TAX FOUNDATION

TAX FOUNDATION BACKGROUND PAPER #9

An Analysis of the Disincentive Effects of the Estate Tax on Entrepreneurship

By:

Patrick Fleenor
Economist
Tax Foundation

J.D. Foster
Executive Director and Chief Economist
Tax Foundation

June 1, 1994

About the Tax Foundation

As the size of government continues to grow, so too does the need for reliable information about its cost and scope. Since 1937, the Tax Foundation has been monitoring tax and fiscal activities at all levels of government: federal, state and local. In that year, civic-minded businessmen envisioned an independent group of researchers who, by gathering data and publishing information on the public sector in an objective, unbiased fashion, could counsel government, industry and the citizenry on public finance.

More than 50 years later, in a radically different public arena, the Foundation continues to fulfill the mission set out by its founders. Through newspapers, radio, television, and mass distribution of its own publications, the Foundation supplies objective fiscal information and analysis to policymakers, business leaders, and the general public.

The Tax Foundation's research record has made it an oft-quoted source in Washington and state capitals, not as the voice of left or right, not as the voice of an industry or even of business in general, but as an advocate of a principled approach to tax policy, based on years of professional research. Today, farsighted individuals, businesses, and charitable foundations still understand the need for sound information on fiscal policy. As a nonprofit, tax exempt 501(c)(3) organization, the Tax Foundation relies solely on their voluntary contributions for its support.

TAX FOUNDATION BACKGROUND PAPER #9

An Analysis of the Disincentive Effects of the Estate Tax on Entrepreneurship

By:

Patrick Fleenor
Economist
Tax Foundation

J.D. Foster
Executive Director and Chief Economist
Tax Foundation

June 1, 1994

Tax Foundation
Washington, D.C.

* * *

Price: $10.00
$5.00 for members

* * *

Tax Foundation
1250 H Street, N.W.
Suite 750
Washington, DC 20005
202-783-2760

An Analysis of the Disincentive Effects of the Estate Tax on Entrepreneurship

Table of Contents

EXECUTIVE SUMMARY

This paper is the second in a series of Tax Foundation studies examining federal transfer taxation. The first of these studies provided a history and overview of federal transfer taxation. This paper attempts to gauge one of the economic effects of federal transfer taxation by examining the disincentive effects of the federal estate tax on entrepreneurs.

The federal government imposes taxes on wealth transfers through its unified transfer tax system. An estate tax is paid on the contents of estates. Transfers of wealth between living persons are subject to a gift tax. Transfers to grandchildren or more distant relatives are subject to the generation skipping transfer tax. Of these, the estate tax is by far the largest generator of revenue and has the greatest effect on economic activity.

In 1994, the federal tax code includes 17 marginal transfer tax rates ranging from 18 percent on transfers of less than $10,000 to 55 percent on those in excess of $3 million. There is also a unified transfer tax credit of $192,800, which is equal to a $600,000 exemption. In addition, the benefit of the unified credit and progressive rate schedule is gradually phased out by an additional 5 percent tax on that portion of a transfer in excess of $10 million but less than $21.04 million. The effective tax rate on estates as small as $5 million is currently 44 percent. Estates over $20.04 million face an effective tax rate of 55 percent.

An individual's decision to save is part of a life-long, forward-looking process. Typically, individuals save a portion of their income during their working years so that they may consume at a comfortable level during their retirement or during periods of unemployment. People often leave bequests because there is no way of knowing when death may strike and because they wish to provide their children and grandchildren with a measure of financial security.

In many instances the nature of entrepreneurial activity also results in the accumulation of large amounts of wealth. During his or her working life, the proprietor of a relatively small manufacturing operation or family farm may accumulate millions of dollars worth of land, plant, and equipment.

Whatever motivation an individual has for accumulating wealth, his willingness to do so is affected by taxes. Perhaps the most obvious example of this is the personal income tax imposed on labor income and the returns to saving. This tax discourages productive effort and reduces the incentive to save relative to consumption.

The estate tax also discourages productive effort and saving. The effect of the tax on saving and economic activity may vary significantly, however, depending on the circumstances of the wealth holder.

The disincentive effect of the estate tax is especially felt by entrepreneurs. As stated above, during a lifetime it is not uncommon for the proprietor of a small business or family farm to accumulate a significant quantity of business assets and personal wealth.

This wealth is a testament to the individual's success at producing goods and services demanded by others in society. It is also a symbol of the jobs and opportunities enjoyed by others that the entrepreneur's hard work and creativity has made possible.

Because most people face sales and income taxes daily, they have a reasonably good sense of the effects that these taxes have on individual incentives and the economy as a whole. The effects of the estate tax, on the other hand, are more difficult to grasp since it is a tax on wealth that has been accumulated over a lifetime.

To clarify these effects, this paper presents a model of the wealth accumulation process. This model is used to compare incentives to accumulate wealth under two tax scenarios. In the first scenario, an entrepreneur's life experience of work, saving, wealth creation, and business expansion is considered in the context of current individual, corporate, and estate tax law. In the second scenario, the estate tax is eliminated and the individual and corporate income tax rates are raised until they produce the same after-tax bequest as under the first scenario. The purpose of this exercise is to develop a more intuitive feel for the dampening effects of the estate tax on entrepreneurship.

The various simulations conducted using this model showed that the estate tax has roughly the same effect on entrepreneurial incentives as a doubling of income tax rates. In other words, income tax rates would need to be nearly twice their current levels, or roughly 70 percent, to produce the same disincentive effects as the current estate tax. Furthermore, given the progressivity of the estate tax, the increase in income tax rates is greater as the size of the estate increases. Given the fact that the estate tax raises only about 1 percent of federal revenue, it is clear that the disincentive effects of the tax are well out of proportion to the revenues associated with the estate tax.

For example, consider an entrepreneur whose non-corporate business allowed him or her to leave an estate valued at $5.2 million, despite the disincentive effects of the estate tax. This estate under current law faces an effective estate tax rate of 44.34 percent, which is clearly a powerful disincentive facing any businessman. In fact, to achieve the same degree of disincentive it would be necessary to raise the effective individual income tax rate facing such an individual from 37 percent to over 68.21 percent.

If the business is structured as a taxable corporation and even more successful, raising the value of the entrepreneur's pre-tax bequest to $23.4 million, then the estate faces an effective estate tax rate of 55 percent. To match the disincentive effects of a 55 percent estate tax rate it is necessary to raise the effective individual and corporate tax rates from 37 and 35 percent to 72 percent and 71.66 percent, respectively.

INTRODUCTION

This paper is the second in a series of Tax Foundation studies examining federal transfer taxation. The first of these studies provided a history and overview of federal transfer taxation. This paper attempts to gauge one of the economic effects of federal transfer taxation by examining the disincentive effects of the federal estate tax on entrepreneurs.

The federal government imposes taxes on wealth transfers through its unified transfer tax system. An estate tax is paid on the contents of estates. Transfers of wealth between living persons are subject to a gift tax. Transfers to grandchildren or more distant relatives are subject to the generation skipping transfer tax. Of these, the estate tax is by far the largest generator of revenue and has the greatest effect on economic activity.

During most of the nation's history, the federal government did not rely on transfer taxes as a permanent source of revenue. Rather, such levies were used as temporary sources of revenue during national emergencies, such as major wars. This changed in 1916 when, along with instituting an income tax, the federal government enacted a permanent estate tax. Sixteen years later, largely to prevent avoidance of the estate tax, it enacted a gift tax. In 1976 and 1986, in still further efforts to thwart avoidance of these transfer taxes, the federal government imposed levies on generation-skipping transfers.

In 1994, the federal tax code includes 17 marginal transfer tax rates ranging from 18 percent on transfers of less than $10,000 to 55 percent on those in excess of $3 million. There is also a unified transfer tax credit of $192,800, which is equal to a $600,000 exemption. In addition, the benefit of the unified credit and progressive rate schedule is gradually phased out by an additional 5 percent tax on that portion of a transfer in excess of $10 million but less than $21.04 million.

I. THE RELATIONSHIP BETWEEN TAXES AND WEALTH ACCUMULATION

An individual's decision to save is part of a life-long, forward-looking process. Typically, individuals save a portion of their income during their working years so that they may consume at a comfortable level during their retirement or during periods of unemployment. People often leave bequests because there is no way of knowing when death may strike and because they wish to provide their children and grandchildren with a measure of financial security.

In many instances the nature of entrepreneurial activity also results in the accumulation of large amounts of wealth. During his or her working life, the proprietor of a relatively small manufacturing operation or family farm may accumulate millions of dollars worth of land, plant, and equipment.

Whatever motivation an individual has for accumulating wealth, his willingness to do so is affected by taxes. Perhaps the most obvious example of this is the personal income tax imposed on labor income and the returns to saving. This tax discourages productive effort and reduces the incentive to save relative to consumption.

The estate tax also discourages productive effort and saving. The effect of the tax on saving and economic activity may vary significantly, however, depending on the circumstances of the wealth holder. For example, it may have a greater effect on an individual who is actively working to build a business than it would have on a person who inherits wealth or who is otherwise not prone to entrepreneurial activity.

The disincentive effect of the estate tax is especially felt by entrepreneurs. As stated above, during a lifetime it is not uncommon for the proprietor of a small business or family farm to accumulate a significant quantity of business assets and personal wealth. The effective tax rate on estates as small as $5 million is currently 44 percent. Estates over $20.04 million face an effective tax rate of 55 percent.

Because most people face sales and income taxes daily, they have a reasonably good sense of the effects that these taxes have on individual incentives and the economy as a whole. The effects of the estate tax on entrepreneurial activity, however, are more difficult to grasp since it is a tax on wealth that has been accumulated over a lifetime.

To clarify these effects, this paper presents a model of the wealth accumulation process. This model is used to compare incentives to accumulate wealth under two tax scenarios. In the first scenario, an entrepreneur's life experience of work, saving, wealth creation, and business expansion is considered in the context of current individual, corporate, and estate tax law. In the second scenario, the estate tax is eliminated and the individual and corporate income tax rates are raised until they produce the same after-tax bequest as under the first scenario. The purpose of this exercise is to develop a more intuitive feel for the dampening effects of the estate tax on entrepreneurship. An important assumption, however, is that the incentive effects of the two regimes are identical if the financial outcomes are identical. In that the model accounts for the major disincentive effects of higher income tax rates, this is a reasonable assumption for most individuals given their motivations for working, saving, and accumulating wealth.

II. A MODEL OF WEALTH ACCUMULATION

The model developed and used in this paper is a mathematical exposition of an individual entrepreneur's wealth accumulation and allocation decision. Because the process of accumulating and allocating wealth occurs over two distinct periods of an individual's life -- working and retirement -- the model is divided into two parts. The first illustrates how wealth is accumulated during an individual's working years. The second part details how a portion of this wealth may be consumed during retirement. Both parts of the model were constructed by combining six equations. These equations describe the following:

(1) The accumulation of wealth over time;

(2) The entrepreneur's total after-income tax income in each period;

(3) The entrepreneur's labor income in each period, which accounts for the disincentive effects of the personal income tax;

(4) A representation of the growth of the entrepreneur's business assets each year;

(5) An expression detailing the entrepreneur's accumulation of equity in the business; and

(6) An expression of the entrepreneur's personal consumption each year.

A short description of each of these equations, as well as a brief explanation of how they are combined is given below. A complete description of the equations and the solution to the model may be found in the appendix.

During an individual's life, wealth will accumulate as income exceeds consumption. This is given by the simple equation:

$$W_j = W_{j-1} + I_j - C_j \qquad (1)$$

where wealth at the end of the current year, W_j, is the sum of accumulated wealth from the prior year, W_{j-1}, plus income earned during the current year, I_j, less current year consumption, C_j.

During each year of an individual's life, income is received from any of three sources: (1) labor compensation; (2) the equity which accrues as a result of the growth of business assets; and (3) income from assets held outside the business, which is referred to here simply as interest. All labor income is received from the business and has two components: wages and distributions of equity. Interest is earned on all wealth that is not part of the business. Income is therefore given by the equation:

$$I = f_2[w, D, F, A, t_i, t_c] \qquad (2)$$

where income received in any year, I, is the after-tax sum of wages received during that year, w, distributions of equity received that year, D, the interest earned on wealth held outside the business during that year, F, and the equity accrued from the growth of business assets during that year, A. Wage and interest income are assumed to be subject to the individual income tax, t_i. Income generated by the growth of business assets is assumed to be subject to either the individual or corporate income tax, t_c, depending on how the business is structured. If the business is structured as a taxable corporation, equity distributions are assumed to be subject to both the individual and corporate income taxes.

Each year an individual's labor income is given by the expression:

$$L=f_3[t_i, t_c] \tag{3}$$

Recall that an individual's labor income is composed of both wages and equity distributions. As a result, L depends on the individual and, in some cases, the corporate income taxes. To avoid undue complexity, this model does not account for payroll taxes imposed on wage income.

The growth of an entrepreneur's business assets is given by the expression:

$$A=f_4[t_i, t_c] \tag{4}$$

where A depends on the individual and, in some cases, corporate income taxes.

Each year, as the business grows, it generates income. As stated above, this income is subject to taxation by either the individual or corporate income taxes, depending on how the firm is structured. The model also allows the entrepreneur to consume a portion this income. When the firm is structured as a taxable corporation, the after-tax, unconsumed equity, E, that an entrepreneur acquires in any year is given by:

$$E=f_5[A, t_i, t_c, \gamma_1] \tag{5}$$

where E depends on growth of the business, A, the individual and in some cases the corporate income taxes, t_i and t_c, and consumption out of after-tax income generated by the growth of business assets, γ_1.

Individuals may consume out of all components of income. Therefore consumption is given by the expression:

$$C=f_6[w,D,F,A,\gamma_0,\gamma_1,t_i, t_c] \tag{6}$$

The marginal and average propensity to consume out of after-tax wage, dividend, and interest income is γ_0. Consumption out of after-tax income generated from the growth of undistributed business equity is given by γ_1.

The complete model of an entrepreneur's wealth accumulation and allocation decisions is created by combining the five equations described above. An entrepreneur's pattern of wealth accumulation may be mapped out by observing the value of W_j (equation (1)) each year. As stated above, during each year of an individual's career, income, I (expression (2)), is determined by labor income consisting of wages, w, and dividends, D; interest received on wealth held outside the business, F; the growth of business assets, A; and by the individual and corporate income tax rates, t_i and t_c. Labor income earned in any particular year is determined by the specific equation assigned to represent expression (3). The amount of interest bearing wealth held in any year is determined in prior years. The amount of business assets held in any particular year is determined by the specific

equation assigned to represent expression (4). Consumption, C_j (expression (5)), during each year of an individual's career is determined by income and by the values assigned to γ_0 and γ_1. During each year of retirement, income is determined by the amount of interest bearing wealth that the individual has accumulated and by the continued growth of the business. Consumption during each year of retirement is assumed to be equal to that in the last year of the individual's career. The model is designed so as to allow for the consideration of a wide variety of income, wealth accumulation, and consumption profiles.

III. WEALTH ACCUMULATION UNDER TWO TAX SCENARIOS

The model presented above may be used to compare wealth accumulation in many different situations. An illuminating exercise is to compare the consequences of two tax scenarios. In the first, the current individual, corporate, and estate tax laws are in effect. In the second scenario there is no estate tax and the model is used to calculate the increases in the individual and/or corporate income tax rates which would be necessary to produce the same after-tax bequest as in the first scenario. As stated above, the purpose of this exercise is to more intuitively assess the disincentive effects of the estate tax on entrepreneurial activity.

CASE I: A Taxable Corporation

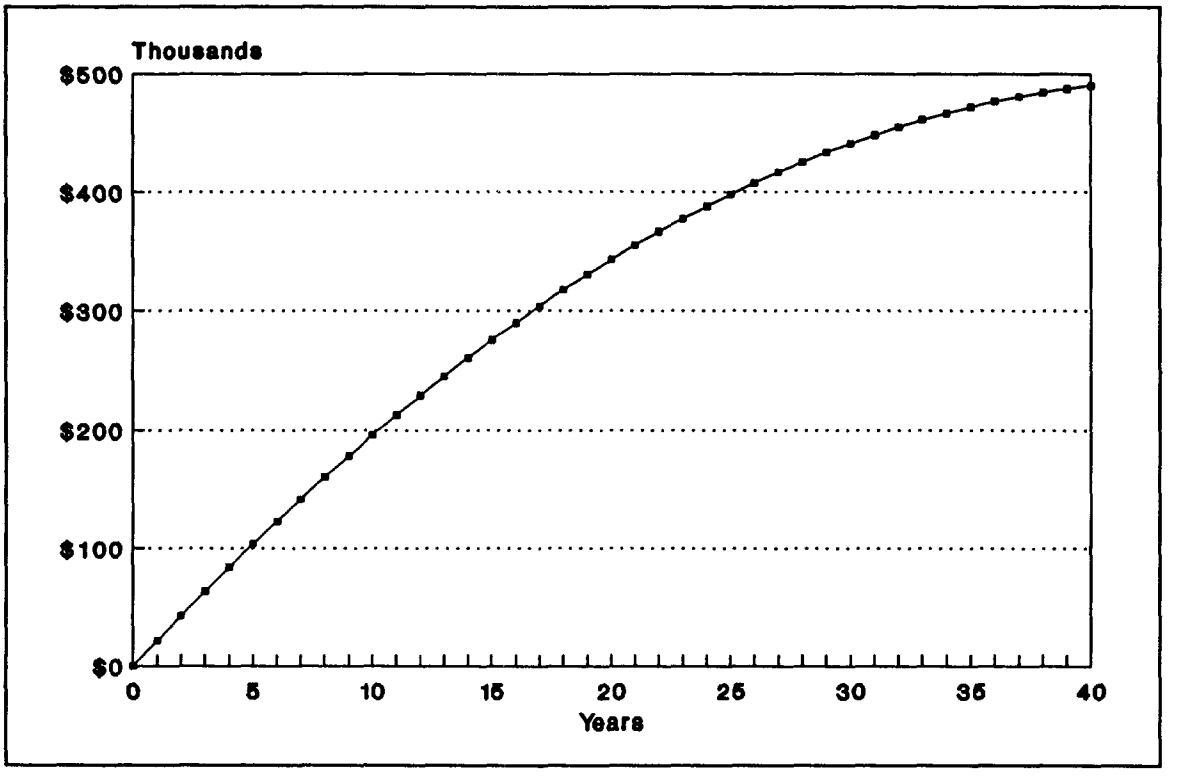
Consider the case of the entrepreneur who starts a business at age 21, owning and operating it as a taxable corporation until age 61. Assume that during this period the individual consumes 93 percent of his labor income and 5 percent of the income generated by the growth of his business. Assume that the entrepreneur lives to age 76, has $10,000 of initial wealth, and faces real, after-tax interest rates of 3 percent during his lifetime. Furthermore, assume that the individual faces an effective federal individual income tax rate of 37 percent, an effective federal corporate income tax rate of 35 percent, and the current schedule of federal estate tax rates.

Suppose the entrepreneur's labor income is $21,805 in the first year of his career and that after ten years this figure rises to $196,000. During the final year of his career assume that the entrepreneur's labor income is $490,000. These assumptions produce the labor income stream illustrated in Figure 1. A successful entrepreneur might be expected to have income growth such as this over his career.

Growth of the entrepreneur's business equity is illustrated in Figure 2. This figure shows that during his first year of operating the business, the entrepreneur accumulates $3,770 of business equity. After 10 years of operation the entrepreneur has accumulated $315,296 of business equity. After 20 years this figure climbs to $1,247,474. By the end of his career the entrepreneur has accumulated $4,962,477 in business equity. It is assumed that the business continues to grow after the individual retires.

The entrepreneur's income, consumption, and wealth accumulation patterns are illustrated in Figure 3. During the tenth year of his career the entrepreneur's total income will be $178,693, of which he will consume $111,264. At the end of this year the

Figure 1
Growth of Labor Income
Case I: A Taxable Corporation



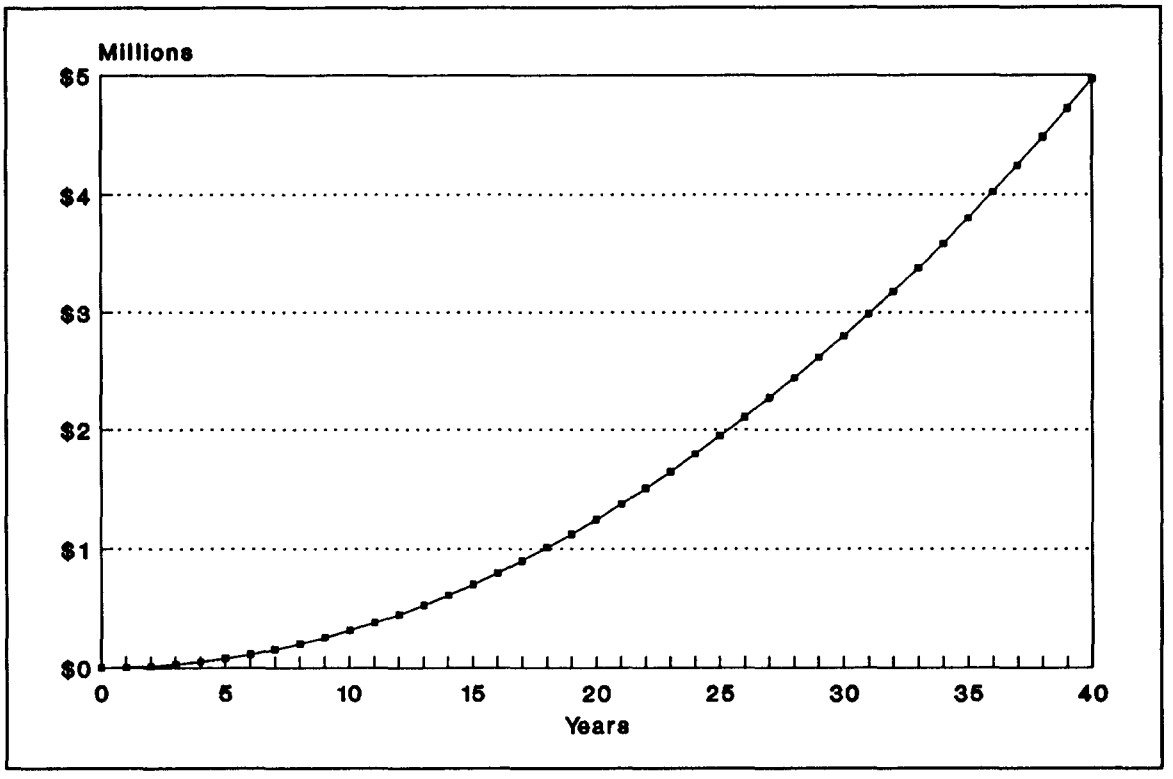
individual will have accumulated $371,675 in total wealth. After 20 years these figures will rise to $333,089, $197,710, and $1,421,242, respectively. During the final year of his career the individual will earn $560,051 and consume $294,499. At the end of his career the entrepreneur will have accumulated $5,508,526 in total wealth.

In the first year of retirement the individual's income drops to $280,090, highlighting the fact that he is no longer earning labor income. Consumption remains constant at $294,499 and total wealth falls slightly to $5,494,117. After 10 years of retirement income is $322,150, consumption remains constant at $294,499, and total wealth is $5,517,248.

At the time of his death at age 76, the individual's estate is valued at $5,752,906. However, as Figure 3 illustrates, because the effective estate tax rate on an estate this size is 45.4 percent, the after-tax bequest left to the individual's heirs will be $3,141,087.

Dramatic as the loss of nearly half an estate's value is, it is difficult to intuitively assess the disincentive effects of the estate tax as perceived by the entrepreneur during his lifetime. To make these effects more comprehensible, the model is altered to examine the scenario in which there is no estate tax. Instead the individual and corporate income taxes are raised until they produce the same after-tax bequest as under the first scenario. With the exception of these tax rates, all other assumptions are the same as those used in

Figure 2
Growth of Business Equity
Case I: A Taxable Corporation



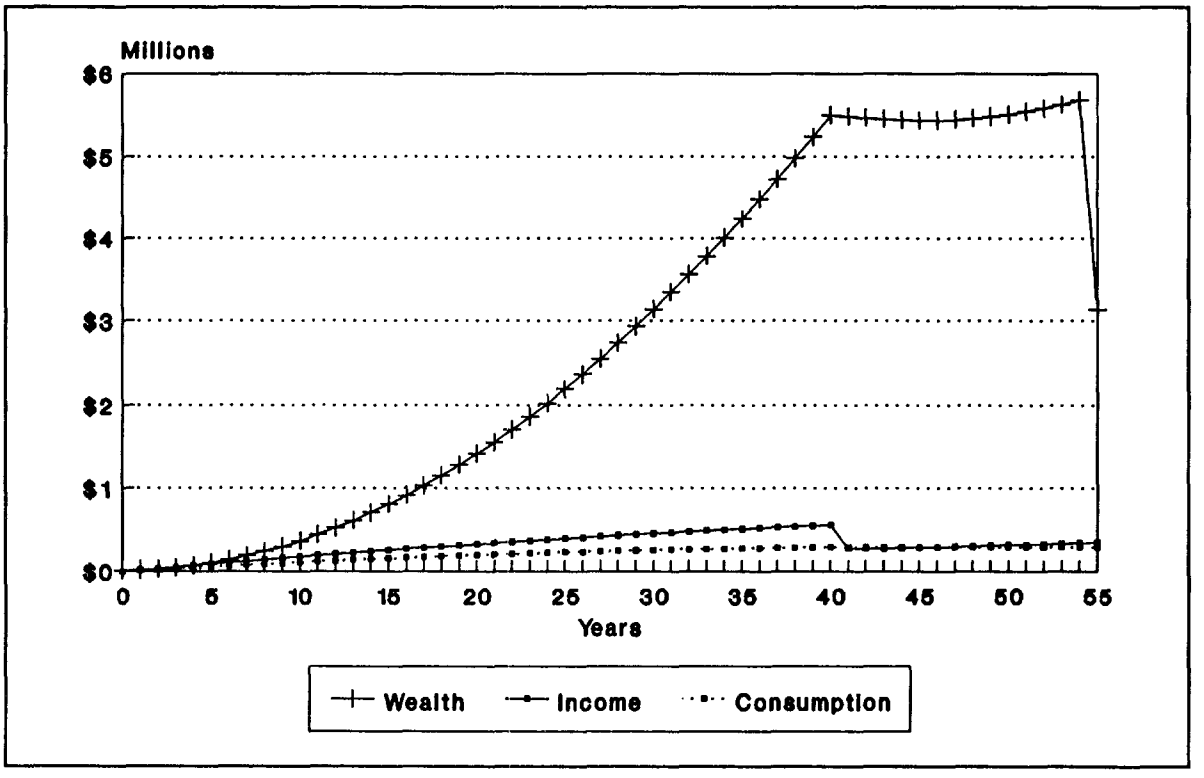
the first scenario. These assumptions, as well as the results of the analysis, are listed in Table I.

To produce the same bequest level as under the initial scenario it was necessary to raise both the effective individual and corporate income taxes substantially. The effective individual income tax rate was raised from 37 to 67 percent. The effective corporate income tax rate was raised from 35 to 67.62 percent.

The high effective income tax rates calculated using the model illustrate the disincentive effects of the current estate tax. Such high income tax rates would lower income, discourage labor force participation, and result in lower saving rates. The current high effective estate tax rates have similar effects.

The model described in Section II is quite flexible and may be used to investigate wealth accumulation in many different situations. Three interesting alterations of the case examined above involve changing the firm's structure to a non-corporate business, raising labor income, and accelerating business growth. In each of these simulations the same, two-scenario analysis is employed.

Figure 3
Income, Consumption, & Wealth Accumulation Patterns
Case I: A Taxable Corporation



CASE II: **A Non-Corporate Business**

The initial simulation considered the case of a small corporation. As a corporation, the business's earnings were subject to the corporate income tax. In addition, the equity distributions received by its owner were subject to both the individual and corporate income taxes. This simulation considers the same business as a non-corporate enterprise. As a non-corporate business (or as a Chapter S corporation), all of the firm's earnings, including any distributions to the owner, would be subject to the individual income tax. Distribution payments would not be subject to double taxation. All other assumptions are the same as those used in the initial simulation. These assumptions, as well as the results of this simulation, are given in Table II.

In this simulation the individual leaves a pre-tax estate valued at $5,187,935. An estate this size is subject to an effective estate tax rate of 44.34 percent. Under the first tax scenario, depicting current law, this simulation produced an after-tax bequest of $2,887,416. In order to arrive at this size bequest under the second scenario, where the estate tax rate is set to zero, it was necessary to raise the individual income tax rate to 68.22 percent, which is just slightly higher than the increase in the personal income tax rate needed when the business was in corporate form. Therefore, altering the business's form does little to change the disincentive effects of the estate tax.

Table I
A Comparison of the Two Tax Scenarios
Case I: A Taxable Corporation

Assumptions	Scenario I	Scenario II
Initial Wealth	$10,000	$10,000
Number of Years the Individual Works	40	40
Number of Years the Individual Consumes	55	55
Marginal & Average Propensity to Consume Labor Income	.93	.93
Marginal & Average Propensity to Consume Deferred Income	.05	.05
Labor Income Received as Equity Distributions	.20	.20
Real, Pre-tax Rate of Interest	.03	.03
Labor Income Diverted to Build Up of Business Assets, β	.02	.02
Labor Income Growth Function Parameters		
λ_1	22,500	22,250
λ_2	-250	-250
Business Asset Growth Function Parameters		
α_1	660	660
α_2	5,000	5,000
Effective Federal Tax Rates		
Individual Income	37%	67%
Corporate Income	35%	67.62%
Estate	45.40%	0%
Bequest After Estate Tax	$3,141,087	$3,141,087

CASE III: Higher Labor Income

The initial simulation considered the case of an individual who started his career with a salary of $21,805 per year and retired 40 years later earning $490,000 per year. As stated above, while this is a fairly rapid rise in income, it would not be unusual for a successful entrepreneur. To investigate the case of an individual who experiences slightly higher growth of his earnings over his career, the labor income equation was altered so that the individual earns $21,928 during the first year of his career and $208,250 in the tenth. In the final year of his career this figure rises to $686,000. All other assumptions are the same as those used in the initial simulation. These assumptions, as well as the results of this simulation, are given in Table III.

Table II
A Comparison of the Two Tax Regimes
Case II: A Non-Corporate Business

Assumptions	Scenario I	Scenario II
Initial Wealth	$10,000	$10,000
Number of Years the Individual Works	40	40
Number of Years the Individual Consumes	55	55
Marginal & Average Propensity to Consume Labor Income	.93	.93
Marginal & Average Propensity to Consume Deferred Income	.05	.05
Labor Income Received as Equity Distributions	.20	.20
Real, Pre-tax Rate of Interest	.03	.03
Labor Income Diverted to Build Up of Business Assets, β	.02	.02
Labor Income Growth Function Parameters		
λ_1	22,500	22,250
λ_2	-250	-250
Business Asset Growth Function Parameters		
α_1	660	660
α_2	5,000	5,000
Effective Federal Tax Rates		
Individual Income	37%	68.22%
Corporate Income	0%	0%
Estate	44.34%	0%
Bequest After Estate Tax	$2,887,416	$2,887,416

In this simulation the individual leaves a pre-tax estate valued at $4,228,716. An estate this size is subject to an effective estate tax rate of 41.92 percent. Note that this estate is $1.52 million smaller than that in the initial simulation. The reason that it is possible in this analysis for an individual with higher lifetime earnings to leave a smaller estate than a person with lower earnings has to do with the consumption patterns of the two individuals. It is assumed that an individual with higher earnings will consume more during both his working years and during retirement. Therefore, it is possible for an individual to retire with more wealth than a person who earned less during his lifetime, deplete this wealth at a rate higher than that person, and leave a smaller estate than the person with lower lifetime earnings.

Table III
A Comparison of the Two Tax Regimes
Case III: Higher Income

Assumptions	Scenario I	Scenario II
Initial Wealth	$10,000	$10,000
Number of Years the Individual Works	40	40
Number of Years the Individual Consumes	55	55
Marginal & Average Propensity to Consume Labor Income	.93	.93
Marginal & Average Propensity to Consume Deferred Income	.05	.05
Labor Income Received as Equity Distributions	.20	.20
Real, Pre-tax Rate of Interest	.03	.03
Labor Income Diverted to Build Up of Business Assets, β	.02	.02
Labor Income Growth Function Parameters		
λ_1	22,500	22,250
λ_2	-125	-125
Business Asset Growth Function Parameters		
α_1	660	660
α_2	5,000	5,000
Effective Federal Tax Rates		
Individual Income	37%	67%
Corporate Income	35%	67.89%
Estate	41.92%	0%
Bequest After Estate Tax	$2,456,063	$2,456,063

Under the first tax scenario, depicting current law, this simulation produced an after-tax bequest of $2,456,063. In order to arrive at this size bequest under the second scenario it was necessary to raise both the individual and corporate income tax rates to 67 and 67.89 percent, respectively. Therefore, even in the case where a lower estate tax rate was applicable, it was necessary to almost double the individual and corporate tax rates in the second scenario (zero estate tax) to produce the same bequest level as under the first scenario.

Table IV
A Comparison of the Two Tax Regimes
Case IV: A Larger Business

Assumptions	Scenario I	Scenario II
Initial Wealth	$10,000	$10,000
Number of Years the Individual Works	40	40
Number of Years the Individual Consumes	55	55
Marginal & Average Propensity to Consume Labor Income	.93	.93
Marginal & Average Propensity to Consume Deferred Income	.05	.05
Labor Income Received as Equity Distributions	.20	.20
Real, Pre-tax Rate of Interest	.03	.03
Labor Income Diverted to Build Up of Business Assets, β	.02	.02
Labor Income Growth Function Parameters		
λ_1	22,500	22,250
λ_2	-250	-250
Business Asset Growth Function Parameters		
α_1	660	660
α_2	14,400	14,400
Effective Federal Tax Rates		
Individual Income	37%	72%
Corporate Income	35%	71.66%
Estate	55%	0%
Bequest After Estate Tax	$10,522,852	$10,522,852

Case IV: A Larger Business

The initial simulation involved a moderate size business. At the time of the entrepreneur's retirement his equity in the business totaled $4.96 million. As stated in the first section of this paper, during his or her working life it is not unusual for the proprietor of a relatively small manufacturing operation or family farm to accumulate millions of dollars worth of land, plant, and equipment. To investigate the case of a larger business, the business asset growth function (equation (4)) was altered so that the individual's business equity totaled $14.25 million at the time of his retirement. All other assumptions are the same as those used in the initial simulation. These assumptions, as well as the results of this simulation, are given in Table IV.

Table V
A Comparison of the Hypothetical Individual Income Tax Rates Generated in Scenario II for Various Labor Income Growth Equations

Labor Income Earned in the Last Year of Entrepreneur's Career	Bequest After Estate Tax	Effective Estate Tax Rate Applicable Under Current Law	Effective Individual Income Tax Under Scenario II
$490,000	$2,887,416	44.34	68.22
$539,000	$2,703,072	43.43	68.28
$588,000	$2,518,745	42.34	68.37
$637,000	$2,334,440	41.03	68.46
$686,000	$2,150,165	39.41	68.57
$735,000	$1,965,931	37.36	68.75
$784,000	$1,776,140	34.91	69.05
$833,000	$1,576,194	32.03	69.74
$882,000	$1,363,509	28.58	71.05
$931,000	$1,138,331	24.07	73.30
$980,000	$901,989	17.20	76.82

Under the initial tax scenario, depicting current law, this set of assumptions produced an after-tax bequest of $10,522,852. To arrive at this size bequest under the second scenario (zero estate tax rate) it was necessary to raise the individual and corporate income tax rates to 72 and 71.66 percent, respectively. These higher income tax rates, as compared to those in the initial simulation, are due to the size of the estate. The estate tax is a progressive tax with larger estates being subject to higher tax rates. In the first simulation the entrepreneur left a $5.75 million estate, which was subject to an effective estate tax rate of 45.4 percent. In the current simulation, the $23.38 million estate is subject to an effective estate tax rate of 55 percent. As a result, higher effective individual and corporate income tax rates are needed in the second tax scenario to produce the same bequest level as under the first scenario.

IV. OTHER SIMULATIONS

The third simulation investigated what happens when the entrepreneur experiences increased labor income growth over his career. In both this case and the initial simulation the businesses were structured as corporations. Table V contains the results of additional simulations conducted in this vein. In each of these simulations the labor income growth equation was altered so as to raise the entrepreneur's labor income gradually in the final

Table VI
A Comparison of the Hypothetical Individual Income Tax Rates Generated in Scenario II for Various Business Growth Equations

Business Equity in the Last Year of Entrepreneur's Career	Bequest After Estate Tax	Effective Estate Tax Rate Applicable Under Current Law	Effective Individual Income Tax Under Scenario II
$4,809,785	$2,887,416	44.34	68.21
$5,288,585	$3,296,235	45.94	68.73
$5,767,385	$3,705,111	47.11	69.10
$6,246,185	$4,114,024	48.02	69.40
$6,724,985	$4,522,963	48.74	69.63
$7,203,785	$4,931,921	49.33	69.82
$7,682,585	$5,308,887	50.11	70.16
$8,161,385	$5,672,369	50.89	70.52
$8,640,185	$6,036,712	51.55	70.83
$9,118,985	$6,400,165	52.13	71.10
$9,597,785	$6,763,635	52.63	71.33

year of his career by 10 percent increments. This produces progressively steeper labor income growth during an individual's career. To add some more variation, each of these simulations also assumed that the business was structured as a noncorporate enterprise. All other assumptions are the same as those used in the initial simulation. As can be seen in the last column of the table, as labor income rises an ever increasing effective individual income tax rate is needed under the second scenario to produce the same bequest as under the first scenario.

The fourth simulation varied another one of the assumptions of the initial simulation and investigated the case where the business grew more rapidly. Table VI contains the results of more simulations conducted in this vein. In each of these simulations the business asset growth equation was altered so as to raise the value of the business gradually in the final year of the entrepreneur's career by 10 percent increments. As was the case when the labor income growth equation was altered in a similar fashion, this produced progressively steeper business asset growth which increased the value of business each year. Each of these simulations also assumed that the business was structured as a noncorporate enterprise. All other assumptions are the same as those used in the initial simulation. As can be seen in the last column of the table, as the value of the business rises, an ever increasing effective individual income tax rate is needed under the second scenario to produce the same bequest as under the first scenario.

CONCLUSION

Because the estate tax is a tax on wealth that has been accumulated over an individual's lifetime, it is often assumed to have little or no effect on that person's economic decision making. This is a specious notion. An individual's decision to work and save is part of a life-long, forward-looking process. High effective estate tax rates, such as those currently in effect, cause people to reduce productive effort and lower the size of their targeted estates.

Because many business endeavors require the accumulation of large amounts of business assets, high effective estate tax rates have a particularly deleterious effect on entrepreneurship. The various simulations conducted using the model developed in this paper showed that the estate tax has roughly the same effect on entrepreneurial incentives as a doubling of income tax rates. Moreover, the necessary increase in income tax rates increases with the size of the estate because estate tax rates are themselves progressive. The estate tax is a heavy burden to place on the nation's most productive citizens, especially in light of the fact that the estate tax raises only about 1 percent of federal revenue annually.

APPENDIX

WEALTH ACCUMULATION MODEL: Description & Solution

In an effort to describe the model used in this paper in a clear and concise fashion, Section II presented most of its equations in general, rather than specific form. This appendix describes each of the specific equations used to construct the model.

The model presented in Section II is a mathematical exposition of an individual entrepreneur's wealth accumulation and allocation decision. As stated above, because this process occurs over two distinct periods of an individual's life, the solution of the model is divided into two parts. The first illustrates how wealth is accumulated during an individual's working years. The second part details how a portion of this wealth may be consumed during retirement.

Wealth Accumulation During the Working Years

During an individual's working years, wealth will accumulate as income exceeds consumption. This is given by the simple equation:

$$W_j = W_{j-1} + I_j - C_j \tag{1}$$

where wealth at the end of year j, W_j, is the sum of accumulated wealth from the prior year, W_{j-1}, plus income earned during the current year, I_j, less current year consumption, C_j.

During each year of an entrepreneur's career, income is received from any of three sources: (1) labor compensation; (2) income generated by the growth of the business; and (3) interest income earned on assets held outside the business. All labor income is received from the business and has two components, wages and equity distributions. Interest is earned on all wealth that is not held as part of the business. Income is therefore given by the equation:

$$I_j = (w_j + D_j(1-t_c) + r(W_{j-1} - E_{j-1}))(1-t_i) + (A_j - A_{j-1})(1-t_c) \tag{2}$$

where income received in any year, I_j, is the after-tax sum of wages received during that year, w_j, equity distributions received during that year, D_j, the interest earned on wealth held outside the business during that year, $r(W_{j-1}-E_{j-1})$, and the income generated by the growth of the business during that year (A_j-A_{j-1}). If the business is structured as a taxable corporation, all wage and interest income is assumed to be subject to the individual income tax, t_i, while the income generated by the growth of business assets is assumed to be subject to the corporate income tax, t_c. Income from equity distributions is assumed to be subject to both the individual and corporate income taxes. When the business is

structured as a noncorporate enterprise, all income is subject to the individual income tax and income from equity distributions is not subject to double taxation.[1]

The fraction of an individual's labor compensation received as equity distributions is determined by Φ. Therefore, in any year, income received as wages is given by:

$$w_j = (1-\phi)(L_j)$$

$$for \qquad 0 \leq \phi \leq 1$$

where L_j is total labor compensation that year. Income received as equity distributions is given by:

$$D_j = \phi(L_j)$$

Income from equity distributions is subject to double taxation when the business is structured as a taxable corporation. Therefore a change in Φ will alter I_j when the business is a taxable corporation.

Each year an individual's labor income is given by the equation:

$$L_j = (1-\beta)(\lambda_1 j + \lambda_2 j^2)e^{\alpha(\bar{t}_j - t_j)} \tag{3}$$

where, as before, j is the current year and λ_1 & λ_2 are labor income parameters. Recall that under the second scenario there is no estate tax and the individual and corporate income tax rates are raised until they yield the same after-tax bequest as under the first regime. Higher individual income tax rates would have two affects on labor income. First, increased rates would lower after-tax labor income directly. This effect is captured in equation (2). Secondly, higher tax rates would cause people to reduce their labor force participation. The $e^{\alpha(\bar{t}i-ti)}$ term is used to illustrate this effect. In both scenarios $e^{\alpha} = 1/(1-\bar{t}_i)$ or $\alpha = \ln(1/(1-\bar{t}_i))$. However, because $\bar{t}_i$ is set equal to t_i under the first scenario, $e^{\alpha(\bar{t}i-ti)}$ is equal to 1 (i.e. $e^0 = 1$) and $L_j(t) = (\lambda_1 j + \lambda_2 j)$ in any given year. In the second scenario the value of $e^{\alpha(\bar{t}i-ti)}$ falls to less than 1. This reduces the slope of the labor income equation and labor income falls in any given year. The β term allows the entrepreneur to channel a portion of his labor income to build-up the equity value of the firm.

A quadratic form such as equation (3) is consistent with the stylized facts of the lifecyle.[2] When the complete model is used to simulate the wealth accumulation and allocation process, the two λ's are assigned specific values to represent a particular pattern of lifetime labor income.

---

[1] The equations described in this section were used to examine the case where the business was structured as a taxable corporation. When other business forms were considered the appropriate alterations of the model were made.

[2] See Mark R. Killingsworth, *Labor Supply*, (Cambridge: Cambridge University Press, 1983) p. 208.

Growth of the entrepreneur's business is given by the equation:

$$A_j = (\alpha_1 j + \alpha_2 j^2) + \beta(\lambda_1 j + \lambda_2 j^2) e^{\alpha(\bar{t}_r - t_j)} \quad (4)$$

$$for \quad 0 \leq \beta \leq 1$$

where α_1 and α_2 are business growth parameters. As with the labor income function, during simulations these parameters are assigned specific values so as to represent a particular pattern of business growth. The second half of the equation represents labor income which has been channeled into firm.

Each year, as the business grows, it generates income. As stated above, this income is subject to taxation by either the individual or corporate income taxes, depending on how the firm is structured. The model also allows the entrepreneur to consume a portion of this income. When the firm is structured as a taxable corporation, the after-tax, unconsumed equity, E_j, that an entrepreneur acquires in any year is given by:

$$E_j = (A_j - A_{j-1}) - t_c (A_j - A_{j-1}) - \gamma_1 (A_j - A_{j-1})(1 - t_c) \quad (5)$$

where $(A_j - A_{j-1})$ represents growth of the business, $-t_c(A_j - A_{j-1})$ represents corporate taxes paid on this income, and $-\gamma_1(A_j - A_{j-1})(1-t_c)$ represents after-tax consumption out of this income.

Individuals may consume out of all sources of income. Consumption is given by the equation:

$$C_j = \gamma_0 (w_j + D_j (1 - t_c) + r (W_{j-1} - E_{j-1}))(1 - t_i) + \gamma_1 (A_j - A_{j-1})(1 - t_c) \quad (6)$$

where the marginal and average propensity to consume out of after-tax wage, equity distribution, and interest income, $((w_j + D_j(1-t_c)) + r(W_{j-1}-E_{j-1}))(1-t_i)$ is determined by γ_0, and consumption out of after-tax income generated by the growth of the business, $(A_j-A_{j-1})(1-t_c)$, is determined by γ_1.

Substituting equations (2) and (6) into equation (1) yields:

$$W_j = W_{j-1} + (w_j + D_j (1 - t_c) + r (W_{j-1} - E_{j-1}))(1 - t_i) + (A_j - A_{j-1})(1 - t_c)$$
$$- \gamma_0 (w_j + D_j (1 - t_c) + r (W_{j-1} - E_{j-1}))(1 - t_i) - \gamma_1 (A_j - A_{j-1})(1 - t_c)$$

After regrouping terms and replacing $(1-\gamma_0)(1-t_i)$ and $(1-\gamma_1)(1-t_c)$ with δ_1 and δ_2 respectively, the amount of wealth an individual has accumulated at the end of his career is given by the equation:

$$W_m = W_0(1+\delta_0 r)^m + \delta_0 \sum_{j=1}^{m} (w_j + D_j(1-t_c))(1+\delta_0 r)^{m-j} \quad (7)$$
$$-\delta_0 r \sum_{j=0}^{m-1} E_j (1+\delta_0 r)^{m-j-1} + \delta_1 \sum_{j=1}^{m} (A_j - A_{j-1})(1+\delta_0 r)^{m-j}$$

Careful examination of equations (1) - (7) reveals that income, consumption, and savings are all affected by individual and corporate income taxes.

Wealth Accumulation and Allocation During Retirement

In retirement, as during an individual's working years, the amount of wealth accumulated at the end of any year is given by the simple equation:

$$W_j = W_{j-1} + I_j - C_j \quad (8)$$

where, as before, wealth at the end of year j, W_j, is the sum of accumulated wealth from the prior year, W_{j-1}, and income earned during the current year, I_j, less current year consumption, C_j.

During retirement, income is assumed to flow from two sources, interest income and the equity the individual accrues as a result of the continued growth of the business. Income is therefore given by the equation:

$$I_j = r(W_{j-1} - E_{j-1})(1-t_i) + (A_j - A_{j-1})(1-t_c) \quad (9)$$

where income received in any year, I_j, is the after-tax sum of interest income received during a given year, $r(W_{j-1}-E_{j-1})$, and the equity which accrues from the growth of business assets during that year (A_j-A_{j-1}). As was the case above, interest income is assumed to be subject to the individual income tax, t_i, and income generated by the growth of the business is assumed to be subject to the corporate income tax, t_c when the firm is structured as a taxable corporation.

During retirement the individual may deplete all of the wealth that he has accumulated outside the business. When this occurs the $(W_{j-1}-E_{j-1})$ term will be equal to zero. The individual will then be forced to begin selling equity in the business.

During retirement an individual is assumed to continue to consume at the same level that he did in the last year of his career. Consumption during each year of an

individual's retirement is therefore given by:

$$\bar{C}=\gamma_0(W_m+D_m(1-t_c)+r(W_{m-1}-E_{m-1}))(1-t_l)+\gamma_1(A_m-A_{m-1})(1-t_c) \quad (10)$$

Substituting equation (9) and $\bar{C}$ into equation (8) gives:

$$W_j=W_{j-1}+r(W_{j-1}-E_{j-1})(1-t_l)+(A_j-A_{j-1})(1-t_c)-\bar{C}$$

At death the size of an individual's estate is given by the equation:

$$W_n(1-t_e)=W_m(1+r(1-t_l))^{n-m}-r(1-t_l)\sum_{j=m}^{n-1}E_j(1+r(1-t_l))^{n-j-1}$$
$$+(1-t_c)\sum_{j=m+1}^{n}(A_j-A_{j-1})(1+r(1-t_l))^{n-j}-\sum_{j=m+1}^{n}\bar{C}(1+r(1-t_l))^{n-j} \quad (11)$$

where m and n are equal to the number of years a person works and lives, respectively, and t_e is the estate tax rate.

The Complete Model of the Wealth Accumulation and Allocation Process

A complete model depicting wealth accumulation and allocation over a individual's lifetime emerges when equations (7) and (11) are combined. By assigning values to the variables in the model and to the parameters of the labor and business asset growth functions (equations (3) and (4)) it is possible to illustrate the wealth accumulation and allocation process.

$$W_m=W_0(1+\delta_0 r)^m+\delta_0\sum_{j=1}^{m}(w_j+D_j(1-t_c))(1+\delta_0 r)^{m-j}$$
$$-\delta_0 r\sum_{j=0}^{m-1}E_j(1+\delta_0 r)^{m-j-1}+\delta_1\sum_{j=1}^{m}(A_j-A_{j-1})(1+\delta_0 r)^{m-j} \quad (7)$$

$$W_n(1-t_e)=W_m(1+r(1-t_l))^{n-m}-r(1-t_l)\sum_{j=m}^{n-1}E_j(1+r(1-t_l))^{n-j-1}$$
$$+(1-t_c)\sum_{j=m+1}^{n}(A_j-A_{j-1})(1+r(1-t_l))^{n-j}-\sum_{j=m+1}^{n}\bar{C}(1+r(1-t_l))^{n-j} \quad (11)$$