# Forecasting Taxable Income for the Individual Income Tax Micro Model

January 2007

Prepared by:
Amy Rehder Harris
amy.harris@iowa.gov
(515) 281-0196

Tax Research and Program Analysis Section
Iowa Department of Revenue

The Iowa Department of Revenue individual income tax micro model uses the most recent tax filing data for taxpayers in the state and proposed or estimated tax parameters to project individual and aggregate tax liability for a future tax year. Because taxpayer data only become available a year or two after taxes are due and because income grows over time, it is necessary to project growth in the reported income of taxpayers to accurately project future tax bills. In addition, the aging of the baby boom generation over the next 25 years will lead to a shift in the age distribution of Iowa taxpayers. It is important to incorporate these expected changes in the age distribution of future taxpayers because the Iowa tax code includes several preferential provisions for the elderly.

Individual income reported on federal and state tax returns is grouped into 16 different types (14 for the State of Iowa) including types such as wages, pensions, Social Security, capital gains, dividends, and interest. Of these sources, wages comprises the greatest share of total income for residents followed by schedule E income (such as rent, royalties, and passive business income), pensions, Social Security, capital gains, and taxable interest (see Table 1). Although one growth rate for total income could be assumed, historical data show that the different sources of income do not change at the same rate, particularly during an economic recession. During the most recent down turn in 2001 real wages stagnated with -0.1 percent growth, capital gains income fell 51 percent, and unemployment compensation rose 46 percent (see Table 2). These numbers suggest the components of income should be projected separately.

The Internal Revenue Service captures historical data on these components from individual tax returns and makes these data available to the Department of Revenue on the Individual Return Transaction File (IRTF). The State of Iowa does not key in the components of income reported by Iowa taxpayers. Using the federal data for Iowa taxpayers, aggregate components of income can be computed over the

1996 to 2004 period. Models developed to explain the historical changes in these components over time, are used to forecast the aggregate value for each component of income for all State of Iowa taxpayers. For each component, the level in each projection year is compared to the corresponding level in the base data year to compute an overall growth rate, with an adjustment to account for any independent impacts from population growth and aging. These growth rates are then applied to each individual reporting non-zero income for each particular income source. Iowa tax parameters that are indexed for inflation, including the income tax brackets and the standard deduction, are also forecasted based on Economy.com GDP forecasts. All other tax parameters, e.g., filing thresholds, personal credits, and pension exclusion amounts, are not indexed and are thus maintained at the nominal values specified in current tax law. Future tax liabilities are computed for each individual based on their grown income and the corresponding tax parameters.

With this projection method, two major assumptions underlie the results. First, future aggregate economic conditions will reflect neither an economic expansion nor an economic recession, rather the economy will be assumed to grow at the average historical rate. This reflects the heavy reliance on basic economic forecasts from Economy.com.[1] Second, individual records will not be aged, i.e., no individual demographic and economic transitions are applied to capture the expected changes in income that occur over the life cycle. Rather, the population of taxpayers available in the base data year is assumed to represent the population of taxpayers in the projection year of the same age and filing status. That is, a 35-year-old single, working taxpayer in 2004 is assumed to represent a 35-year-old single, working taxpayer in 2015; likewise a 65-year-old married, retired taxpayer in 2004 is assumed to represent a 65-year-old married, retired taxpayer in 2015. This assumption is reasonable

[1] Economy.com provides historical data for a wide array of economic variables along with projections through 2030 for many of those same series. In particular, the Economy.com forecast for the S&P 500 fluctuates between 2007 and 2016, then grows at a steady 6.0 percent rate for each future year; likewise, its forecasts for future interest rates are stable after 2011.

within a short projection window where no huge behavioral shifts in marital transitions or labor force participation should occur. The model does incorporate projected population growth and the changing age distribution within the population of taxpayers using an age-weighting technique discussed below.

The Census Bureau projects that the Iowa population will increase by 2.0 percent between 2004 and 2015.[2] More dramatic is the expected aging of the population that will occur during that same time. The share of the Iowa population 55 and older is projected to rise by nearly 20 percent over the next 10 years. Because the Iowa individual income tax system includes special tax preferences for elderly residents such as additional elderly credits, higher filing thresholds, a pension income exclusion and exclusion of Social Security benefits, capturing this shift in the age distribution is crucial for accurate projections of future tax liability. Aging is captured by applying an age-specific weight to each taxpayer where the weight accounts for the projected change in the share of the total population comprised by each age relative to the share of that age in the 2004 distribution of taxpayers.[3] For example, the 2015 weight for a 25 year-old taxpayer is 0.897 while the 2015 weight for a 65 year-old taxpayer is 1.476. Under the projected age distribution, the slight population increase and the aging of the population increase the taxpayer count relative to 2004 by 3.2 percent. This reflects the shift in population from those less likely to file taxes (the young) to those more likely to file (the old).

This memo documents the relatively simple models that were used to project growth for the various components of income. For each component, a brief discussion is presented regarding what data series were expected to explain historic changes in the aggregate value of the income source within the State,

[2] Census projections by single-year of age for 2004 through 2030, based on the 2000 Census, were accessed at http://www.census.gov/population/www/projections/projectionsagesex.html, Section III, File 3.

[3] The weight applied to a taxpayer of age *a* equals the ratio of the projected population of age *a* in the target year divided by the number of taxpayers of age *a* in 2004 to population of age *a* in 2004 divided by the number of taxpayers of age *a* in 2004. Age-weights are assigned to the primary taxpayer for all state filing statuses, and also to the secondary taxpayer for those with filing status married separately on the same return.

the specification of the model, the source of forecasts for each independent variable, and what each model implies about the future direction of that component. The discussions are ordered based on the average contribution of that income source to overall taxpayer income of Iowa residents over the last nine years (see Table 1). All models were estimated using aggregate income values for resident taxpayers expressed in real 1996 dollars adjusted using the CPI-U. The memo ends with a presentation of how all these models work together, along with the age weighting, to project total adjusted gross income and tax liability within the individual income tax micro model.

1. Wages

Over the 1996 to 2004 period, wages comprised an average of 69 percent of total income reported by Iowa taxpayers on the federal tax form, by far the most important source of income (see Table 1). Over this same time period, the level of real wages grew 1.8 percent on average, reflecting real wage growth in the State economy (see Table 2). That growth was not smooth, however. The IRTF data suggests that aggregate real wages for Iowa taxpayers fell 2.7 percent in 2000 and another 0.1 percent in 2001. Attempts to explain the large drop in wages in 2000 proved difficult because neither Iowa employment, hours worked, nor hourly wages experienced the same drop in that year.[4] Data provided in the IRS Statistics of Income (SOI) report wages and salaries for Iowa taxpayers grew 0.7 in 2000 and fell 0.7 percent in 2001.[5] Because the historic SOI data for Iowa taxpayers is available for this income type (beginning with 1997) and appears more consistent with actual experience for this key income component, it is used to estimate the model for wages.[6]

[4] The drop can be explained as a decrease in the number of Iowans filing taxes. Matches between the IRTF and the Iowa Master File dropped 2.9 percent between 1999 and 2000, and 2.5 percent for taxpayers reporting positive wage income. This may reflect a drop in wages which pushed people off the tax roles, a drop in tax compliance, or data issues in the construction of the data files. The latter is under investigation.

[5] The SOI data also does not report a drop in the number of Iowa taxpayers between 1999 and 2000, neither for all resident filers nor for filers reporting wages. The IRS will be contacted in an attempt to determine why such a discrepancy exists between the two wage data series when the underlying data source, federal tax returns for Iowans, should be the same.

[6] The SOI data do not report aggregate values for all of the components of income forecasted in the micro model.

Total wages are effectively the number of individuals working in the economy times the average wage times the number of hours worked. These three economic series are thus expected to explain the historic movements in wages and be useful for predicting future wages.

The model for real Iowa wage income is specified as follows:

$$\text{Log(Wage Income)} = \beta + \gamma * \text{Log(Iowa Non-Farm Employment)} + \alpha * \text{Log(Average Wage for Total Private Workers)} + \delta * \text{Log(Average Weekly Hours Worked in Manufacturing)} + \varepsilon$$

The logs are used to transform the multiplicative relationship noted above into a linear equation that can easily be estimated. As expected, all three series have positive coefficients together explaining over 96 percent of the variability in aggregate wages over the last eight years (see Table 3).

Forecasting wages first requires forecasting values for the three explanatory series (see Table 4). Actual data on total non-farm employment is available from Iowa Workforce Development through 2005. Values for 2006 through 2008 are taken from the Iowa Economic Forecast produced by the Institute for Economic Research at the University of Iowa in December 2006. Values for 2009 and later are projected using estimated growth rates for U.S. non-farm employment projected by Economy.com and for the Iowa working population (ages 20 through 64) projected by the U.S. Census. Under these assumptions, Iowa employment is projected to grow from 1.5 million in 2006 to 1.7 million in 2020 where it will remain through the next decade. The forecast for average hourly wages applies the observed historical growth rate in hourly wages of 0.9 percent in every future year, where historical data through 2006 were extracted from the Bureau of Labor Statistics (BLS) web site. The forecasted value of weekly manufacturing hours is set equal to the historical average of 41.5 hours per week (a drop from the actual 2006 value); again historical data through 2006 were extracted from the BLS web site.

Figure 1 presents nominal wages as reported for Iowans in the SOI (solid line) and the projected values of wages under the model (dotted line with triangles) for the 1996 to 2015 period. The figure also presents aggregate nominal wages as reported for Iowans on the IRTF (dashed line). Projected nominal growth rates are 5.3 and 5.7 percent for 2005 and 2006 and average nominal growth for the 2007 to 2015 period is 4.1 percent (see Table 5). Projected real growth rates are 1.9 and 2.2 for 2005 and 2006, with average real growth of 1.8 percent for 2007 to 2015 (see Table 6).

2. Schedule E Income

Schedule E income includes all passive business income from partnerships, S corporations, as well as rental income from properties including farmland, royalties, and income paid from estates and trusts, that is, all types of income reported on the Federal schedule E. Over the 1996 to 2004 period, this income source comprised 5.5 percent of adjusted gross income on average for Iowa resident taxpayers (see Table 1). This income source experienced drops in 2000 and 2001 during the state and national recessions, but has returned to strong growth in recent years (see Table 2). The hodgepodge of income types can be summarized as returns to land assets and returns to business assets. As those returns rise, schedule E income should rise. Thus farmland values and the S&P 500 were tested as explanatory variables, along with various Treasury interest rates.

The preferred model for real Iowa schedule E income is specified as follows:

$$\text{Schedule E Income} = \beta + \gamma * \text{Iowa Farmland Values} + \alpha * \text{S\&P 500} + \delta * \text{Change in S\&P 500} + \varepsilon$$

Coefficients on farmland values, the level and the change in the S&P 500 are positive and explain 78 percent of the variability (see Table 3). Attempts to also include Treasury rates failed as the coefficients came in negative and close to zero.

Forecasting schedule E income requires a forecast of both farmland values and S&P 500. Farmland values are assumed to grow at 3 percent per year, just over half of the average growth rate observed during the 1997 to 2004 period (5.9 percent growth). The forecast for the S&P 500 was taken from Economy.com.

Figure 2 presents nominal schedule E income as reported by Iowans on their federal tax returns (solid line) and the projected values of schedule E income under the model (dotted line with triangles) for the 1996 to 2015 period. Projected nominal growth rates for 2005 and 2006 are 2.8 and 5.5 percent and average nominal growth thereafter (2007-2015) is 4.1 percent (see Table 5). Projected real growth rates for 2005 and 2006 are -0.6 and 2.0 percent with average real growth of 1.8 percent for 2007 to 2015 (see Table 6).

3. Taxable Pension Income

Taxable pension income for Iowa resident taxpayers has been increasing over the last nine years, rising from 4.4 percent of total income to 5.4 percent, as the share of retirees in the State has been increasing (see Table 1).[7] The real growth rate in the late 1990's, topping an average of 7 percent growth a year over 1997 through 1999, far exceeded the average annual growth rate during the early 2000's, at just 2.5 percent (see Table 2). This dramatic slowdown in pension growth reflects, in large part, the drop in asset values such as stock investments that occurred in 2001 and 2002.

The model for real Iowa taxable pension income is specified as follows:

$$\text{Taxable Pension Income} = \beta + \gamma * \text{Iowa population 55 and older} + \alpha * \text{S\&P 500} + \varepsilon$$

[7] The distinction of what pension income is taxable is driven by federal tax rules. Pension income that is not taxable by Iowa because of the $6,000/$12,000 pension exclusion is considered as taxable pension income here.

The coefficients on both independent variables are positive and explain 96 percent of the variation (see Table 3). The population share aged 55 and older did the best at explaining the recent movements in pension income, compared to the share aged 62 and older or 65 and older. This is not surprising because many individuals begin retirement between age 55 and the Social Security early eligibility age of 62, and thus rely solely on pension income, a good portion of which is likely taxable, at the time of retirement.

Forecasting taxable pension income requires forecasts for the Iowa population and the stock market. Population projections for the number of Iowans aged 55 and older were taken from the Census. Future values for the S&P 500 were taken from Economy.com.

Figure 3 presents nominal taxable pension income as reported by Iowans on their federal tax returns (solid line) and the projected values of taxable pension income under the model (dotted line with triangles) for the 1996 to 2015 period. Projected nominal growth rates for 2005 and 2006 are 10.6 and 9.0 percent and average nominal growth thereafter (2007-2015) is 6.9 percent (see Table 5). Projected real growth rates for 2005 and 2006 are 7.0 and 5.3 percent with average real growth for 2007 to 2015 at 4.7 percent. The aging of the baby boom accounts for half of the projected nominal growth and three-fourths of the projected real growth.

4. Total Social Security Benefits

The majority of Social Security benefits in Iowa are received by retired workers. Similar to pension income, Social Security benefits have been increasing as a share of total income reported by Iowa taxpayers from 3.9 percent in 1996 to 4.6 percent in 2004 (see Table 1). Currently, in Iowa, up to 50

percent of individual Social Security benefits can be taxed as income depending on the amount of other income reported on the tax return.[8] Starting in tax year 2007, the Iowa taxable share of Social Security benefits will phase down to zero percent by 2014. Despite this new law, it is still necessary to forecast Social Security benefits because the amount subject to Iowa income tax prior to 2007 must be considered when comparing income to the minimum filing thresholds. In addition, it is useful to estimate the reduction in revenues that accompanies the phase-out in taxation of these Social Security benefits.

Social Security benefits include both amounts paid to retired workers and their dependents (spouses, survivors and children) and to disabled workers and their dependents. Because disabled benefits only comprise 17 percent of total benefits paid, the focus on explaining the level of benefits received by Iowans is on retired benefits. Workers can claim retired benefits as early as age 62. Benefits paid to current beneficiaries are increased for the cost-of-living each year. New Social Security benefits are computed as a function of past wages, however, so the total stream of benefits could be expected to track wages (although technically with somewhat of a lag).

The model for real Iowa total Social Security benefits is specified as follows:

$$\text{Total Social Security Benefits} = \beta + \gamma * \text{Iowa population 62 and older} + \alpha * \text{Iowa Wages} + \varepsilon$$

The coefficients on both independent variables are positive, explaining 86 percent of the variation (see Table 3). Estimates using a one-year lag of wages were less successful. Forecasting Social Security benefits using the above equation requires forecasts for the population and wages. Population numbers are projected by the Census. Wage forecasts are those made using the equation discussed in section 1.

[8] The federal taxable share can be as high as 85 percent. Because the tax treatment of Social Security benefits differs between the federal and state tax code, total benefits are forecasted and the federal and state taxable shares are computed within the micro model.

Figure 4 presents nominal total Social Security benefits as reported by Iowans on their federal tax returns (solid line) and the projected values of total Social Security benefits under the model (dotted line with triangles) for the 1996 to 2015 period. Projected nominal growth rates for 2005 and 2006 are 6.6 and 7.0 percent and average nominal growth thereafter (2007-2015) is 6.8 percent (see Table 5). Projected real growth rates for 2005 and 2006 are 3.1 and 3.5 percent with average real growth for 2007 to 2015 of 4.1 percent (see Table 6). The first wave of baby boomers reaches age 62 in 2008, driving the rise in this component of income.

5. Capital Gains Income

Taxable capital gains realizations include both gains and losses and comprise 4.2 percent of Iowa income on average reported by taxpayers (see Table 1). This source of income is extremely volatile, experiencing increases of over 40 percent in 1997 and 2004 and a decrease of over 50 percent in 2001 (see Table 2). Projections of capital gains or losses are difficult because the economic factors used to explain historic realizations, such as the stock market, are very difficult to forecast. Although forecasts from Economy.com are used in models of various other components, other researchers (in particular the Congressional Budget Office) have found that using such forecasts for capital gains projections can give misleading results. Therefore, realizations are projected using two different methods. Current year realizations, those for years between the most recent tax data and the current date where asset price information is available, are projected using the estimated equation presented below. Future realizations are projected using some numbers based on the Congressional Budget Office (CBO) mean reversion model for realizations, explained in more detail below.

Capital gains reported as income reflect gains that individuals have realized in the last year usually through the sale of an asset such as a share of stock. Capital losses can also be claimed, although reported losses are limited to $3,000 per tax year.[9] With the rise of mutual funds in the last 20 years, many taxpayers are forced to realize gains on their mutual fund holdings even when they did not sell any shares during the tax year. This reflects the trading activity of the mutual fund account which includes many purchases and sales of assets throughout the years. Regardless, both actual asset sales and mutual fund realizations are highly correlated with the level of the stock market and changes in that level. (Since 1997, capital gains realizations from the sale of a residential house have been excluded from taxable income for the vast majority of individuals.)

The model for real Iowa capital gains realizations is specified as follows:

$$\text{Capital Gains Income} = \beta + \gamma * \text{S\&P 500} + \alpha * \text{Change in S\&P 500} + \varepsilon$$

As expected, both series have positive coefficients, together explaining over 84 percent of the variability in aggregate realizations over the last nine years (see Table 3). The equation relates observed stock market levels and changes in levels to aggregate realizations over the 1996 to 2004 period. S&P 500 values are known for 2005 and 2006, therefore, those values and the above equation are used to project capital gains realization for 2005 and 2006. One complication arises in that the model's predicted value of realizations for 2004 differs significantly from the observed value. To account for the prediction error, an add-factor of -$610.3 million, the gap between predicted and actual in 2004, was applied to the projected values for 2005 and 2006 as well.[10] Realizations from 2007 and later are forecasted using a different method discussed below.

[9] Because the observed distribution of capital gains income is truncated at -$3,000, the application of the growth factor is adjusted accordingly (the method is discussed in the final section).

[10] Add-factors are applied whenever the model projects a real value in 2004 that differs from the actual value by more than 5 percent. The OECD defines an add-factor as "the adjustment made to equation- based projection over the forecasting

The choice to use different methods for forecasting capital gains realizations for current years and future years is based on work published by the CBO.[11] When asset values are known, CBO uses historical relationships between those values and realizations to project capital gains income. For the future years, CBO assumes mean reversion in the share of capital gains realizations relative to GDP. Although the experiences of the late 1990's stock market boom raised doubt about the reliability of a mean reversion model, the fall in prices during 2001 and 2002 calmed those doubts. CBO uses a 5-year mean reversion from the most recent year's ratio of capital gains to GDP to the long-run historical average ratio of 2.8 percent, with some adjustments for the prevailing capital gains tax rate.[12] Iowa data reveal an historical average ratio of capital gains realizations by Iowa residents relative to Iowa GDP by State of 2.25 percent (see the horizontal line in Figure 5). The current Iowa ratio, forecasted as 1.85 percent in 2006, is projected to revert to the historical average ratio during the five years starting in 2007 (see the dashed line in Figure 5). Under the mean reversion method, future growth in real capital gains income equals expected growth in real Iowa GDP, which is assumed to be two percent, rather than the much higher expected growth in stock market values.

Figure 5 presents nominal total capital gains realizations as reported by Iowans on their federal tax returns (solid line) and the projected values of capital gains under the model (dotted line with triangles) for the 1996 to 2015 period. Projected nominal growth rates for 2005 and 2006 are -8.0 and 20.3

---

period. For example, if an equation has under-predicted a variable in recent periods, then an "add factor" may be added to the equation if it is judged that the equation will under-predict over the forecast period as well. In short, add factors are equation- residuals applied over the forecast period." OECD Glossary of Statistical Terms, accessed at http://stats.oecd.org/glossary/detail.asp?ID=44 on January 26, 2007.

[11] See CBO, *Description of CBO's Models and Methods for Projecting Federal Revenues*, Washington, D.C., May 2001, p. 11; and Kim, Jangryoul, Preston Miller, and Larry Ozanne, *Estimating and Forecasting Capital Gains with Quarterly Models*, Congressional Budget Office, Technical Paper 2004-14, Washington, D. C., September 2004.

[12] If the tax rate is below the historical average, capital gains realizations as a share of GDP are projected to be above the historical average. Recently CBO has introduced new methods for projecting capital gains realizations for years in which asset values are unknown, but not too far into the future, i.e., the near-term. For simplicity, the CBO long-run technique is used for all future years in the forecast for Iowa.

percent and average nominal growth thereafter (2007-2015) is 6.4 percent (see Table 5). Projected real growth rates for 2005 and 2006 are -11.0 and 16.3 percent with average real growth for 2007 to 2015 as 4.4 percent (see Table 6). The negative growth rate projected for 2005 reflects the strong positive change in 2004 relative to the increase in 2005. Note the two percent real growth for 2012 and later, the years after the ratio of capital gains to Iowa GDP is projected to have returned to the historical mean.

Under this two-part method, capital gains realizations rise from 3.7 percent of total income for Iowa taxpayers in 2004 to 4.4 percent by 2011. Figure 5 also presents the alternative if the capital gains model equation were used to forecast all future years of capital gains income. The alternative forecast (dotted line with circles) would suggest a level of capital gains income in 2015 that is 41 percent higher than under the preferred method (dotted line with triangles).

6. Taxable Interest Income

Taxable interest is reported on both the Federal and the Iowa 1040. However, statutory differences exist between what interest is taxable by the federal government and what interest is taxable by the state. For example, interest earned on Treasury securities is taxable by the federal government but not by the state while interest earned on most state and local municipal bonds are taxable by the state but not by the federal government. State taxable interest is used to compute state adjusted gross income. However, federal taxable interest is also used in the calculation of taxable Social Security benefits for both federal and state adjusted gross income. Thus both taxable interest amounts are used to compute state tax liability. Unfortunately, unlike federal taxable interest, state taxable interest is not available in the micro model base data. The question remains whether federal taxable interest is a close enough

proxy for state taxable interest or whether it is necessary to estimate a separate state taxable interest value.

Both state and federal taxable interest are available for those who filed electronically. In 2003, nearly 87 percent of taxpayers reporting non-zero taxable interest on their state return reported the exact same amount as taxable on their federal return. For 2004, over 88 percent of state and federal taxable interest amounts are equal. The biggest differences in federal and state taxable interest amounts are reported by individuals with the highest incomes, where state exceeds federal in most cases. A closer look at all those reporting different numbers on the federal and state returns reveals the aggregate differences are quite small, less than 0.5 percent of the total. Therefore, it is not economical to estimate state taxable interest as a different amount than the available federal taxable interest variable.

Federal taxable interest comprises 3.5 percent of total income on average for Iowa taxpayers, where that share has been falling over time (see Table 1). Taxable interest includes interest earned on savings accounts, CD's, corporate and government bonds, and money market funds. For most of these financial instruments, the interest paid is linked to the federal funds rate. Therefore, the model for real taxable interest is specified as follows:

$$\text{Taxable Interest Income} = \beta + \gamma * \text{Federal Funds Rate} + \varepsilon$$

The coefficient on the real federal funds rate is positive and can explain over 86 percent of the variation in interest income (see Table 3). The forecast of taxable interest income predicts a strong rebound in interest income over the 2005 and 2006 tax years, reflecting the steady rate increases by the Federal Open Market Committee over the last 30 months (see Figure 6). Economy.com projects the rate will fall slightly over the 2007 to 2010 period from just under 5 percent to 4.5 percent, but then remain steady.

Figure 6 presents nominal taxable interest income as reported by Iowans on their federal tax returns (solid line) and the projected values of taxable interest income under the model (dotted line with triangles) for the 1996 to 2015 period. An add-factor of -$184.9 million, the gap between predicted and actual in 2004, was applied to the projected values. Projected nominal growth rates for 2005 and 2006 are 36.6 and 27.1 percent and average nominal growth thereafter (2007-2015) is 1.6 percent (see Table 5). Projected real growth rates for 2005 and 2006 are 32.2 and 22.9 percent with average real growth just below zero for 2007 to 2015 (see Table 6). The flat real growth reflects the flat interest forecast after 2010.

7. Business Income

Business income or loss as reported on the Federal schedule C reflects income received by taxpayers who are self-employed or proprietors. It comprises just over 3 percent of total income on average reported by Iowa taxpayers (see Table 1). Business profits or losses should reflect general movements in the business economy which can be proxied by changes in the stock market. Therefore, the model used to forecast real business income is the following:

$$\text{Business Income} = \beta + \gamma * \text{Change in S\&P 500} + \varepsilon$$

Both the intercept and the stock market change coefficient are positive, but can only explain 58 percent of the variation (see Table 3). A model that also includes the level of the S&P 500 had a worse fit, and the coefficient on that parameter was close to zero. Attempts to include National Income and Product Accounts before tax profits or U.S. proprietor income series in the equation also proved unsuccessful. Therefore, this limited model was used, although work will continue to improve this specification. The forecast for the change in the S&P value is based on data from Economy.com.

Figure 7 presents nominal business income as reported by Iowans on their federal tax returns (solid line) and the projected values of business income under the model (dotted line with triangles) for the 1996 to 2015 period. An add-factor of -$112.7 million, the gap between predicted in actual in 2004, was applied to the projected values. Projected nominal growth rates for 2005 and 2006 are -0.3 and 3.7 percent and average nominal growth thereafter (2007-2015) is 2.3 percent (see Table 5). Projected real growth rates for 2005 and 2006 are -3.6 and 0.2 percent with -0.1 percent growth for 2007 to 2015 (see Table 6). The flat growth reflects the projected flat rate of change in the S&P 500 after 2007 (as opposed to steady growth in the level of the S&P 500 which is not included in this model).

8. Dividends

Dividend income is received by taxpayers who own shares in publicly-traded companies held in accounts that are taxable (as opposed to defined contribution pensions, IRAs or some other tax-preferred investment account). The average share of Iowa income reported by taxpayers received in the form of dividends is 1.8 percent (see Table 1). Because dividends usually reflect the profitability of publicly-traded businesses, it is reasonable to believe the value of the stock market and changes in the value of the stock market would provide a good estimation of dividend income.

The model for real Iowa dividend income is specified as follows:

$$\text{Dividend Income} = \beta + \gamma * \text{S\&P 500} + \alpha * \text{Change in S\&P 500} + \varepsilon$$

As expected, both series have positive coefficients together explaining 83 percent of the variability in taxable dividends over the last nine years (see Table 3). Again, the forecast for the level and change in the S&P value is based on data from Economy.com.

Figure 8 presents nominal dividend income as reported by Iowans on their federal tax returns (solid line) and the projected values of dividend income under the model (dotted line with triangles) for the 1996 to 2015 period. An add-factor of -$77.9 million, the gap between predicted and actual in 2004, was applied to the projected values. Projected nominal growth rates for 2005 and 2006 are -2.7 and 7.2 percent and average nominal growth thereafter (2007-2015) is 4.9 percent, driven by the steady six percent annual nominal increase projected for the stock market (see Table 5). Projected real growth rates for 2005 and 2006 are -5.8 and 3.6 percent with 2.5 percent average annual growth for 2007 to 2015 (see Table 6). As can be seen in Figure 7, the negative growth rates projected for 2005 do not reflect an expected outcome below the general increasing trend, rather they reflect the above trend growth in 2004.

9. Taxable IRA Distributions

The individual retirement account (IRA) is a tax-deferred savings tool established in the federal tax code in 1974 to encourage saving for those without employer-provided pensions. Eligibility to contribute to IRAs was expanded to all taxpayers in 1981. Taxpayers were allowed to contribute $2,000 annually to their account, and for those with adjusted gross income below a threshold, that contribution was deductible from their taxable income in the year of contribution. Earnings on the savings are not taxable. Upon reaching 59 ½ an individual is able to begin to withdraw IRA savings, however, because the contributions were not taxed as income, the withdrawals are taxable. Taxpayers are required to start withdrawing amounts from the IRA by age 70 ½ .

In 1997, a new form of IRA was created, the Roth IRA, where contributions are made with after-tax dollars and withdrawals in retirement are tax-free. This savings tool competes with the traditional IRA, where taxpayers must decide whether they prefer to pay taxes on the savings at the time of

investment, the Roth IRA, or at the time of withdrawal, the traditional IRA. The Roth IRA is advantageous for a taxpayer who expects to face an equal or higher tax bracket in retirement as in the year of contribution. This choice also matters to the government who must estimate when those tax payments will be received

In 2001, the maximum contribution amounts for both the traditional and Roth IRA were expanded to $3,000 for 2002-2004 tax years, $4,000 for 2005-2007, $5,000 in 2008, and indexed for inflation thereafter. At the same time, taxpayers over age 50 were allowed additional contributions to help them bolster savings in the short time before their retirement. Individuals with income below a threshold were given the option to convert any traditional IRA balances to Roth IRA balances, whereupon the taxes on the original tax-deductible IRA amounts must be paid.

In 2004, nationally over $3.0 trillion was held in IRA accounts. Assets have been on a steady increase since 1975, although they did experience a dip in 2001 and 2002 with the drop in the stock market. In 2004, 12.8 percent of U.S. households, 14.3 million, held a Roth IRA, while 32.8 percent, or 36.7 million, held a traditional IRA.[13] Although the share of households with a Roth IRA is over one-third the share with a traditional IRA, just 3 percent of assets held in IRAs were in Roth accounts in 2004. In 2001, contributions into Roth IRAs exceeded those into traditional IRAs and recent tax law changes will liberalize the ability to convert traditional balances to Roths. Thus it is reasonable to believe that the assets in Roth IRAs as a share of all IRA assets will increase substantially over time, although the exact amount is highly uncertain. The growth of Roth IRAs is important to the forecasting of taxable IRA distributions because future withdrawals from Roths are not taxable. In addition, many of the taxable distributions reported in recent tax years likely reflect conversions of traditional IRA balances

[13]Holden, Sarah, et.al., "The Individual Retirement Account at Age 30: A Retrospective," Investment Company Institute Perspective, Vol. 11, No. 1, February 2005.

into Roth IRA balances (an assumption based on the reporting of taxable distributions by many taxpayers younger than 59 ½).

The share of Iowa income reported by taxpayers attributable to taxable IRA distributions has risen from 0.9 percent in 1996 to 1.5 percent in 2004 (see Table 1). Taxable IRA distributions should reflect both the level of assets held in IRAs and the number of people who are likely, or required, to take distributions. The model for real Iowa taxable IRA distributions is specified as follows:

$$\text{Taxable IRA Distributions} = \beta + \gamma * \text{S\&P 500} + \alpha * \text{Population 70plus} + \varepsilon$$

As expected, both series have positive coefficients, together explaining 95 percent of the variability in taxable dividends over the last nine years (see Table 3). The share aged 70 and older reflects those required to take distributions; attempts to include younger ages reduced the explanatory power of the model. Again, the forecast for the level and change in the S&P value is based on data from Economy.com and population projections are based on data from the Census.

Figure 9 presents nominal taxable IRA distributions as reported by Iowans on their federal tax returns (solid line) and the projected values of taxable IRA distributions under the model (dotted line with triangles) for the 1996 to 2015 period. Projected nominal growth rates for 2005 and 2006 are 10.1 and 10.2 percent (see Table 5). Starting in 2017, the count aged 70 and older in Iowa is projected to grow almost 3 percent per year. In addition to the steady 6 percent annual nominal increase in the stock market, this fast growth in the population would lead forecasted annual growth of over 9 percent per year for 2017 through 2020 and average 7 percent growth over the next 10 years. In light of the expected rise of Roth IRAs, this growth in taxable distributions seems too high. Therefore, the coefficient on the population variable was gradually reduced starting in 2007 (10 years after the inception of the Roth IRA) to serve as an ad hoc adjustment for the expected rise of Roths, and thus

non-taxable distributions (as well as the eventual exhaustion of conversion dollars). The adjustment reduces the forecasted average nominal growth rate to 5.6 percent for 2007 to 2015 and the average real growth rate to 3.2 percent for the same time period (see Tables 5 and 6).

10. Tax-Exempt Interest

Tax-exempt interest is only reported on the Federal 1040 and is only used in the micro model to calculate taxable Social Security benefits for Federal and State purposes. The Social Security worksheet, for both Federal and State, uses the Federal definition of tax-exempt interest (and the Federal concept of taxable interest). Federal tax-exempt interest would be received by taxpayers who hold municipal bonds.

This income source comprised just 0.8 percent on average of Iowa income reported by taxpayers (see Table 1). Unlike many other investment-linked income sources, tax-exempt interest fell in 1998 and 1999 as well as 2000 and 2001 (see Table 2). Attempts at developing a model to explain the historical path of tax-exempt interest were unsuccessful. Therefore, this component of income was forecast by projecting 1.2 percent real annual growth, 3.5 percent nominal annual growth (see Figure 10, Tables 5 and 6). This growth is higher than the projected average annual growth in taxable interest of 1.6 percent, but less than the projected average annual growth in dividends and capital gains of 5.6 and 6.4 percent.

11. State Refunds

State refunds as reported on the Federal 1040 are only used in the micro model to calculate taxable Social Security benefits for federal and state purposes. Historical aggregate state refunds reported by Iowa residents are highly correlated with wages which is not surprising given most refunds are claimed

by wage earners. At the aggregate level, as wages rise, withholding rises, and the amount of state refunds rise. However, wages alone cannot fully explain the pattern of state refunds over the past nine years. Individuals may over withhold from wages to cover possible earnings from passive business activity, interest income, or capital gains. Thus if these income sources fall in a given year, refunds should rise accordingly.

State refunds comprise just under 0.5 percent of income reported by Iowa taxpayers on average (see Table 1). Because refunds claimed on the federal return reflect state tax filings from the previous year, it is reasonable to consider one-year lagged values of wages or non-earned income sources as explanatory variables.

The model for real Iowa state refunds (as claimed the federal return) is specified as follows:

$$\text{State Refunds} = \beta + \gamma * \text{Lag(Wages)} + \alpha * \text{Lag(Schedule E Income)} + \varepsilon$$

The coefficient on lagged wages is positive as expected while the coefficient on schedule E income is negative (see Table 3). Although lagged capital gains realizations also had a negative coefficient when added separately to the model, the fit was the best when only schedule E income was used.

The forecast for state refunds can be made using the forecasts for wages and schedule E income, based on the respective models discussed above. The model does a reasonable job predicting historical refund values. However, additional ex-post adjustments were required to account for the recent changes in the Iowa withholding formula that have reduced refunds. Refunds paid to taxpayers for the 2005 tax year were 15 percent below refunds paid for the 2004 tax year in contrasts to the 6 percent growth in refunds seen between 2003 and 2004. Thus, it is expected that state refunds claimed on federal tax returns for tax year 2006 will be 15 percent below the amount forecasted by the model.

This reduction is phased down to 10 percent over the 2007 through 2015 forecast years (see Figure 11). Projected nominal growth rates for 2005 and 2006 are -3.6 and -5.5 percent and average nominal growth thereafter (2007-2015) is 5.5 percent (see Table 5). Projected real growth rates for 2005 and 2006 are -6.7 and -8.7 with 3.2 percent average real growth for 2007 to 2015 (see Table 6).

12. Unemployment Compensation

Unemployment compensation is received by Iowa workers eligible for the program: those totally or partially unemployed who earned a minimum amount of wages in work covered by unemployment insurance in the last 15 to 18 months, lost their job through no fault of their own, and are able and available for work. Unemployment compensation amounts are based on the wages earned by the worker prior to the unemployment spell and average 0.4 percent of Iowa income reported by taxpayers (see Table 1). Although some individuals experience unemployment spells at all points in a business cycle, overall unemployment compensation should rise and fall with the unemployment rate. Large increases were observed in 2001 and 2002, while unemployment compensation dropped significantly in 2004 (see Table 2).

The model for real Iowa unemployment compensation is specified as follows:

$$\text{Unemployment Compensation} = \beta + \gamma * \text{Insured Unemployment Rate} + \varepsilon$$

The unemployment rate has a large positive coefficient and explains 93 percent of the variability in unemployment compensation over the last nine years (see Table 3). The rate used is the annual average of the unemployment rate of insured Iowa workers reported weekly by the Department of Labor.[14] The long-run forecast for the unemployment rate is set equal to the average unemployment

[14] The insured unemployment rate, covering only those receiving unemployment insurance relative to the number working in UI covered employment, differs from the general unemployment rate, covering all individuals in the labor force looking

rate observed in the last three years (removing the boom years of 1996-2000 and the recession years of 2001-2003) of 1.75 percent. In the short-run, actual data is used for 2005 and 2006, and the below-average 1.64 percent rate observed for 2006 is smoothed to the long-run forecast over five years.

Figure 12 presents nominal unemployment compensation as reported by Iowans on their federal tax returns (solid line) and the projected values of unemployment compensation under the model (dotted line with triangles) for the 1996 to 2015 period. The boom and recession are clearly seen in the historical data. Going forward, the growth is driven by expected inflation in wages, and thus unemployment compensation. Projected nominal growth rates for 2005 and 2006 are -4.7 and -4.9 percent and average nominal growth thereafter (2007-2015) is 2.8 percent (see Table 5). The 7.6 percent growth rate for 2007 reflects the smoothing technique used for the insured unemployment rate. Forecasted unemployment rates are equal to 1.75 percent, the average for the 2004 to 2006 period, averaged with the previous annual value. Thus in 2007, the forecasted unemployment rate is 1.70=((1.75+1.64)/2), a jump from the low 1.64 observed in 2006. Projected real growth rates for 2005 and 2006 are -7.8 and -8.1 percent with a 1.1 percent average growth rate over 2007 to 2015 (see Table 6).

13. Farm income

Farm income or loss reflects amounts reported on the Federal schedule F. Farmers report income using either a cash or accrual method. Both focus on earnings from the sale of livestock or crops net the expenses incurred. In addition, payments received from agricultural programs are also reported as income. In 2004, over half of taxpayers reporting non-zero farm income reported losses. Recently, aggregate farm income has been negative as well. Figure 13 presents farm income as reported by

for work regardless of previous employment status. The former can be much lower than the latter, e.g., 2.1 percent versus 3.5 percent in December 2006.

taxpayers over the last 11 years. A downward trend is evident, although it also appears to rise and fall with the general economy (rising in 1999, falling sharply in 2001 and 2002 and rising again in 2003).

The model for real Iowa farm income is specified as follows:

$$\text{Farm Income} = \beta + \gamma * \text{Gross Domestic Product for Iowa} + \alpha * \text{Time Trend} + \varepsilon$$

As expected, the coefficient on the time trend (year minus 1996) is negative (see Table 3). The coefficient on GDP for Iowa is positive, but not much different from zero. The model can explain 67 percent of the variability in farm income over the last nine years. GDP for Iowa forecast values for 2006 through 2008 are taken from the Iowa Economic Forecast produced by the Institute for Economic Research at the University of Iowa. For 2009 and later, 2 percent real growth, and 4.6 percent nominal growth in Iowa GDP is assumed, where the latter equals the historical average nominal growth rate. The time trend is adjusted to restrain its large negative impacts on the forecast, using 90 percent of the coefficient in 2005, phasing down to 79.5 percent by 2018. This pushes farm income into positive territory throughout the forecast. This was assumed to be more likely than ongoing negative aggregate farm income, particularly in light of the growing intersection of farming and the energy sector.

Figure 13 presents nominal farm income as reported by Iowans on their federal tax returns (solid line) and the projected values of farm income under the model (dotted line with triangles) for the 1996 to 2015 period. An add-factor of $35.1 million, the gap between predicted and actual in 2004, was applied to the projected values. For 2005, nominal farm income is projected to rise to $21.3 million from the negative $5.4 million observed in the 2004 data. For 2006, nominal farm income is projected to jump to $58.5 million. This growth is projected to reverse in 2009, leading to an average nominal growth rate for 2007 to 2015 of -15.3 percent (see Table 5). The average real growth rate for 2007 to 2015 is projected to be -14.7 percent.

14. Other gains

Other gains, as reported on the Federal return, reflect income or losses from the sale of business assets and comprise just 0.2 percent of income reported by Iowa taxpayers (see Table 1). Business profits or losses should correlate with this component of income. It is also reasonable to believe that sales of assets may correlate with movements in the corporate sector which can be captured by changes in the S&P 500. The model for real other gains is specified as follows:

$$\text{Other Gains} = \beta + \gamma * \text{Change in S\&P 500} + \alpha * \text{Business Income} + \varepsilon$$

As expected, the coefficient on the change in the S&P 500 is positive while the coefficient on business income is negative (see Table 3). It appears that individuals sell assets when business income falls. The model can explain 76 percent of the variability in other gains income over the last nine years. S&P 500 forecasts come from Economy.com and business income forecasts are those produced by the model explained in section 7.

Figure 14 presents nominal other gains as reported by Iowans on their federal tax returns (solid line) and the projected values of other gains under the model (dotted line with triangles) for the 1996 to 2015 period. Projected nominal growth rates for 2005 and 2006 are -5.2 and 3.7 percent and average nominal growth thereafter (2007-2015) is 2.3 percent (see Table 5). Projected real growth rates for 2005 and 2006 are -8.3 and 0.2 percent with average real growth for 2007 to 2015 of -0.1 percent.

15. Alimony Received

Alimony received includes income received by divorced taxpayers from ex-spouses. Success in modeling the historical values for this component of income was limited. Attempted explanatory

variables include wages, interest rates, and the insured unemployment rate. The final specification chosen for real alimony received is the following:

$$\text{Alimony Received} = \beta + \gamma * \text{Insured Unemployment Rate} + \varepsilon$$

Because payments of alimony will likely fall when unemployment rises, and thus ex-spouses are less likely to be able to pay the agreed amounts, the negative coefficient on the variable is reasonable (see Table 3). The model is only able to explain 25 percent of the variation in alimony payments over the last nine years. Because this component of income comprises less than one-tenth of one percent of total income on average, no more effort was expended to consider additional data that might improve the model's fit (see Table 1). The long-run forecast for the unemployment rate is the average unemployment observed in the last three years (removing the boom years of 1996-2000 and the recession years of 2001-2003). In the short-run, actual data is used for 2005 and 2006, and the below-average 1.64 percent rate observed for 2006 is smoothed to the long-run forecast over five years.

Figure 15 presents nominal alimony received as reported by Iowans on their federal tax returns (solid line) and the projected values of alimony received under the model (dotted line with triangles) for the 1996 to 2015 period. Projected nominal growth rates for 2005 and 2006 are 0.3 and 3.9 percent and average nominal growth thereafter (2007-2015) is 2.2 percent (see Table 5). Projected real growth rates for 2005 and 2006 were -3.0 and 0.4 percent with real average annual growth for 2007 to 2015 or -0.1 percent (see Table 6).

16. Other income

This line on the Federal return (as well as on the State return) includes all income not reported on any other line in the tax return. Examples of types of other income include taxable distributions of education or health savings accounts, prizes or gambling winnings, jury duty pay, income from an

activity not engaged in for profit, and loss on certain corrective distributions of excess deferrals. Given the disparate nature of this income it is difficult to determine any source that explained changes over time. Figure 16 shows the historical pattern of aggregate other income, showing a general downward trend over time and negative aggregate values in six of the nine years.

The model for real Iowa other income is specified as follows:

$$\text{Other Income} = \beta + \gamma * \text{Time Trend} + \varepsilon$$

The coefficient on the time trend (year minus 1996) is negative (see Table 3). The model can explain 66 percent of the variability in other income over the last nine years.

The time trend is turned off after 2004 such that the forecast for real other income is constant. Figure 16 presents nominal other income as reported by Iowans on their federal tax returns (solid line) and the projected values of other income under the model (dotted line with triangles) for the 1996 to 2015 period. An add-factor of $27.4 million, the gap between predicted and actual in 2004, was applied to the projected values. Projected nominal growth rates for 2005 and 2006 are 3.4 and 3.5 percent and average nominal growth thereafter (2007-2015) is 2.2 percent, keeping in mind the aggregate amount of other income remains negative.

17. Adjustments and Credits

In addition to forecasting growth for each of the components of income, it is also necessary to project growth for the various adjustments and credits reported on the Federal and State income tax returns. Currently growth rates for almost all such variables are based on forecasted growth rates for correlated income sources. For example, the growth rate for moving expenses, deductible self employment taxes, alimony paid, the research credit, and itemized deductions is set equal to the forecasted growth rate of

wages. The Iowa capital gains exclusion and self-employed health deductions are set to grow with GDP for Iowa. The Iowa earned income tax credit (EITC) is not explicitly grown, rather the federal EITC is recomputed each year based on changes in taxpayer's AGI and the inflation-indexed EITC parameters and then the Iowa EITC, a share of the federal, is calculated.

Federal income tax payments and federal income tax refunds were modeled and forecasted in order to capture the implementation and scheduled expiration of recent federal tax cuts including the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) and the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA).

The model used for Federal income tax payments is the following:

$$\text{Federal Income Tax Payments} = \beta + \gamma*\text{Wages} + \alpha*\text{Capital Gains} + \delta*\text{EGTRRA Tax Cut Indicator} + \theta*\text{JGTRRA Tax Cut Indicator} + \varepsilon$$

The model used for Federal income tax refunds is the following:

$$\text{Federal Income Tax Refunds} = \beta + \gamma*\text{Wages} + \alpha*\text{Schedule E Income} + \delta*\text{EGTRRA Tax Cut Indicator} + \theta*\text{JGTRRA Tax Cut Indicator} + \varepsilon$$

The coefficients on the tax cuts are negative for the payments model and positive for the refunds model (see Table 3). The wages variable has a positive coefficient in both models, reflecting the fact that many wage earners have withholding that exceeds their tax liability, thus as wages rise both payments and refunds would increase. Capital gains have a positive impact on tax payments; when realizations rise, tax liability rises. Schedule E income has a negative impact on refunds; when returns on assets rise, tax refunds fall. Figures 17 and 18 present the historical and forecasted federal income tax payments and refunds. The 2001 and 2002 drops in federal payments reflect the tax cuts passed those years which are scheduled to expire in 2010, hence the sharp forecasted rise in payments that year.

Similarly, refunds rose in 2001 and 2002. The drop in refunds due to the expiration of those cuts appears in 2012.

18. Applying Growth Factors to the Components of Income

Once aggregate forecasts for each component of income have been made, these forecasts are translated into growth rates and applied to the individual data in the individual income tax base file. For the vast majority of income components, those with only positive values, the growth factors are applied in a straightforward manner. For each source of income, an individual's record in a future year is simply current income increased by the ratio of aggregate income in the future year over aggregate income in the base year. For example, wages are projected to grow 29 percent between 2004 and 2010, so any individual reporting positive wages on the 2004 base file is assigned an amount of wages 29 percent larger when the data is grown to 2010 (see Case 1 in Table 7).

Six sources of income require additional consideration because it is possible for taxpayers to report negative values. These sources include schedule E income, farm income, business income, capital gains, other gains, and other income amounts. Growth factors for these sources of income are applied using three different techniques. For those types where aggregate income remains positive in all years with steady growth projections, including schedule E income, business income, and other gains, the growth rate is applied using a formula that changes all individual values by the same magnitude and in the same direction as the aggregate. For example, if the aggregate growth factor for schedule E income is projected to be 26.5 percent, then an individual reporting $10,000 in schedule E income in the base year would be projected to have $12,653 of schedule E income in the forecast year, an increase of $2,653 (see Case 2 in Table 7). Likewise an individual reporting -$10,000 in schedule E income in the base year would be projected to have -$7,347 of schedule E income in the forecast year, also an

increase of $2,653. Alternatively, applying a 26.5 percent increase across the board, regardless of whether the initial value is negative, would change the second taxpayer's forecasted schedule E income to -$12,653. If one believes that this income source is growing, it seems reasonable to assign higher absolute values for every taxpayer, not just those reporting positive values. The former technique does lead to a slight misalignment with the aggregate growth forecasted for the particular component of income, but that misalignment is ignored because it is believed moving incomes in the same direction is more plausible.

The second special adjustment is applied only to capital gains. The unique treatment is necessary because taxpayers can report negative capital gains, but those losses are limited to -$3,000 in any one tax year. Because a taxpayer reporting the maximum capital loss most likely suffered a loss more than that amount in the given year, it would not make sense to assume growth for a forecast year would push all of these taxpayers' losses above $3,000. Thus the growth adjustment, both increases and decreases, are only applied to individuals reporting non-zero capital gains that are above the loss limit. The projected growth of 55.6 percent is applied to a taxpayer reporting positive gains and a taxpayer reporting negative gains that fall short of the loss limit (see Case 3 in Table 7). Both are projected to experience an increase of $667 in capital gains. The taxpayer reporting the loss limit, however, is assumed to remain at that loss limit (thus assuming the losses experienced exceeded $3,667).

The third special adjustment is applied to farm income and the other income categories. Because these income types have negative aggregate amounts in many years and flip between negative and positive aggregate amounts in history, the techniques used above would lead to results that were far from the desired ones. Therefore, an additive method was used to adjust these income types at the micro level. For years when the target year aggregate is less than the base year aggregate, the average absolute

value of the difference is subtracted from the income of each individual reporting a non-zero amount where the average is calculated as the target minus the base divided by the number of non-zero values in the base data. Conversely, when the target year aggregate is greater than the base year aggregate, the average absolute value of the difference is added to the income of each individual reporting a non-zero amount. For example, aggregate farm income is projected to grow from -$5.4 million in 2004 to $37.3 million in 2010 (see Case 4 in Table 7). This is a -790 percent change in farm income, but applying a -790 percent change to the absolute value of each farmer's income would not lead to the desired aggregate amount of farm income. Instead the aggregate change in levels, $42.7 million, is divided by the number of taxpayers reporting non-zero farm income in 2004, 86,869, to get the average change of $492. This amount is then added to all non-zero farm income amounts. Clearly there is no reason to believe that each farmer would experience the same dollar change in income over this time period, but this seemed the cleanest way to reach the desired aggregate growth amount.

19. Incorporating Aging Adjustments with the Above Components of Income Growth Factors

Many of the models used to project future growth in the components of income explicitly include population forecasts that will capture the expected aging of the population. This makes sense because many of these income sources such as Social Security benefits, pension income, and IRA distributions will grow along with the aging population. However, the model also explicitly incorporates the aging of the population by applying age weights to the taxpayer data which will increase the future projected levels of these income sources independent of the growth factors. If the projected growth from these models was also applied to the age-weighted data, the growth in many components of income would be overstated. Therefore, it is necessary to account for the impacts of aging on the income components and adjust the growth factors accordingly.

The technique used in the model is similar to that used by the Congressional Budget Office for their individual income tax model.[15] First the age weights are applied to the tax data and aggregate income is computed for each year. The changes in the components of income due to aging alone are then used to adjust the growth factor such that the overall growth matches that predicted by the models. For example, the Social Security model forecasts 110 percent growth in benefits between 2004 and 2015. Aging alone produces 19 percent growth in benefits between 2004 and 2015. To achieve the projected aggregate growth rate, Social Security benefits on each tax return are increased by about 78 percent (2.10/1.19=1.78).

20. Results

Once all of these forecasts have been made and the growth factors and age weights have been applied, it is important to check what the model projects for the future path of adjusted gross income, taxable income, and tax liability. Figures 20, 21, and 22 provide those results, but first Figure 19 presents the historical and forecasted total Iowa population and resident taxpayers from 1990 to 2015. The count of resident taxpayers is historically more volatile than the population, however, the two appear to rise along a similar trend.

Figure 20 presents the historical and forecasted path of Iowa AGI for resident taxpayers. Over the 1990 to 2000 period, AGI for Iowa residents grew 4.7 percent annually (see Table 8). Including the most recent recession and following years, 2001 through 2004, drops the average growth rate to 3.9 percent. The model forecasts nominal annual average growth of 4.7 percent for resident taxpayers and 4.9 percent for all taxpayers. Excluding 2005 and 2006, where projections are based in large part on

[15] See CBO, *Description of CBO's Models and Methods for Projecting Federal Revenues*, Washington, D.C., May 2001, p. 10-12.

observed data, the forecasted nominal annual average growth rate in AGI falls to 4.3 percent for resident taxpayers and 4.4 percent for all taxpayers.

Figure 21 presents the historical and forecasted path of Iowa taxable income for resident taxpayers. Over the 1990 to 2000 period, taxable income grew 4.6 percent annually (see Table 8). Including the 2001 to 2004 drops the average growth rate to 4.1 percent. The model forecasts nominal annual average growth of 4.4 percent for resident taxpayers, including a flat spot in 2011 that corresponds to the expiration of the recent federal tax cuts. Excluding 2005 and 2006 lowers the average growth rate for taxable income to 3.9 percent for resident taxpayers and 4.0 percent for all taxpayers.

Figure 22 presents the historical and forecasted path of Iowa tax liability for resident taxpayers. Because tax liability is subject to tax law changes such as the 10 percent income tax cut in 1998, comparing growth rates over time is less straightforward. However, numbers are provided for completeness. Over the 1990 to 2000 period, tax liability grew 4.0 percent annually (see Table 8). Including the 2001 to 2004 years drops the average growth rate to 3.8 percent. Considering 1990 to 1997 only, an attempt to remove the impact of the major tax law change in 1998, raises the average annual growth rate to 5.6 percent. The model forecasts nominal annual average growth of 5.0 percent for both resident taxpayers and all taxpayers. Excluding 2005 and 2006, the forecasted nominal annual average growth rate in tax liability falls to 4.5 percent for both resident taxpayers and all taxpayers.

## 21. Future work

These growth factors reflect the first step toward creating an economic forecasting model for the State of Iowa. Many additional steps will be taken over time to improve the techniques for forecasting future income for Iowa taxpayers and thus the forecasts of future Iowa income tax revenues. Each

year, models will be reestimated with more recent data and specifications reconsidered. Models will be developed for the larger adjustments rather than using simple growth factors. For example, itemized deductions may be more accurately forecasted with a separate model rather than simply linking its projected growth to the projected growth in wages.

Additional advancements to the model are also envisioned. Recently wage growth has been experienced differentially across the earnings distribution, therefore steps will be taken to apply different rates of wage growth depending on the wages reported by the household in the base data set. Attempts will also be made to model demographic transitions over time with the explicit aging of each taxpayer. This will require more consideration of how components of income change across the life cycle.

## Table 1. Shares of Components of Income Based on Resident Tax Records

| Component of Income from Iowa/Federal Tax Record | Tax Year | | | | | | | | | Average Share |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | |
| Wages | 68.04% | 67.63% | 67.35% | 66.85% | 67.94% | 70.75% | 72.01% | 71.71% | 70.62% | 69.21% |
| Schedule E Income | 5.54% | 5.61% | 5.56% | 5.56% | 5.13% | 5.15% | 5.33% | 5.47% | 5.84% | 5.46% |
| Pensions | 4.29% | 4.40% | 4.45% | 4.59% | 4.81% | 5.07% | 5.40% | 5.36% | 5.39% | 4.86% |
| Social Security | 3.92% | 4.19% | 4.29% | 3.98% | 4.25% | 4.46% | 4.58% | 4.56% | 4.60% | 4.31% |
| Capital Gains | 3.60% | 4.94% | 5.66% | 6.70% | 5.52% | 2.82% | 2.35% | 2.63% | 3.69% | 4.21% |
| Taxable Interest | 4.48% | 4.27% | 4.09% | 3.71% | 3.79% | 3.88% | 3.00% | 2.47% | 2.11% | 3.53% |
| Business Income | 3.58% | 3.27% | 3.33% | 3.21% | 3.01% | 2.90% | 3.00% | 3.01% | 2.88% | 3.13% |
| Dividends | 1.98% | 2.00% | 1.88% | 1.88% | 1.97% | 1.58% | 1.37% | 1.48% | 1.67% | 1.76% |
| Taxable IRAs | 0.87% | 0.96% | 1.37% | 1.50% | 1.66% | 1.65% | 1.42% | 1.43% | 1.51% | 1.37% |
| Tax-Exempt Interest | 0.99% | 1.05% | 0.88% | 0.68% | 0.66% | 0.62% | 0.62% | 0.62% | 0.63% | 0.75% |
| State Refunds | 0.40% | 0.38% | 0.41% | 0.46% | 0.42% | 0.49% | 0.59% | 0.57% | 0.50% | 0.47% |
| Unemployment Compensation | 0.35% | 0.30% | 0.28% | 0.30% | 0.32% | 0.48% | 0.66% | 0.66% | 0.47% | 0.42% |
| Farm Income | 1.20% | 0.72% | 0.15% | 0.33% | 0.24% | -0.06% | -0.41% | 0.01% | -0.01% | 0.24% |
| Other Gains | 0.25% | 0.25% | 0.20% | 0.21% | 0.22% | 0.20% | 0.19% | 0.23% | 0.26% | 0.22% |
| Alimony Received | 0.07% | 0.06% | 0.06% | 0.06% | 0.06% | 0.06% | 0.06% | 0.06% | 0.06% | 0.06% |
| Other Income | 0.45% | -0.04% | 0.03% | -0.01% | 0.02% | -0.05% | -0.16% | -0.27% | -0.21% | -0.03% |

Note: Data for Iowa residents taken from the Individual Return Transaction File for various tax years provided by the Internal Revenue Service.

## Table 2. Changes in Real Components of Income Based on Iowa Resident Tax Records

| Component of Income from Iowa/Federal Tax Record | Tax Year 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | Average Change |
|---|---|---|---|---|---|---|---|---|---|
| Wages | 4.02% | 6.35% | 2.48% | -2.65% | -0.09% | 0.34% | 1.23% | 2.76% | 1.80% |
| Schedule E Income | 6.09% | 5.70% | 3.33% | -11.62% | -3.66% | 1.99% | 4.30% | 11.36% | 2.19% |
| Pensions | 7.44% | 7.93% | 6.65% | 0.22% | 1.27% | 5.01% | 0.82% | 4.90% | 4.28% |
| Social Security | 11.91% | 9.37% | -4.14% | 2.22% | 0.58% | 1.39% | 1.18% | 5.31% | 3.48% |
| Capital Gains | 43.86% | 22.34% | 22.12% | -21.01% | -51.06% | -17.82% | 13.65% | 46.68% | 7.34% |
| Taxable Interest | -0.34% | 2.46% | -6.54% | -2.02% | -1.85% | -23.74% | -16.19% | -11.11% | -7.42% |
| Business Income | -4.57% | 8.98% | -0.69% | -10.21% | -7.29% | 1.66% | 2.00% | -0.12% | -1.28% |
| Dividends | 5.70% | 0.09% | 3.32% | 0.27% | -22.95% | -14.78% | 9.95% | 17.87% | -0.07% |
| Taxable IRAs | 16.50% | 51.36% | 13.24% | 5.89% | -4.50% | -15.12% | 2.51% | 10.14% | 10.00% |
| Tax-Exempt Interest | 10.87% | -9.99% | -20.02% | -7.01% | -10.20% | -1.80% | 2.04% | 5.60% | -3.81% |
| State Refunds | -0.44% | 14.51% | 16.40% | -13.93% | 12.76% | 17.99% | -1.22% | -9.11% | 4.62% |
| Unemployment Compensation | -10.76% | 0.38% | 11.22% | 1.40% | 45.89% | 33.97% | 2.49% | -26.03% | 7.32% |
| Farm Income | -36.78% | -78.39% | 134.79% | -30.65% | -123.75% | -681.53% | 103.49% | -170.96% | -110.47% |
| Other Gains | 1.77% | -11.70% | 4.95% | 1.73% | -12.79% | -7.39% | 23.19% | 19.61% | 2.42% |
| Alimony Received | 0.06% | 3.98% | -2.78% | -4.89% | 2.33% | -3.49% | 2.23% | 5.18% | 0.33% |
| Other Income | -108.68% | 191.48% | -145.98% | 218.91% | -392.81% | -188.29% | -70.62% | 18.87% | -59.64% |
| Total | 4.65% | 6.78% | 3.26% | -4.22% | -4.06% | -1.42% | 1.66% | 4.34% | 1.37% |

Note: Data for Iowa residents taken from the Individual Return Transaction File for various tax years provided by the Internal Revenue Service.

## Table 3. Coefficients for Components of Income Growth Factor Models

| Independent Variable | Component of Income | | | | | |
|---|---|---|---|---|---|---|
| | Wages | Schedule E Income | Pensions | Social Security | Capital Gains | Taxable Interest |
| Intercept | -1.52 | 1,397.60 | -3,994.91 | -3,687.84 | -872.80 | 961.32 |
| Non-farm employment | 0.96 | | | | | |
| Hourly wage | 0.74 | | | | | |
| Weekly hours | 0.00 | | | | | |
| S&P 500 | | 0.17 | 0.07 | | 2.34 | |
| Change in S&P 500 | | 785.91 | | | 3,544.36 | |
| Farmland Values | | 0.48 | | | | |
| Wages | | | | 0.07 | | |
| Lagged Wages | | | | | | |
| Schedule E Income | | | | | | |
| Lagged Schedule E Income | | | | | | |
| Capital Gains | | | | | | |
| Iowa Gross Domestic Product | | | | | | |
| Business Income | | | | | | |
| Federal Funds rate | | | | | | 174.62 |
| Insured unemployment rate | | | | | | |
| Population 55+ | | | 0.01 | | | |
| Population 62+ | | | | 0.01 | | |
| Population 70+ | | | | | | |
| Time trend | | | | | | |
| EGTRRA tax cut indicator | | | | | | |
| JGTRRA tax cut indicator | | | | | | |
| Share of Variation Explained | 96.3 | 78.5 | 95.9 | 86.0 | 84.8 | 86.4 |

## Table 3 (continued). Coefficients for Growth Models

| Independent Variable | Business Income | Dividends | Taxable IRAs | Tax-Exempt Interest | State Refunds | Unemployment Compensation |
|---|---|---|---|---|---|---|
| Intercept | 1,414.84 | 512.33 | -3,335.97 | | -105.88 | -84.38 |
| Non-farm employment | | | | | | |
| Hourly wage | | | | | | |
| Weekly hours | | | | | | |
| S&P 500 | | 0.23 | 0.46 | | | |
| Change in S&P 500 | 472.70 | 612.08 | | | | |
| Farmland Values | | | | | | |
| Wages | | | | | | |
| Lagged Wages | | | | | 0.02 | |
| Schedule E Income | | | | | -105.88 | |
| Lagged Schedule E Income | | | | | -0.15 | |
| Capital Gains | | | | | | |
| Iowa Gross Domestic Product | | | | | | |
| Business Income | | | | | | |
| Federal Funds rate | | | | | | |
| Insured unemployment rate | | | | | | 167.98 |
| Population 55+ | | | | | | |
| Population 62+ | | | | | | |
| Population 70+ | | | 0.01 | | | |
| Time trend | | | | | | |
| EGTRRA tax cut indicator | | | | | | |
| JGTRRA tax cut indicator | | | | | | |
| Share of Variation Explained | 57.4 | 83.1 | 95.0 | NA | 70.8 | 93.0 |

## Table 3 (continued). Coefficients for Growth Models

| Independent Variable | Farm Income | Other Gains | Alimony Received | Other Income | Federal Tax Payments | Federal Tax Refunds |
|---|---|---|---|---|---|---|
| Intercept | -2,952.61 | 253.79 | 31.26 | 99.15 | 693.20 | -822.78 |
| Non-farm employment | | | | | | |
| Hourly wage | | | | | | |
| Weekly hours | | | | | | |
| S&P 500 | | | | | | |
| Change in S&P 500 | | 94.75 | | | | |
| Farmland Values | | | | | | |
| Wages | | | | | 0.19 | 0.10 |
| Lagged Wages | | | | | | |
| Schedule E Income | | | | | | -0.53 |
| Lagged Schedule E Income | | | | | | |
| Capital Gains | | | | | 0.08 | |
| Iowa Gross Domestic Product | 0.04 | | | | | |
| Business Income | | -0.11 | | | | |
| Federal Funds rate | | | | | | |
| Insured unemployment rate | | | -1.29 | | | |
| Population 55+ | | | | | | |
| Population 62+ | | | | | | |
| Population 70+ | | | | | | |
| Time trend | -144.02 | | | -28.21 | | |
| EGTRRA tax cut indicator | | | | | -754.00 | 212.53 |
| JGTRRA tax cut indicator | | | | | -500.30 | 94.87 |
| Share of Variation Explained | 67.3 | 76.1 | 25.7 | 65.7 | 91.1 | 93.1 |

## Table 4. Historical and Projected Growth Rates for Wages and the Explanatory Variables

| *Tax Year* | *Wages* | *Real Wages* | *Iowa Employment* | *Iowa population aged 20-64* | *National Employment* | *Average Hourly Wages* | *Average Weekly Hours* |
|---|---|---|---|---|---|---|---|
| 1997 | 6.41% | 3.98% | 1.70% | 0.28% | 2.25% | 1.21% | 1.43% |
| 1998 | 8.00% | 6.36% | 2.54% | 0.36% | 1.47% | 3.34% | -1.64% |
| 1999 | 4.82% | 2.57% | 1.79% | 0.39% | 1.54% | 2.02% | -1.19% |
| 2000 | 0.54% | -2.73% | 0.67% | 0.76% | 2.55% | 0.79% | 0.49% |
| 2001 | 2.75% | -0.06% | -0.87% | 0.39% | 0.03% | -0.50% | -0.24% |
| 2002 | 1.47% | -0.12% | -1.24% | 0.85% | -0.34% | 1.47% | 0.98% |
| 2003 | 4.00% | 1.67% | -0.48% | 0.86% | 0.92% | -0.85% | 0.97% |
| 2004 | 5.48% | 2.74% | 1.17% | 0.73% | 1.10% | 0.71% | 1.20% |
| 2005 | 5.32% | 1.88% | 1.64% | 0.62% | 1.78% | 1.67% | -1.42% |
| 2006 | 5.69% | 2.17% | 1.80% | 0.51% | 1.84% | -0.83% | 1.66% |
| 2007 | 2.86% | 0.41% | 1.03% | 0.35% | 1.06% | 0.90% | -1.88% |
| 2008 | 3.83% | 1.73% | 0.92% | 0.25% | 0.60% | 0.90% | 0.00% |
| 2009 | 4.04% | 1.90% | 1.11% | 0.28% | 0.82% | 0.90% | 0.00% |
| 2010 | 4.60% | 2.38% | 1.60% | 0.33% | 1.26% | 0.90% | 0.00% |
| 2011 | 4.61% | 2.31% | 1.53% | 0.22% | 1.31% | 0.90% | 0.00% |
| 2012 | 4.26% | 1.87% | 1.07% | -0.20% | 1.28% | 0.90% | 0.00% |
| 2013 | 4.16% | 1.77% | 0.97% | -0.27% | 1.25% | 0.90% | 0.00% |
| 2014 | 4.11% | 1.75% | 0.94% | -0.32% | 1.27% | 0.90% | 0.00% |
| 2015 | 3.97% | 1.64% | 0.83% | -0.44% | 1.28% | 0.90% | 0.00% |
| Average growth | | | | | | | |
| 1997-2006 | 4.45% | 1.85% | 0.87% | 0.58% | 1.31% | 0.90% | 0.22% |
| 2005-2015 | 4.31% | 1.80% | 1.22% | 0.12% | 1.25% | 0.81% | -0.15% |
| 2007-2015 | 4.05% | 1.75% | 1.11% | 0.02% | 1.12% | 0.90% | -0.21% |

## Table 5. Historical and Projected Nominal Growth Rates for the Components of Income

| Tax Year | Wages | Schedule E Income | Pensions | Social Security | Capital Gains | Taxable Interest | Business Income | Dividends | Taxable IRAs | Tax-Exempt Interest | State Refunds | Unemplt Comp | Farm Income | Other Gains | Alimony Received | Other Income |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1997 | 6.41% | 8.52% | 9.91% | 14.47% | 47.16% | 1.95% | -2.38% | 8.12% | 19.17% | 13.42% | 1.84% | -8.71% | -35.33% | 4.10% | 2.36% | -108.88% |
| 1998 | 8.00% | 7.35% | 9.61% | 11.08% | 24.25% | 4.06% | 10.68% | 1.65% | 53.71% | -8.59% | 16.30% | 1.94% | -78.05% | -10.32% | 5.60% | -192.91% |
| 1999 | 4.82% | 5.61% | 9.00% | -2.02% | 24.81% | -4.36% | 1.50% | 5.60% | 15.74% | -18.25% | 18.97% | 13.68% | 139.98% | 7.26% | -0.63% | -147.00% |
| 2000 | 0.54% | -8.65% | 3.59% | 5.66% | -18.36% | 1.15% | -7.19% | 3.64% | 9.44% | -3.89% | -11.04% | 4.81% | -28.32% | 5.15% | -1.69% | -222.91% |
| 2001 | 2.75% | -0.92% | 4.16% | 3.44% | -49.67% | 0.94% | -4.66% | -20.76% | -1.78% | -7.65% | 15.97% | 50.05% | -124.35% | -10.30% | 5.25% | -401.12% |
| 2002 | 1.47% | 3.14% | 6.20% | 2.53% | -16.89% | -22.88% | 2.81% | -13.82% | -14.16% | -0.69% | 19.33% | 35.48% | 591.35% | -6.35% | -2.40% | 191.57% |
| 2003 | 4.00% | 7.16% | 3.58% | 3.95% | 16.76% | -13.90% | 4.79% | 12.96% | 5.31% | 4.83% | 1.48% | 5.29% | -103.62% | 26.57% | 5.03% | 75.29% |
| 2004 | 5.48% | 14.29% | 7.67% | 8.11% | 50.40% | -8.80% | 2.61% | 20.93% | 13.00% | 8.37% | -6.71% | -24.06% | -170.09% | 22.78% | 7.98% | -17.08% |
| 2005 | 5.32% | 2.76% | 10.59% | 6.58% | -7.99% | 36.64% | -0.33% | -2.65% | 10.09% | 4.64% | -3.59% | -4.67% | -494.43% | -5.18% | 0.27% | 3.40% |
| 2006 | 5.69% | 5.53% | 8.97% | 7.03% | 20.29% | 27.10% | 3.68% | 7.16% | 10.19% | 4.69% | -5.53% | -4.91% | 174.60% | 3.70% | 3.91% | 3.45% |
| 2007 | 2.86% | 3.73% | 8.19% | 3.78% | 9.80% | 2.15% | 1.60% | 3.90% | 4.65% | 3.68% | 5.94% | 7.55% | 7.57% | 1.55% | 2.19% | 2.45% |
| 2008 | 3.83% | 3.53% | 6.78% | 5.18% | 9.19% | 0.02% | 1.90% | 3.24% | 5.28% | 3.29% | 2.95% | 4.48% | 19.70% | 1.89% | 1.93% | 2.06% |
| 2009 | 4.04% | 4.40% | 7.11% | 7.13% | 8.31% | 2.09% | 2.74% | 6.06% | 3.37% | 3.32% | 6.97% | 3.27% | -28.97% | 2.78% | 2.03% | 2.09% |
| 2010 | 4.60% | 4.07% | 7.32% | 7.53% | 8.23% | -0.41% | 2.20% | 4.98% | 4.26% | 3.40% | 6.07% | 2.75% | -30.26% | 2.20% | 2.14% | 2.17% |
| 2011 | 4.61% | 4.01% | 7.03% | 7.16% | 8.16% | 2.04% | 2.06% | 4.65% | 5.03% | 3.47% | 7.19% | 2.53% | -27.20% | 2.05% | 2.23% | 2.24% |
| 2012 | 4.26% | 4.22% | 7.01% | 6.94% | 4.40% | 2.35% | 2.25% | 5.01% | 6.35% | 3.58% | 6.66% | 2.50% | -13.39% | 2.24% | 2.34% | 2.35% |
| 2013 | 4.16% | 4.33% | 6.81% | 6.81% | 4.39% | 2.34% | 2.39% | 5.28% | 7.80% | 3.57% | 5.06% | 2.41% | 14.29% | 2.39% | 2.34% | 2.34% |
| 2014 | 4.11% | 4.30% | 6.38% | 6.91% | 4.37% | 2.32% | 2.41% | 5.07% | 6.67% | 3.55% | 4.51% | 2.36% | -33.56% | 2.41% | 2.32% | 2.32% |
| 2015 | 3.97% | 4.25% | 6.48% | 6.57% | 4.34% | 2.30% | 2.27% | 4.98% | 6.17% | 3.52% | 4.40% | 2.32% | -22.85% | 2.27% | 2.30% | 2.30% |
| Average growth | | | | | | | | | | | | | | | | |
| 1997-2004 | 4.18% | 4.56% | 6.71% | 5.90% | 9.81% | -5.23% | 1.02% | 2.29% | 12.56% | -1.56% | 7.02% | 9.81% | 23.95% | 4.86% | 2.69% | -102.88% |
| 2005-2015 | 4.31% | 4.10% | 7.52% | 6.51% | 6.68% | 7.18% | 2.11% | 4.34% | 6.35% | 3.70% | 3.69% | 1.87% | -39.50% | 1.66% | 2.18% | 2.47% |
| 2007-2015 | 4.05% | 4.14% | 6.86% | 6.78% | 6.42% | 1.63% | 2.28% | 4.91% | 5.62% | 3.46% | 5.48% | 2.83% | -15.28% | 2.28% | 2.20% | 2.23% |

## Table 6. Historical and Projected Real Growth Rates for the Components of Income

| Tax Year | Wages | Schedule E Income | Pensions | Social Security | Capital Gains | Taxable Interest | Business Income | Dividends | Taxable IRAs | Tax-Exempt Interest | State Refunds | Unemplt Comp | Farm Income | Other Gains | Alimony Received | Other Income |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1997 | 3.98% | 6.04% | 7.40% | 11.86% | 43.80% | -0.38% | -4.61% | 5.65% | 16.45% | 10.83% | -0.48% | -10.79% | -36.80% | 1.72% | 0.02% | -108.68% |
| 1998 | 6.36% | 5.71% | 7.94% | 9.39% | 22.35% | 2.47% | 8.99% | 0.10% | 51.37% | -9.98% | 14.52% | 0.39% | -78.39% | -11.69% | 3.99% | -191.49% |
| 1999 | 2.57% | 3.35% | 6.66% | -4.13% | 22.14% | -6.41% | -0.68% | 3.33% | 13.25% | -20.01% | 16.42% | 11.24% | 134.83% | 4.96% | -2.77% | -145.99% |
| 2000 | -2.73% | -11.63% | 0.21% | 2.22% | -21.02% | -2.14% | -10.21% | 0.26% | 5.88% | -7.02% | -13.93% | 1.39% | -30.66% | 1.72% | -4.89% | -218.91% |
| 2001 | -0.06% | -3.63% | 1.30% | 0.61% | -51.05% | -1.83% | -7.27% | -22.93% | -4.47% | -10.18% | 12.79% | 45.94% | -123.69% | -12.76% | 2.36% | -392.87% |
| 2002 | -0.12% | 1.53% | 4.53% | 0.93% | -18.19% | -24.08% | 1.20% | -15.17% | -15.50% | -2.24% | 17.46% | 33.36% | 580.52% | -7.81% | -3.93% | 187.00% |
| 2003 | 1.67% | 4.76% | 1.27% | 1.62% | 14.15% | -15.82% | 2.45% | 10.44% | 2.96% | 2.49% | -0.79% | 2.94% | -103.54% | 23.74% | 2.68% | 71.37% |
| 2004 | 2.74% | 11.32% | 4.87% | 5.30% | 46.49% | -11.17% | -0.05% | 17.79% | 10.07% | 5.56% | -9.14% | -26.03% | -168.27% | 19.59% | 5.17% | -19.24% |
| 2005 | 1.88% | -0.60% | 6.97% | 3.10% | -11.00% | 32.16% | -3.59% | -5.83% | 6.49% | 1.21% | -6.74% | -7.79% | -481.52% | -8.29% | -3.01% | 0.01% |
| 2006 | 2.17% | 2.02% | 5.34% | 3.46% | 16.29% | 22.87% | 0.23% | 3.59% | 6.52% | 1.20% | -8.68% | -8.08% | 165.44% | 0.24% | 0.44% | 0.00% |
| 2007 | 0.41% | 1.25% | 5.61% | 1.30% | 7.17% | -0.29% | -0.83% | 1.42% | 2.15% | 1.20% | 3.41% | 4.98% | 5.00% | -0.88% | -0.25% | 0.00% |
| 2008 | 1.73% | 1.43% | 4.62% | 3.06% | 6.99% | -2.00% | -0.16% | 1.15% | 3.16% | 1.20% | 0.87% | 2.37% | 17.28% | -0.17% | -0.13% | 0.00% |
| 2009 | 1.90% | 2.27% | 4.91% | 4.93% | 6.09% | 0.00% | 0.64% | 3.89% | 1.26% | 1.20% | 4.78% | 1.16% | -30.43% | 0.68% | -0.06% | 0.00% |
| 2010 | 2.38% | 1.86% | 5.04% | 5.25% | 5.93% | -2.53% | 0.03% | 2.75% | 2.04% | 1.20% | 3.81% | 0.57% | -31.74% | 0.03% | -0.03% | 0.00% |
| 2011 | 2.31% | 1.73% | 4.68% | 4.81% | 5.78% | -0.20% | -0.18% | 2.35% | 2.73% | 1.20% | 4.84% | 0.28% | -28.80% | -0.19% | -0.02% | 0.00% |
| 2012 | 1.87% | 1.83% | 4.55% | 4.48% | 2.00% | 0.00% | -0.10% | 2.60% | 3.91% | 1.20% | 4.21% | 0.14% | -15.38% | -0.11% | -0.01% | 0.00% |
| 2013 | 1.77% | 1.95% | 4.36% | 4.37% | 2.00% | 0.00% | 0.05% | 2.87% | 5.34% | 1.20% | 2.65% | 0.07% | 11.68% | 0.05% | 0.00% | 0.00% |
| 2014 | 1.75% | 1.94% | 3.97% | 4.48% | 2.00% | 0.00% | 0.09% | 2.69% | 4.26% | 1.20% | 2.14% | 0.04% | -35.07% | 0.09% | 0.00% | 0.00% |
| 2015 | 1.64% | 1.91% | 4.09% | 4.18% | 2.00% | 0.00% | -0.02% | 2.62% | 3.79% | 1.20% | 2.06% | 0.02% | -24.58% | -0.02% | 0.00% | 0.00% |
| Average growth | | | | | | | | | | | | | | | | |
| 1997-2004 | 1.80% | 2.18% | 4.27% | 3.47% | 7.33% | -7.42% | -1.27% | -0.07% | 10.00% | -3.82% | 4.61% | 7.30% | 21.75% | 2.43% | 0.33% | -102.35% |
| 2005-2015 | 1.80% | 1.60% | 4.92% | 3.95% | 4.11% | 4.55% | -0.35% | 1.83% | 3.78% | 1.20% | 1.21% | -0.57% | -40.74% | -0.78% | -0.28% | 0.00% |
| 2007-2015 | 1.75% | 1.80% | 4.65% | 4.10% | 4.44% | -0.56% | -0.05% | 2.48% | 3.18% | 1.20% | 3.20% | 1.07% | -14.67% | -0.06% | -0.06% | 0.00% |

## Table 7. Application of Growth Factors in the Micro Model Forecasts

***Case 1. Only Positive Values***

| | ***Wages (Millions)*** |
|---|---|
| *2004* | $40,866.14 |
| *2010* | $52,869.47 |
| growth factor | 129.37% |

| Example: | ***Taxpayer 1*** |
|---|---|
| *Wages 2004* | $10,000 |
| *Wages 2010* | $12,937 |
| *change* | $2,937 |

***Case 2. Possible Negative Values, Aggregate Positive***

| | ***Schedule E Income (Millions)*** |
|---|---|
| *2004* | $3,376.65 |
| *2010* | $4,272.59 |
| growth factor | 126.53% |

| Example: | ***Taxpayer 1*** | ***Taxpayer 2*** |
|---|---|---|
| *Sch E 2004* | $10,000 | -$10,000 |
| *Sch E 2010* | $12,653 | -$7,347 |
| *change* | $2,653 | $2,653 |

***Case 3. Possible Negative Values, Aggregate Positive, Bottom Limit***

| | ***Capital Gains Income (Millions)*** |
|---|---|
| *2004* | $2,133.94 |
| *2010* | $3,319.24 |
| growth factor | 155.55% |

| Example: | ***Taxpayer 1*** | ***Taxpayer 2*** | ***Taxpayer 3*** |
|---|---|---|---|
| *Cap Gains 2004* | $1,200 | -$1,200 | -$3,000 |
| *Cap Gains 2010* | $1,867 | -$533 | -$3,000 |
| *change* | $667 | $667 | $0 |

***Case 4. Possible Negative Values, Aggregate Possibly Negative***

| | ***Farm Income (Millions)*** | |
|---|---|---|
| *2004* | -$5.40 | |
| *2010* | $37.33 | |
| average change | $492 | -790.82% |

| Example: | ***Taxpayer 1*** | ***Taxpayer 2*** |
|---|---|---|
| *Farm 2004* | $10,000 | -$10,000 |
| *Farm 2010* | $10,492 | -$9,508 |
| *change* | $492 | $492 |

## Table 8. Projected Levels and Growth Rates in Adjusted Gross Income, Taxable Income, and Tax Liability for Resident Taxpayers and All Taxpayers Using the Micro Model with Adjustments for Growth and Aging

| | Resident Taxpayers | | | | | | All Taxpayers | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AGI | | Taxable Income | | Tax Liability | | AGI | | Taxable Income | | Tax Liability | |
| **Tax Year** | Level | Growth | Level | Growth | Level | Growth | Level | Growth | Level | Growth | Level | Growth |
| 2004 | 53,284,165,178 | | 41,207,766,038 | | 2,035,051,293 | | 67,556,238,931 | | 51,854,548,048 | | 2,128,340,352 | |
| 2005 | 56,287,419,305 | 5.64% | 43,195,252,600 | 4.82% | 2,140,344,237 | 5.17% | 71,036,906,831 | 5.15% | 53,980,308,448 | 4.10% | 2,235,788,395 | 5.05% |
| 2006 | 60,651,371,105 | 7.75% | 46,685,126,516 | 8.08% | 2,350,887,366 | 9.84% | 76,954,760,895 | 8.33% | 58,715,032,731 | 8.77% | 2,457,606,935 | 9.92% |
| 2007 | 62,573,017,345 | 3.17% | 48,075,670,183 | 2.98% | 2,410,872,757 | 2.55% | 79,671,776,453 | 3.53% | 60,718,989,966 | 3.41% | 2,522,080,468 | 2.62% |
| 2008 | 65,281,307,878 | 4.33% | 50,205,979,862 | 4.43% | 2,534,321,529 | 5.12% | 83,279,158,000 | 4.53% | 63,536,887,008 | 4.64% | 2,652,265,764 | 5.16% |
| 2009 | 68,178,294,751 | 4.44% | 52,448,318,421 | 4.47% | 2,658,509,823 | 4.90% | 87,206,598,207 | 4.72% | 66,570,850,672 | 4.78% | 2,783,716,344 | 4.96% |
| 2010 | 71,376,838,056 | 4.69% | 54,934,570,353 | 4.74% | 2,812,407,070 | 5.79% | 91,441,028,160 | 4.86% | 69,832,439,217 | 4.90% | 2,945,763,383 | 5.82% |
| 2011 | 74,770,337,573 | 4.75% | 55,766,817,479 | 1.51% | 2,841,108,971 | 1.02% | 95,964,647,217 | 4.95% | 70,914,010,916 | 1.55% | 2,976,585,826 | 1.05% |
| 2012 | 78,046,561,149 | 4.38% | 57,841,808,326 | 3.72% | 2,967,731,497 | 4.46% | 100,235,888,061 | 4.45% | 73,600,605,942 | 3.79% | 3,109,955,947 | 4.48% |
| 2013 | 81,376,873,380 | 4.27% | 60,401,709,750 | 4.43% | 3,129,659,057 | 5.46% | 104,562,481,928 | 4.32% | 76,871,765,997 | 4.44% | 3,280,296,877 | 5.48% |
| 2014 | 84,760,414,292 | 4.16% | 63,005,789,409 | 4.31% | 3,296,425,610 | 5.33% | 108,971,067,902 | 4.22% | 80,211,070,411 | 4.34% | 3,455,742,348 | 5.35% |
| 2015 | 88,408,020,819 | 4.30% | 65,852,799,852 | 4.52% | 3,479,677,610 | 5.56% | 113,671,290,816 | 4.31% | 83,809,036,634 | 4.49% | 3,648,122,805 | 5.57% |
| **Average growth** | | | | | | | | | | | | |
| 1990-2000 | 4.68% | | 4.61% | | 4.02% | | 5.94% | | 5.75% | | 4.12% | |
| 1990-2004 | 3.87% | | 4.06% | | 3.84% | | 4.77% | | 5.00% | | 3.95% | |
| 2005-2015 | 4.72% | | 4.36% | | 5.02% | | 4.85% | | 4.47% | | 5.04% | |
| 2007-2015 | 4.28% | | 3.90% | | 4.46% | | 4.43% | | 4.04% | | 4.50% | |

Notes: The low growth in taxable income and tax liability in 2011 reflects assumptions that the Federal tax changes in EGTRRA and JGTRRA are allowed to expire after 2010.

**Figure 1. Actual and Forecasted Wages**

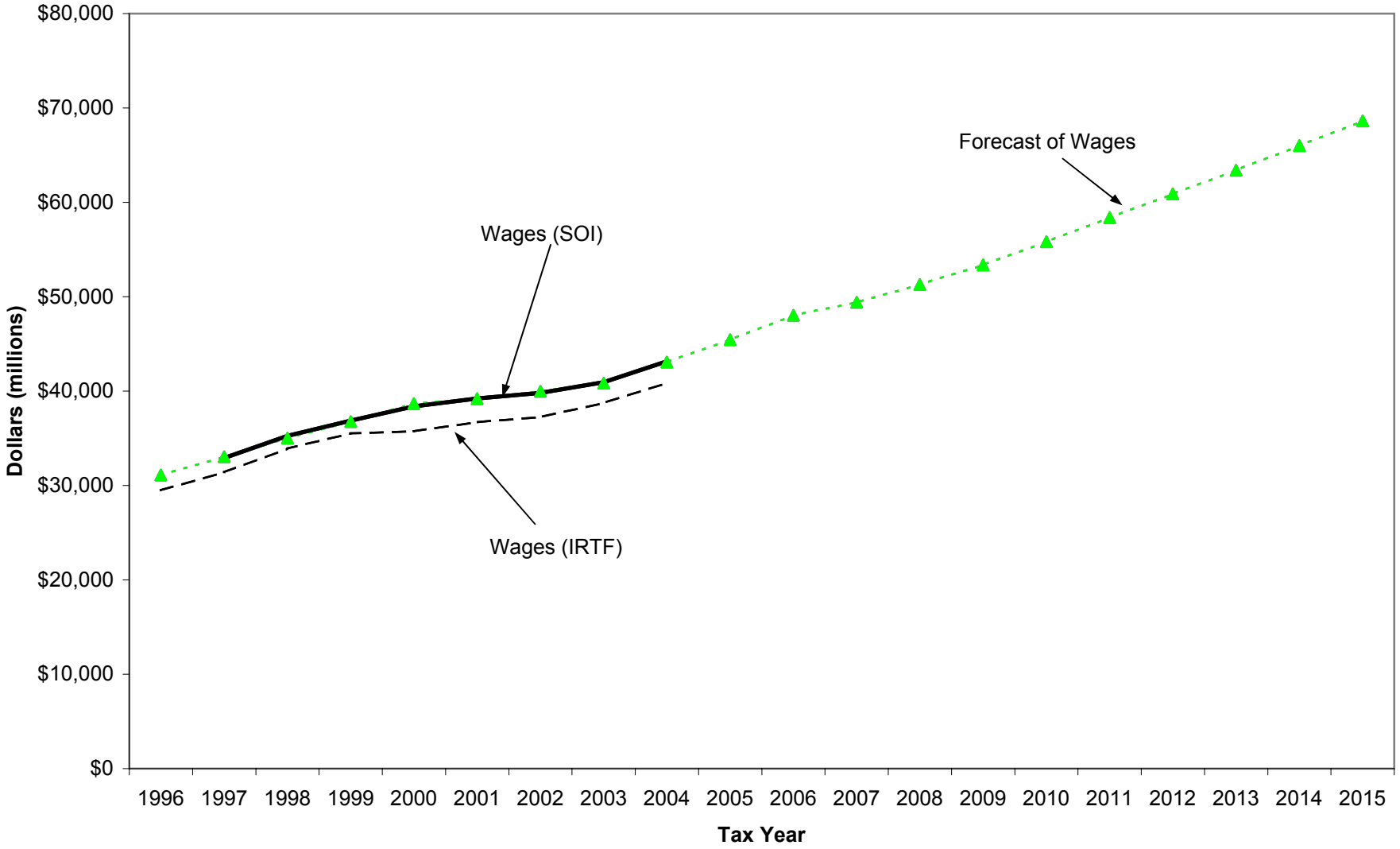

**Figure 2. Actual and Forecasted Schedule E Income**

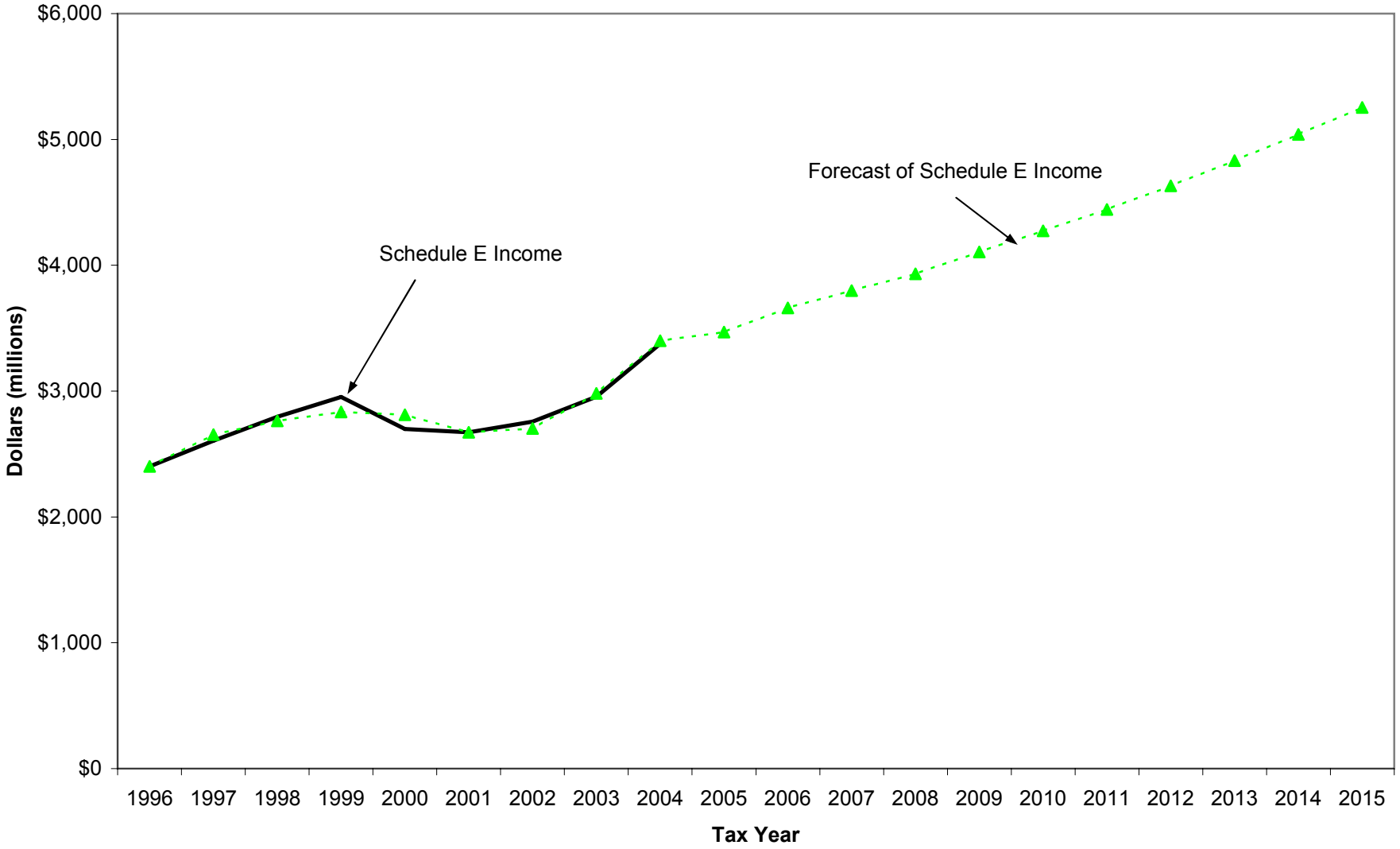

**Figure 3. Actual and Forecasted Taxable Pension Income**

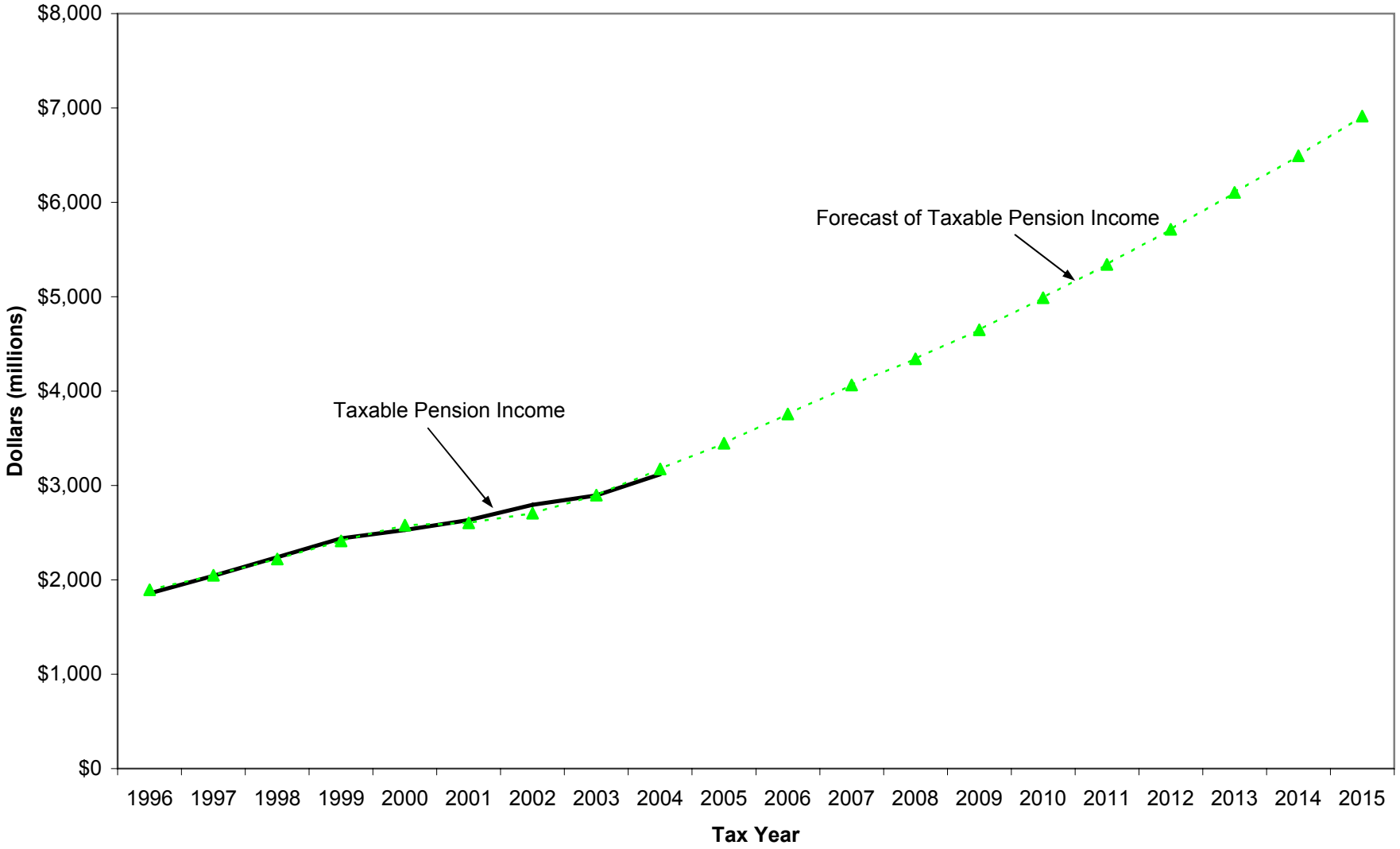

**Figure 4. Actual and Forecasted Total Social Security Benefits**

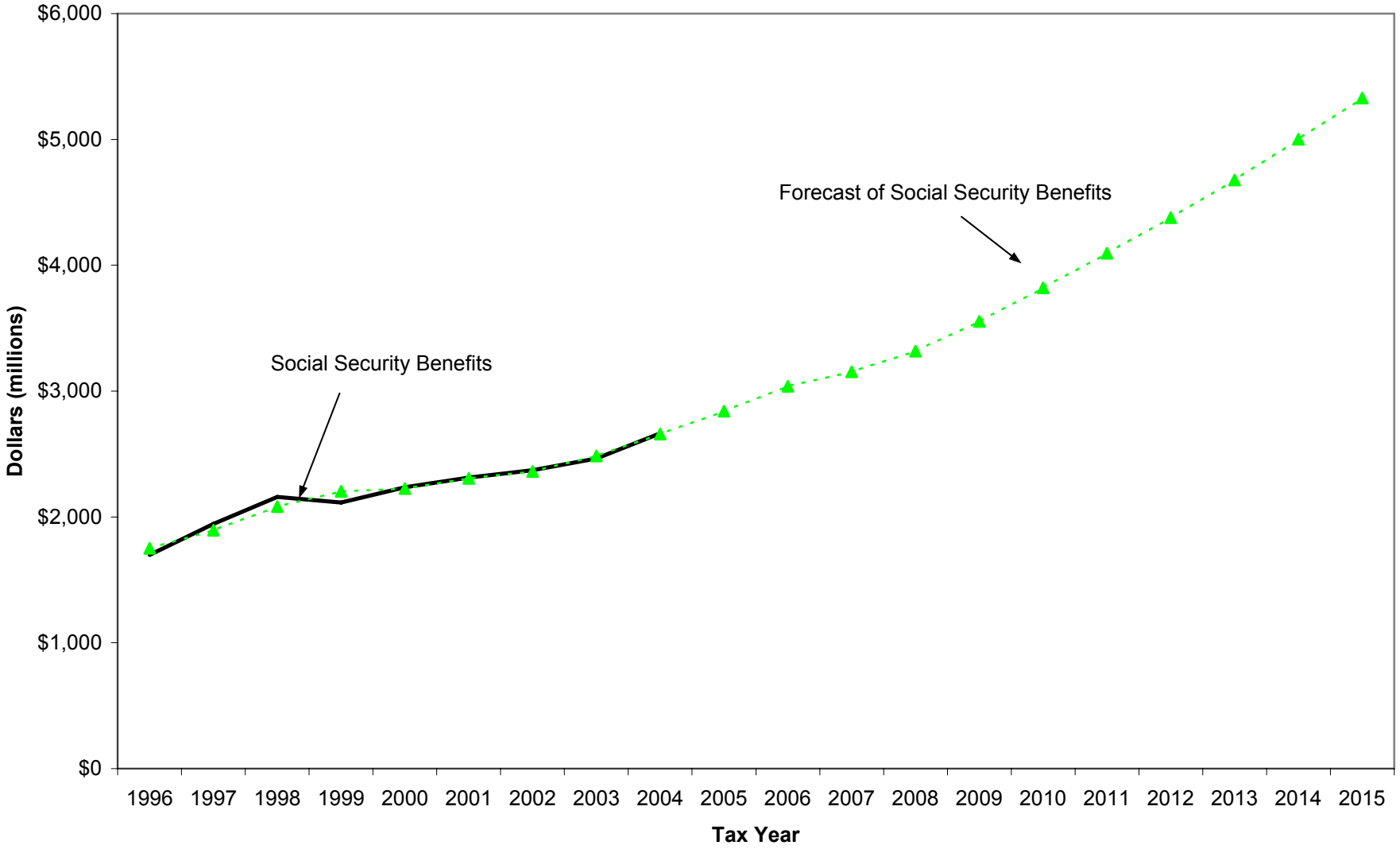

**Figure 5. Actual and Forecasted Capital Gains Income**

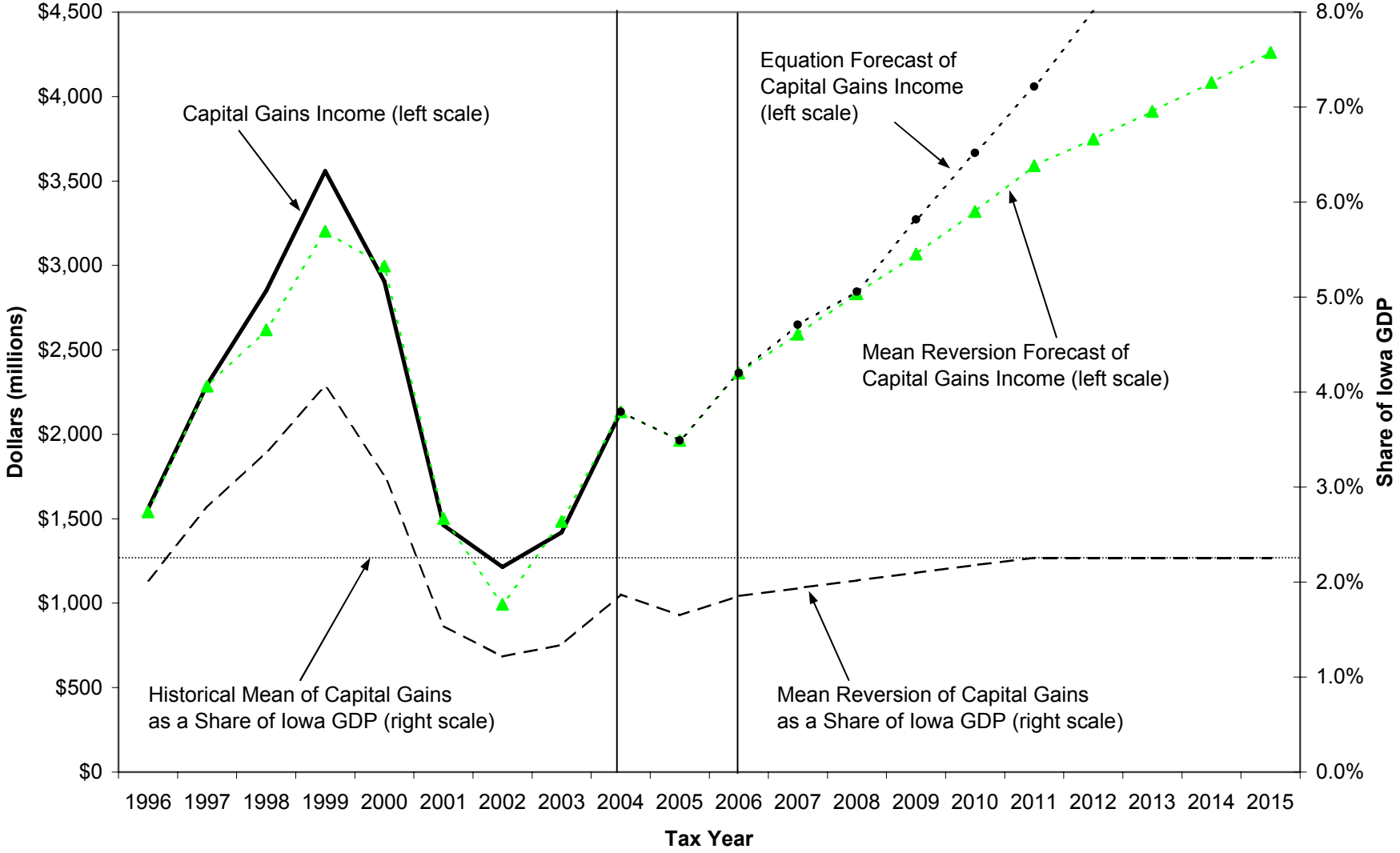

**Figure 6. Actual and Forecasted Taxable Interest Income**

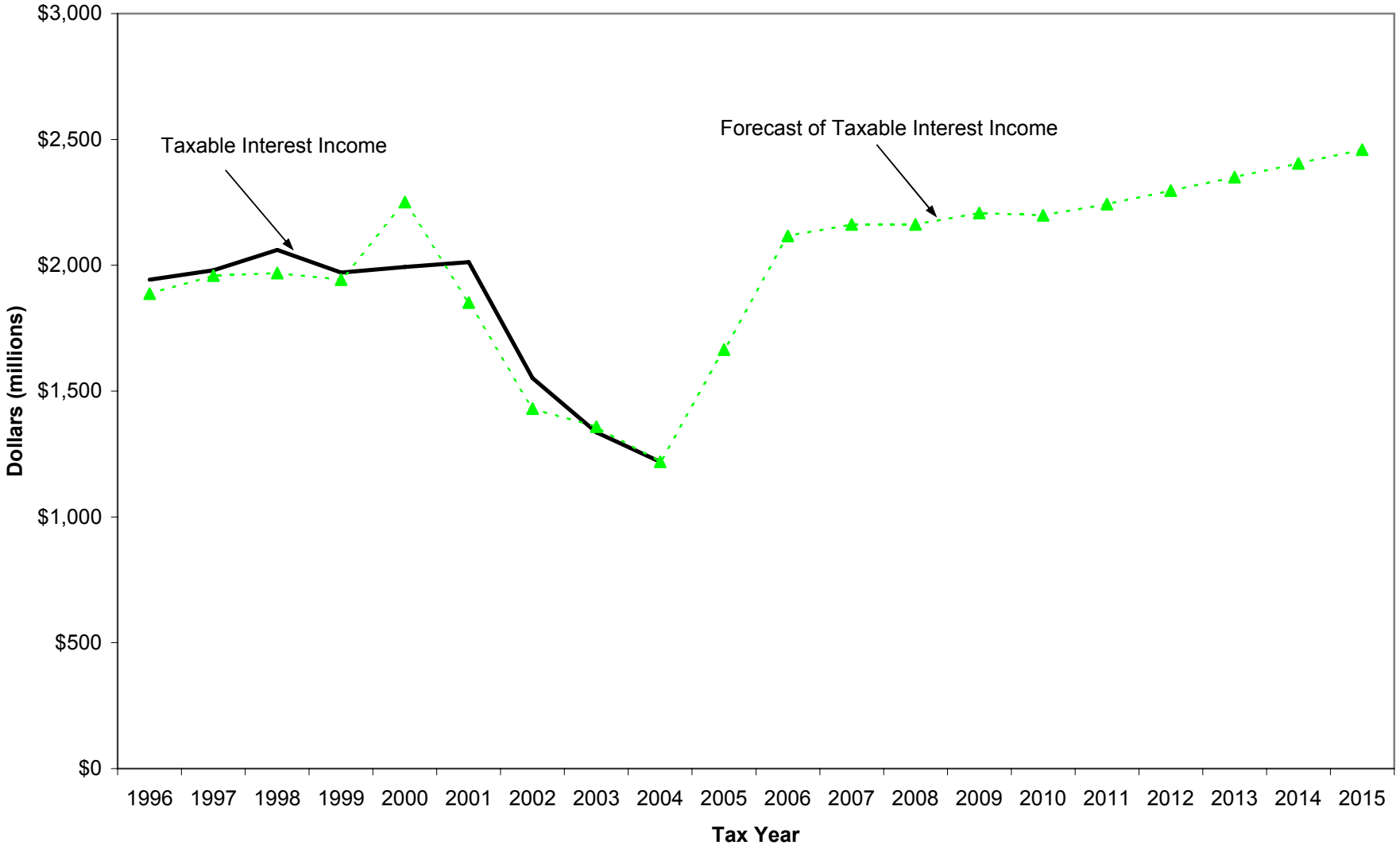

**Figure 7. Actual and Forecasted Business Income**

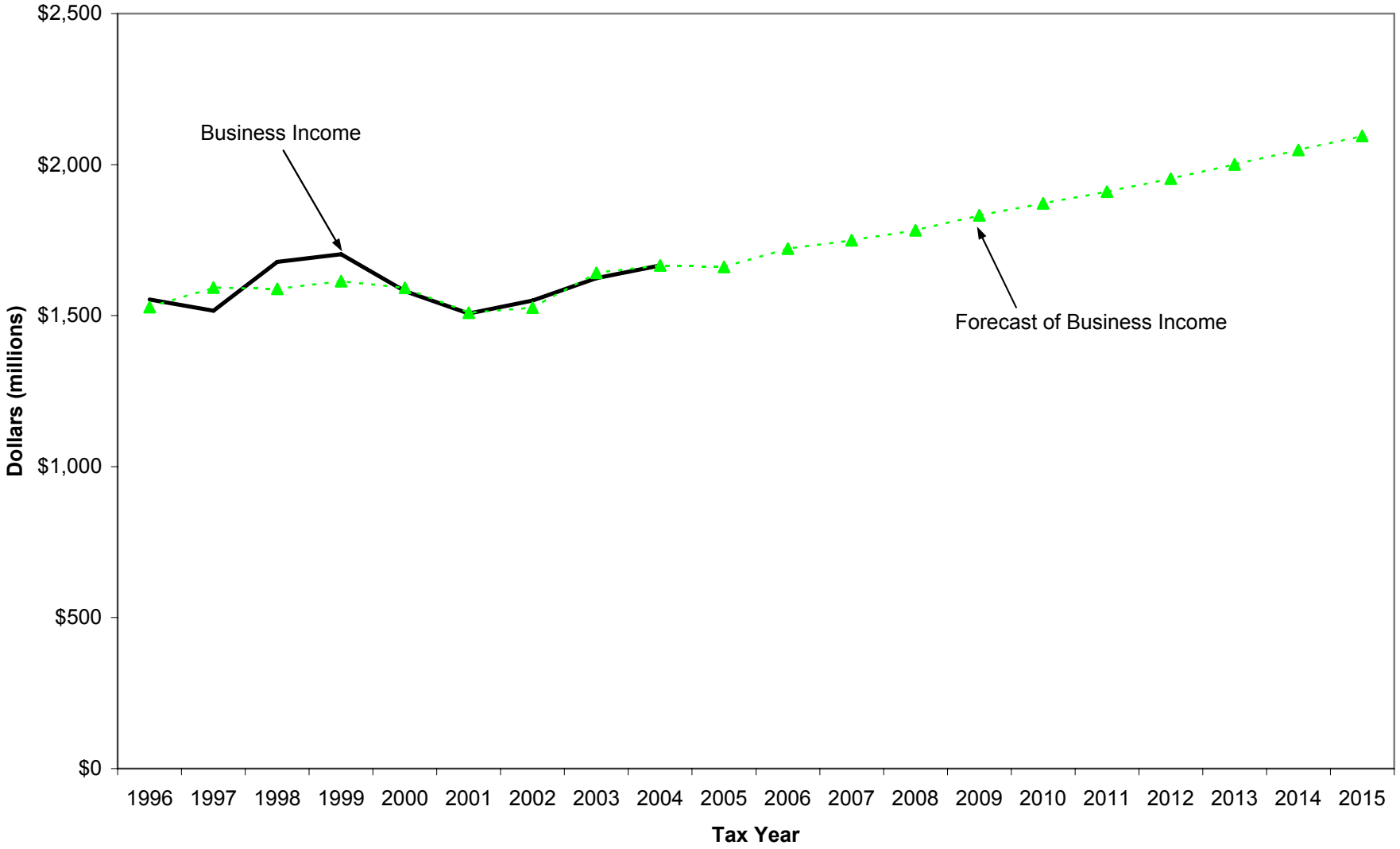

**Figure 8. Actual and Forecasted Dividend Income**

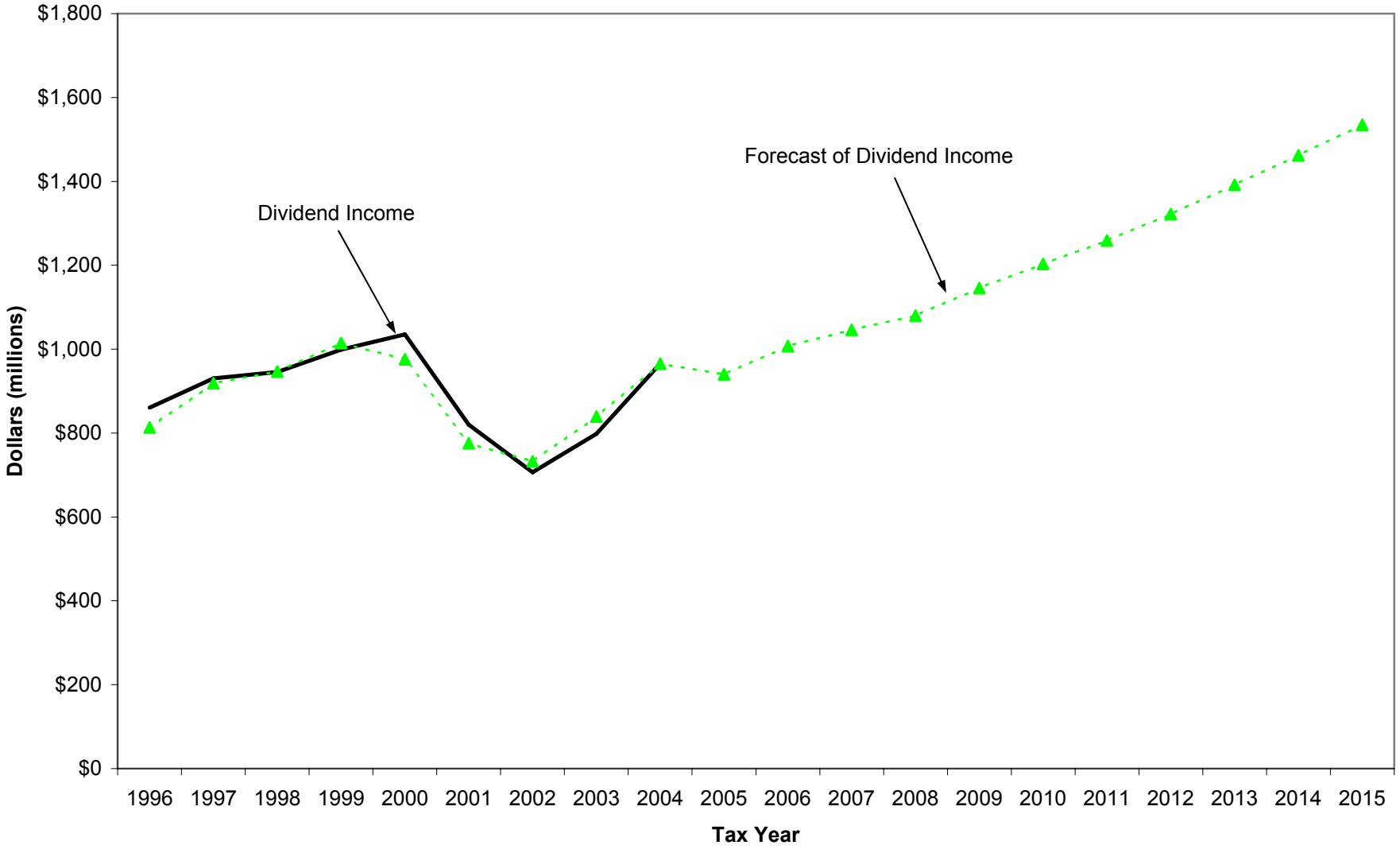

**Figure 9. Actual and Forecasted Taxable IRA Distributions**

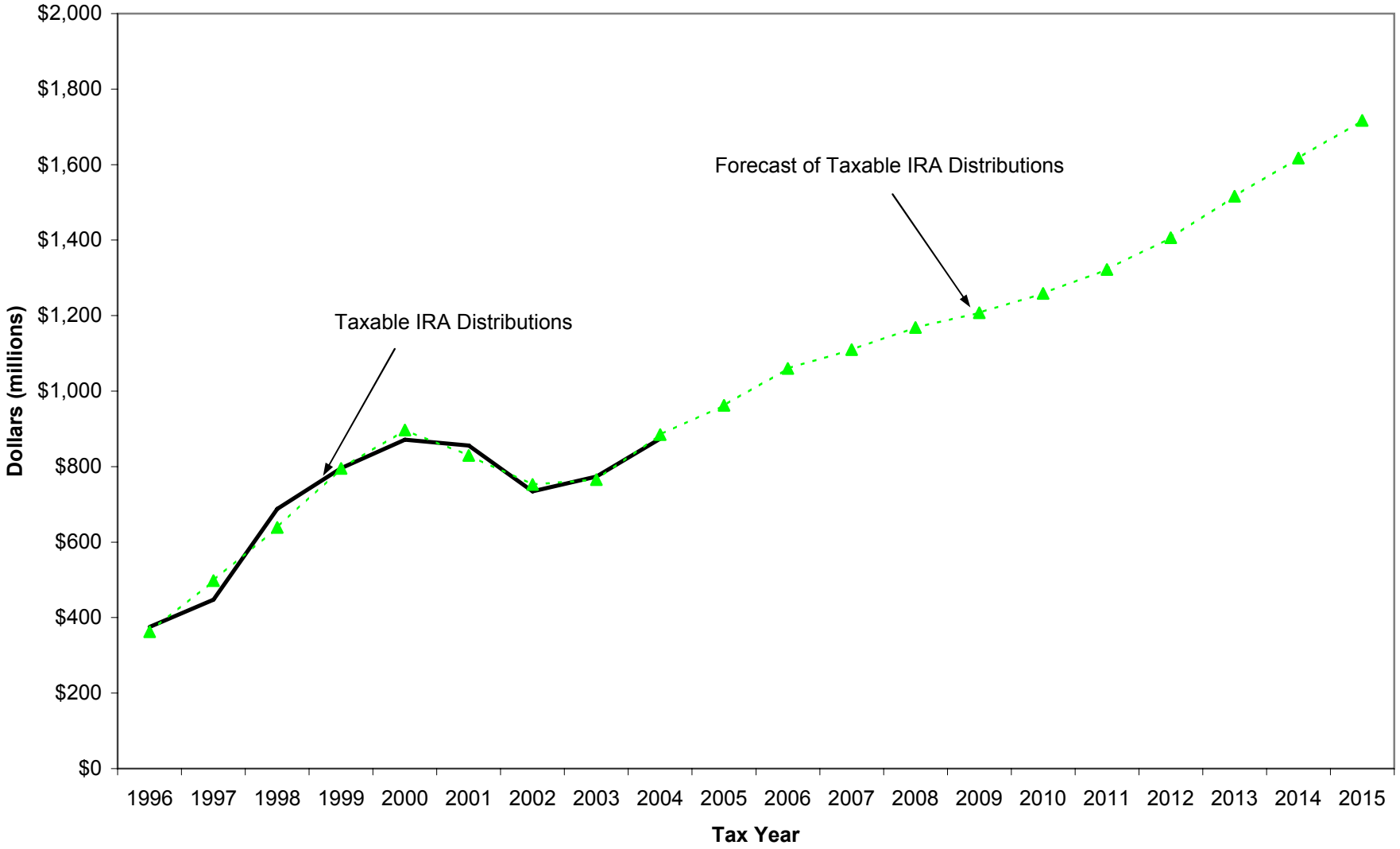

**Figure 10. Actual and Forecasted Tax-Exempt Interest Income**

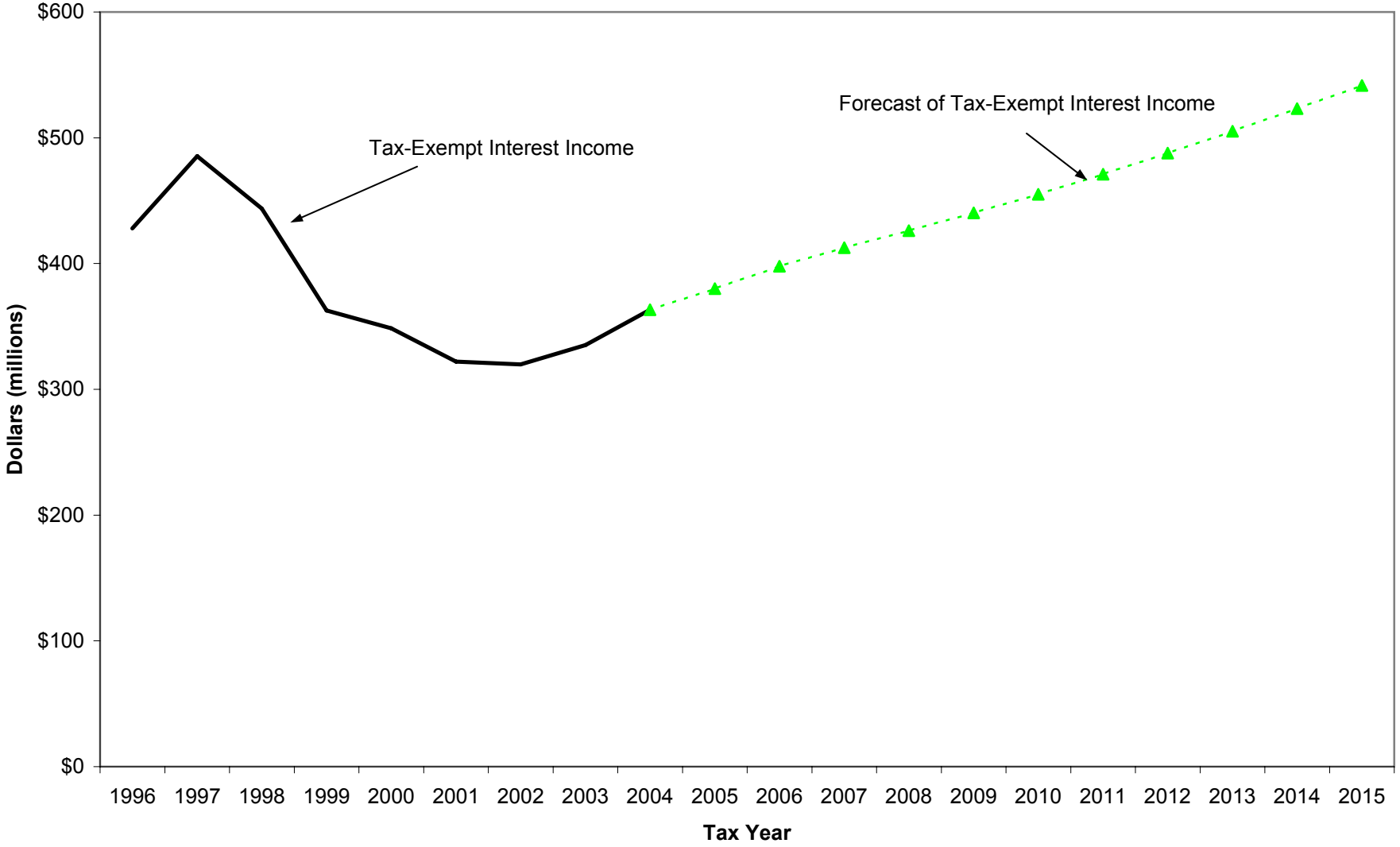

**Figure 11. Actual and Forecasted State Refunds**

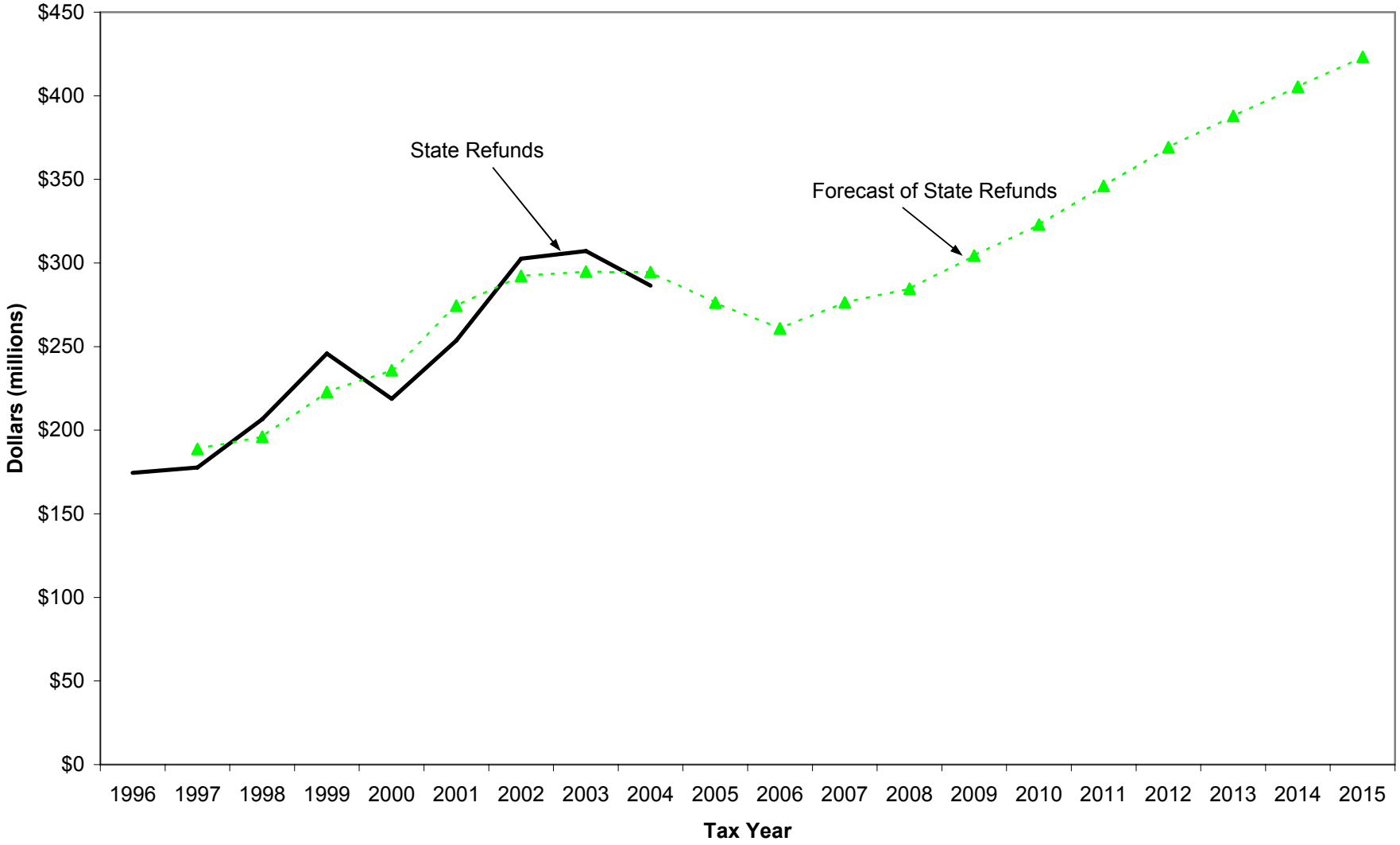

**Figure 12. Actual and Forecasted Unemployment Compensation**

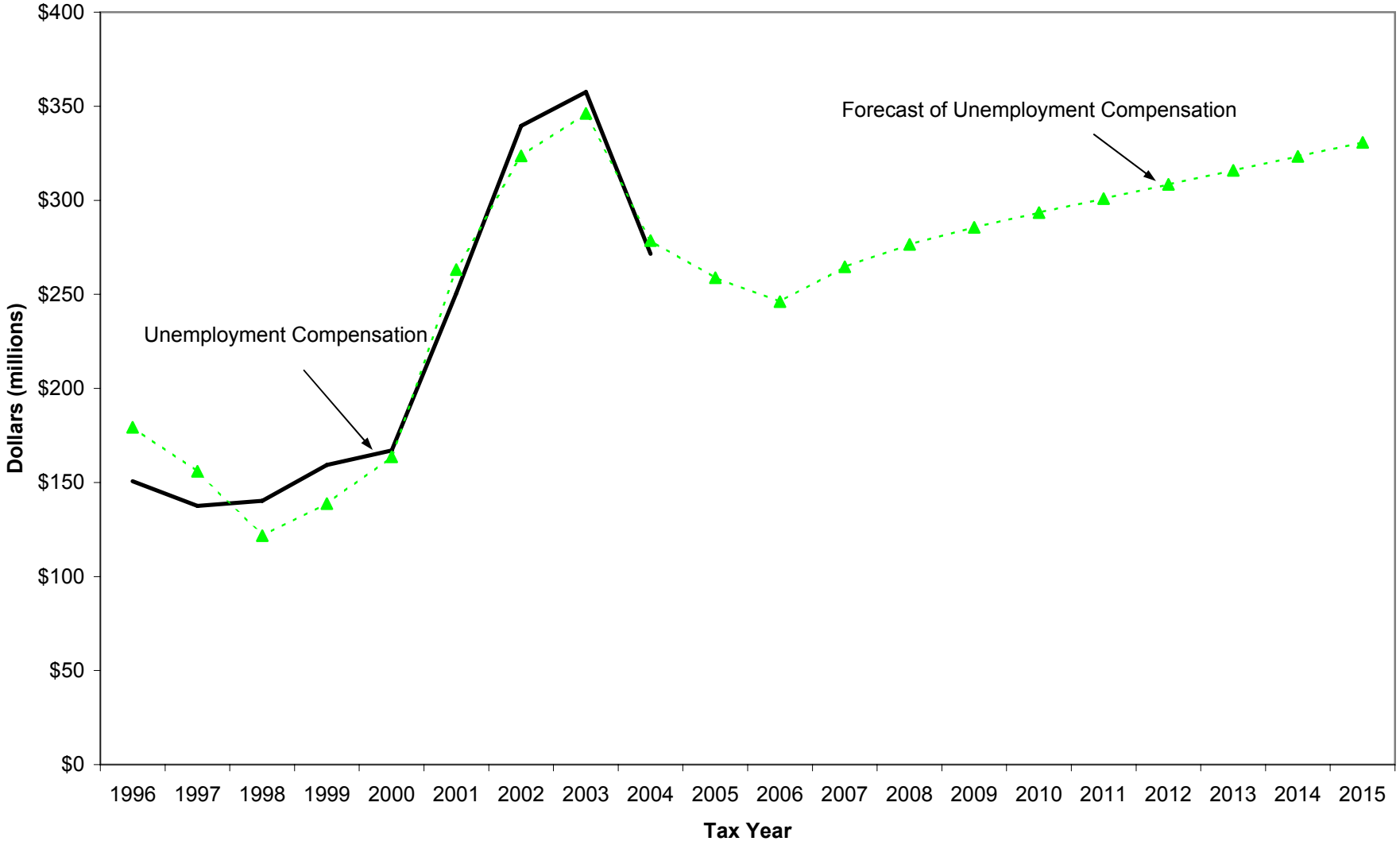

**Figure 13. Actual and Forecasted Farm Income**

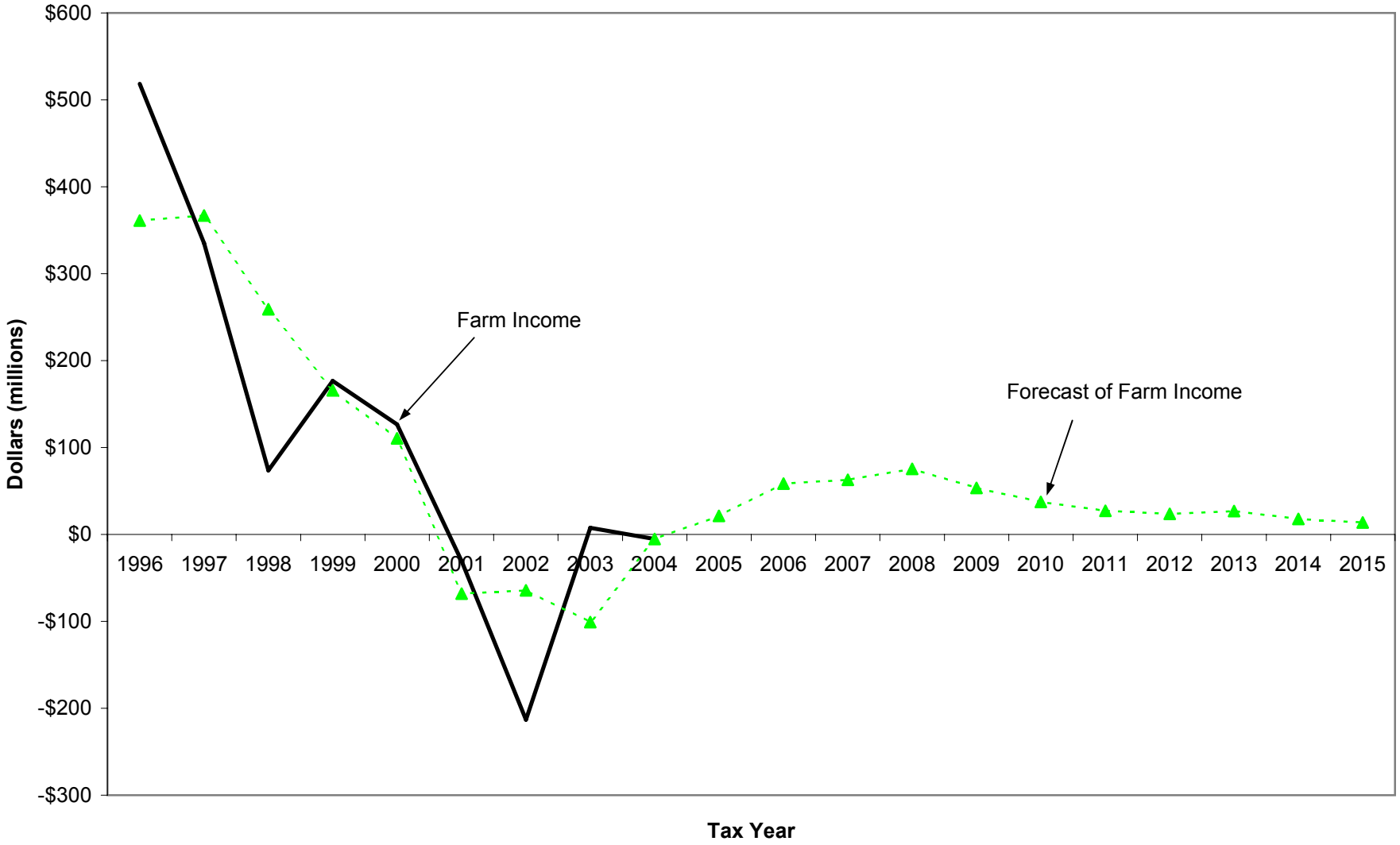

**Figure 14. Actual and Forecasted Other Gains**

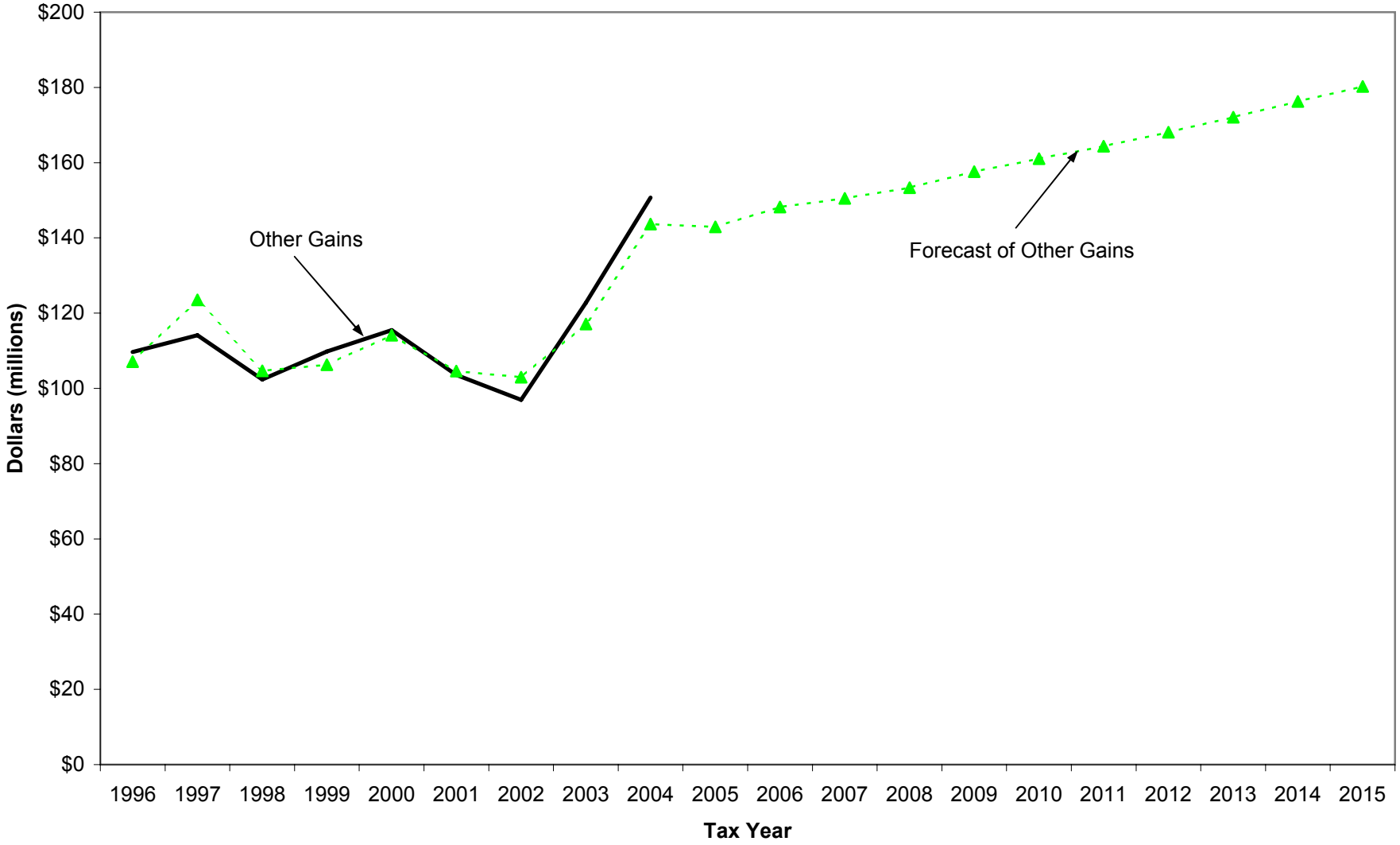

**Figure 15. Actual and Forecasted Alimony Received**

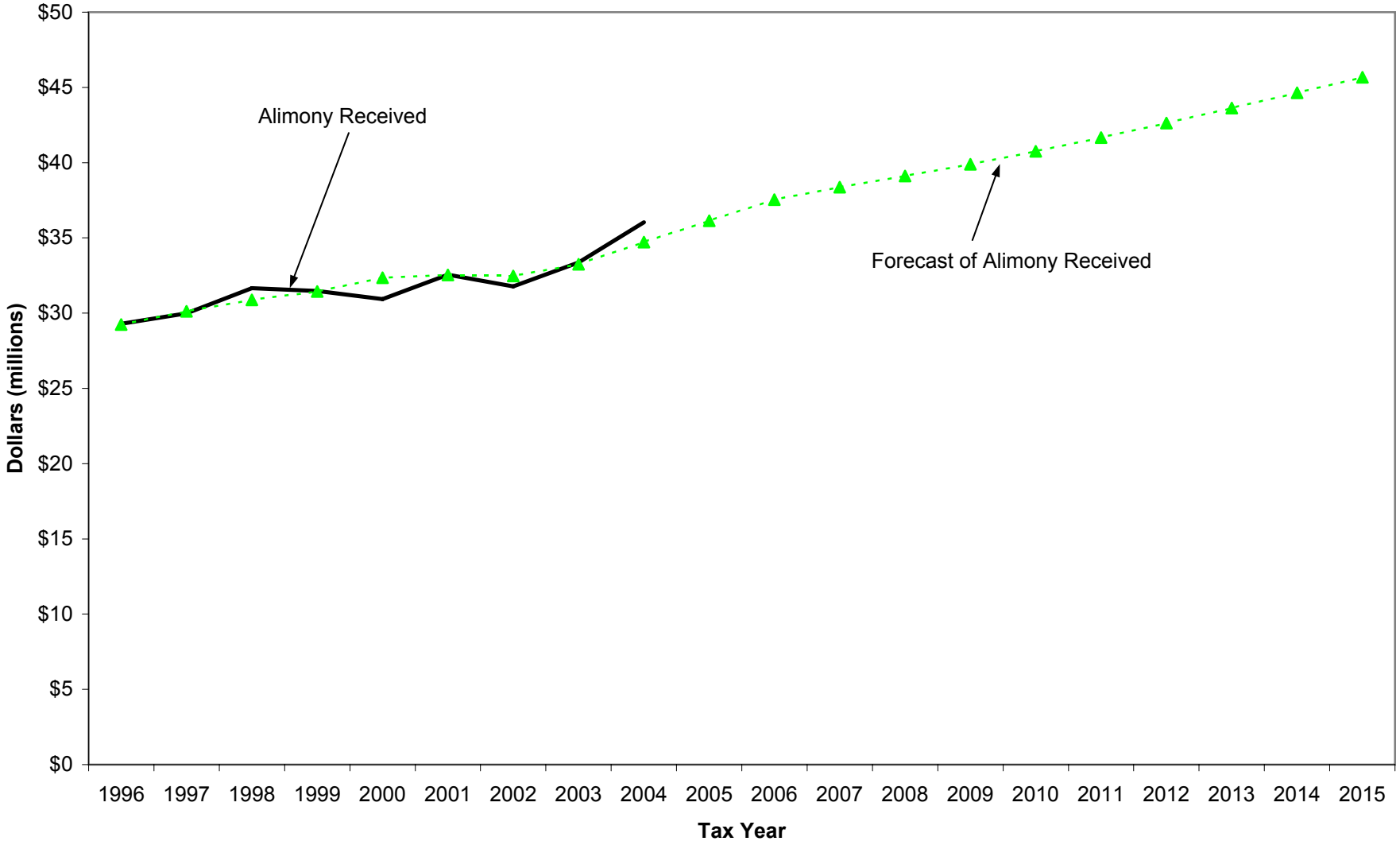

**Figure 16. Actual and Forecasted Other Income**

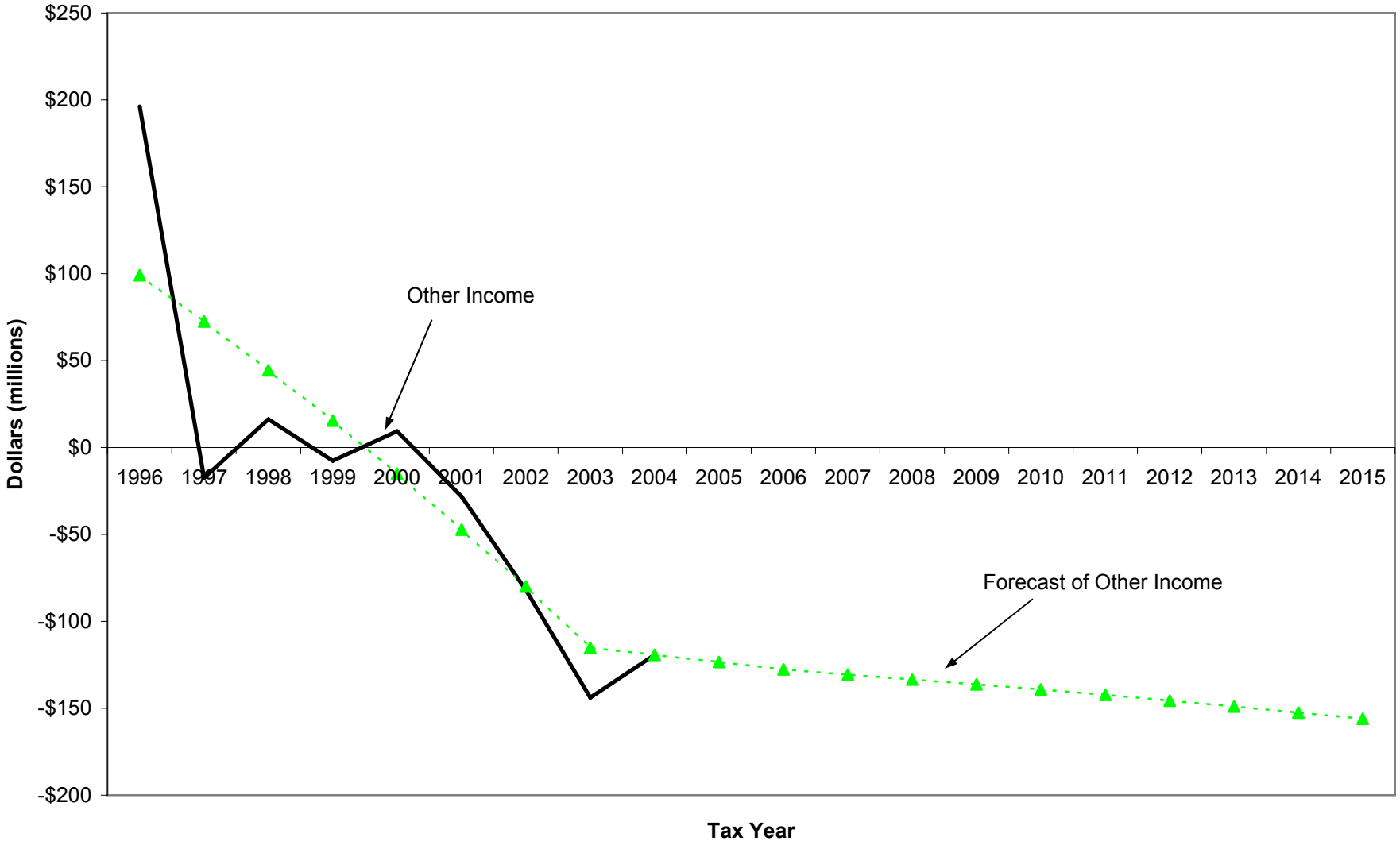

**Figure 17. Actual and Projected Federal Income Tax Payments**

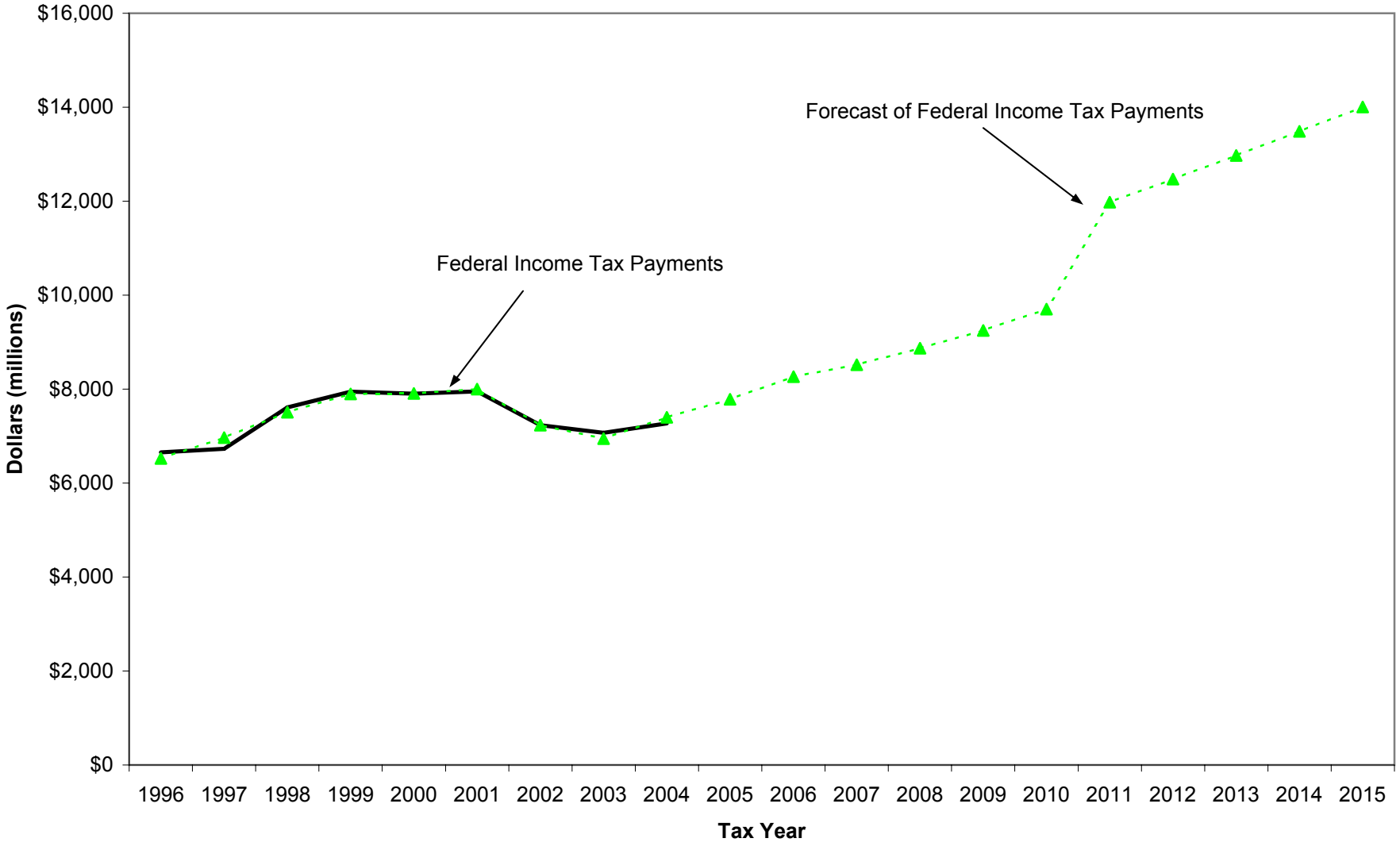

**Figure 18. Actual and Projected Federal Income Tax Refunds**

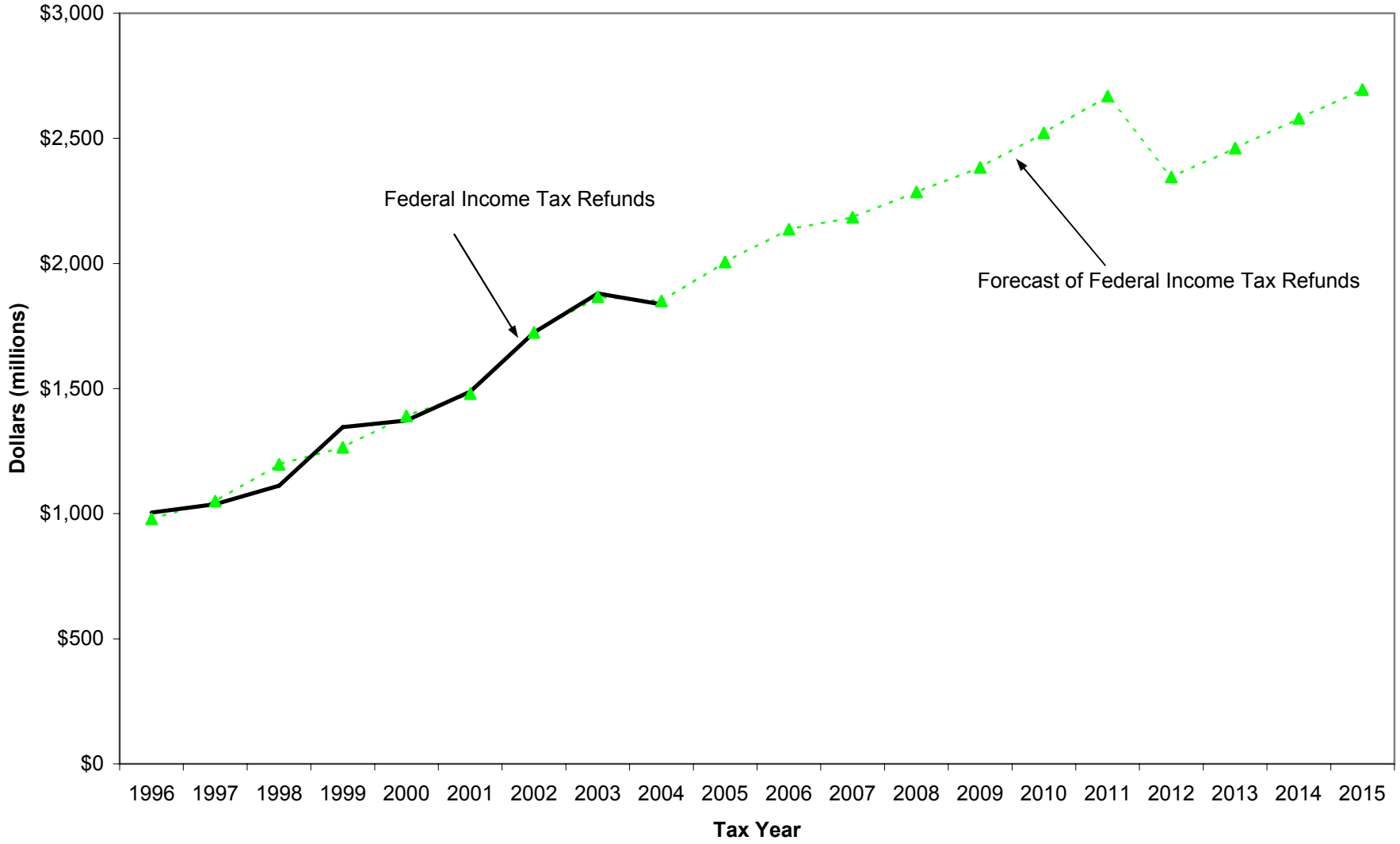

**Figure 19. History and Forecasts of Iowa Population and Counts of Resident Taxpayers**

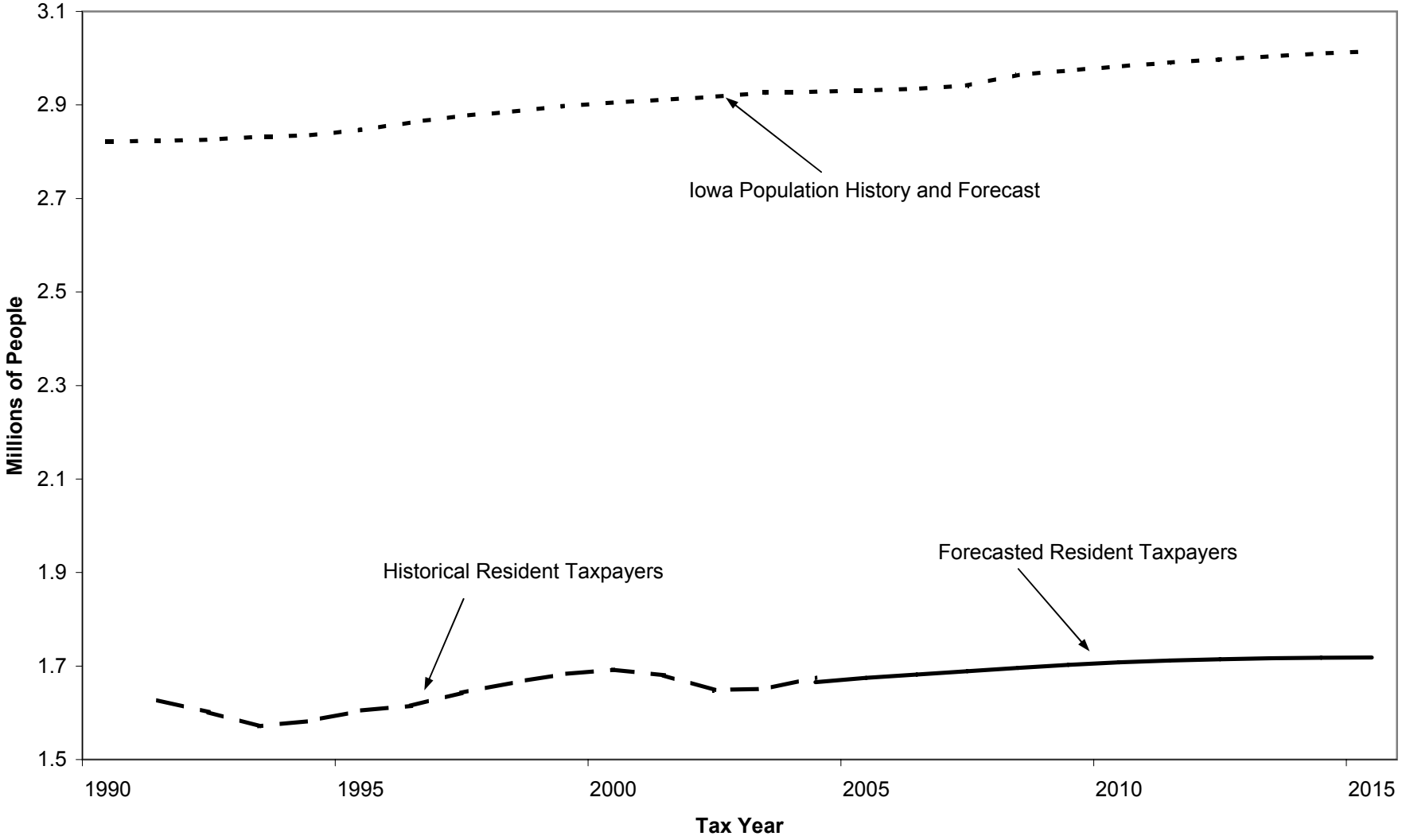

**Figure 20. Resident Historical AGI and Forecasted AGI**

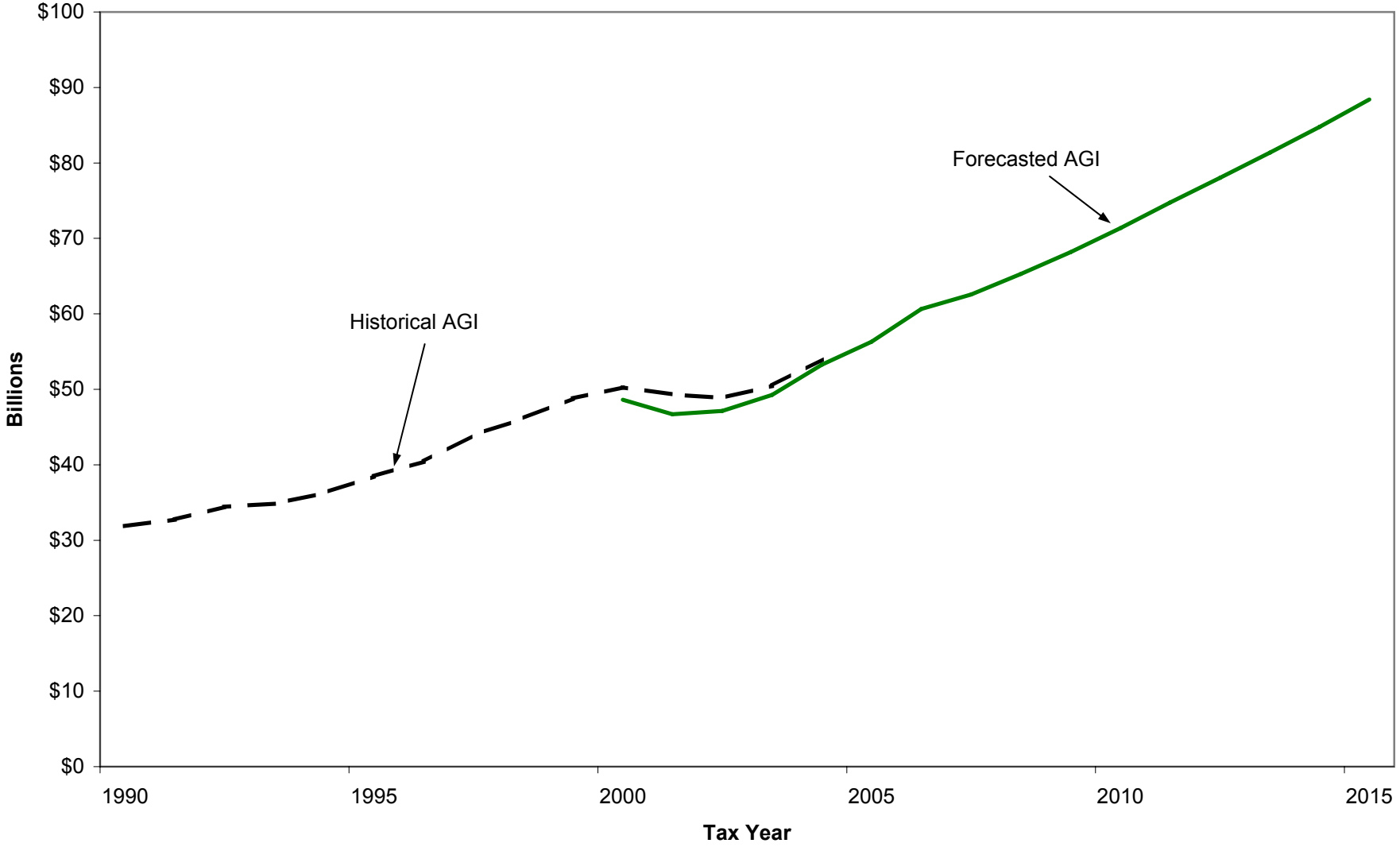

**Figure 21. Resident Historical Taxable Income and Forecasted Taxable Income**

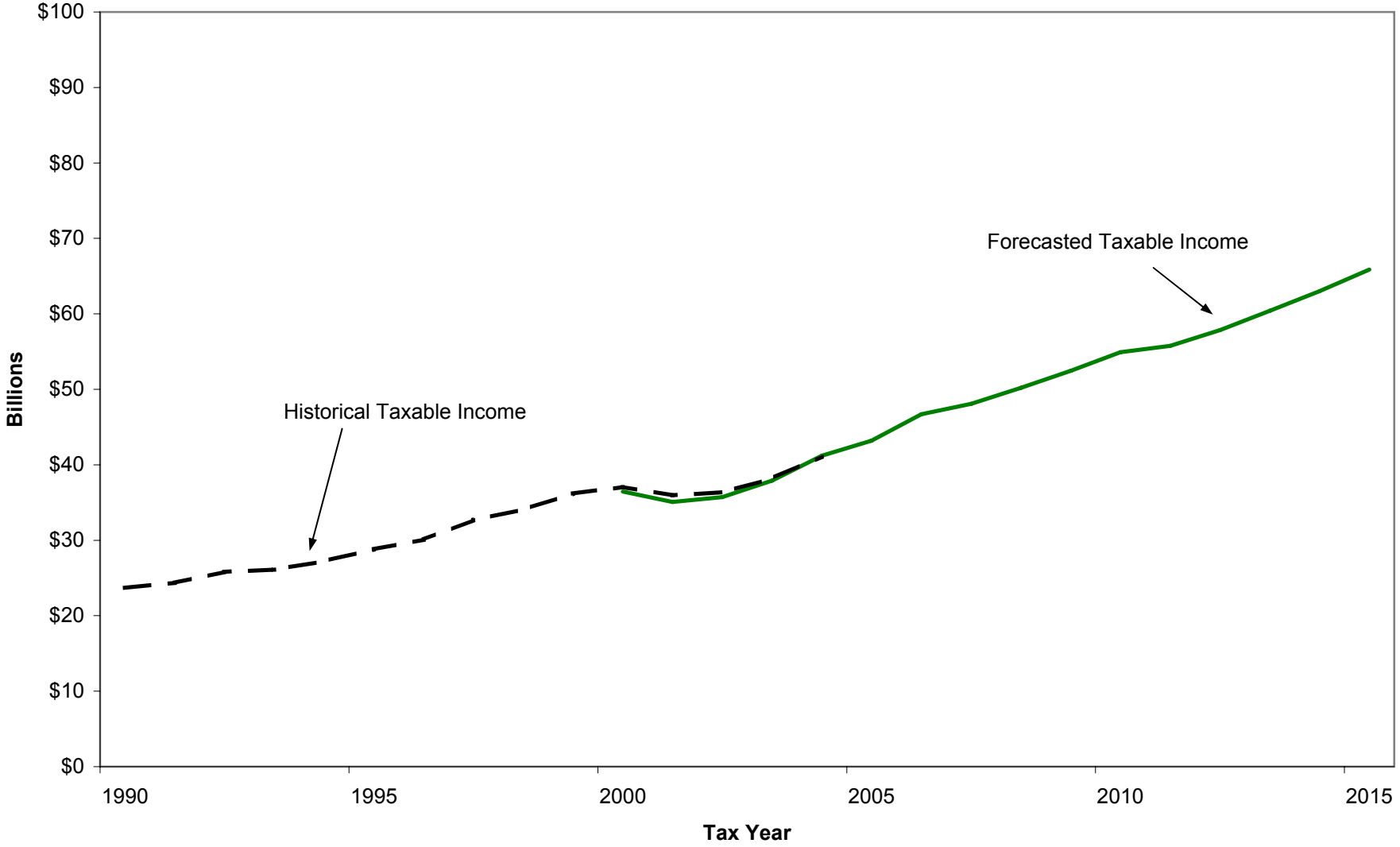

**Figure 22. Resident Historical Tax Liability and Forecasted Tax Liability**