life insurance is based on the idea that the benefits are meant to replace lost income. In that scenario, taxing the death benefits would be very unpopular for politicians as the “poor widow struggles to make ends meet”. For those with small estates that are not subject to the estate tax, this treatment is what was intended. However, in recent years, ownership restrictions have been added to target those who would use life insurance as an estate-planning instrument. As with similar restrictions, there are always loopholes.

⁵⁸ Chamberlain, Prante, and Fleenor (2006), *Death and Taxes: The Economics of the Federal Estate Tax*.

⁵⁹ Fleenor and Foster (1994), *An Analysis of the Disincentive Effects of the Estate Tax on Entrepreneurship*.

In this case, there are two loopholes that allow the individual different levels of security. The most secure option is to create an insurance trust where the trust is made the owner of the policy. The premiums paid through the trust may also be subject to gift taxes but these can be mitigated through the creation of a secondary trust. The trust can be restricted to use the life insurance proceeds to pay estate taxes but the insured cannot change the beneficiaries or access the cash value of the policy. This wastes resources in the creation and maintenance of trusts that would otherwise be unnecessary. This also decreases the negotiable assets of the individual, effectively reducing wealth.

The less secure option is to simply make someone else, usually a child, the owner of the policy. However, under this approach the insured cannot make legally binding restrictions on how the life insurance proceeds are to be used. The other catch to this approach is that the policy premiums are treated as gifts to the policy owner and would be subject to a gift tax if the premium exceeds the annual gift exemption, which is currently \$12,000 per year. In either option, the transfer of ownership must be made at least three years before the insured dies. Since no one knows when they are going to die, if they choose to hold ownership for some period of time, this introduces additional risk that the policy could be included in their estate if they die earlier than anticipated.

There are two obvious potential changes to the treatment of life insurance with regards to the estate tax. The first possibility is that any policy on the life of the deceased is considered part of the estate, regardless of ownership. The other possibility is that life insurance is not considered part of the estate, regardless of ownership. Neither of these changes would impact low wealth individuals.

The first possibility of inclusion in the estate regardless of ownership could have huge detrimental effects for private businesses. In publicly held companies, the death of an owner simply means the stock is transferred according to that owner's will. It has no effect on the continued operation of the company. In a privately held company, the death of an owner could have a dramatic impact on the continued operation of the company. This is especially true in professional partnerships where the next of kin is not likely to be able to fill the role of the deceased. It is a common practice in these types of businesses for the owners to take out policies on the other owners. These

policies are then used to pay the value of the deceased owner's interest in the business to their beneficiaries. Without this option, the company may be forced to take on the beneficiaries in an ownership role or to liquidate part or all of the business to pay the beneficiaries.

Inclusion in the estate regardless of ownership would remove the two current loophole options for using life insurance to pay the estate taxes. This would, in effect, completely remove the benefit of using life insurance for estate planning. This change would likely result in a transfer of assets from life insurance to other assets. This change would also mean that more wealth would be subject to the estate tax, increasing the disincentive to wealth accumulation. The use of life insurance trusts would be all but eliminated; however, efforts would be shifted to finding other loopholes or tax shelters to reduce the estate tax burden.

The second possibility of not including life insurance in the estate regardless of ownership would likely increase wealth accumulation. This change would reduce or eliminate the need for life insurance trusts. Such a change would also increase wealth because funds would not be wasted on the services involved in creating and maintaining trusts. The professionals involved in this specialty could use their talents in other endeavors. This change would also reduce risk for the insured because they would no longer need to transfer ownership at any point. Additionally they would have access to the cash value of the policy that could be used for any number of wealth creating activities such as buying a house, starting a business, or investing in other assets.

Elimination of the Estate Tax

The estate tax has been in place for over 100 years. The inclination to tax the rich and “even the playing the field” has, if anything, grown stronger. However, the threat of losing a large portion of your entire life's work creates a huge incentive to reduce or destroy that wealth before the government can redistribute it. The estate tax exemption creates an automatic target to accumulate wealth up to and then stop. All of these perverse incentives lead to a lower level of wealth creation for individuals and the economy as a whole, both today and into the future.

Table 11: Effective Estate Tax Rates⁶⁰

Year	Gross Estate	Charitable Contributions	Effective Estate Tax Rate
1995	< \$1 million	21.88%	6.15%
	\$1 - \$2.5 million	24.10%	16.06%
	\$2.5 - \$5 million	19.93%	24.53%
	\$5 - \$10 million	25.46%	26.84%
	\$10 - \$20 million	23.01%	25.80%
	> \$20 million	45.39%	16.81%
2000	< \$1 million	19.04%	5.12%
	\$1 - \$2.5 million	21.24%	15.56%
	\$2.5 - \$5 million	27.56%	25.24%
	\$5 - \$10 million	27.24%	28.37%
	\$10 - \$20 million	26.08%	26.71%
	> \$20 million	38.88%	18.48%
2001	< \$1 million	16.62%	4.83%
	\$1 - \$1.5 million	23.93%	10.95%
	\$1.5 - \$2 million	24.54%	17.51%
	\$2 - \$3.5 million	24.35%	22.75%
	\$3.5 - \$5 million	24.62%	29.87%
	\$5 - \$10 million	23.36%	29.19%
	\$10 - \$20 million	26.53%	26.87%
	> \$20 million	43.06%	19.77%
2002	< \$1 million	17.92%	4.94%
	\$1 - \$1.5 million	23.02%	10.89%
	\$1.5 - \$2 million	30.24%	16.13%
	\$2 - \$3.5 million	27.88%	21.71%
	\$3.5 - \$5 million	23.18%	26.64%
	\$5 - \$10 million	26.28%	27.25%
	\$10 - \$20 million	26.85%	27.47%
	> \$20 million	50.09%	17.55%
2006	< \$1 million	26.00%	6.99%
	\$1 - \$1.5 million	21.95%	6.84%
	\$2 - \$3.5 million	23.32%	16.19%
	\$3.5 - \$5 million	25.28%	24.19%
	\$5 - \$10 million	26.19%	28.91%
	\$10 - \$20 million	25.40%	29.02%
	> \$20 million	56.31%	23.49%

Elimination of the estate tax removes these disincentives to wealth accumulation. This benefits everyone. Wealth is necessary for investment, which leads to growth. More growth means more wealth, more jobs, more technology, a greater variety of goods and services, and a higher quality of life. The argument of leveling the playing field does not hold because wealthy people have the resources to find ways around the estate tax by using instruments like life insurance trusts. Additionally, the revenue argument is meaningless as the estate tax has accounted for less than two percent of annual tax revenues since 1960 (with the exception of one year).

⁶⁰ Internal Revenue Service (1995- 2007)

Finally, the argument for charitable giving is muted by several data points. First, after the estate tax changes in 2001, which reduced the wealth subject to estate tax and top marginal tax rate, the portion of estates contributed to charities did not change significantly as demonstrated in Table 10. Second, throughout the modern history of the estate tax, the portion of the estate contributed to charities by the highest wealth group has been larger than other income groups. This has resulted in the highest wealth group paying a lower effective estate tax rate than many of the other wealth groups, as demonstrated in Table 11. If charitable giving were strictly to avoid estate taxes, one would expect to see donations at a rate that would make the effective estate tax rate the same as for other wealth groups. Finally, changes to the income tax would likely increase charitable giving during the lifetime of an individual, rather than postponing major charitable contributions until death.

There is another argument for removing the estate tax. It is simply the fact that all of this wealth has been taxed at least once already. With a few exceptions, most wealth is accumulated with income which individuals pay income tax on before the purchase of the initial asset. Those few exceptions, like 401(k) plans, pay income tax as they are paid out. Additionally, many assets are then subject to income tax on the earning, capital gains taxes⁶¹, corporate income taxes, sales taxes, and property taxes.

The potential impacts of these changes to the estate tax are significant. Quantifying just how significant these changes may be is an important next step. The next section develops a model to quantify the impact of some these changes.

The Model

The primary contribution and significant difference of this model compared to others is that it includes the impact of estate taxes on transfers of wealth. Another significant difference is the use of an individual utility function instead of a household utility function. This model will be used to quantify changes to the estate tax.

The model is based on an individual that will be maximizing his utility, not household utility. There are strong arguments for using a household utility function.

⁶¹ There are some assets that escape paying the capital gains tax because the estate is valued at the time of death. However, this "stepping-up" provision is removed after 2010.

However, the contention here is that all decisions are made by the individual. It could also be argued that a household utility is maximized by maximizing individual utility within the household, especially if you consider that there may be positive externalities to each individual having maximized their personal utility. Individuals may be influenced by their household (and others) but the decision is ultimately made by the individuals. Using the individual utility function also allows for outcomes that a household utility function would not, like a single individual with no children who has a life insurance policy. The richness of family decision-making can be built onto the individual, but it is difficult to break down a household to the individual level.

The economy is made up of individuals, a production sector, an insurance sector, and a government sector. Individuals are indexed by their age, $t \in T = \{1, 2, \dots, T\}$ and live a maximum of T periods. Survival each period is uncertain. The probability of surviving from age t to age $t + 1$ is denoted by $(1 - \phi_t) \in (0, 1)$ and is determined by the United States Life Tables (1998). Consumers have preferences defined over consumption, c , and after-tax bequests, x . Individuals can invest in two assets with the same level of risk, savings and life insurance. The savings asset is denoted by $a' \in A$ and offers a real rate of return r . The face value of life insurance is denoted by $f' \in F$ and has a premium p_t per \$1,000 of coverage⁶².

Firms operate under a constant returns to scale, Cobb-Douglas technology with capital and labor inputs to produce goods. The government does not make any transfers with the estate taxes collected. This section describes the main elements of the quantitative model.

Individuals

An individual's income depends on labor and interest. Individuals are endowed with a fixed amount of time each period and they supply this endowment to the labor market inelastically until retirement at age $t^* \leq T$. Individuals differ in their productivity due to age only. Labor productivity is defined as n_t for all individuals of age t . The age profile of average labor productivity is $\{n_t\}_{t=1}^T$. Thus, a worker's labor earnings in a given

period are wn_t where w is the market wage rate. An additional source of income is provided by interest earnings on savings, $(1+r)a$. Hence, income is defined as:

$$y(a, n_t, t; P) = \begin{cases} wn_t + (1+r_a)a & \text{if } t < t^* \\ (1+r_a)a & \text{if } t \geq t^* \end{cases}$$

where $P = \{p_t, r_a, r_f\}$ is the vector of prices.

The individual's current period budget constraint depends on the individual's savings, life insurance premiums and face value, labor income, and age. Individuals make decisions over consumption, savings, life insurance, and bequests. Individuals are assumed to be endowed with an initial level of wealth. The individual's optimization problem is straightforward. The value function for an individual is described by the state vector which depends on the entering savings, a , life insurance holdings, f , and age, t . The value function can then be expressed as:

$$\begin{aligned} V(a, f, t) = & \max_{(c, x, a', f') \in \Omega_t} [u(c, x) + \beta V(a', f', t+1)] \\ \text{s.t. } & y(a, n_t, t; P) \geq c + a' + p_t f' \\ & x = (1+r)a - [(1+r)a - \eta]\tau + 1000f \\ & x, c, f' \geq 0 \end{aligned}$$

where $p_t f'$ denotes the premiums or cost of life insurance holdings. The bequest, x , is determined by savings, life insurance holdings, and the estate tax. The estate tax is given by $[(1+r)a - \eta]\tau$ where τ is the estate tax rate and η is the estate tax exemption. Consumption and life insurance holdings cannot be negative. The same restriction is not placed on savings as divesting of savings in retirement is expected. Additionally, out of pocket life insurance premiums are scheduled to stop at retirement⁶³.

⁶² Life insurance is generally priced and sold in \$1,000 intervals.

⁶³ The premiums during the working years are sufficient for a cash build up within the policy that will pay the premiums from the cash value until death. This is a standard practice within the industry.

Consumption during retirement is funded solely through savings. This consumption is smoothed to be \$40,000 per year, which represents approximately 80 percent of the pre-retirement average income. This means that the minimum savings for any type of individual is the amount necessary to fund the post-retirement consumption. This restriction is necessary because the model does not include social security, which provides for consumption smoothing in other models.

The decision over savings and life insurance is made as a percentage of wage income. That is, individuals decide that there is a portion of their income they will not consume, ρ . The portion of income they do not consume is allocated between savings and insurance premiums.

$$\begin{aligned}c_t &= (1 - \rho)wn_t \\ \rho &= \rho_a + \rho_f \\ a' &= (1 + r_a)a + \rho_a wn_t \\ f' &= \frac{\rho_f wn_t}{p_t} \\ s.t. \quad f' &\geq f\end{aligned}$$

The restriction that the face value must be greater than or equal to the previous face value reflects the permanent nature of the whole life policy. This means that if an individual purchases a \$10 thousand policy at age 20, they will keep that policy and pay the premiums until retirement. They may purchase additional insurance at later periods but are restricted to maintain any previously purchased life insurance.

The Production Sector

In this economy, a representative firm produces goods in a competitive environment. These goods can be used for consumption or asset accumulation. The representative firm produces goods using a constant returns to scale Cobb-Douglas technology $F(K, N)$ where K and N represent the amounts of capital and labor employed in production. The aggregate resource constraint is given by:

$$F(K, N) = C + G + K' - (1 - \delta)K$$

where C , G , and K represent aggregate consumption, government spending, and capital stock, respectively. The parameter δ is the depreciation rate of capital.

The Insurance Sector

The insurance sector is assumed to be a financial intermediary. As such, it is a zero profit firm. The premiums that are collected pay loads, l , which are a percent of premiums. These loads cover administrative overhead and any transaction costs. The remaining value earns a return, r_f , which is sufficient to cover death benefit payouts⁶⁴.

The resulting constraint is:

$$\sum_t (1 + r_f) [p_t f_i (1 - l)] = \sum_t 1000 f_i$$

Since the returns on capital are determined by the production sector, it must be that the return on saving and the return on insurance to the insurance sector are the same.

Government

Because this model is focused on the estate tax, the government plays a very small role in this model. Since estate taxes represent approximately two percent of annual collections, it is easy to assume that these collections are complete consumed by the government and not transferred. Then the government runs a balanced budget such that:

$$G = \sum_t \phi_{i,t} [(1 + r_a) a_i - \eta] \tau$$

There is no income, welfare, or social security tax in this model. The absence of a social security tax means that individuals will be forced to save for their own retirement to smooth consumption.

⁶⁴ This assumption can be relaxed to enrich the model.

Calibrating the Model

In order to evaluate the model, parameters and functional forms must be determined. Most of the parameters are estimated using a Method of Moments approach. That is, the parameters are consistent with key attributes of the economy in 1998.

Demographics

An individual enters the labor force at age 20 (beginning of period 1) and lives until a maximum age of 100. Retirement is mandatory at age 65. Individuals survive to the next period with probability $(1 - \phi_t)$. These probabilities are from the National Center for Health Statistics, United States Life Tables, 1998.

Preferences

For life insurance decisions, a household utility function is often employed. While family circumstances do affect individual decisions, ultimately the individual makes choices and receives utility from those decisions. This model uses an individual utility function of the form:

$$u_t = \left(\frac{1 - \phi_t}{1 - \sigma} \right) c_t^{1-\sigma} + \left(\frac{\omega \phi_t}{1 - \gamma} \right) x_t^{1-\gamma}$$

This utility function is the combination of two constant elasticity of substitution (CES) utility functions with weights. This equation is similar to the equation used by Fischer (1973)⁶⁵. The first portion of the function comes from consumption, c . This is subject to the standard risk aversion (σ) and the probability of living through the period $(1 - \phi_t)$. The second portion of the function comes from the value of after-tax bequests, x . This is subject to risk aversion⁶⁶, represented as γ , and the probability of dying before the end of the period ϕ_t .

⁶⁵ Fischer (1973), *A Life Cycle Model of Life Insurance Purchases*.

⁶⁶ Although the equation is not written this way, the risk aversion could also change with age, as people tend to become more risk averse, as they grow older, especially with regards to their wealth and bequests.

It is a reasonable assumption that the risk aversion for consumption and bequests are not the same but the model is designed so this assumption is not forced to be true. Additionally, the second portion of the utility function is weighted by ω which captures the family influence on the importance of the bequest. The probability of dying increases with age. The weight given to the family for this model is $\omega \geq 0$. The weight could be a function of the number of children, age, marital status, number of dependents, age of dependents, etc.

Endowments

Each individual begins with an initial asset position. The distribution of initial assets is such that the individual starts with neither savings nor life insurance at age 20. Workers are assumed to have an inelastic labor supply, but the effective quality of their labor depends on age, to capture the “hump” in life-cycle earnings. Many models include idiosyncratic shocks to income, which have not been included in this model for simplicity. Including income shocks would add richness to the model.

Production

The representative firm in the production sector is a competitive, profit-maximizing firm. The aggregate production function is assumed to be Cobb-Douglas in form:

$$F(K, N) = AK^\alpha N^{(1-\alpha)}$$

There are no technology shocks in this model so A is a constant that is calibrated. The inelastic labor supply means that N is also a constant set equal to one.

Prices

The premiums and loads for life insurance are based on life insurance illustrations from Jefferson Pilot Financial⁶⁷. For the purposes of this model, life insurance may not be initiated after age 50 and premiums are paid until retirement.

⁶⁷ Jefferson Pilot Financial is now part of Lincoln Financial. Lincoln Financial is a major provider of life insurance in the U.S.

This is required so that the cash value will be large enough to maintain the policy until death without paying additional premiums out of pocket once an individual has retired. The loads are calculated as a percent of the annual premium paid through retirement.

Table 12: Calculated Insurance Premiums and Loads

Starting Age	Premium per \$1,000 Coverage	Loads
20	\$3.57	23%
30	\$5.38	25%
40	\$9.76	28%
50	\$21.12	26%

Estate Taxes

The estate tax will revert to a \$1 million exemption and 55 percent tax rate in 2011. This is the tax information that will be included in this model for estate taxes. There are also spousal deductions and charitable contribution deductions that can be used to significantly reduce the effective estate tax rate. For initial analysis, these deductions will not be included in the model.

Estimation

Some parameters have standard values that have been established through years of research⁶⁸. These parameters and their values are listed in Table 13⁶⁹. Once these parameters are employed, there are five remaining parameters to be determined.

Table 13: Exogenous Parameters

Parameters	Value
α	0.3
β	0.96
δ	0.06

⁶⁸ There is not an exact agreement on these values but a generally accepted range. In general, α is estimated to fall between 0.25 and 0.4; β is estimated to fall between 0.9 and 1.0; and δ is estimated to fall between 0.04 and 0.10. Chambers and Schlagenhauf (2002) use values of 0.33, 0.995, and 0.05 respectively. Chambers, Schlagenhauf, and Young (2003) use values of 0.36, 1.005, and 0.10 respectively. For comparison, Cooley and Prescott (1995) use values of 0.4, 0.947, and 0.048.

⁶⁹ The model is not sensitive to these parameters.

The first parameter to be calibrated is the technology parameter in the production function, which also affects wages. The next two are the elasticities for consumption and bequests. Finally, the proportion of individuals who value bequests, $\omega > 0$, versus those who only value consumption, $\omega = 0$. In addition, an appropriate value for $\omega > 0$ must be determined as well.

Table 14: Estimated Parameters

Parameters	Value
A	1500
σ	0.8
γ	0.72
Bequestors	7.53%
$\omega > 0$	2

Using these parameter estimates, the results from the model are compared to the data from the SCFD. These comparisons are included in Tables 15 and 16. Looking at age groups, the calibrated model matches the pattern of income well but the level of income is actually higher in the data than the model for all age groups. The amount of savings predicted by the model varies significantly from the data. However, the data includes multiple assets that are not part of this savings value. In contrast, the model treats all assets other than life insurance as savings. Additionally, the model forces savings for retirement because there is no social security. This causes the savings predicted by the model to be higher than actual savings in the SCFD. Despite the difference in savings, the bequest values from the model match the wealth data closely both in levels and pattern.

Comparing the model with the data based on wealth groups shows that the savings from the model does not match the data well. This again is because the data does not include other assets as savings and has a forced savings component to replace social security. However, the distribution of wealth created by the model matches the data very well with 92.47% of the population having wealth below \$1 million compared to 96 percent in the data.

Table 15: Model Calibration by Age Group

Statistic	Age Group	Target	Model
Savings	20 – 29	\$1,720	\$6,246
	30 – 39	\$7,352	\$33,357
	40 – 49	\$11,066	\$95,465
	50 – 59	\$18,682	\$221,470
	60 – 65	\$25,486	\$362,640
	Over 65	\$36,695	\$176,640
Face Value of Life Insurance	20 - 29	\$243,438	\$67,514
	30 - 39	\$160,116	\$99,489
	40 - 49	\$127,963	\$105,560
	50 - 59	\$74,215	\$101,970
	60 - 65	\$46,661	\$95,578
	Over 65	\$42,574	\$46,689
Number with Insurance	20 - 29	7.65%	7.53%
	30 - 39	15.65%	7.53%
	40 - 49	24.05%	7.53%
	50 - 59	28.13%	7.53%
	60 - 65	35.90%	7.53%
	Over 65	35.49%	7.53%
Income	20 - 29	\$29,277	\$27,738
	30 - 39	\$57,197	\$43,393
	40 - 49	\$57,100	\$49,751
	50 - 59	\$59,133	\$48,411
	60 - 65	\$54,795	\$42,750
	Over 65	\$53,209	\$40,000
Wealth	20 - 29	\$28,093	\$73,760
	30 - 39	\$104,730	\$132,850
	40 - 49	\$175,559	\$201,030
	50 - 59	\$294,516	\$323,440
	60 - 65	\$405,779	\$458,220
	Over 65	\$364,425	\$223,330

It is also interesting to compare the decisions of the two types of individuals, those who value bequests and those who do not. The following figure compares the decisions and results for the two types of individuals ($\omega = 0,2$). The most interesting aspect of the comparison is that the individual who values bequests has far more wealth but only slightly greater lifetime utility than the individual who only values consumption.

Table 16: Model Calibration by Wealth Group

Statistic	Wealth Group	Target	Model
Portion of Households	Under \$1 million	96.00%	92.47%
	Over \$1 million	4.00%	7.53%
Savings	Under \$1 million	\$13,232	\$138,860
	Over \$1 million	\$100,056	\$183,070

Figure 5: Optimal Decisions of Individuals Who Value Bequests versus Individuals Who Only Value Consumption

Another interesting result of this model is that the optimal choice of all individuals is to avoid paying any estate tax. This conflicts with reality where two to three percent of all estates pay the estate tax. This may reflect that, in reality, people do not plan sufficiently for the estate tax or that the optimal amounts of life insurance are not available in the market.

Quantifying the Impact of Changes to the Estate Tax

Now that the model is calibrated to approximate the individual decisions under the current tax regime, these results are used as a baseline for comparing various changes to the estate tax. It is now possible to quantify how specific changes to the estate tax would affect the decisions of individuals with regards to consumption, the accumulation of wealth, and the types of assets held. There are a number of changes to the estate tax that could be considered and that were discussed earlier in this chapter. Four of those changes are considered in this section. They include changing the total exemption, marginal tax rates, treatment of life insurance, and elimination of

the estate tax. Evaluating other changes to the estate tax would require a more complex model than the one developed here.

Change the Total Exemption

Theory suggests that the total exemption acts much like a price ceiling. For the estate tax, the implication is that people will accumulate wealth up to the tax exemption but not beyond. If the amount they would have accumulated in the absence of the estate tax is below the exemption, then the exemption limit and the estate tax has no effect. For those who would have accumulated wealth beyond the exemption, they will either not accumulate more wealth or will put their money in tax-exempt assets with a lower return. Decreasing the exemption would shift more assets from taxable assets to insurance while increasing the exemption would have the opposite effect.

Table 17: Comparison of Changes to the Exemption

Statistic	Age Group	Baseline	Increase to \$2 million	Decrease to \$250,000
Savings	20 - 29	\$6,246	\$8,651	\$5,717
	30 - 39	\$33,357	\$44,324	\$30,869
	40 - 49	\$95,465	\$120,200	\$89,615
	50 - 59	\$221,470	\$261,650	\$211,440
	60 - 65	\$362,640	\$409,160	\$350,420
	Over 65	\$176,640	\$198,590	\$168,760
Wealth	20 - 29	\$73,760	\$60,616	\$78,474
	30 - 39	\$132,850	\$120,900	\$138,080
	40 - 49	\$201,030	\$201,450	\$203,380
	50 - 59	\$323,440	\$340,140	\$321,330
	60 - 65	\$458,220	\$482,720	\$453,420
	Over 65	\$223,330	\$234,530	\$219,070

To test this theory, consider increasing the total exemption to \$2 million or decreasing the exemption to \$250 thousand. As expected, the exemption does act as a ceiling but this ceiling does not prevent further asset accumulation. Instead the ceiling created by the exemption causes people to shift their asset allocation between savings and life insurance to minimize their estate tax liability.

The optimal decision is to substitute from savings into life insurance once the exemption limit has been reached. This is because the return on savings below the exemption, $(1 + r)$, is greater than the return on life insurance, $(1 + r)(1 - l)$. However,

once the exemption is reached, the return on savings is decreased by the estate tax to $(1 + r)(1 - \tau)$ which is less than the return on life insurance so long as $\tau > l$.

Table 18: Percentage Comparisons of Changes to the Exemption

Statistic	Baseline	Increase to \$2 million	Decrease to \$250,000
Market Interest Rate	8.00%	7.09%	8.23%
Portion of Income to Savings			
$\omega = 0$	3.69%	5.05%	3.52%
$\omega = 2$	4.30%	6.70%	3.63%
Portion of Income to Insurance Premiums			
$\omega = 0$	0%	0%	0%
$\omega = 2$	11.60%	8.49%	12.65%

When the exemption is increased, those who care about bequests put more money into savings. This is because the return on savings that is not subject to the estate tax is greater than the return on life insurance because of the life insurance loads. The increase in savings by this type of individual drives down the market interest rate. In return, the individual who only values consumption must save more to offset the decrease in return, which drives the interest rate down further.

In contrast, when the exemption is decreased those who care about bequests put more money into insurance. Although the assets of the insurance company do go into the capital stock, loads and payouts of death benefits decrease the additions to the capital stock. Thus, the market interest rate increases because the supply of capital has decreased in relative terms. The savings of the non-bequestor decreases in response to the higher interest rate. Although the increase in the interest rate may be viewed as positive, it also reflects that there are fewer assets going into productive use.

The optimal decisions by both types of individuals follow the same pattern as the baseline figure. The only difference is the magnitude of the optimal choices and the degree of divergence between the two types of individuals. For the bequestor, the increased tax exemption greatly increases their savings over the baseline. This is also true for the non-bequestor. More importantly, the wealth of individuals, both bequestors and non-bequestors, is greater with the increased exemption.

Figure 6: Savings with Changes to the Exemption for Bequestors

Figure 7: Savings with Changes to the Exemption for Non-Bequestors

Figure 8: Wealth with Changes to the Exemption for Bequestors

Figure 9: Wealth with Changes to the Exemption for Non-Bequestors

Change the Top Marginal Tax Rate

A reduction in the marginal tax rate would also have a positive impact on wealth accumulation. A lower rate would reduce the penalty to wealth accumulation. This would encourage more accumulation of wealth and reduce the incentive to engage in tax avoidance activities, including the purchase of life insurance for its estate tax exemption.

Table 19: Comparison of Changes to the Tax Rate

Statistic	Age Group	Baseline	Decrease to 15%
Savings	20 - 29	\$6,246	\$6,113
	30 - 39	\$33,357	\$38,151
	40 - 49	\$95,465	\$134,090
	50 - 59	\$221,470	\$396,040
	60 - 65	\$362,640	\$767,720
	Over 65	\$176,640	\$1,648,400
Wealth	20 - 29	\$73,760	\$6,113
	30 - 39	\$132,850	\$38,151
	40 - 49	\$201,030	\$130,410
	50 - 59	\$323,440	\$365,400
	60 - 65	\$458,220	\$697,930
	Over 65	\$223,330	\$1,424,300

To test the impact of changing the marginal tax rate, the rate is increased to 75 percent or lowered to 15 percent. Increasing the rate to 75 percent has no impact in this model because the tax rate is greater than the loads on life insurance. This means the optimal decision is always to substitute from savings into life insurance once the exemption on savings has been reached. Therefore, increasing the estate tax to 75 percent does not change the outcome compared to the baseline.

$$(1+r)(1-\tau) < (1+r)(1-l) \quad \text{if } \tau > l$$

However, decreasing the estate tax rate below the loads on life insurance would make savings, even beyond the estate tax exemption, the preferred asset. Therefore, pre-tax wealth and pre-tax savings are the same in this scenario. This scenario demonstrates an optimal choice where individuals do pay some estate taxes. The amount of savings is approximately equal to the savings in the baseline for the first twenty to thirty years. After that, the savings continues to increase and outpace the

baseline because those who value bequests are substituting savings for life insurance because the net return to savings is higher.

Table 20: Percentage Comparisons of Changes to the Tax Rate

Statistic	Baseline	Decrease to 15%
Market Interest Rate	8.00%	11.24%
Portion of Income to Savings		
$\omega = 0$	3.69%	1.32%
$\omega = 2$	4.30%	36.21%
Portion of Income to Insurance Premiums		
$\omega = 0$	0%	0%
$\omega = 2$	11.60%	0%

When bequestors substitute out of life insurance they save an even greater percentage of their incomes compared to the baseline. This is because they are losing a portion of their savings to the estate tax. An interesting effect is that the interest rate increases to 11.24 percent, which allows the non-bequestors to decrease their savings percentage. This increase in the interest rate reflects an increase in the productivity of capital due to the significant increase in capital.

$$MP_K = \alpha AK^{\alpha-1}$$

$$r = \alpha A \left(\frac{K}{N} \right)^{\alpha-1}$$

Finally, the patterns of the optimal decisions are quite different from the baseline. The savings and estate values for bequestors show the slow accumulation of wealth through consistent saving. Additionally, the consumption by bequestors is significantly lower and the value function is below that of the non-bequestor until the last few years of life.

Figure 10: Optimal Decisions with 15 Percent Tax Rate

Change the Treatment of Life Insurance Proceeds

There are two obvious potential changes to the treatment of life insurance with regards to the estate tax. The first possibility is that any policy on the life of the deceased is considered part of the estate, regardless of ownership. The other possibility is that life insurance is not considered part of the estate, regardless of ownership. Neither of these changes would impact low wealth individuals.

Inclusion of life insurance in the estate regardless of ownership would remove the option for using life insurance to pay estate taxes. This would, in effect, completely remove the benefit of using life insurance for estate planning which would result in a transfer of assets from life insurance to other assets. This would also mean that more wealth would be subject to the estate tax. This again is a disincentive to accumulating wealth. Not including life insurance in the estate regardless of ownership would likely increase wealth accumulation.

Table 21: Comparison of Taxable Life Insurance

Statistic	Age Group	Baseline	Taxable Life Insurance
Savings	20 - 29	\$6,246	\$5,631
	30 - 39	\$33,357	\$34,391
	40 - 49	\$95,465	\$117,480
	50 - 59	\$221,470	\$335,630
	60 - 65	\$362,640	\$635,990
	Over 65	\$176,640	\$1,145,600
Wealth	20 - 29	\$73,760	\$5,631
	30 - 39	\$132,850	\$34,391
	40 - 49	\$201,030	\$112,130
	50 - 59	\$323,440	\$260,940
	60 - 65	\$458,220	\$457,990
	Over 65	\$223,330	\$602,750

The current design of this model limits the change in tax treatment of life insurance that can be tested. This model can only test the implications of making life insurance part of the taxable estate. Because life insurance would be subject to the same tax as savings, life insurance will no longer be purchased because the return is less than that of savings due to the insurance loads. Therefore, the results of this change are very similar to changing the tax rate to be below the insurance loads. However, in this case the tax rate is maintained at the 55 percent level.

Table 22: Percentage Comparisons of Taxable Life Insurance

Statistic	Baseline	Taxable Life Insurance
Market Interest Rate	8.00%	10.43%
Portion of Income to Savings		
$\omega = 0$	3.69%	1.52%
$\omega = 2$	4.30%	29.38%
Portion of Income to Insurance Premiums		
$\omega = 0$	0%	0%
$\omega = 2$	11.60%	0%

As expected, the results are similar to reducing the tax rate. However, the model predicts less savings and wealth than with the tax deduction. This is the expected result because bequestors will still accumulate assets but the value is diminished by the estate tax, so their optimal savings decreases to offset the tax losses.

Figure 11: Savings with Taxable Life Insurance for Bequestors

Figure 12: Savings with Taxable Life Insurance for Non-Bequestors

Figure 13: Wealth with Taxable Life Insurance for Bequestors

Figure 14: Wealth with Taxable Life Insurance for Non-Bequestors

The market interest rate again is higher than the base model but it is lower than the scenario with a 15 percent tax rate. The patterns of the optimal decisions are also similar to the 15 percent tax rate scenario. For the bequestor, the savings with taxable life insurance is significantly higher than the baseline because they transfer all of their assets to savings. Interestingly, wealth is also significantly higher than the baseline even though there is no longer life insurance to shelter the assets from the estate tax.

Eliminate the Estate Tax

The estate tax creates a significant incentive to reduce and/or destroy wealth before the government can redistribute it. The exemption amount creates an automatic target to accumulate wealth to and the effect of this price ceiling type effect has already been demonstrated. The special tax treatment of life insurance has been shown to change the assets holdings of individuals to minimize their estate tax liability. All of these perverse incentives lead to a lower level of wealth creation for individuals and the economy as a whole, both today and into the future.

Table 23: Comparison of Repeal of the Estate Tax

Statistic	Age Group	Baseline	Decrease to 0%
Savings	20 - 29	\$6,246	\$6,177
	30 - 39	\$33,357	\$39,387
	40 - 49	\$95,465	\$142,460
	50 - 59	\$221,470	\$435,030
	60 - 65	\$362,640	\$862,590
	Over 65	\$176,640	\$2,109,200
Wealth	20 - 29	\$73,760	\$6,177
	30 - 39	\$132,850	\$39,387
	40 - 49	\$201,030	\$142,460
	50 - 59	\$323,440	\$435,030
	60 - 65	\$458,220	\$862,590
	Over 65	\$223,330	\$2,109,200

Eliminating the estate tax is equivalent to reducing the tax rate to zero percent. As such, the results here are similar to reducing the estate tax below the insurance loads. Bequestors substitute out of insurance but in this case they are not losing any part of their savings to taxes. The savings and wealth start at similar levels to the baseline but grow to be significantly larger, with wealth at retirement almost double that of the baseline model.

In this scenario, the model again predicts a higher interest rate and greater investment by bequestors. As before, the non-bequestors are able to save less because of the higher return. The pattern of optimal decisions is also similar to decreasing the tax rate.

Table 24: Percentage Comparisons of Repeal of the Estate Tax

Statistic	Baseline	Decrease to 0%
Market Interest Rate	8.00%	11.67%
Portion of Income to Savings		
$\omega = 0$	3.69%	1.15%
$\omega = 2$	4.30%	39.09%
Portion of Income to Insurance Premiums		
$\omega = 0$	0%	0%
$\omega = 2$	11.60%	0%

The interesting thing to notice is that reducing or eliminating the estate tax is beneficial for bequestors. Bequestors have both higher savings and higher wealth with lower estate tax rates. However, the non-bequestors save significantly less with a lower estate tax because the rate of return is higher.

Figure 15: Savings with Changes to the Tax Rate for Bequestors

Figure 16: Savings with Changes to the Tax Rate for Non-Bequestors

Figure 17: Wealth with Changes to the Tax Rate for Bequestors

Figure 18: Wealth with Changes to the Tax Rate for Non-Bequestors

Overall Results

For those who value bequests, eliminating the estate tax leads to the greatest wealth accumulation. It also leads to the highest market interest rates which allows those who do not value bequests to consume more today and save less for retirement. Looking at lifetime utility, there is very little difference among any of these changes for the non-bequestors. This is because they are not directly affected by the estate tax because they only accumulate enough wealth to consume during retirement.

Figure 19: Wealth with Changes to the Estate Tax for Bequestors

Figure 20: Wealth with Changes to the Estate Tax for Non-Bequestors

The major differences are seen in the lifetime utility of the bequestors. These individuals have the highest lifetime utility when the estate tax is removed. Interestingly, their second highest lifetime utility comes from making life insurance taxable. This change causes them to move their assets out of life insurance and into savings exclusively.

This model has supported the theoretical results of many changes to the estate tax. It has also quantified the effects of these changes, which could provide a useful tool for tax policy analysis. However, the effects quantified here are only the beginning. The model does not capture the secondary and tertiary effects of such dramatic changes to wealth and productivity.

Figure 21: Lifetime Utility with Changes to the Estate Tax for Bequestors

Figure 22: Lifetime Utility with Changes to the Estate Tax for Non-Bequestors

Conclusion

This chapter has developed a basic general equilibrium model that captures the effects of estate tax on individual asset decisions. The model demonstrates that the estate tax has little effect on those who do not intend to make bequests. The primary impact of the estate tax is on those individuals who value bequests. For those who value bequests, repeal of the estate tax leads to the greatest increase in lifetime utility and wealth. Repeal of the estate tax also leads to higher interest rates, which allows non-bequestors to save less for their retirement needs.

CHAPTER 5

DOES LIFE INSURANCE PROMOTE ENTREPRENEURSHIP?

Entrepreneurs are often considered to be the drivers of economic growth. However, entrepreneurs face significant financial risks and the estate tax creates a significant disincentive to entrepreneurship. Life insurance, particularly whole life, provides a legal means of mitigating the effects of the estate tax on the wealth of entrepreneurs. In addition to reducing the threat of the estate tax, life insurance may also provide a low risk asset that enables individuals to engage in entrepreneurial activities.

Portfolio Theory

Harry Markowitz first identified the idea of portfolio theory in 1952⁷⁰. He showed how investors could reduce the risk of their stock holdings by choosing stocks that do not move together. He also showed that expected return and risk are the only pieces of information needed to make portfolio decisions. This idea was later enhanced with the development of the capital asset pricing model (CAPM) that shows risk and return are always positively correlated. To take on a high level of risk, an individual must be induced by a high expected return⁷¹. The expected returns to entrepreneurship are high, but this comes with a high level of risk.

Portfolio Theory Applied to the Individual

All individuals have different levels of risk tolerance or aversion. There are specific characteristics that predictably change an individual's risk tolerance. With age, people tend to become less risk tolerant. However, increases in wealth, which often come with age, tend to make people more tolerant of risk. The number of dependents is known to make people less tolerant of risk, in particular, when it comes to income. This suggests that people may balance their personal portfolio of risk.

⁷⁰ Markowitz (1952), *Portfolio Selection*.

⁷¹ Brealey, Myers, and Allen (2008), *Principles of Corporate Finance*.

A personal portfolio of risk is not just the financial portfolio of an individual. The financial portfolio makes up a large portion of the personal portfolio, but there are other components of an individual's life that contribute to the individual's personal portfolio. There are two significant decisions that an individual makes that affect the individual's personal risk portfolio. The first decision is about family while the second is about employment.

The decision to have a family adds risk to the personal portfolio. In most marriages, there is a certain level of financial dependency. That is not to say that either spouse could not be self-supporting, but that a spouse could not maintain the same standard of living without the other spouse. Adding fully dependent children to this scenario further increases this risk. This type of risk will be referred to as family support risk.

The employment or career decision of an individual contributes a different type of risk to the personal portfolio. When an individual takes a steady pay, corporate job with a defined career path, they have chosen very low risk employment. This is not to say that this type of job is perfectly secure as it is still subject to standard market risk. It is more the fact that there is little variability in pay and any changes are relatively predictable. This is in contrast to those who are self-employed entrepreneurs. The entrepreneur faces uncertain income with high variability and somewhat unpredictable patterns. Those who choose to be entrepreneurs have a high level of what will be referred to as employment risk.

Consider two individuals of the same age. If all other factors are equal, these individuals should have approximately the same risk tolerance. Now consider that one of the individuals is single while the other is married with two children. The individual who is married with children has a much higher family support risk than the single individual. Because the single individual has low family support risk, the single individual can select high-risk employment and maintain a relatively balanced personal portfolio. On the other hand, the individual who is married with children will choose low risk employment to balance their personal portfolio.

Figure 23: Risk Portfolio of Single Individual versus Married with Children

The Risks of Entrepreneurship

Employment risk takes on many forms. For the entrepreneur these risks include income variability, unpredictability of income and hours, potential business failure, and threats to other assets. The number of people that are dependent on the entrepreneur magnifies each of these risks.

Most businesses take several years to turn a profit. Many entrepreneurs must endure several periods of negative or zero returns from their business. Because of this, entrepreneurs must have other assets or means of support to finance personal consumption during these periods. Faig and Shum (2002) look at portfolio choices of individuals who have what they describe as “personal illiquid projects.” These projects are things like small businesses and real estate. They find that many of these projects must be partially self-financed and represent a large portion of household wealth. They suggest that entrepreneurs hold safe financial assets to provide liquidity for their personal projects⁷². They argue that entrepreneurs choose safer portfolios to ensure the continuation of their business. According to Heaton and Lucas (2000), entrepreneurs hold much safer portfolios than other investors do as a means of diversification for their business risk⁷³.

Entrepreneurs also face special risk with their labor. Besides the fact that their labor income is very risky, it is also nontradable. Entrepreneurs can take traditional

⁷² Faig and Shum (2002), *Portfolio Choice in the Presence of Personal Illiquid Projects*.

employment but that employment will not use their entrepreneurial skills and thus will not pay for those skills and ideas. This nontradable feature of entrepreneurial income enhances the demand for safer assets according to Viceira (2001)⁷⁴.

Entrepreneurs may also face significant financial constraints. Because of the high level of risk involved in entrepreneurial activities, outside capital or debt may be limited or unavailable and the price of such outside funding may be costly. Faig and Shum⁷⁵ suggest that a combination of legal constraints and information asymmetry are the reasons why entrepreneurs have limited access to borrowing. They find that entrepreneurs hold safer portfolios beyond diversification needs, indicating that liquidity needs are also important⁷⁶. According to Gentry and Hubbard (2000) the limited access to financing causes entrepreneurs to have higher rates of savings for self-financing and liquidity⁷⁷. Gentry and Hubbard also suggest that these financial constraints apply even to wealthy entrepreneurs.

How Life Insurance Mitigates the Risks of Entrepreneurship

Whole life insurance can be used to mitigate some of the risks of entrepreneurship. Whole life insurance is a negotiable asset. As such, it can be used to secure financing to support personal consumption or business expenses. Loans can also be taken against the cash value of a whole life policy. This option provides an entrepreneur liquidity and the ability to smooth consumption. Additionally, the estate tax generates a huge disincentive to asset accumulation for the entrepreneur. The Tax Foundation found that the 55 percent estate tax causes entrepreneurs to make decisions as if the income tax were doubled⁷⁸. As discussed in previous chapters, whole life insurance can be used to reduce the estate tax burden faced by entrepreneurs.

Entrepreneurs have high volatility of future income but also have higher expected future income. According to Zhu (2007), an individual's expected future income is a

⁷³ Heaton and Lucas (2000), *Portfolio Choice and Asset Prices: The Importance of Entrepreneurial Risk*.

⁷⁴ Viceira (2001), *Optimal Portfolio Choice for Long-Horizon Investors with Nontradable Labor Income*.

⁷⁵ Faig and Shum (2002).

⁷⁶ Faig and Shum (2002).

⁷⁷ Gentry and Hubbard (2000), *Entrepreneurship and Household Saving*.

⁷⁸ Chamberlain, Prante, and Fleenor (2006).

primary determinant of life insurance purchases⁷⁹. Lin and Grace (2007) conclude that the more volatile a household's living standard, the more life insurance they will hold⁸⁰. Lin and Grace use the Survey of Consumer Finance (SCF) to determine that higher potential volatility in living standards implies the purchase of more life insurance to reduce financial vulnerability.

Applying the ideas of portfolio theory, entrepreneurs have a large level of risk in their employment and so will minimize risk elsewhere. Heaton and Lucas find that both wage and proprietary income are important determinants of expected returns. They find that business value reduces risk tolerance while those with greater wealth have a higher risk tolerance. They conclude that the risk of entrepreneurial income drives households to hold less risky assets than similarly wealthy households⁸¹. Huang, Milevsky, and Wang (2008) find that income volatility determines the optimal mix between risky and risk-free assets. They determine that when wages are highly correlated with returns on risky assets, the allocation of investments in risky financial assets is reduced to counteract risky wages⁸².

The nontradable nature of entrepreneurial labor suggested by Viceira is another risk factor for entrepreneurs. This risk is related to the underemployment of human capital. Those with high levels of human capital are less vulnerable to financial portfolio risk. Huang, Milevsky, and Wang suggest that life insurance hedges human capital and that households with higher education have a better understanding of the need for life insurance and therefore hold more life insurance⁸³.

Empirical Analysis

Both Faig and Shum (2002) and Heaton and Lucas (2000) use data from the Survey of Consumer Finance (SCF) to analyze the relationship between entrepreneurship and asset holdings. Both include controls for wealth and use business value as their measure of entrepreneurship. Faig and Shum also include a control for

⁷⁹ Zhu (2007), *One-Period Model of Individual Consumption, Life Insurance, and Investment Decisions*.

⁸⁰ Lin and Grace (2007), *Household Life Cycle Protection: Life Insurance Holdings, Financial Vulnerability, and Portfolio Implications*.

⁸¹ Heaton and Lucas (2000).

⁸² Huang, Milevsky, and Wang (2008), *Portfolio Choice and Life Insurance: The CRRA Case*.

⁸³ Huang, Milevsky, and Wang (2008).

human capital and suggest that housing value may be an important component in the personal portfolio of risk. Heaton and Lucas also make the distinction between liquid, financial, and total wealth.

Figure 24: Individual Risk Portfolio of an Entrepreneur

However, a greater level of wealth is not necessarily associated with entrepreneurship. In fact, often entrepreneurs develop from those who have nothing left to lose. There may be many factors beyond the scope of economics that influence someone to be an entrepreneur. Applying portfolio theory suggests that entrepreneurial activity may be a function of family support risk, life insurance, and other low-risk assets. Using the same data set described in Chapter 3 there is information on business assets, value of wealth in different asset types, cash value and face value of whole life insurance, marital status, and number of dependents. The general form of the model is:

$$Entrepreneurship = f(\text{Family Support Risk}, \text{Asset Risk})$$

The idea here is that an increase in family support risk or asset risk will decrease entrepreneurial activity. With the given data set, there are two variables that can proxy for entrepreneurship. There is data on both business income and business assets. Family support risk will be represented by the number of dependents and marital status while low-risk assets will be represented by whole life insurance and other low risk assets. The specific form of the model is:

$$\text{Business Income} = \beta_0 + \beta_1 \text{Married} + \beta_2 \text{Kids} + \beta_3 \text{Life Insurance} + \beta_4 \text{Other Low Risk Assets}$$

If this theory is correct, life insurance and other low-risk assets decrease both the family support risk and asset risk so positive coefficient estimates are expected on both of these. It is important to separate life insurance from other low risk assets for two reason. One reason is that Fortune (1973) found a negative relationship between wealth and life insurance holdings due to decreased risk aversion with increased wealth and concluded that life insurance is a substitute for other low risk assets⁸⁴. The second reason is that this separation allows for testing specifically whether life insurance enables or supports entrepreneurship independently of other low-risk assets.

It has been suggested that the ratio of other low risk assets to wealth is more important than just the presence of other low risk assets⁸⁵. To capture this effect, two ratios are calculated and included in the regressions. The first ratio compares other low risk assets to total wealth while the second ratio compares other low risk assets to wealth not including the primary home value. The difference in these ratios is whether home value is included. The nature of home ownership and mortgage is debated in the literature. Faig and Shum consider a home to be an illiquid project, like entrepreneurship, that requires liquidity and increases risk. Others suggest that home ownership provides a relatively stable and tradable asset that reduces risk.

Life insurance is limited to only those policies that are individually purchased whole life policies. To be used as an asset, a life insurance policy must be whole life and usually must be individually owned. In addition, to be included as owning a whole life policy, the policy must have a face value over \$10 thousand. This restriction removes funeral policies as described in Chapter 3.

The specification of this model implies that entrepreneurship depends on owning life insurance. It may actually be the case that owning life insurance depends on being an entrepreneur. That is, an individual who has decided to become an entrepreneur then decides to purchase life insurance to balance risks. Without observing these

⁸⁴ Fortune (1973), *A Theory of Optimal Life Insurance: Development and Tests*.

⁸⁵ Faig and Shum (2002) are among those who use values relative to net worth while Gentry and Hubbard (2000) are among those who do not use relative values.

decisions over time, it is impossible to determine the direction of causality. Regardless of the direction of causality, life insurance can still be thought of as supporting entrepreneurship if the relationship is statistically significant.

Hypothesis and Expected Results

If life insurance is enabling entrepreneurship then several things should be observed in the data. Family support risk is captured by the presence of a spouse or children. The low risk assets that are expected to counter the high employment risk of the entrepreneur are measured by life insurance and other low risk assets. The other low risk assets include government bonds, certificates of deposit, savings accounts, and money market funds. Age and total wealth are included as controls for overall risk tolerance.

Family support risk increases with the number of dependents. This means that the number of children is expected to decrease entrepreneurship. The presence of a spouse may increase or decrease entrepreneurship. If the spouse is working, the spouse's income reduces the family support risk by providing another source of income, thus having a positive effect on entrepreneurship. If the spouse is not working and dependent on the other spouse's income, this will have a negative effect on entrepreneurship.

Low risk assets of all types are expected to have a positive effect on entrepreneurship. The ownership of whole life insurance should have a positive effect on entrepreneurship. It is not clear whether the face value of life insurance is important versus the simple possession of life insurance. If life insurance is being used as collateral to ease borrowing constraints, then the face value should be positive and significant. If life insurance is simply acting as a hedge against risk, then the simple ownership of whole life insurance should be positive and significant. Other low risk assets should also have a positive effect on entrepreneurship. The ratio of other low risk assets to wealth should also have a positive effect because a larger ratio represents more wealth in low risk assets.

Age and wealth are included as controls because they have predictable effects on risk tolerance. As an individual ages, they tend to become more risk averse. This means that older individuals are less likely to be entrepreneurs. In contrast, wealthy

individuals tend to be less risk averse, holding other things constant. Their accumulated wealth makes it easier for them to take risks and so wealth should have a positive effect on entrepreneurship.

As with earlier analysis, it may be important to separate high and low wealth individuals. When the sample is split this way, there should be differences between high and low wealth individuals. For low wealth individuals, the results should be the same as the full sample. For high wealth individuals, their significant wealth accumulation means they face far less risk by becoming an entrepreneur. This means that marriage, children, and other low risk assets should have no effect on entrepreneurship for high wealth individuals. Life insurance may still have a positive effect on entrepreneurship if it provides protection of assets or reduces borrowing constraints. Age is still expected to have a negative effect on entrepreneurship for high wealth individuals.

Business Income Regression Results

There are three measures of entrepreneurship that will be considered. Two of the measures are business income and business assets. Both of these measures are limited dependent variables because large portions of the survey respondents do not own a business and so report values of zero. This is not censored data because all of the observed data is valid and not artificially truncated. This situation is referred to as a corner solution and a Tobit model is usually employed because standard OLS will provide biased coefficient estimates⁸⁶. However, the Tobit model does not allow for population weights⁸⁷.

A similar regression technique is an interval regression approach where the interval is equivalent to left censoring at zero. Interval regression is a generalization of the Tobit model that will allow the use of population weights. This interval regression method will be referred to as a weighted Tobit model⁸⁸ and is the initial technique employed for this analysis.

⁸⁶ Wooldridge (2006). *Introductory Econometrics*.

⁸⁷ Stata 9 does not allow population weights to be employed with the Tobit model.

Table 25: Weighted Tobit Results of Business Income and Face Value

Dependent Variable: Business Income	Full Sample			Wealth Below \$1 million			Wealth Over \$1 million		
Face Value of Whole Life Insurance	0.0262	0.0261	0.0260	0.0196	0.0192	0.0191	0.0218	0.0220	0.0219
	(0.118)	(0.120)	(0.121)	(0.413)	(0.419)	(0.423)	(0.269)	(0.262)	(0.266)
Number of Children	2.4991	2.4196	2.4094	2.3892	2.3838	2.3734	9.8608	9.7265	9.8615
	(0.269)	(0.283)	(0.286)	(0.267)	(0.266)	(0.269)	(0.243)	(0.247)	(0.242)
Married	12.3613	11.8567	11.8453	11.1917	10.7015	10.7124	-21.1535	-21.5829	-21.6884
	(0.033)	(0.040)	(0.040)	(0.045)	(0.055)	(0.055)	(0.342)	(0.335)	(0.327)
Age	-0.2773	-0.2523	-0.2606	-0.3883	-0.3900	-0.3981	-1.6913	-1.6173	-1.6418
	(0.053)	(0.089)	(0.080)	(0.009)	(0.010)	(0.009)	(0.024)	(0.026)	(0.023)
Wealth	0.01334	0.0140	0.0140	0.0479	0.0463	0.0462	0.0053	0.0050	0.0051
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.222)	(0.242)	(0.235)
Low-Risk Assets	0.0425			-0.0067			-0.0043		
	(0.319)			(0.929)			(0.934)		
Low-Risk Assets / Total Wealth		-2.6975			-2.5766			-83.4172	
		(0.295)			(0.289)			(0.459)	
Low-Risk Assets / Total Wealth not Including Home			-0.3377			-0.4353			-39.1640
			(0.589)			(0.454)			(0.661)
Constant	-78.4215	-77.8249	-77.5227	-69.1205	-67.7184	-67.4442	23.9758	23.7754	23.7131
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.561)	(0.559)	(0.562)
χ^2	46.97	38.96	38.61	35.97	34.22	33.90	13.44	13.28	13.39
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0366	0.0387	0.0372
Uncensored Observations	474	474	474	372	372	372	102	102	102
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population. Interval is generated by left censoring of data at zero.									

The first set of results uses business income as the measure of entrepreneurship. Using business income as the dependent variable in weighted Tobit reveals that there are 474 respondents who have business income. In the full sample, the controls of wealth and age are significant and have the expected sign. Married is

⁸⁸ The Stata 9 procedure used to estimate the model is intreg with population weights.

found to be positive and significant while the number of children is not significant. This suggests that the presence of a spouse reduces risk by providing an additional source of income that enables entrepreneurship.

Table 26: Weighted Tobit Results of Business Income and Owning a Whole Life Policy

Dependent Variable: Business Income	Full Sample			Wealth Below \$1 million			Wealth Over \$1 million		
Owens Whole Life Insurance	9.5061	9.0467	8.9842	4.9179	4.6538	4.6114	16.4855	16.6461	16.4888
	(0.089)	(0.104)	(0.107)	(0.407)	(0.432)	(0.437)	(0.305)	(0.300)	(0.304)
Number of Children	2.6820	2.5944	2.5829	2.4665	2.4589	2.4477	10.6138	10.4920	10.6177
	(0.238)	(0.252)	(0.254)	(0.252)	(0.252)	(0.255)	(0.209)	(0.211)	(0.207)
Married	11.6529	11.2200	11.2189	10.9674	10.5044	10.5205	-23.6955	-24.1920	-24.2287
	(0.044)	(0.052)	(0.052)	(0.050)	(0.059)	(0.059)	(0.287)	(0.279)	(0.273)
Age	-0.3062	-0.2786	-0.2868	-0.4065	-0.4081	-0.4161	-1.7366	-1.6587	-1.6846
	(0.033)	(0.063)	(0.056)	(0.006)	(0.007)	(0.007)	(0.022)	(0.025)	(0.021)
Wealth	0.0139	0.0146	0.0146	0.0486	0.0470	0.0469	0.0059	0.0056	0.0057
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.165)	(0.176)	(0.170)
Low-Risk Assets	0.0449			-0.0071			-0.0015		
	(0.296)			(0.925)			(0.978)		
Low-Risk Assets / Total Wealth		-2.6916			-2.5721			-82.5662	
		(0.296)			(0.291)			(0.471)	
Low-Risk Assets / Total Wealth not Including Home			-0.3541			-0.4443			-37.6649
			(0.572)			(0.445)			(0.679)
Constant	-78.0221	-77.5041	-77.2050	-68.7788	-67.3727	-67.1011	23.0271	22.7108	22.6699
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.579)	(0.578)	(0.581)
χ^2	49.84	39.57	39.14	38.14	35.90	35.49	13.47	13.22	13.42
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0361	0.0397	0.0369
Uncensored Observations	474	474	474	372	372	372	102	102	102
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population. Interval is generated by left censoring of data at zero.									

For the full sample, owning a whole life insurance policy is positive and statistically significant when other low risk assets are included without being a ratio.

When other low risk assets are included as a ratio, owning a whole life policy is still positive but is not statistically significant at the 10 percent level. If the tolerance increased to a 15 percent level, owning whole life and the face value of life insurance are both positive and statistically significant, regardless of how the other low risk assets are included. The positive, and marginally significant, effect of life insurance suggests that life insurance supports entrepreneurship.

The results for the low wealth group are very similar to the full sample results. Married and wealth are found to be positive and significant. However, wealth has a larger effect in the low wealth group than the full sample. Similarly, the effect of age is also negative and larger in the low wealth group compared to the full sample. In the high wealth group, age is the only significant variable. The effect of age on entrepreneurship in the high wealth group is significantly larger than the low wealth group and full sample.

For the high wealth group, the only significant variable is age, which is still negative as predicted. The prediction that marriage, number of children, and other low risk assets would be non-significant for the high wealth group is supported. Life insurance is also not significant for high wealth individuals. This indicates that life insurance is not protecting assets or reducing borrowing constraints for high wealth individuals according to the Interval OLS estimation.

Robustness of Results

As a robustness check, the standard procedure of unweighted Tobit analysis is employed because the data has a corner solution as well as OLS. There should be few differences between the weighted and unweighted Tobit results. All of the differences should be a result of the population weighting. The OLS results may be very different from the weighted Tobit because OLS is expected to produce biased estimates with data of this type.

The unweighted Tobit results show some significant difference from the weighted results. For the full sample, wealth and marriage still have a positive and significant effect. However, age is no longer statistically significant although the estimate is still negative. Finally, the major difference is that owning life insurance and the number of children are both estimated by the unweighted Tobit to be positive and statistically

significant. The positive coefficient estimate on children is unexpected. This result may indicate that those with children may be more inclined to start a business so they may pass it to their children. The coefficient estimates of owning life insurance are also much larger in magnitude compared to the weighted Tobit estimates.

Table 27: Unweighted Tobit Results of Business Income and Owning a Whole Life Policy

Dependent Variable: Business Income	Full Sample			Wealth Below \$1 million	Wealth Over \$1 million
Owens Whole Life Insurance	17.6345	17.3009	17.2448	7.3921	41.0032
	(0.001)	(0.001)	(0.001)	(0.088)	(0.039)
Number of Children	3.7438	3.7360	3.7221	2.5231	4.8893
	(0.088)	(0.089)	(0.091)	(0.129)	(0.651)
Married	17.8248	17.1999	17.2011	11.5543	-13.6417
	(0.004)	(0.006)	(0.006)	(0.014)	(0.678)
Age	-.02176	-0.1899	-0.1980	-0.3660	-2.1160
	(0.250)	(0.310)	(0.290)	(0.019)	(0.042)
Wealth	0.0147	0.0152	0.0152	0.0415	0.0087
	(0.000)	(0.000)	(0.000)	(0.000)	(0.024)
Low-Risk Assets	0.0358			-0.0412	0.0156
	(0.302)			(0.488)	(0.810)
Low-Risk Assets / Total Wealth		-3.0632			
		(0.440)			
Low-Risk Assets / Total Wealth not Including Home			0.0659		
			(0.977)		
Constant	-129.7998	-129.4833	-129.1658	-86.8265	-21.7019
	(0.000)	(0.000)	(0.000)	(0.000)	(0.760)
χ^2	118.99	115.61	114.74	56.49	17.89
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0065
Pseudo- R^2	0.0168	0.0163	0.0162	0.0105	0.0117
Uncensored Observations	452	452	452	353	99
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The Tobit estimations are left censored and not weighted to be representative of the population.					

The positive coefficient estimate on owning life insurance is strongly significant in the unweighted Tobit model (p-value of 0.001) and weakly significant in the weighted Tobit model (p-value of 0.089 to 0.121). The significance of the unweighted Tobit results for life insurance lessens the weakness of the weighted Tobit results. When the sample is split by wealth, owning whole life insurance remains positive and statistically

significant for both high and low wealth individuals in the unweighted Tobit estimation. These mixed results suggest that further analysis is appropriate.

Another way to check these results is to simply employ standard OLS with population weights. Standard OLS will include the many zero observations, which will result in OLS providing biased coefficient estimates and suffering from heteroskedasticity⁸⁹. Robust standard errors are employed to correct for the heteroskedasticity problem.

The population weighted standard OLS results fall in between the weighted and unweighted Tobit results. Like the weighted Tobit results, OLS finds marriage and wealth to have positive and significant effects, while age has a negative and significant effect in the full sample. However, OLS also finds number of children and owning life insurance to have positive and statistically significant effect for the full sample, like the unweighted Tobit results.

When the sample is split by wealth, the OLS results much more closely match the weighted Tobit results. For the low wealth group, OLS and weighted Tobit both find married, age, and wealth to be statistically significant and have the same signs. However, the coefficient estimates are significantly different. For the high wealth group, OLS and weighted Tobit both find age to have negative and statistically significant effects. Additionally, OLS finds owning life insurance to be positive and statistically significant, while the weighted Tobit does not. Again, the coefficient estimates from OLS are significantly different in magnitude from the weighted and unweighted Tobit results. More results are presented in Appendix C.

All of these results put together suggest that life insurance does have a positive impact on entrepreneurship. In particular, owning whole life insurance appears to be more important than the face value of life insurance held. Additionally, life insurance may be more important for high wealth individuals when entrepreneurship is measured as business income. Again, it should be noted that it could be that individuals purchase life insurance because they are entrepreneurs, rather than life insurance enables individuals to become entrepreneurs.

⁸⁹ Wooldridge (2006).

Table 28: OLS Results of Business Income and Owning a Whole Life Policy

Dependent Variable: Business Income	Full Sample			Wealth Below \$1 million			Wealth Over \$1 million		
Owens Whole Life Insurance	1.3918	1.3690	1.3696	0.7965	0.8060	0.8063	5.4052	5.5776	5.5377
	(0.074)	(0.079)	(0.079)	(0.343)	(0.336)	(0.336)	(0.071)	(0.063)	(0.065)
Number of Children	0.3940	0.3997	0.4018	0.3186	0.3316	0.3340	3.2120	3.1997	3.2119
	(0.072)	(0.072)	(0.072)	(0.139)	(0.127)	(0.126)	(0.186)	(0.186)	(0.185)
Married	0.8782	0.8716	0.8771	0.9227	0.9122	0.9177	-1.4042	-1.4889	-1.4821
	(0.067)	(0.074)	(0.074)	(0.052)	(0.059)	(0.059)	(0.638)	(0.621)	(0.622)
Age	-0.0238	-0.0238	-0.0251	-0.0222	-0.0243	-0.0256	-0.2716	-0.2557	-0.2573
	(0.008)	(0.019)	(0.014)	(0.001)	(0.001)	(0.001)	(0.016)	(0.023)	(0.023)
Wealth	0.0037	0.0037	0.0037	0.0061	0.0055	0.0055	0.0031	0.0031	0.0031
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.140)	(0.141)	(0.141)
Low-Risk Assets	-0.0006			-0.0079			0.0058		
	(0.931)			(0.279)			(0.619)		
Low-Risk Assets / Total Wealth		-0.4747			-0.4815			-9.3012	
		(0.403)			(0.398)			(0.519)	
Low-Risk Assets / Total Wealth not Including Home			-0.0531			-0.0565			-4.8741
			(0.461)			(0.436)			(0.658)
Constant	1.5215	1.5726	1.6025	1.3160	1.4448	1.4762	17.0706	16.9498	16.8927
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.040)	(0.044)	(0.044)
F-Statistic	5.93	5.27	5.23	6.28	6.02	6.00	2.69	2.64	2.63
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0143	0.0159	0.0164
R^2	0.0328	0.0332	0.0325	0.0196	0.0198	0.0188	0.0501	0.0501	0.0499
N	3,780	3,745	3,739	3,363	3,328	3,322	417	417	417
P-values reported in parentheses are based on robust standard errors. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.									

Business Asset Regression Results

Another way to measure entrepreneurship is to look at business assets. Business assets may not be as good a measure of entrepreneurship as business income because the personal and business assets of an entrepreneur are often intertwined. Despite this fact, business assets are often used to measure entrepreneurial activity. The predicted effects of the independent variables are the

same as when measuring entrepreneurship as business income. As before, weighted Tobit with population weights is employed.

Table 29: Weighted Tobit Results of Business Assets and Life Insurance

Dependent Variable: Business Assets	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Face Value	Owns Policy Over \$10,000	Face Value	Owns Policy Over \$10,000	Face Value	Owns Policy Over \$10,000
Life Insurance	0.1408	37.4015	0.0280	4.1752	0.2674	183.6748
	(0.150)	(0.364)	(0.598)	(0.789)	(0.137)	(0.406)
Number of Children	4.2079	5.0717	2.4987	2.5818	56.4516	63.5783
	(0.799)	(0.759)	(0.666)	(0.656)	(0.567)	(0.505)
Married	38.6246	37.1782	9.4957	9.5467	-81.6840	095.3592
	(0.378)	(0.399)	(0.536)	(0.533)	(0.787)	(0.762)
Age	-4.4365	-4.5677	-1.7709	-1.7938	-29.9558	-30.5604
	(0.001)	(0.001)	(0.000)	(0.000)	(0.006)	(0.003)
Wealth	0.3286	0.3321	0.2133	0.2151	0.3000	0.3061
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Low-Risk Assets	-0.6765	-0.6625	-0.2157	-0.2198	-1.0648	-1.0486
	(0.142)	(0.149)	(0.319)	(0.312)	(0.106)	(0.106)
Constant	-467.2782	-464.4162	-140.3956	-139.7305	872.7213	863.8651
	(0.000)	(0.000)	(0.000)	(0.000)	(0.109)	(0.109)
χ^2	52.38	42.66	44.49	44.55	32.71	24.66
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004
Uncensored Observations	447	447	309	309	138	138
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population. Interval is generated by left censoring of data at zero.						

The results using business assets as the measure of entrepreneurship are similar to the results found when using business income as the measure of entrepreneurship. Wealth and age are the only variables that are statistically significant for the full sample and the sub-samples by wealth. The unweighted Tobit and OLS (presented in Appendix C) find other low risk assets to be negative and statistically significant suggesting that other low-risk assets are a substitute for business assets. However, life insurance is not found to be statistically significant when business assets are used as the measure of entrepreneurship.

Probability Regression Results

Rather than using business income or assets as a measure of entrepreneurial activity, it may be a better approach to look at the probability of being an entrepreneur. To do this analysis, a binary variable is created that identifies an individual as an entrepreneur if they have any sort of business income (positive or negative), and zero otherwise. In this case, a Probit model is employed which is unaffected by the large number of zero observations. The expected results of the probability analysis are the same as the expected results using business income or assets.

Table 30: Probit Marginal Effects for Entrepreneurship and Life Insurance

Dependent Variable: Entrepreneur	Face Value of Life Insurance			Owns a Whole Life Insurance Policy Over \$10,000		
Life Insurance	0.00003	0.00003	0.00003	0.0204	0.0193	0.0191
	(0.493)	(0.504)	(0.508)	(0.231)	(0.262)	(0.268)
Number of Children	0.0062	0.0061	0.0060	0.0064	0.0063	0.0063
	(0.375)	(0.394)	(0.397)	(0.356)	(0.376)	(0.379)
Married	0.0309	0.0300	0.0300	0.0288	0.0280	0.0281
	(0.064)	(0.077)	(0.077)	(0.083)	(0.097)	(0.097)
Age	-0.0008	-0.0008	-0.0008	-0.0009	-0.0008	-0.0008
	(0.067)	(0.101)	(0.095)	(0.052)	(0.085)	(0.079)
Wealth	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Low-Risk Assets	0.0001			0.0001		
	(0.301)			(0.298)		
Low-Risk Assets / Total Wealth		-0.0055			-0.0055	
		(0.338)			(0.338)	
Low-Risk Assets / Wealth (no housing)			-0.0006			-0.0006
			(0.702)			(0.690)
χ^2	43.35	35.01	33.99	48.64	37.03	36.00
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo- R^2	0.0234	0.0222	0.0217	0.0243	0.0229	0.0224
N	3,780	3,745	3,739	3,780	3,745	3,739
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.						

The population weighted Probit results are very similar to the weighted Tobit results when business income is used as the measure of entrepreneurship. Marriage and wealth have positive and statistically significant effects while age has a negative and significant effect. However, life insurance and other low-risk assets are not found to be statistically significant.

The differences between the Probit and weighted Tobit results concerning life insurance may suggest a direction of causality. Since life insurance is found to be significant in the weighted Tobit but not significant in the Probit suggests that owning life insurance depends on being an entrepreneur. This is in contrast to the suggested causal link that being an entrepreneur depends on owning life insurance. This does not negate the idea that life insurance enables entrepreneurial activity. It only suggests that life insurance does not cause entrepreneurship. Additionally, these differences in results suggest that a selection model may be an appropriate estimation technique.

Selection Model Estimation

As described earlier in this chapter, the data on business income is left censored with multiple observations of zero business income for those who do not choose to be entrepreneurs. This problem is also referred to as incidental truncation, which can be addressed with a selection model. The selection model estimates the probability of being an entrepreneur in conjunction with estimation of the quantitative model of business income.

A major criticism of selection modeling is that it is subject to omitted variables bias. To reduce this problem, the initial selection model uses the full set of independent variables for both the selection and regression equations. This specification provides the most imprecise estimates from the Heckit model⁹⁰. Education has also been included as an explanatory variable in this analysis. The literature provides mixed results on the relationship between entrepreneurship and education but it is reasonable to think that education may affect business income even if it does not influence the decision to become an entrepreneur.

⁹⁰ Wooldridge (2002). *Econometric Analysis of Cross Section and Panel Data*.

Table 31: Heckit Results with Owns a Whole Life Policy

Dependent Variable: Business Income	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Regression	Selection	Regression	Selection	Regression	Selection
Owns Whole Life Insurance	9.9649	0.1451	8.1307	0.0647	19.0599	0.1080
	(0.110)	(0.149)	(0.160)	(0.588)	(0.169)	(0.588)
Number of Children	4.1618	0.0461	0.9766	0.0462	12.6453	0.0879
	(0.098)	(0.256)	(0.475)	(0.324)	(0.104)	(0.471)
Married	14.4926	0.2734	5.8483	0.2566	-1.1816	-0.3975
	(0.027)	(0.007)	(0.291)	(0.027)	(0.931)	(0.228)
Age	-0.2542	-0.0043	-0.1158	-0.0070	-0.3435	-0.0207
	(0.105)	(0.093)	(0.492)	(0.052)	(0.430)	(0.076)
Wealth	0.0138	0.0002	0.0368	0.0008	0.0085	0.00002
	(0.000)	(0.000)	(0.001)	(0.003)	(0.092)	(0.558)
Low-Risk Assets	0.0179	-0.00004	-0.1130	-0.0007	0.0500	-0.0006
	(0.704)	(0.962)	(0.046)	(0.678)	(0.464)	(0.379)
Education	2.9093	0.0546	-2.6223	0.0324	5.7885	0.0497
	(0.073)	(0.034)	(0.023)	(0.338)	(0.118)	(0.464)
Constant	-105.8816	-1.6498	31.2381	-1.4941	1.4761	0.4053
	(0.000)	(0.000)	(0.002)	(0.000)	(0.968)	(0.655)
Model χ^2	56.95		40.42		18.75	
Prob > Model χ^2	0.0000		0.0000		0.0090	
Wald Test χ^2	290.86		8.39		4.68	
Prob > Wald χ^2	0.0000		0.0038		0.0305	
Uncensored Observations	468		369		99	
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.						

The results of the Heckit are consistent with the other models. The Wald test for independent equations strongly suggests that the use of the full variable specification is a valid selection model. Married, age, and wealth are all statistically significant. Wealth is positive and significant in both the selection and regression models for all groups except the high wealth group where wealth is only significant in the regression model. Age is negative and statistically significant for all subsamples but only in the selection model. The age effect is largest for the high wealth group but all of the coefficient estimates from the Heckit are smaller in magnitude compared to other models. The estimates on education are mixed. Education has positive effects in the full sample, negative effects in the low wealth group, and no significant effects in the high wealth

group. This variety of results may explain the inconsistent results on education in the literature.

Table 32: Heckit Results with Face Value

Dependent Variable: Business Income	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Regression	Selection	Regression	Selection	Regression	Selection
Face Value of Whole Life Insurance	0.0314	0.00004	0.0581	0.00005	0.0567	0.0001
	(0.107)	(0.170)	(0.000)	(0.911)	(0.112)	(0.510)
Number of Children	3.9905	0.0436	0.9753	0.0456	9.9169	0.0851
	(0.110)	(0.283)	(0.465)	(0.329)	(0.210)	(0.489)
Married	15.0331	0.2850	4.6915	0.2643	2.1044	-0.3809
	(0.020)	(0.005)	(0.395)	(0.023)	(0.860)	(0.260)
Age	-0.2148	-0.0039	-0.0294	-0.0068	-0.1930	-0.0204
	(0.165)	(0.137)	(0.848)	(0.061)	(0.601)	(0.078)
Wealth	0.0131	0.0002	0.0331	0.0008	0.0079	0.00002
	(0.000)	(0.000)	(0.002)	(0.003)	(0.147)	(0.619)
Low-Risk Assets	0.0148	-0.00008	-0.1138	-0.0007	0.0369	-0.0006
	(0.749)	(0.921)	(0.042)	(0.665)	(0.564)	(0.370)
Education	2.9902	0.0571	-2.5101	0.0337	5.1151	0.0522
	(0.063)	(0.025)	(0.024)	(0.319)	(0.155)	(0.448)
Constant	-106.5696	-1.6703	27.6251	-1.5008	-0.8259	0.4031
	(0.000)	(0.000)	(0.003)	(0.000)	(0.981)	(0.658)
Model χ^2	56.45		60.77		18.44	
Prob > Model χ^2	0.0000		0.0000		0.0101	
Wald Test χ^2	285.85		8.46		2.85	
Prob > Wald χ^2	0.0000		0.0036		0.0914	
Uncensored Observations	468		369		99	
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.						

The face value of life insurance is estimated to have positive and statistically significant effects in the regression portion of the Heckit for the full sample and low wealth group. This further supports that the direction of causality may be life insurance depends on entrepreneurship rather than the alternative.

Table 33: Heckit Results with Selected Variables and Owns a Whole Life Policy

Dependent Variable: Business Income	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Regression	Selection	Regression	Selection	Regression	Selection
Owns Whole Life Insurance		0.2079		0.1745		0.1386
		(0.030)		(0.107)		(0.553)
Number of Children		0.0416		0.0402		0.0977
		(0.310)		(0.345)		(0.471)
Married		0.2651		0.2925		-0.3869
		(0.007)		(0.005)		(0.259)
Age	-0.0237	-0.0035	-0.0432	-0.0047	-0.3321	-0.0218
	(0.889)	(0.188)	(0.816)	(0.101)	(0.587)	(0.068)
Wealth	0.0126		0.0406		0.0094	
	(0.001)		(0.000)		(0.069)	
Low-Risk Assets	-0.0237		-0.1260		0.0252	
	(0.589)		(0.021)		(0.694)	
Education	-1.1003		-2.7147		6.6079	
	(0.275)		(0.009)		(0.092)	
Constant	52.8226	-1.4124	52.2358	-1.4022	15.3720	0.7113
	(0.000)	(0.000)	(0.000)	(0.000)	(0.752)	(0.409)
Model χ^2	11.78		16.61		8.37	
Prob > Model χ^2	0.0191		0.0023		0.0790	
Wald Test χ^2	11.84		7.11		0.08	
Prob > Wald χ^2	0.0006		0.0077		0.7818	
Uncensored Observations	468		369		99	
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.						

Reducing the overlap of independent variables in the Heckit model will provide estimates that are more precise. Omitted variables bias is still a concern so a variety of specifications is employed. Using the earlier results and theory, several variables can be reasonably removed. From the theory presented earlier in this chapter, the decision to become an entrepreneur should be a function of life insurance, number of children, marital status, and age. Then business income should be a function of age, wealth, other low-risk assets, and education. Alternative specifications remove variables that have p-values over 0.5000 in the original Heckit results. These alternative specifications are presented in Appendix D.

Table 34: Heckit Results with Selected Variables and Face Value

Dependent Variable: Business Income	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Regression	Selection	Regression	Selection	Regression	Selection
Face Value of Whole Life Insurance		0.0007		0.0006		0.0002
		(0.019)		(0.157)		(0.471)
Number of Children		0.0382		0.0380		0.0932
		(0.334)		(0.358)		(0.487)
Married		0.2770		0.3007		-0.3694
		(0.004)		(0.003)		(0.299)
Age	-0.0049	-0.0030	-0.0257	-0.0042	-0.3193	-0.0214
	(0.977)	(0.255)	(0.890)	(0.142)	(0.606)	(0.073)
Wealth	0.0126		0.0402		0.0094	
	(0.002)		(0.000)		(0.069)	
Low-Risk Assets	-0.0260		-0.1279		0.0245	
	(0.553)		(0.019)		(0.700)	
Education	-1.04		-2.6411		6.6443	
	(0.294)		(0.009)		(0.096)	
Constant	59.8676	-1.4251	55.8159	-1.4164	14.9604	0.7149
	(0.000)	(0.000)	(0.000)	(0.000)	(0.754)	(0.404)
Model χ^2	10.99		16.25		8.34	
Prob > Model χ^2	0.0267		0.0027		0.0798	
Wald Test χ^2	10.47		6.09		0.08	
Prob > Wald χ^2	0.0012		0.0136		0.7775	
Uncensored Observations	468		369		99	
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.						

The Heckit results with the selected variables do not vary significantly from the original Heckit results. Wealth and married have positive and significant effects similar to other results. Again, there are mixed results on education with education having negative effects in the regression equation for the low wealth group and positive effects for the high wealth group. Life insurance is also found to have a positive and statistically significant effect in the selection equation for the full sample. It should also be noted that the Wald test for independent equations suggests that this specification is not valid for the high wealth group.

Conclusion

Entrepreneurs face additional risk from their choice of employment. Low risk assets, including life insurance, may offset this risk. Whole life insurance may also provide entrepreneurs with a way to ease business financing constraint and protect their business from the estate tax. Empirical analysis suggests the holding of life insurance depends on being an entrepreneur. This still supports the idea that life insurance enables entrepreneurial activities even though the direction of causality is reversed from the original theory. Another interesting result is that marriage appears to support entrepreneurship by providing an additional source of income, which outweighs the potential dependency of a spouse. Finally, other low-risk assets appear to be a substitute for business assets.

CHAPTER 6

CONTRIBUTIONS AND FUTURE RESEARCH

Contributions

There is a significant body of research dedicated to understanding the decision to purchase life insurance. The primary assumption is that life insurance is purchased to replace lost income and maintain the family standard of living. Under this assumption, wealthy individuals and single individuals have no reason to purchase life insurance. Yet, the data shows that these types of individual do hold life insurance. This research attempts to explain these apparent anomalies.

The primary argument is that wealthy people use life insurance for estate planning purposes. This idea is supplemented by a secondary argument that life insurance enables entrepreneurship. Both of these arguments can explain why wealthy and single individuals may purchase life insurance.

The first two chapters lay out the relationship between life insurance and the estate tax. While the information in these chapters is publically available, it is rarely connected in this way outside of the insurance industry. Practitioners in estate planning have long understood the tax benefits of life insurance. Economists have long understood the potential distortionary effects of taxes such as the estate tax. These chapters synthesize these two well-understood ideas into an explanation for the still mysterious anomalies of life insurance purchases by wealthy and single individuals.

The third chapter provides evidence of a different life insurance decision-making process for wealthy individuals versus those who are not wealthy. The first pieces of evidence demonstrate that in the absence of an estate tax, life insurance is an inefficient means of accumulating assets for bequest purposes. However, in the presence of an estate tax, life insurance may be an efficient means of accumulating assets for bequests. This leads to the idea of an individual utility function that includes both consumption and after-tax bequests. Simulations of this utility function demonstrate that individuals with and without families may gain utility from life insurance in the presence of an estate tax. While the idea of an individual utility function that

includes bequests is not new, the introduction of a weight on bequests allows for the importance of family status but also allows for individuals without families to value bequests. The weight based on family status reconciles this utility function with the body of literature that argues that the life insurance purchase decision is a family decision. The presence of a weight on bequests even for individuals without families allows for explanation of one of the anomalies of single individuals holding life insurance.

The third chapter also employs a unique data set to determine the characteristics of the life insurance purchase decision. Separating the sample by wealth clearly demonstrates that high and low wealth individuals make different life insurance decisions. Low wealth individuals appear to purchase life insurance for the traditional purpose of maintaining the family standard of living or to preserve assets for bequests. Wealthy individuals appear to purchase life insurance only to facilitate passing wealth to their children. These results are consistent with other research, but by separating the sample by wealth the results help explain the anomaly of high wealth individuals purchasing life insurance.

The research through chapter three strongly suggests that the estate tax has a significant impact on the decisions made by individuals, particularly the decision to purchase life insurance. Chapter four explores how changes to the estate tax would affect decisions over asset allocation including life insurance. The model in chapter four is a simple general equilibrium model but this simple model captures the dramatic impact of four potential changes to the estate tax. For those who value bequests, elimination of the estate tax leads to the greatest accumulation of wealth and highest lifetime utility. This basic model provides a means to quantify the impact of changes to the estate tax, which is important for policy decisions. Given that the current estate tax reforms expire at the end of 2010, this model as a policy tool could be very important in determining the future form of the estate tax.

The secondary argument of this research is that life insurance may enable entrepreneurship. The fifth chapter explores the use of life insurance as a low-risk asset to balance the risk associated with entrepreneurship. Because of the asset features of whole life insurance, life insurance may reduce borrowing constraints or may

provide liquidity through the cash value. Using the same data as chapter three, this chapter looks at the impact of life insurance on entrepreneurial activity measured in several ways. The results here are not as strong as those in chapter three but it appears that owning a whole life insurance policy does enable entrepreneurship. This result then provides another explanation as to why wealthy and single individuals may hold life insurance.

This research provides two original explanations for why rich people buy life insurance. The primary reason is to mitigate the estate tax. The secondary reason is to enable entrepreneurship. These explanations are supported by both theory and data. Additionally, this research provides a basis for policy analysis regarding changes to the estate tax.

Future Research

One path for future research is to extend the general equilibrium model. The current model is very simple. It does not include idiosyncratic nor economy-wide income shocks. These shocks can add a richness of reality and uncertainty that the current model does not have. The current model also does not include two important estate tax deductions. The spousal deduction and charitable contribution deduction can greatly decrease the estate tax burden an individual may face. Including these deductions may have a significant impact on the estate tax effects on life insurance purchases. Including these deductions would also allow the model to quantify the impact of changes to these deductions.

Another possibility for future research is the use of multiple years of data. All of the data analysis in this research is based on a single year of survey results. However, this survey has been completed for many years. Multiple years of observations would allow for several types of additional analysis, as well as more observations. Data from after the estate tax change in 2001 could be compared to data before the change to see if there were significant changes in behavior. Looking at the data over time may also reveal patterns in life insurance purchases that may reflect changes in attitudes, understanding of life insurance, availability of life insurance products, availability of other assets, other tax changes, etc.

Finally, research could continue into the state level estate and inheritance taxes. Several states continue to collect estate and inheritance taxes in addition to the federal estate tax. It would be interesting to look at the differences in these state taxes and the different insurance and asset holdings by individuals in those states. Another dimension of state level taxes is that these taxes may influence relocation decisions. Most people do not think about estate and inheritance taxes when they relocate but this may be a significant consideration for retirees or those approaching retirement.

A. Comparison of Life Insurance and Savings Details

Life Insurance illustrations from Jefferson Pilot Financial (now Lincoln Financial) assuming an annual return of 4.35% and retirement at age 65. Savings calculations based on an annual return of 5%.

Attained Age	Purchase Whole Life Insurance			Put Premiums in Savings	Savings Required to Have Same After-tax Value at Death		Savings Required to Cover \$1m in Estate Taxes	
	Premium	Cash Value	Death Benefit	After-tax Savings	Annual Savings	Benefit of Saving over Life Insurance	Annual Savings	Cost of Saving over Life Insurance
41	9,761	0	1,000,000	9,761	7,897	1,864	17,548	-7,787
42	9,761	0	1,000,000	20,010	7,897	1,864	17,548	-7,787
43	9,761	0	1,000,000	30,772	7,897	1,864	17,548	-7,787
44	9,761	950	1,000,000	42,071	7,897	1,864	17,548	-7,787
45	9,761	9,435	1,000,000	53,936	7,897	1,864	17,548	-7,787
46	9,761	22,602	1,000,000	66,393	7,897	1,864	17,548	-7,787
47	9,761	36,130	1,000,000	79,474	7,897	1,864	17,548	-7,787
48	9,761	50,069	1,000,000	93,209	7,897	1,864	17,548	-7,787
49	9,761	64,397	1,000,000	107,630	7,897	1,864	17,548	-7,787
50	9,761	79,117	1,000,000	122,773	7,897	1,864	17,548	-7,787
51	9,761	90,825	1,000,000	138,672	7,897	1,864	17,548	-7,787
52	9,761	103,085	1,000,000	155,367	7,897	1,864	17,548	-7,787
53	9,761	115,902	1,000,000	172,896	7,897	1,864	17,548	-7,787
54	9,761	129,316	1,000,000	191,302	7,897	1,864	17,548	-7,787
55	9,761	143,353	1,000,000	210,628	7,897	1,864	17,548	-7,787
56	9,761	157,896	1,000,000	230,921	7,897	1,864	17,548	-7,787
57	9,761	173,089	1,000,000	252,228	7,897	1,864	17,548	-7,787
58	9,761	188,955	1,000,000	274,600	7,897	1,864	17,548	-7,787
59	9,761	205,549	1,000,000	298,091	7,897	1,864	17,548	-7,787
60	9,761	222,886	1,000,000	322,757	7,897	1,864	17,548	-7,787
61	9,761	240,974	1,000,000	348,656	7,897	1,864	17,548	-7,787
62	9,761	259,831	1,000,000	375,849	7,897	1,864	17,548	-7,787
63	9,761	279,423	1,000,000	404,403	7,897	1,864	17,548	-7,787
64	9,761	299,837	1,000,000	434,384	7,897	1,864	17,548	-7,787
65	9,761	321,111	1,000,000	465,864	7,897	1,864	17,548	-7,787
66	0	334,005	1,000,000	489,157	0	0	0	0
67	0	347,262	1,000,000	513,615	0	0	0	0
68	0	360,831	1,000,000	539,296	0	0	0	0
69	0	374,756	1,000,000	566,261	0	0	0	0
70	0	388,978	1,000,000	594,574	0	0	0	0
71	0	403,534	1,000,000	624,303	0	0	0	0
72	0	418,351	1,000,000	655,518	0	0	0	0
73	0	433,494	1,000,000	688,294	0	0	0	0
74	0	448,879	1,000,000	722,708	0	0	0	0
75	0	464,569	1,000,000	758,844	0	0	0	0
76	0	480,466	1,000,000	796,786	0	0	0	0
77	0	496,521	1,000,000	836,625	0	0	0	0
78	0	512,780	1,000,000	878,456	0	0	0	0
79	0	529,108	1,000,000	922,379	0	0	0	0
80	0	545,591	1,000,000	968,498	0	0	0	0
81	0	562,106	1,000,000	1,016,923	0	0	0	0
82	0	578,783	1,000,000	1,067,769	0	0	0	0
83	0	595,539	1,000,000	1,121,158	0	0	0	0
84	0	612,403	1,000,000	1,177,216	0	0	0	0
85	0	629,485	1,000,000	1,236,076	0	0	0	0
					Sum of Benefit	46,606		
					Time Value of Benefit	236,076		
							-194,684	
							-986,147	

Life Insurance illustrations from Jefferson Pilot Financial (now Lincoln Financial) assuming an annual return of 4.35% and retirement at age 65. Savings calculations based on an annual return of 5%.

B. Other Life Insurance Regression Results

Linear Probability Results

Dependent Variable:	Full Sample		Wealth Below \$1 million		Wealth Above \$1 million	
Owns a Whole Life Policy	All Policies	Face Value over \$10,000	All Policies	Face Value over \$10,000	All Policies	Face Value over \$10,000
Wealth	0.00004	0.00006	0.0003	0.0002	0.000001	0.000003
	(0.057)	(0.002)	(0.000)	(0.000)	(0.956)	(0.880)
Age	0.0050	0.0010	0.0041	0.0002	0.0030	0.0018
	(0.000)	(0.028)	(0.000)	(0.696)	(0.425)	(0.625)
Liabilities	0.0010	0.0010	0.0008	0.0008	0.0008	0.0009
	(0.014)	(0.008)	(0.062)	(0.041)	(0.280)	(0.265)
Number of Children	-0.0105	-0.0007	-0.0084	0.0006	0.1453	0.1044
	(0.323)	(0.937)	(0.427)	(0.944)	(0.013)	(0.068)
Married	0.1350	0.1448	0.1087	0.1250	0.2298	0.1941
	(0.000)	(0.000)	(0.002)	(0.000)	(0.054)	(0.095)
Married & Children	-0.0314	-0.0520	-0.0328	-0.0665	-0.0926	0.0085
	(0.431)	(0.111)	(0.428)	(0.044)	(0.562)	(0.956)
Liabilities & Children	0.0409	0.2534	0.0563	0.3224	0.0289	0.0536
	(0.869)	(0.279)	(0.849)	(0.241)	(0.925)	(0.855)
Wealth & Children	0.00001	0.000004	-0.000005	0.00006	-0.00005	-0.00006
	(0.684)	(0.912)	(0.962)	(0.526)	(0.203)	(0.137)
Married & Liabilities	-0.5108	-0.5601	-0.2285	-0.2990	-0.7843	-0.7863
	(0.232)	(0.146)	(0.617)	(0.475)	(0.348)	(0.340)
Constant	-0.1037	-0.0075	-0.0843	0.0144	0.0174	0.0664
	(0.002)	(0.775)	(0.015)	(0.587)	(0.944)	(0.779)
F-Statistic	23.38	19.53	28.33	23.93	1.83	1.57
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0616	0.1221
N	3,780	3,780	3,363	3,363	417	417
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. All of the "& Children" variables are interactions with the presence of children, not the number of children. The estimations are weighted to be representative of the population and the test statistics are based on robust standard errors.						

C. Other Entrepreneurship Regression Results

Unweighted Tobit Results of Business Income and Face Value

Dependent Variable: Business Income	Full Sample			Wealth Below \$1 million	Wealth Over \$1 million
Face Value of Whole Life Insurance	0.0200	0.0203	0.0203	0.0219	0.0153
	(0.045)	(0.042)	(0.042)	(0.105)	(0.452)
Number of Children	3.5759	3.5621	3.5495	2.4541	4.6577
	(0.104)	(0.106)	(0.107)	(0.139)	(0.674)
Married	19.8950	19.1637	19.1529	11.8069	-6.3667
	(0.001)	(0.002)	(0.002)	(0.012)	(0.846)
Age	-0.1623	-0.1385	-0.1468	-0.3413	-2.0229
	(0.388)	(0.456)	(0.429)	(0.029)	(0.052)
Wealth	0.0143	0.0148	0.01483	0.0410	0.0089
	(0.000)	(0.000)	(0.000)	(0.000)	(0.026)
Low-Risk Assets	0.0328			-0.0413	0.01223
	(0.345)			(0.484)	(0.852)
Low-Risk Assets / Total Wealth		-3.1459			
		(0.427)			
Low-Risk Assets / Total Wealth not Including Home			0.0871		
			(0.969)		
Constant	-130.2088	-129.7111	-129.3891	-86.9935	-18.0114
	(0.000)	(0.000)	(0.000)	(0.000)	(0.801)
χ^2	112.22	109.35	108.54	56.11	14.09
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0286
Pseudo- R^2	0.0158	0.0155	0.0153	0.0105	0.0092
Uncensored Observations	452	452	452	353	99

P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The Tobit estimations are left-censored and not weighted to be representative of the population.

OLS Results of Business Income and Face Value

Dependent Variable: Business Income	Full Sample			Wealth Below \$1 million			Wealth Over \$1 million		
Face Value of Whole Life Insurance	0.0101	0.0100	0.0100	0.0085	0.0086	0.0086	0.0100	0.0103	0.0102
	(0.044)	(0.045)	(0.045)	(0.184)	(0.178)	(0.178)	(0.214)	(0.205)	(0.207)
Number of Children	0.3575	0.3630	0.3653	0.3003	0.3114	0.3139	2.816	2.7959	2.8076
	(0.099)	(0.099)	(0.098)	(0.159)	(0.148)	(0.147)	(0.240)	(0.243)	(0.241)
Married	0.8743	0.8648	0.8698	0.8880	0.8783	0.8833	-1.0548	-1.1214	-1.1208
	(0.066)	(0.074)	(0.073)	(0.059)	(0.067)	(0.067)	(0.717)	(0.703)	(0.703)
Age	-0.0191	-0.0190	-0.0202	-0.0183	-0.0199	-0.0211	-0.2641	-0.2496	-0.2509
	(0.030)	(0.056)	(0.044)	(0.005)	(0.007)	(0.004)	(0.018)	(0.027)	(0.026)
Wealth	0.0034	0.0034	0.0034	0.0055	0.0050	0.0051	0.0028	0.0028	0.0028
	(0.004)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)	(0.182)	(0.186)	(0.186)
Low-Risk Assets	-0.0006			-0.0068			0.0051		
	(0.922)			(0.361)			(0.656)		
Low-Risk Assets / Total Wealth		-0.4755			-0.4809			-8.6276	
		(0.402)			(0.397)			(0.537)	
Low-Risk Assets / Total Wealth not Including Home			-0.0517			-0.0553			-4.6278
			(0.475)			(0.447)			(0.666)
Constant	1.3485	1.3962	1.4260	1.154	1.2611	1.2922	18.0388	17.9648	17.9046
	(0.003)	(0.006)	(0.005)	(0.007)	(0.007)	(0.005)	(0.032)	(0.035)	(0.035)
F-Statistic	5.75	5.20	5.20	6.22	5.97	5.96	2.46	2.45	2.44
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0237	0.0243	0.0251
R^2	0.0384	0.0388	0.0381	0.0241	0.0244	0.0233	0.0516	0.0516	0.0515
N	3,780	3,745	3,739	3,363	3,328	3,322	417	417	417
P-values reported in parentheses are based on robust standard errors. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.									

Unweighted Tobit Results of Business Assets and Life Insurance

Dependent Variable: Business Assets	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Face Value	Owns Policy Over \$10,000	Face Value	Owns Policy Over \$10,000	Face Value	Owns Policy Over \$10,000
Life Insurance	0.2333	66.8769	0.0508	2.8790	0.2165	125.6564
	(0.003)	(0.154)	(0.137)	(0.808)	(0.172)	(0.447)
Number of Children	20.4989	24.5499	3.3815	3.6461	33.9566	53.9733
	(0.277)	(0.194)	(0.455)	(0.420)	(0.704)	(0.541)
Married	108.2820	107.6480	10.0215	11.3082	-118.9913	-124.5772
	(0.042)	(0.046)	(0.427)	(0.372)	(0.668)	(0.657)
Age	-6.2860	-6.5835	-2.0345	-2.0745	-46.3029	-46.4425
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wealth	0.3311	0.3413	0.2146	0.2189	0.3000	0.3083
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Low-Risk Assets	-1.0393	-0.9839	-0.2434	-0.2483	-1.2530	-1.1974
	(0.001)	(0.002)	(0.154)	(0.146)	(0.041)	(0.051)
Constant	-921.2191	-926.2910	-191.4137	-190.5036	1421.705	1373.784
	(0.000)	(0.000)	(0.000)	(0.000)	(0.017)	(0.022)
χ^2	506.41	499.59	129.08	127.00	129.14	127.87
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo- R^2	0.0556	0.0548	0.0239	0.0236	0.0473	0.0469
Uncensored Observations	447	447	309	309	138	138

P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The Tobit estimations are left-censored and not weighted to be representative of the population.

OLS Results of Business Assets and Life Insurance

Dependent Variable: Business Assets	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Face Value	Owns Policy Over \$10,000	Face Value	Owns Policy Over \$10,000	Face Value	Owns Policy Over \$10,000
Life Insurance	-0.0027	-11.4351	0.0106	1.0986	0.0323	26.0674
	(0.964)	(0.255)	(0.357)	(0.586)	(0.781)	(0.682)
Number of Children	2.5667	2.4957	0.7069	0.7303	10.4054	11.1918
	(0.013)	(0.021)	(0.207)	(0.195)	(0.825)	(0.818)
Married	-9.2350	-7.8285	-0.5368	-0.5050	-36.3693	-38.8700
	(0.032)	(0.052)	(0.626)	(0.642)	(0.609)	(0.599)
Age	-0.7820	-0.7743	-0.1254	-0.1303	-13.2153	-13.2398
	(0.005)	(0.002)	(0.000)	(0.000)	(0.002)	(0.002)
Wealth	0.1758	0.1766	0.0319	0.0325	0.2475	0.2485
	(0.001)	(0.001)	(0.000)	(0.000)	(0.002)	(0.002)
Low-Risk Assets	-0.5736	-0.5719	-0.0447	-0.0461	-0.6067	-0.6064
	(0.011)	(0.011)	(0.037)	(0.033)	(0.013)	(0.016)
Constant	24.1363	24.5122	6.0599	6.2572	612.1146	607.0501
	(0.008)	(0.004)	(0.000)	(0.000)	(0.014)	(0.015)
F-Statistic	5.80	6.10	7.04	7.09	7.10	5.39
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.3328	0.3335	0.0522	0.0512	0.4239	0.4240
N	3,780	3,780	3,363	3,363	417	417
P-values reported in parentheses are based on robust standard errors. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.						

D. Other Selection Model Results

Heckit Results with Alternate Specification and Owning a Whole Life Policy

Dependent Variable: Business Income	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Regression	Selection	Regression	Selection	Regression	Selection
Owens Whole Life Insurance	1.1925		8.3187		19.5692	
	(0.502)		(0.147)		(0.155)	
Number of Children	4.1163	0.0455	0.9867	0.0466	12.5552	0.0940
	(0.101)	(0.259)	(0.469)	(0.318)	(0.108)	(0.444)
Married	15.8743	0.2949	5.8934	0.2639	-1.0700	-0.3731
	(0.016)	(0.003)	(0.284)	(0.024)	(0.937)	(0.268)
Age	-0.2369	-0.0040	-0.1170	-0.0071	-0.3272	-0.0213
	(0.132)	(0.118)	(0.487)	(0.048)	(0.446)	(0.067)
Wealth	0.0141	0.0002	0.0370	0.0007	0.0085	0.00002
	(0.000)	(0.000)	(0.001)	(0.003)	(0.091)	(0.652)
Low-Risk Assets	0.0203		-0.1150		0.0471	
	(0.091)		(0.040)		(0.487)	
Education	3.1936	0.0251	-2.6187	0.0341	5.7550	0.0503
	(0.045)	(0.018)	(0.023)	(0.313)	(0.120)	(0.458)
Constant	-107.5150	-1.6710	30.6425	-1.4899	1.7353	0.4291
	(0.000)	(0.000)	(0.002)	(0.000)	(0.963)	(0.636)
Model χ^2	54.59		40.58		19.09	
Prob > Model χ^2	0.0000		0.0000		0.0079	
Wald Test χ^2	291.27		8.32		3.93	
Prob > Wald χ^2	0.0000		0.0039		0.0473	
Uncensored Observations	468		369		99	
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.						

Heckit Results with Alternate Specification and Owning a Whole Life Policy

Dependent Variable: Business Income	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Regression	Selection	Regression	Selection	Regression	Selection
Owens Whole Life Insurance	11.8597		9.0873		19.2002	
	(0.028)		(0.114)		(0.132)	
Number of Children	1.8154	0.0435	1.3097	0.0407	12.3267	0.0939
	(0.236)	(0.327)	(0.369)	(0.379)	(0.121)	(0.444)
Married		0.2980		0.3236		-0.3645
		(0.005)		(0.003)		(0.280)
Age	-0.0621	-0.0021	-0.0793	-0.0032	-0.3237	-0.0214
	(0.701)	(0.455)	(0.655)	(0.280)	(0.450)	(0.065)
Wealth	0.0118		0.0397		0.0086	
	(0.002)		(0.000)		(0.087)	
Low-Risk Assets	-0.0130		-0.1137		0.0465	
	(0.763)		(0.041)		(0.487)	
Education	-1.7883	0.0824	-3.1940	0.0687	5.6666	0.0516
	(0.099)	(0.001)	(0.002)	(0.015)	(0.095)	(0.447)
Constant	42.3290	-1.7869	44.3229	-1.7216	2.0896	0.4571
	(0.001)	(0.000)	(0.001)	(0.000)	(0.957)	(0.611)
Model χ^2	20.87		26.37		19.05	
Prob > Model χ^2	0.0019		0.0002		0.0041	
Wald Test χ^2	5.32		3.05		0.34	
Prob > Wald χ^2	0.0211		0.0809		0.5584	
Uncensored Observations	468		369		99	
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.						

Heckit Results with Alternate Specification and Face Value

Dependent Variable: Business Income	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Regression	Selection	Regression	Selection	Regression	Selection
Face Value of Whole Life Insurance	0.0090		0.0584		0.0574	
	(0.089)		(0.000)		(0.109)	
Number of Children	5.0974	0.0593	1.0134	0.0465	9.9547	0.0933
	(0.033)	(0.130)	(0.457)	(0.319)	(0.208)	(0.443)
Married	14.6989	0.2850	4.3290	0.2639	2.9509	-0.3728
	(0.026)	(0.005)	(0.422)	(0.024)	(0.809)	(0.269)
Age		-0.0009		-0.0072		-0.0214
		(0.131)		(0.041)		(0.059)
Wealth	0.0129	0.0002	0.0324	0.0007	0.0078	0.00002
	(0.000)	(0.000)	(0.006)	(0.003)	(0.148)	(0.645)
Low-Risk Assets	0.0166		-0.1178		0.0322	
	(0.146)		(0.019)		(0.606)	
Education	3.4020	0.0634	-2.5189	0.0340	4.9999	0.0505
	(0.030)	(0.010)	(0.022)	(0.312)	(0.174)	(0.457)
Constant	-118.9109	-1.8381	28.3494	-1.4887	-4.5316	0.4347
	(0.000)	(0.000)	(0.015)	(0.000)	(0.876)	(0.627)
Model χ^2	52.77		51.82		16.43	
Prob > Model χ^2	0.0000		0.0000		0.0116	
Wald Test χ^2	281.81		0.72		1.26	
Prob > Wald χ^2	0.0000		0.3964		0.2621	
Uncensored Observations	468		369		99	
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.						

Heckit Results with Alternate Specification and Face Value

Dependent Variable: Business Income	Full Sample		Wealth Below \$1 million		Wealth Over \$1 million	
	Regression	Selection	Regression	Selection	Regression	Selection
Face Value of Whole Life Insurance	0.0668		0.0604		0.0685	
	(0.000)		(0.000)		(0.045)	
Married		0.2919		0.2989		-0.3238
		(0.001)		(0.003)		(0.337)
Age		-0.0060		-0.0092		-0.0245
		(0.015)		(0.002)		(0.010)
Wealth	0.0081	0.0002	0.0295	0.0008	0.0080	0.00002
	(0.034)	(0.000)	(0.016)	(0.000)	(0.145)	(0.607)
Low-Risk Assets	-0.0203		-0.1161		0.0204	
	(0.595)		(0.020)		(0.738)	
Education	-1.3795		-2.7033		4.7663	
	(0.136)		(0.006)		(0.144)	
Constant	52.8388	-1.2986	42.7835	-1.2676	2.57	0.8910
	(0.000)	(0.000)	(0.000)	(0.000)	(0.934)	(0.183)
Model χ^2	31.72		35.44		11.52	
Prob > Model χ^2	0.0000		0.0000		0.0213	
Wald Test χ^2	6.86		3.40		0.54	
Prob > Wald χ^2	0.0088		0.0650		0.4616	
Uncensored Observations	468		369		99	
P-values reported in parentheses. All variables valued in dollars were adjusted to be in thousands of dollars. The estimations are weighted to be representative of the population.						

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BIOGRAPHICAL SKETCH

Lisa received a BS in Finance and Economics from Lake Superior State University in 1998. After working for Ford Credit, The Maxim Group, and Todd Consulting she returned to school in 2002. Lisa completed an MA in Applied Economics, with a concentration in Finance, at the University of North Carolina at Greensboro in 2004. From there, she moved to Florida State University to complete a PhD in Economics with fields in Financial Economics, Urban Economics, and Applied Econometrics.