ECONOMIC AND REVENUE ESTIMATING METHODOLOGY

CONTENTS

AN OVERVIEW OF THE FORECAST PROCESS

The Division of the Budget (DOB) *Economy and Revenue Estimation Methodology* supplements the detailed forecast of the economy and the tax and miscellaneous receipts sources presented in the Executive Budget. The purpose of this volume is to provide background information on the methods and models used to generate the estimates for the major receipt sources contained in the Budget. DOB's forecast methodology utilizes sophisticated econometric models, augmented by the input of a panel of economic experts, and a thorough review of economic and revenue data to form multi-year quarterly projections of economic and revenue changes.

AN ASSESSMENT OF FORECAST RISK

No matter how sophisticated the methods used, all forecasts are subject to error. For this reason, a proper assessment of the most significant forecast risks can be as critical to the budget process as the forecast itself. Therefore, we begin by reviewing the most important sources of forecast error and discuss how they affect the forecasts used to construct the Executive Budget.

DATA QUALITY

Even the most accurate forecasting model is constrained by the accuracy of the available data. The data used by the Budget Division to produce a forecast typically undergo several stages of revision. For example, the quarterly components of real U.S. gross domestic product (GDP), the most widely cited measure of national economic activity, are revised no less than five times over a four year period, not including the rebasing process. Each revision incorporates data that was not available when the prior estimate was made. Initial estimates are often based on sample information, though early vintages are sometimes based on the informed judgment of the analyst charged with tabulating the data. The monthly employment estimates produced under the Current Employment Statistics program undergo a similar revision process as better, more broad-based data become available and with the evolution of seasonal factors. The total U.S. nonagricultural employment estimate for December 1989 has been revised no less than 10 times since it was first published in January 1990.[1] Less frequently, data are revised based on new definitions of the underlying concepts.[2] Unfortunately, revisions tend to be largest at or near business cycle turning points, when accuracy is most critical to fiscal planners. Finally, as we demonstrate below, the available data are sometimes not suitable for economic or revenue forecasting purposes, such as the U.S. Bureau of Economic Analysis' estimate of wages at the state level.

MODEL SPECIFICATION ERROR

Economic forecasting models are by necessity simplifications of complex social processes involving millions of decisions made by independent agents. Although economic theory provides some guidance as to how these models should be specified, theory is often imprecise with respect to capturing behavioral dynamics and structural shifts.[3] Moreover, modeled relationships may vary over time. Often one must choose between models that use the average behavior of the series over its entire history to forecast the future and models

[1] The current estimate for total employment for December 1989 of 108.8 million is 0.7 percent below the initial estimate of 109.5.

[2] The switch from SIC to NAICS is a classic example of how changes in the definition of a data series can challenge the modeler. The switch not only changed the industrial classification scheme, but also robbed state modelers of decades of employment history.

[3] See R.C. Fair, *Specification, Estimation, and Analysis of Macroeconomic Models*, Cambridge, MA: Harvard University Press, 1984; and Clements M.P and D. F. Hendry, eds., *A Companion to Economic Forecasting*, Malden, MA: Blackwell Publisher, 2002.

which give more weight to the more recent behavior of the series.[4] Although more complicated models may do a better job of capturing history, they may be no better at forecasting the future, leading to the parsimony principle as a guiding precept in the model building process.

MODEL COEFFICIENTS: FIXED POINTS OR RANGES?

Although model coefficients are generally treated as fixed in the forecasting process, coefficient estimates are themselves random variables, governed by probability distributions. Typically, this distribution is assumed to be normal, a key to making statistical inference. Reporting the standard errors of the coefficient distributions gives some indication of the precision with which one can measure the relationship between two variables. For many of the results reported below, point estimates of the coefficients are reported along with their standard errors. However, it would be more accurate to say that there is a 66 percent probability that the true coefficient lies within a range of the estimated coefficient plus and minus the standard error.

ECONOMIC SHOCKS

A multitude of random events occur that can affect the economy and revenues but that no model can capture. September 11 is the most extreme example of such an event. Some economic variables are more sensitive to shocks than others. For example, equity markets rise and fall on the day's news, sometimes by large magnitudes. In contrast, GDP growth tends to fluctuate within a relatively narrow range. For all of these reasons, the probability of any forecast being precisely accurate is virtually zero. But although one can not be confident about hitting any particular number correctly, one can feel more confident about specifying a range within which the actual number is likely to fall. Often economic forecasters use sophisticated techniques, such as Monte Carlo analysis, to estimate confidence bands based on the model's performance, the precision of the coefficient estimates, and the inherent volatility of the series.[5] A 95 percent confidence band (or even a much less exacting band) often can be quite wide, suggesting the possibility that the actual result could deviate substantially from the point estimate. From a practitioner's perspective, these techniques are only valid if the model is properly specified.

Sometimes what appears to be a random economic shock may actually be a more permanent structural change. In the latter half of the 1990s, most forecasters underestimated the national economy's performance for several consecutive years before it became recognized that the economy had shifted to a higher productivity growth path and talk of the "new economy" became common. Structural shifts in the underlying economy or revenue structure are difficult to model in practice, particularly since the true causes of such shifts only become clear with hindsight. This can lead to large forecast errors when these shifts occur rapidly or when the cumulative impact is felt over the forecast horizon. Policy makers must be kept aware that even a well specified model can perform badly when structural changes occur.

EVALUATING A LOSS FUNCTION

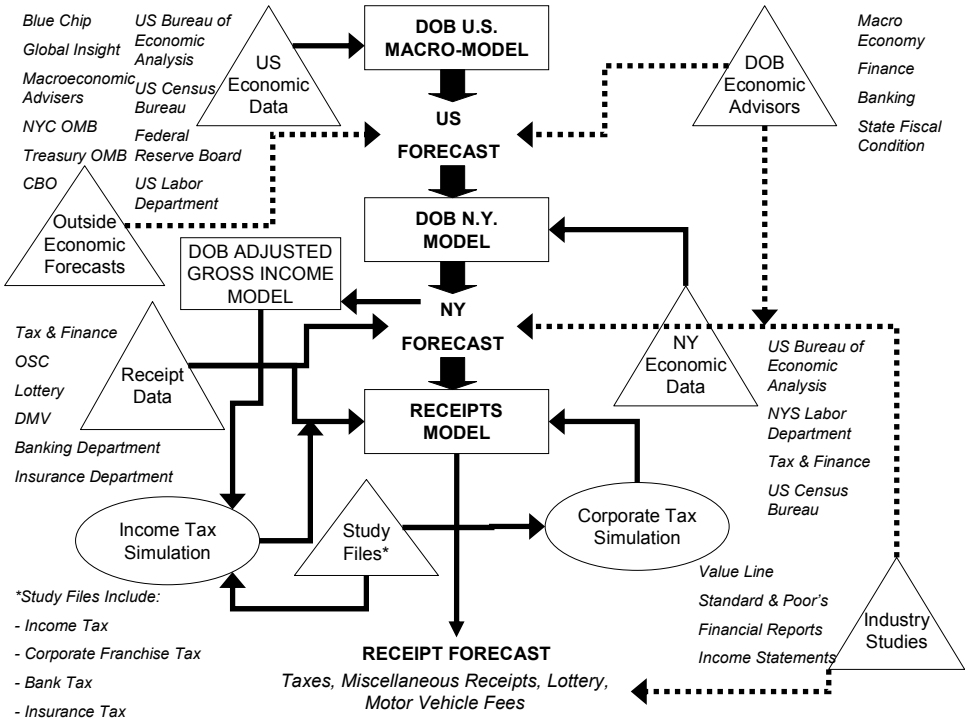
The prevalence of sources of forecast error underscores the importance of assessing the risks to the forecast, and explains why the discussion of such risks consumes such a large portion of the economic backdrop presented with the Executive Budget. In light of all of the

[4] See Andrew C. Harvey, *Time Series Models*, second edition, Cambridge: The MIT Press, 1993.
[5] For an example of such an analysis, see Lynn Holland, Hilke Kayser, Robert Megna, and Qiang Xu (2001). "The Volatility of Capital Gains Realizations in New York State: a Monte Carlo Study," in *Proceedings, 94th Annual Conference on Taxation*, National Tax Association, Washington, DC, 2002, pp. 172-183.

potential sources of forecast risk, how does a budgeting entity utilize the knowledge of risks to inform the forecast? Standard econometric theory tells us that the probability of any point forecast being correct is zero, but a budget must be based on a single projection.

One way to reconcile these two facts it to evaluate the cost of one's forecasting errors, giving rise to the notion of a loss function. A conventional example of a loss function is the root-mean-squared forecast error (RMSFE). In constructing that measure, the "cost" of an inaccurate forecast is the square of the forecast error itself, implying that large forecast errors are weighted more heavily than small errors. Because positive and negative errors of equal magnitude are weighted the same, the RMSFE is symmetric. However, in the professional world of forecasting, as in our daily lives, the costs associated with an inaccurate forecast may not truly be symmetric. For example, how much time we give ourselves to get to the airport may not be based on the average travel time between home and the gate, since the cost of being late and missing the plane may outweigh the cost of arriving early and waiting awhile longer. Granger and Pesaran (2000) show that the forecast evaluation criterion derived from their decision-based approach can differ markedly from the usual RMSFE.[6] They suggest a more general approach, known as generalized cost-of-error functions, to deal with asymmetries in the cost of over- and under-predicting.[7] In the revenue-estimating context, the cost of overestimating receipts for a fiscal year may outweigh the cost of underestimating receipts, given that ongoing spending decisions may be based on revenue resources projected to be available. In summary, forecast errors are an inevitable part of the process and, as a result, policymakers must be fully informed of the forecast risks, both as to direction and magnitude.

The Economic and Revenue Forecasting Process



[6] See C. W. J. Granger and M. H. Pesaran, "A Decision-based Approach to Forecast Evaluation," in Chan and Tong (eds.), *Statistics and Finance: An Interface*, London: Imperial College Press, 2000; and C. W. J. Granger and M. H. Pesaran, "Economic and Statistical Measures of Forecast Accuracy," *Journal of Forecasting*, 2000, Vol. 19, pp. 537-560.

[7] For a detailed discussion, see C.W.J. Granger, *Empirical Modeling in Economics: Specification and Evaluation*, Cambridge University Press,1999.

OVERVIEW

The above flow chart provides an overview of the receipts forecasting process. The entire forecast process, from the gathering of information to the running of various economic and receipt models, is designed to inform and improve the DOB receipt estimates. As with any large scale forecasting process, the qualitative judgment of experts plays an important role in the estimation process. It is the job of the DOB economic and revenue analysts to consider all of the sources of model errors and to assess the impact of changes in the revenue environment that models cannot be expected to capture. Adjustments that balance all of these risks while minimizing the appropriate loss function are key elements of the process. Nevertheless, in the final analysis, such adjustments tend to be relatively small. The Budget Division's forecasting process remains guided primarily by the results from the models described in detail below.

THE ECONOMY

The economic environment is the most important factor influencing the receipts estimates. The receipts structure of New York State is dominated by tax sources, such as the personal income and sales taxes, that are sensitive to economic conditions. As a result, the first and most important step in the construction of receipts projections requires an analysis of economic trends at both the State and national levels. The schedule below sketches the frequency and timing of forecasts performed over the course of the year.

ECONOMIC AND REVENUE FORECAST SCHEDULE

A brief overview of how the Budget Division forecasting process unfolds over the course of the calendar year is presented below. From one perspective, the following schedule begins at the end, since the submission of the Executive Budget in January represents the culmination of research and analysis done throughout the preceding year. For the remainder of the year, the Economic and Revenue Unit closely monitors all of the relevant economic and revenue data and regularly updates an extensive array of annual, quarterly, monthly, weekly, and daily databases. For example, estimates of U.S. Gross Domestic Product data are released at the end of each month for the preceding quarter. U.S. employment and unemployment rate data is released on the first Friday of each month for the preceding month, while unemployment benefits claims data is released on a weekly basis. Receipts data published by the Office of the State Comptroller is released by the 15th of each month for the preceding month, while similar data from the New York State Department of Taxation and Finance is monitored on both a monthly and daily basis. The Executive Budget forecast is updated four times during the year in compliance with State Finance Law.

JANUARY	Governor submits Executive Budget to the Legislature by the middle of the month, or by February 1 following a gubernatorial election.
FEBRUARY	Prepare forecast for *Executive Budget With 30-Day Amendments*.
MARCH	Joint Legislative-Executive Economic and Revenue Consensus Forecasting Conference.
APRIL	Statutory deadline for enactment of State Budget by the Legislature.
JUNE/JULY	Prepare forecast for First Quarter Financial Plan Update (July Update).
SEPTEMBER/ OCTOBER	Prepare forecast for Mid-Year Financial Plan Update: > Meet with DOB Economic Advisory Board for review and comment on mid-year forecast. > Incorporate comments of Advisory Board members.
DECEMBER	Prepare Executive Budget forecast and supporting documentation.

The process begins with a forecast of the U.S. economy. The heart of the DOB U.S. forecast is the DOB macroeconomic model. The DOB model structure employs recent advances in econometric modeling techniques to project the most likely path of the U.S. economy over the multi-year forecast horizon included in the Executive Budget. The model

framework and its development is described in detail in this volume. Model output is combined with our qualitative assessment of economic conditions to complete a preliminary U.S. forecast. In addition, Division of the Budget staff review the projections of other forecasters of the U.S. economy to provide a yardstick against which to judge the DOB forecast.

The U.S. forecast serves as the key input to the New York macroeconomic forecast model. National conditions with respect to employment, income, financial markets, foreign trade, consumer confidence, and stock market prices can have a major impact on New York's economic performance. However, the New York economy is subject to idiosyncratic fluctuations, which can lead the State economy to perform much differently than the nation as a whole. The evolution of the New York economy is governed in part by a heavy concentration of jobs and income in the financial and business service industries. As a result, economic events that disproportionately affect these industries can have a greater impact on the New York economy than on the rest of the nation. The New York economic model is structured to capture both the obvious linkages to the national economy and the factors which may cause New York to deviate from the nation. The model estimates the future path of major elements of the New York economy, including employment, wages and other components of personal income and makes explicit use of the linkages between employment and income earned in the financial services sector and the rest of the State economy.

To adequately forecast personal income tax receipts — the largest single component of the receipts base — projections of the income components that make up State taxable income are also required. For this purpose, DOB has constructed models for each of the components of New York State adjusted gross income. The results from this series of models serve as input to the income tax simulation model described below, which is the primary tool for calculating New York personal income tax liability.

A final part of the economic forecast process involves using tax collection data to assess the current state of the New York economy. Tax data is often the most current information available for judging economic conditions. For example, personal income tax withholding provides information on wage and employment growth, while sales tax collections serve as an indicator of consumer purchasing activity. Clearly, there are dangers in relying too heavily on tax information to forecast the economy, but this data is vital in assessing the plausibility of the existing economic forecast, particularly for the year in progress and at or near turning points when "realtime" data are most valuable.

ECONOMIC ADVISORY BOARD

At this point, a key component of the forecast process takes place: the Budget Director and staff confer with a panel of economists with expertise in macroeconomic forecasting, finance, the regional economy, and public sector economics to obtain valuable input on current and projected economic conditions, as well as an assessment of the reasonableness of the DOB estimates. In addition, the panel provides input on other key functions that may impact receipts growth, including financial services compensation and the performance of sectors of the economy difficult to capture in any model.

FORECASTING RECEIPTS

Once the economic forecast is complete, the projections are used as inputs into the forecasts of selected revenues. Again, we combine qualitative assessments, our econometric analysis, and expert opinions on the New York revenue structure to produce a final receipts forecast.

DECOMPOSING CASH COLLECTIONS

Much can be learned about the forces operating on receipts just by carefully examining the data. Many of the revenue sections of this report contain a series of related plots termed "component collection graphs." The first graph in the series is the raw collections data for the tax. The next three plot the underlying components of the series as determined by the structural time series approach developed by Harvey.[8] This approach decomposes the series into its trend, seasonal, and irregular components. In many cases, close examination of these charts reveals important patterns and shifts in the data that suggest strategies for modeling and forecasting. Although these graphs are not a substitute for more substantive analysis, they represent a productive first step in evaluating the data generating process.

MODELING AND FORECASTING

The DOB receipts estimates for the major tax sources rely on a sophisticated set of econometric models that link economic conditions to revenue generating capacity. The models use the economic forecasts described above as inputs and are calibrated to capture the impact of policy changes. As part of the revenue estimation process, DOB staff analyze industry trends, tax collection experience, and other information necessary to better understand and predict receipts activity.

For large tax sources, such as the personal income tax, receipt estimates are approached by constructing underlying taxpayer liability and then projecting liability into future periods based on the economic forecast generated from econometric models specifically developed for each tax. After liability is estimated for future taxable periods, it is converted to cash estimates on a fiscal year basis.

The Division of the Budget employs micro-simulation models to estimate future tax liabilities for the personal income and corporate taxes. This technique starts with detailed taxpayer information taken directly from tax returns (the data is stripped of identifying taxpayer information) and allows for the actual computation of tax under alternative policy and economic scenarios. The DOB simulations allow for a bottom-up estimate of tax liability for future years as the data file of taxpayers is "grown," based on DOB estimates of economic growth. An advantage of this approach is it allows direct calculation of tax law changes and the revenue impact of already enacted and proposed tax changes on future liability. As with most of our revenue models, the simulation models require projections of the economic variables that drive tax liability. The income tax and corporate tax simulation models incorporate the direct effect of a policy change on taxpayers. However, the models do not permit feedback from the taxpayer response to the macroeconomy. For large policy changes intended to influence taxpayer behavior and trigger changes in the underlying economy, adjustments are made outside the modeling process.[9] The simulation of future tax liability is most important for the income tax, which accounts for over half of General Fund tax receipts. The income tax simulation is discussed in greater detail later in this report.

[8] See Andrew C. Harvey, *Forecasting, Structural Time Series Models and the Kalman Filter*. Cambridge: Cambridge Univeristy Press, 1989.

[9] For examples of modeling efforts that attempt to incorporate such feedback, see Congressional Budget Office, *How CBO Analyzed the Macroeconomic Effects of the President's Budget*, July 2003.

U.S. MACROECONOMIC MODEL

The Economic and Revenue Unit within the Division of the Budget (DOB) provides projections on a wide range of economic and demographic variables. These estimates are used in the development of State revenue projections, expenditure trending, debt capacity analysis, and for other budget planning purposes. The Division has developed econometric models for the U.S. and State economies that yield the forecasts needed for these purposes.

RECENT DEVELOPMENTS IN MACROECONOMIC MODELING

Macroeconomic modeling has undergone a number of important changes during the last 25 years, primarily as a result of developments in economic and econometric theory. However, fundamental changes in the structure of the economy since the 1970s have also led to a significant altering of the way the economy is modeled. Four related lines of economic research have had a significant impact on the current state of macroeconomic modeling.

The first major development was Robert Lucas' (1976) critique of the role of expectations in traditional macroeconomic models. If economic models did not incorporate the assumption that agents were forward looking, then it would be unlikely that model forecasts would be consistent with a rational response on the part of agents to a policy change, should there be one. The result was a widespread adoption of rational expectations in macroeconomic forecasting models. The Lucas analysis also initiated the emergence of a new generation of econometric models explicitly based on micro-foundations. Firms and households are assumed to make decisions based on optimization plans that are realized in the long run.

Second, Christopher Sims (1980) raised serious doubts that standard large-scale econometric models were effective in properly identifying the behavioral relations among agents in the economy. This critique led to a more flexible identification of the behavioral relations among economic agents within a vector autoregression (VAR) model framework. Unlike structural models, VAR models do not impose an *a priori* structure on the dynamic relationships among economic variables.

A third development was initiated by the classic study of Nelson and Plosser (1982), which concluded that the hypothesis of nonstationarity cannot be rejected for a wide range of commonly used macroeconomic data series. Heuristically, nonstationarity implies the lack of a constant mean and variance in a time series. Research surrounding the absence of stationarity has led to a re-evaluation of what constitutes a long-run equilibrium relationship, and prompted a revisiting of the problem of spurious regression described by Granger and Newbold (1974). This led to a more rigorous analysis of the time series properties of economic data and the implications of these properties for model specification and statistical inference.

Further, nonstationarity also led to a fourth development, engendered by the work of Engle and Granger (1987), Johansen (1991), and Phillips (1991) on the presence of long-run equilibrium relationships among macroeconomic data series, also known as cointegration. Although cointegrated series can deviate from their long-term trends for substantial periods, there is always a tendency to return to their common equilibrium paths. This behavior led to the development of a framework for dealing with nonstationary data in an econometric setting known as the error-correction model. The error-correction framework has permitted extensive research on how to best exploit the predictive power of cointegrating relationships.

Another area that has spawned a substantial wealth of academic research is the choice of an optimal monetary policy. The dramatic changes in the institutional structure of financial markets over the past 25 years have rendered the aggregate money supply a much less tractable target than interest rates. In addition, new developments in economic theory,

including game theory and the rational expectations hypothesis, appear to favor a rule-based monetary policy, as opposed to a purely discretionary approach. A rule-based approach is believed to maximize the credibility of the central bank, a key input to the effectiveness of the policy itself. However, the desirability of this feature must be weighed against the reliability of the information available when policy decisions are made. Perhaps the most popular example of an interest rate-setting rule is the one proposed by John Taylor (1993) and commonly known as Taylor's rule. Although the debate as to which rule yields the optimal monetary policy is ongoing, recent research by Orphanides (2003) using real-time data indicates that Federal Reserve policy has been consistent with a "Taylor-rule framework" almost since its inception.

BASIC FEATURES

The Division of the Budget's U.S. macroeconomic model (DOB/U.S.) incorporates the theoretical advances described above in an econometric model used for forecasting and policy simulation. The agents represented by the model's behavioral equations optimize their behavior subject to economically meaningful constraints. The model addresses the Lucas critique by specifying an information set that is common to all economic agents, who incorporate this information when forming their expectations. The model's long-run equilibrium is the solution to a dynamic optimization problem carried out by households and firms. The model structure incorporates an error-correction framework that ensures movement back to equilibrium in the long run.

Like the Federal Reserve Board model, the assumptions that govern the long-run behavior of DOB/U.S. are grounded in neoclassical microeconomic foundations. Consumers exhibit maximizing behavior over consumption and labor-supply decisions and firms maximize profit. The model solution converges to a balanced growth path in the long run. Consumption is determined by expected wealth; expected wealth is, in part, determined by expected future output and interest rates. The value of investment is affected by the cost of capital and expectations about the future path of output and inflation.

However, in addition to the microeconomic foundations which govern long-run behavior, DOB/U.S. incorporates dynamic adjustment mechanisms which reflect that while agents are forward-looking, they do not adjust to changes in economic conditions instantaneously. Sources of "friction" within the economy include adjustment costs, the wage-setting process, and persistent spending habits among consumers. The presence of such frictions delays the adjustment of nonfinancial variables, producing periods when labor and capital deviate from their optimal paths. The presence of such imbalances constitutes signals that are important in the setting of wages and prices because price setters must anticipate the actions of other agents. For example, firms set wages and prices in response to a set of expectations concerning productivity growth, available labor, and the consumption choices of households.

In contrast to the "real" sector, the financial sector is assumed to be unaffected by frictions due to the negligible cost of transactions and the presence of well-developed primary and secondary markets for financial assets. This contrast between the real and financial sectors permits monetary policy to have a short-run impact on output. Monetary policy is administered through interest-rate manipulation via a federal funds rate policy target. Current and anticipated changes in this rate influence agents' expectations and the rate of return on various financial assets.

OVERVIEW OF MODEL STRUCTURE

DOB/U.S. comprises six modules of estimating equations, forecasting well over 200 variables. The first module estimates real potential U.S. output, as measured by real U.S. gross domestic product (GDP). The next module estimates the formation of agent

expectations, which become inputs to blocks of estimating equations in subsequent modules. Agent expectations play a key role in determining long-term equilibrium values of important economic variables, such as consumption and investment, which are estimated in the third module. A fourth module produces forecasts for variables thought to be influenced primarily by exogenous forces but, in turn, play an important role in determining the economy's other major indicators. These variables, along with the long-term equilibrium values estimated in the third module, become inputs to the core behavioral model, which comprises the fifth block of estimating equations. The core behavioral model is the largest part of DOB/U.S. and much of the discussion that follows focuses on this component. The final module is comprised of satellite models that use core model variables as inputs, but do not feed back into the core. The current estimation period for the model is the first quarter of 1965 through the third quarter of 2004, although some data series do not have historical values for the full period. Descriptions of each of the six modules follow below.

POTENTIAL OUTPUT AND THE OUTPUT GAP

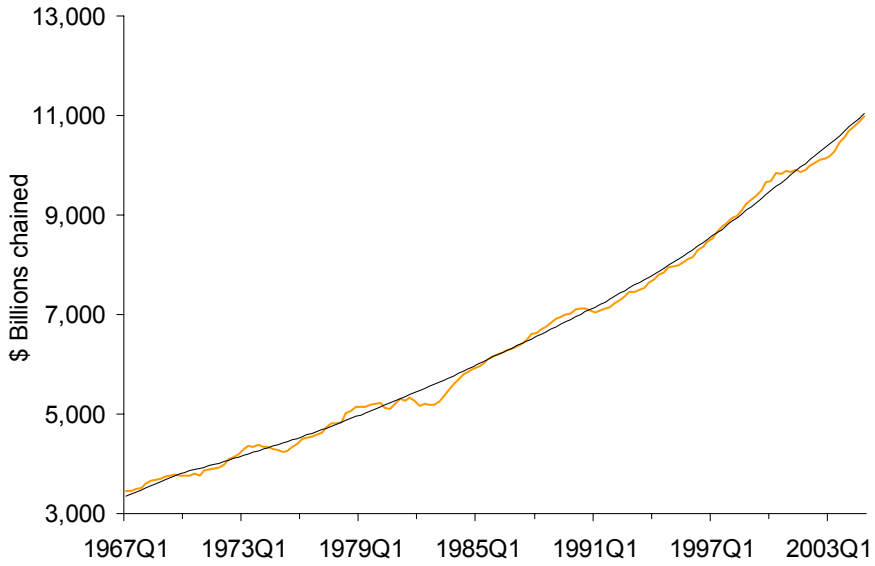
Potential Gross Domestic Product (GDP) is one of the foundational elements of DOB/U.S. on which the model's long-term equilibrium values and monetary policy forecasts are based. Potential GDP is the level of output that the economy can produce when all available resources are being utilized at their most efficient levels. The economy can produce both above and below this level, but when it does so for an extended period, economic agents can expect inflation to either rise or fall, although the precise timing of that movement can depend on a multiplicity of factors. The output gap is defined as the difference between actual and potential output.

The Budget Division method for estimating potential GDP largely follows that of the Congressional Budget Office (CBO) (1995, 2001). This method estimates potential GDP for each of the four major economic sectors defined under U.S. Bureau of Economic Analysis National Income and Product Account (NIPA) data: nonfarm business, farm, government, and households and nonprofit institutions. The nonfarm business sector is by far the largest sector of the U.S. economy, accounting for 77.4 percent of total GDP in 2000. A neoclassical growth model is used to model this sector, incorporating three inputs to the production process: labor (measured by the number of hours worked), the capital stock, and total factor productivity. The last of these three inputs, total factor productivity, is not directly measurable. It is estimated by substituting the actual values of hours worked and capital into a fixed coefficient Cobb Douglas production function, where a coefficient of 0.7 is applied to labor and 0.3 is applied to capital and all values are in logarithms. Total factor productivity is the residual resulting from a subtraction of the log value of output accounted for by labor and capital from the historical log value of output.

Each of the inputs to private nonfarm business production is assumed to contain a component that varies with the business cycle and a long-term trend component that tracks the evolution of economy's capacity to produce. Inputs are adjusted to their "potential" levels by estimating and then removing the cyclical component from the data series. The cyclical component is assumed to be reflected in the deviation of the actual unemployment rate from what economists define as the nonaccelerating inflation rate of unemployment, or NAIRU. When the unemployment rate falls below the NAIRU, indicating a tight labor market, the stage is set for higher wage growth and, in turn, higher inflation. An unemployment rate above the NAIRU has the opposite effect. Estimation of the long-term trend component presumes that the "potential" level of an input grows smoothly over time, but rather than assuming a fixed growth rate, the growth rate is allowed to rise or fall at business cycle peaks as dictated by the data. Once the models are estimated, the potential level is defined as the fitted values from the regression, where the unemployment rate deviations from the NAIRU are set equal to zero. This same method is applied to all three of the major inputs to private nonfarm business production.

To obtain a measure of potential private nonfarm business GDP, the potential levels of the three production inputs are substituted back into the production function where hours worked, capital, and total factor productivity are given coefficients of 0.7, 0.3, and 1.0, respectively. For the other three sectors of the economy, the cyclical component is removed directly from the series itself in accordance with a variant of the regression method used to estimate the potential levels of the inputs to private nonfarm business production. Nominal potential measures for the four sectors are also estimated by multiplying the chained dollar estimates by the implicit price deflators based on actual historical data for each quarter. The estimates for the four sectors are then "Fisher" added together to yield an estimate for total potential real U.S. GDP.[10] Figure 1 compares the DOB construction of potential GDP to actual.

Figure 1
Potential GDP vs. Actual



Source: Economy.com; DOB staff estimates.

EXPECTATIONS FORMATION

Few important macroeconomic relationships are free from the influence of expectations. When examining behavioral relationships in a full macroeconomic model, the general characteristics and policy implications of that model will depend upon precisely how expectations are formed.

Rational and Adaptive Expectations

Expectations play an important role in DOB/U.S. in the determination of consumer and firm behavior. For example, when deciding expenditure levels, consumers will take a long-term view of their income prospects. Thus, when deciding how much to spend in a given period, they consider not only their income in that period, but also their lifetime or "permanent income," as per the "life cycle" or "permanent income" hypotheses put forward by Friedman (1957) and others. In estimating their permanent incomes, consumers are assumed to use all the information available to them at the time they make purchases.

[10] Throughout DOB/U.S., aggregates of chained dollar estimates are calculated by Fisher adding the component series. Similarly, components of chained dollar estimates constructed by DOB, such as noncomputer nonresidential fixed investment and nonoil imports, are calculated using Fisher subtraction.

Producers are also are assumed to be forward-looking, basing their decisions on their expectations of future prices, interest rates, and output. However, since both households and firms experience costs associated with adjusting their long-term expenditure plans, both are assumed to exhibit a degree of behavioral inertia, making adjustments only gradually.

DOB/U.S. assumes that all economic agents form their expectations "rationally," meaning all available information is used, and expectations are correct, on average, over the long-term. More formally, the expectation of a variable *Y* at time *t*, Y_t, formed at period *t-1*, is the statistical expectation of Y_t based on all available information at time *t-1*. However, because of the empirical finding that agents adjust their expectations only gradually, expectations in DOB/U.S. are assumed to have an "adaptive" component as well. We therefore include the term, $\alpha\ Y_{t-1}$, where α is hypothesized to be between zero and one. Consistent with rational expectations theory, it is assumed that agents' long-run average forecast error is zero. This "hybrid" specification is inspired by Roberts (2001), Rudd and Whelan (2003), Sims (2003), and others who find that the notions of adaptive and rational expectations should not be viewed as mutually exclusive, particularly in light of the high information costs associated with forecasting. Moreover, given the empirical importance of lags in forecasting inflation, as well as other economic variables, it cannot be said that "price-stickiness" is model-inconsistent.

While the importance of expectations in forecasting is now well established, their specification continues to challenge model builders. DOB/U.S. estimates agent expectations in two stages. First, measures of expectations pertaining to three key economic variables are estimated within a vector autoregressive framework. These expectations become part of an information set that is shared by all agents who then use them, in turn, to form expectations over variables that are specific to a particular subset of agents, such as households and firms. Details of this process are presented below.

Shared Expectations

All agents in DOB/U.S. use a common information set to form expectations. This set consists of three key macroeconomic variables: inflation as represented by the GDP price deflator, the percentage output gap, and the federal funds rate. The percentage output gap is defined as actual real GDP minus potential real GDP, divided by actual real GDP. The variables are estimated within a VAR framework, with the federal funds rate and the GDP inflation rate in first-difference form (see Table 1).

The long-run values of the three variables are constrained by "endpoint" conditions. Two of these restrictions are represented by the first two terms on the right-hand side in Table 1. For inflation, the terminal constraint is the ten-year inflation rate expectation, as measured by survey data developed by the Federal Reserve Bank of Philadelphia. The endpoint condition for the federal funds rate is computed from forward rates. The assumption that the percentage output gap becomes zero in the long run is implied and need not appear explicitly in the equations. An important feature of the endpoint restrictions for the federal funds rate and inflation is that they are not fixed. Should the public alter its expectations in response to economic developments, such as a shift in monetary policy, these changes are captured and then fed into the rest of the model. Figure 2 illustrates how the three variables that comprise shared expectations converge to their long-term equilibrium values over time.

Table 1
Historical VAR Model

Federal Funds Rate (r)

$$\Delta r_t = \underset{(0.0425)}{-0.0632}(r-r_\infty)_{t-1} + \underset{(0.0692)}{0.0313}(\pi-\pi_\infty)_{t-1} + \underset{(0.0849)}{0.122}\Delta r_{t-1} - \underset{(0.0849)}{0.354}\Delta r_{t-2} + \underset{(0.0856)}{0.129}\Delta r_{t-3} + \underset{(0.0805)}{0.0152}\Delta r_{t-4}$$
$$+ \underset{(0.0896)}{0.0839}\Delta\pi_{t-1} + \underset{(0.0858)}{0.199}\Delta\pi_{t-2} + \underset{(0.0798)}{0.110}\Delta\pi_{t-3} + \underset{(0.0688)}{0.0773}\Delta\pi_{t-4}$$
$$+ \underset{(0.0946)}{0.360}\chi_{t-1} - \underset{(0.139)}{0.105}\chi_{t-2} - \underset{(0.136)}{0.202}\chi_{t-3} + \underset{(0.0949)}{0.0435}\chi_{t-4}$$

GDP Deflator (π)

$$\Delta\pi_t = \underset{(0.0153)}{-0.0323}(r-r_\infty)_{t-1} - \underset{(0.0834)}{0.0758}(\pi-\pi_\infty)_{t-1} + \underset{(0.102)}{0.215}\Delta r_{t-1} + \underset{(0.102)}{0.00934}\Delta r_{t-2} + \underset{(0.103)}{0.0167}r_{t-3} + \underset{(0.0970)}{0.0500}\Delta r_{t-4}$$
$$- \underset{(0.108)}{0.449}\Delta\pi_{t-1} - \underset{(0.103)}{0.346}\Delta\pi_{t-2} + \underset{(0.0963)}{0.256}\Delta\pi_{t-3} + \underset{(0.0830)}{0.0509}\Delta\pi_{t-4}$$
$$+ \underset{(0.114)}{0.0859}\chi_{t-1} + \underset{(0.167)}{0.0145}\chi_{t-2} - \underset{(0.163)}{0.0835}\chi_{t-3} - \underset{(0.114)}{0.0229}\chi_{t-4}$$

Percentage Output Gap (χ)

$$\chi_t = \underset{(0.0352)}{-0.0393}(r-r_\infty)_{t-1} - \underset{(0.0572)}{0.0485}(\pi-\pi_\infty)_{t-1} + \underset{(0.0703)}{0.109}\Delta r_{t-1} - \underset{(0.0702)}{0.314}\Delta r_{t-2} + \underset{(0.0708)}{0.0779}\Delta r_{t-3} - \underset{(0.0666)}{0.0985}\Delta r_{t-4}$$
$$+ \underset{(0.0741)}{0.137}\Delta\pi_{t-1} + \underset{(0.0710)}{0.120}\Delta\pi_{t-2} + \underset{(0.0660)}{0.0444}\Delta\pi_{t-3} + \underset{(0.0569)}{0.00889}\Delta\pi_{t-4}$$
$$+ \underset{(0.0782)}{1.153}\chi_{t-1} - \underset{(0.115)}{0.0244}\chi_{t-2} - \underset{(0.112)}{0.195}\chi_{t-3} - \underset{(0.0785)}{0.00411}\chi_{t-4}$$

Note: The subscript '∞' is used to indicate the end-point condition.

For the percentage output gap, the end-point condition stipulates a long-run value of zero.

Agent-Specific Expectations

The common information set is augmented by expectations pertaining to agents in specific sectors. For example, households base their consumption decisions on the expected lifetime accumulation of income and wealth. Therefore, the household-specific information set includes expectations over the components of real disposable personal income and after-tax values of securities- and nonsecurities-related wealth. Similarly, the firm sector-specific information set includes expectations over the relative prices of investment goods.

LONG-TERM EQUILIBRIUM DETERMINATION

The economy's long-term equilibrium is derived from a set of conditions that result from the optimizing behavior of economic agents, without regard for short-term adjustment costs. In the case of equilibrium consumption, households are assumed to be utility maximizers subject to a lifetime income constraint. Firms are assumed to maximize profits subject to a constant return to scale production function, and are assumed to exhibit price taking behavior.

Equilibrium Consumption

In the household sector, optimizing behavior is based on a life-cycle model in which consumers maximize the present discounted value of their expected lifetime utility. Risk-averse consumers who have unconstrained access to capital markets will tend to smooth their consumption spending over time, by borrowing, saving, or dissaving as circumstances demand, based on an estimate of expected future lifetime resources commonly referred to as "permanent income." Expected permanent income is comprised of the present discounted value of current and future real disposable income plus the value of household wealth. In DOB/U.S., the expected value of household permanent income for

each quarter in the forecast period is approximated by a relatively stable share of expected potential GDP plus expected values for securities-related and nonsecurities-related wealth. The expected values for all of the components of permanent income are determined in the agent-specific expectations module.

Real disposable income is comprised of several income sources, including labor income, property income (including income from interest and dividends), and transfer income. For relatively young working-age household members, labor income will constitute a large share of permanent income, whereas for those in retirement, property and transfer income will predominate. Therefore, the precise composition of aggregate permanent income at any given point in time will depend on the age profile of the U.S. household population. Since this age profile varies over time, the various components of permanent income enter the equation for long-term equilibrium consumption separately. In addition, this equation includes the current and lagged value of the output gap, capturing the notion that the rate at which households discount future income may depend on household perceptions of income risk, which in turn is assumed to vary with the business cycle. In DOB/U.S., the variation in long-term equilibrium consumption is assumed to be best approximated by the variation in those components of total consumption that tend not to exhibit extreme volatility over the course of the business cycle, namely services and nondurable goods.[11]

Equilibrium Investment in Producer Durable Equipment

Between 1992 and 2000, nonresidential investment in producer durable equipment and software grew at an average annual rate of 11.5 percent. At the time, most econometric models failed to capture this persistent and significant growth. Tevlin and Whelan (2000) postulate two reasons as to why so many failed to capture the late 1990s investment boom. First, the average depreciation rate for producer durable equipment increased dramatically as computers grew as a share of the total. The rapid rate of advancement in digital technology rendered computer and related equipment obsolete in just a few years. Indeed, the depreciation rate for computers and related equipment is more than twice the rate for other equipment.[12] Secondly, investment became more sensitive to the user cost of capital. In order to address these problems, DOB/U.S. estimates investment in computer equipment separately from the remainder of producer durable equipment.[13] Figure 2 compares the growth in the two investment components since 1990.

Profit maximizing behavior dictates that the long-term rate of equilibrium investment is the rate of investment that maintains the optimum capital-output ratio. Assuming a standard Cobb-Douglas production function, the optimal capital-output ratio will be proportional to the ratio of the price of output to the rental rate of capital. This relationship holds for both types of producer durable equipment. Given this optimal ratio, desired growth in investment varies with output growth and changes in the rental rate of capital.

For each type of equipment, the rental rate of capital is defined as its purchase price, represented by the implicit price deflator, multiplied by the sum of the financial cost of capital and the rate of depreciation. The financial cost of capital, a measure of the cost of borrowing in equity and debt markets, is estimated by giving equal weight to an estimate of the after-tax cost of equity and the yield on Moody's Baa-rated corporate bonds.[14] Different rates of depreciation are used for computer and noncomputer equipment.

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[11] A "fisher addition" of nondurable and services consumption produces the noncyclical component of total consumption.

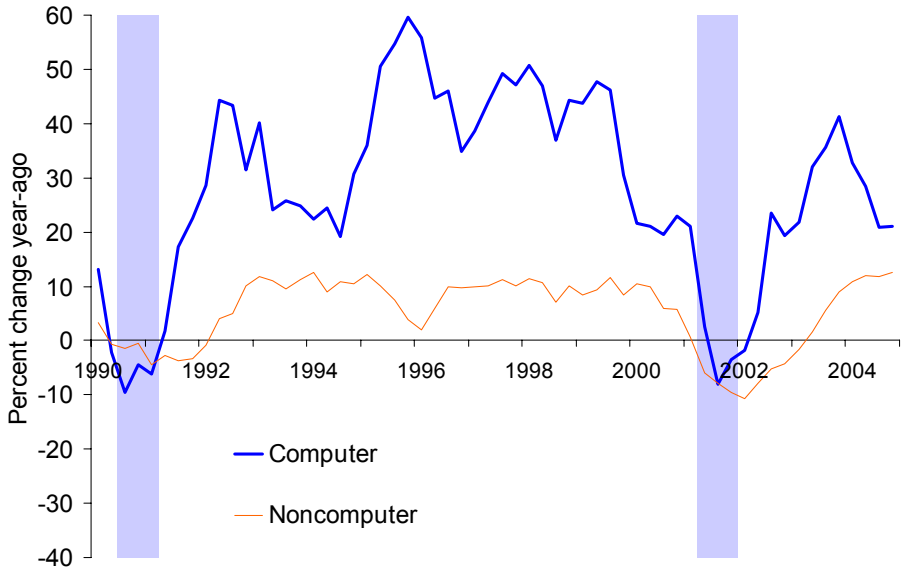
[12] See Fraumeni (1997).

[13] The brisk growth of computer equipment as a share of total producer durable equipment may represent in part an error in the data. Chain-weighting tends to overestimate real quantities when prices fall as quickly as those of computers and related equipment.

[14] The series that estimates the after-tax cost of borrowing in the equity market is created by Global Insight.

Figure 2

Real Producer Durable Equipment Growth



Note: Shaded areas represent U.S. recessions.
Source: Economy.com; DOB staff estimates.

Equilibrium Prices, Productivity, Wages, and Hours Worked

In equilibrium, the price level is determined by the neoclassical model condition that price equals marginal cost. Long-run productivity growth is determined by a time series model reflecting the belief that its own recent history is the best predictor of future growth. Long-term equilibrium nominal wage growth is determined by the sum of trend productivity growth and the long-term expected rate of inflation. The desired level of man-hours worked is constructed by dividing potential real GDP by trend labor productivity.

EXOGENOUS VARIABLES

There are many economic variables for which economic theory provides little or no guidance as to either their long-term or short-term behavior. The exogenous variable module estimates future values for over 30 such variables, whose inputs are variables from the shared information set and autoregressive terms. Although a few exogenous variables become inputs to the behavioral equations within the core behavioral module, most are incorporated into identity equations defined to arrive at NIPA concepts.

THE CORE BEHAVIORAL MODULE

The core behavioral module contains 118 estimating equations, of which 33 are behavioral. The behavioral equations summarize the behavior of representative agents acting with foresight to achieve optimal outcomes in the presence of constraints. In the economy's real sector, the movement toward equilibrium is hampered, in the short run, by adjustment costs. Through the dynamic adjustment process, agents plan to close the gap between the current level of the variable in question and the desired level. The magnitude of an adjustment made by agents during any given period is based on the size of the gap, past values of the variable, and past and expected values of other variables that may affect agents' decisions.

In the financial sector, agents are assumed to adjust instantaneously when new information becomes available. Therefore, the equations for this sector do not contain any dynamic adjustment terms. The core behavioral module is composed of five sectors: households, firms, government, the financial sector, and the foreign sector. Each is described below.

The Household Sector

The main decision variables for households are consumption, housing investment, and labor supply. Following the Federal Reserve Board's methodology, DOB/U.S. assumes the existence of two groups of consumers. The larger class consists of forward-looking utility maximizing consumers whose consumption decisions are constrained by their permanent incomes as defined above. Implicit in the model is the recognition that this group of households is heterogeneous, representing various stages of the life-cycle. The second group is comprised of low-income households, who are assumed to base their consumption decisions on current-period income rather than permanent income. Such behavior may arise because of credit market constraints that prevent these households from borrowing for the purpose of smoothing their spending over time. Consequently, such households are referred to as "liquidity constrained."

The four equations for the household sector incorporate expectations from either the shared information set VAR model or the agent-specific information set. The agent-specific information set for the household sector contains the expected value of wage and nonwage income, as well as the expected value of household wealth. The behavioral equations for the household sector balance the theoretically appealing notion of a long-term equilibrium with the empirically observed phenomenon of habit persistence. The equations for the determination of cyclical consumption, noncyclical consumption, and housing investment appear in Table 2. Brief descriptions of the equations follow:

Consumption

Consumption is divided into cyclical (durable goods) and noncyclical components (services and nondurables), since these two components tend to exhibit significantly different growth rates over the course of a business cycle (see Figure 3). Noncyclical consumption is estimated using first differences of the logs of the data within a polynomial adjustment cost framework. The equation contains an "error-correction" term that captures the tendency toward equilibrium, a lagged dependent variable that captures the partial adjustment effects of habit persistence, forward expectations of both desired noncyclical consumption and the output gap, and real income. The latter term captures the behavior of liquidity-constrained households. The specification for cyclical consumption is very similar to the noncyclical consumption specification, except for the exclusion of the second expectations term and the inclusion of potential GDP and an interest rate, which captures the fact that many consumer durables, such as automobiles and large appliances, are purchased on credit.

Residential Fixed Investment

Residential investment by households is estimated using a dynamic adjustment equation. It is assumed that households adjust their rate of housing investment in accordance with a long-term equilibrium relation between desired noncyclical consumption and housing services. Two cost variables are also included in order to capture features of both supply and demand in the housing market. Thus, the equation contains desired consumption divided by current housing investment, a lagged endogenous variable to capture habit persistence, forward-looking expectations of desired consumption, the mortgage rate, the price deflator for residential investment, and the real average price of one-family homes sold.

Table 2
Household Sector: Real Consumption and Residential Investment

Noncyclical Consumption

$$\Delta \ln C1_t = \underset{(0.000632)}{0.00469} + \sum_{\tau=0}^{5} EZQC_{t+\tau} + \underset{(0.0363)}{0.0790}\,(\ln QC - \ln C1)_{t-1} + \underset{(0.0670)}{0.183}\,\Delta \ln C1_{t-1} + \underset{(0.0308)}{0.130}\,(\Delta \ln Y_t - \sum_{\tau=0}^{5} EZQC_{t+\tau}) + \underset{(0.0117)}{0.0607} \sum_{\tau=0}^{5} EZGAP_{t+\tau} + \underset{(0.0287)}{0.0469}\,\Delta \ln Y_{t-3} - \underset{(0.00329)}{0.0109}\, D1980Q2_t$$

$Adjusted\ R^2 = 0.445$

Cyclical Consumption

$$\Delta \ln C2_t = \sum_{\tau=0}^{5} EZQC_{t+\tau} + \underset{(0.00111)}{0.00575}\,(\ln QC - \ln C2)_{t-1} - \underset{(0.0653)}{0.383}\,\Delta \ln C2_{t-1} + \underset{(0.210)}{0.571}\,\Delta \ln Y_t - \underset{(0.00171)}{0.00517}\,\Delta r_{t-1} + \underset{(0.0454)}{0.312}\,\Delta \ln INVH_t - \underset{(0.0226)}{0.109}\, D1970Q4_t - \underset{(0.0225)}{0.0992}\, D1974Q4_t - \underset{(0.0233)}{0.0952}\, D1980Q2_t - \underset{(0.0227)}{0.0567}\, D1981Q4_t - \underset{(0.0222)}{0.0890}\, D1987Q1_t + \underset{(0.0226)}{0.0735}\, D2001Q4_t$$

$Adjusted\ R^2 = 0.545$

Residential Fixed Investment

$$\Delta INVH_t = \underset{(4.92)}{-13.2} + \sum_{\tau=0}^{5} EZQC_{t+\tau} + \underset{(0.370)}{1.11}\,(QC / INVH)_{t-1} + \underset{(0.0557)}{0.573}\, INVH_{t-1} - \underset{(148)}{299}\,\Delta PIH_t - \underset{(1.35)}{2.15}\,\Delta RM_t + \underset{(0.174)}{0.392}\,\Delta PSH_t + \underset{(0.0146)}{0.0420}\,\Delta Y_t + \underset{(4.67)}{25.4}\, D1980Q2Q3Q4_t + \underset{(7.87)}{31.7}\, D1976Q4_t + \underset{(7.90)}{28.1}\, D1977Q2_t$$

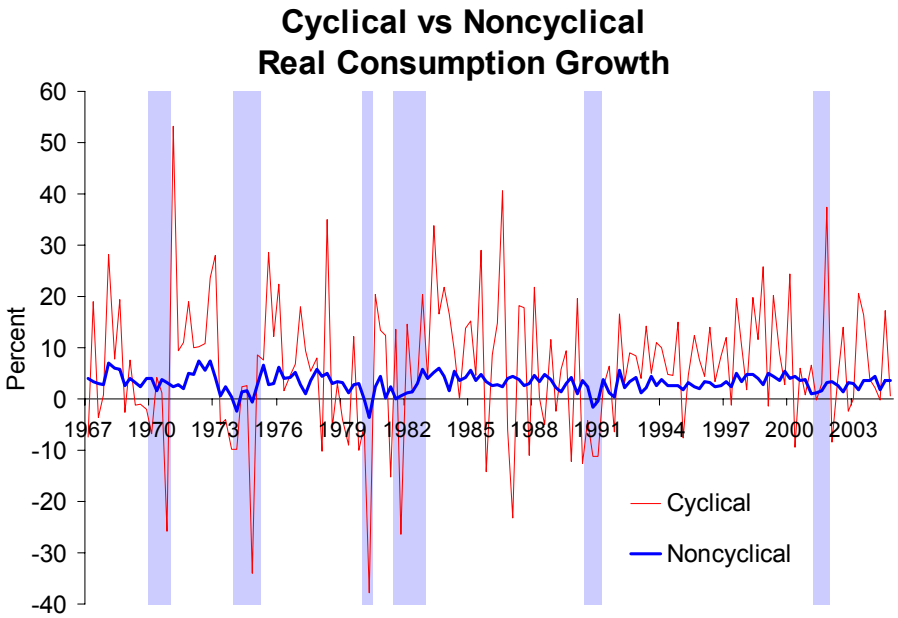
$Adjusted\ R^2 = 0.569$

C1	Real noncyclical consumption
C2	Real cyclical consumption
QC	Desired real noncyclical consumption
Y	Real disposable personal income
EZQC	Expected desired noncyclical consumption
EZGAP	Expected potential GDP gap.
POTGDP	Potential real GDP
r	Federal funds rate
INVH	Residential fixed investment
PIH	Price deflator for residential investment
RM	Mortgage rate
PSH	Real new home price

Labor Supply

Households must make decisions about how much labor they supply to the labor market. In DOB/U.S., the behavioral equation which determines the first difference of the labor force participation rate includes its own lags; real GDP lagged three quarters; a dummy variable capturing the influx of women into the labor market in the sixties, seventies, and eighties; and dummy variables capturing the extraordinary increases in hiring in the first quarters of 1990 and 2000 for enumerations of the decennial censuses. The labor supply is then determined by multiplying the labor force participation rate by an estimate of the working-age population (ages 16 through 64).

Figure 3



Note: Shaded areas represent U.S. recessions.
Source: Economy.com; DOB staff estimates.

The Firm Sector

DOB/U.S. incorporates the assumption that firms set their prices and levels of factor inputs used in production to maximize profits. This sector determines the levels of the two components of nonresidential fixed investment, private nonresidential structures, labor demand, real wages, and output prices. Like the behavioral equations describing the household sector, several of the firm sector equations incorporate both error-correction terms to capture the impact of long-term equilibrium relationships and dynamic adjustment terms to capture firm-level adjustment costs. The behavioral equations for investment in computer-related producer durable equipment, all other producer durable equipment, and nonresidential structures appear in Table 3.

Nonresidential Investment

DOB/U.S. estimates three categories of nonresidential investment: investment in computer-related producer durable equipment and software, investment in all other equipment, and investment in nonresidential structures. The estimating equations for investment in computer and related equipment and all other equipment are virtually identical. Both equations contain an error-correction term, defined as a lag difference between equilibrium and current investment, an autoregressive term, forward expectations of equilibrium investment, and the appropriate rental rate of capital, as defined above. Longer lags yield a superior fit in the equation for noncomputer equipment due to its relatively low depreciation rate. In addition, the computer equipment equation contains the first difference in potential GDP growth and a dummy variable to capture the large decline in investment during the second and third quarters of 2001. The equation for noncomputer equipment contains the current period value for the output gap. Investment in nonresidential structures is determined by its own rental rate, real U.S. GDP growth, as well as its own past values and dummy variables.

Table 3
Firm Sector: Nonresidential Fixed Investment

$$\Delta ICO_t = \underset{(0.852)}{-4.75} + \sum_{\tau=0}^{5} EQICO_{t+\tau} + \underset{(0.0447)}{0.132}\,(QICO - ICO)_{t-1} + \underset{(0.0939)}{0.108}\,\Delta ICO_{t-1} + \underset{(0.0180)}{0.119}\,\Delta POTGDP_t$$
$$- \underset{(0.0205)}{0.0100}\,\Delta RRC_t - \underset{(1.44)}{11.9}\,Y2KD_t + \underset{(0.116)}{4.54}\,AR1$$

Adjusted $R^2 = 0.692$

$$\Delta IEXCO_t = \underset{(1.21)}{3.23} + \sum_{\tau=0}^{5} EQIEXCO_{t+\tau} + \underset{(0.0202)}{0.0607}(QIEXCO - IEXCO)_{t-2} + \underset{(0.0751)}{0.256}\,\Delta IEXCO_{t-2}$$
$$+ \underset{(0.448)}{0.975}\,GDPGAP_t - \underset{(181)}{446}\,\Delta RRO_{t-2} - \underset{(6.22)}{20.7}\,Y2KD_t + \underset{(0.0826)}{0.171}\,AR1 + \underset{(0.0865)}{0.239}\,AR3$$

Adjusted $R^2 = 0.415$

$$\Delta \ln IS_t = \underset{(0.0668)}{0.240}\,\Delta \ln IS_{t-1} + \underset{(0.0666)}{0.222}\,\Delta \ln IS_{t-2} + \underset{(0.174)}{0.643}\,\Delta \ln GDP_t - \underset{(0.0715)}{0.174}\,\Delta \ln RRS_{t-3} + \underset{(0.134)}{0.201}\,\Delta \ln RRO_t$$
$$- \underset{(0.0228)}{0.0999}\,D1886Q2 - \underset{(0.0225)}{0.104}\,D2001Q4 + \underset{(0.0235)}{0.0690}\,D1978Q2$$

Adjusted $R^2 = 0.425$

ICO	Nonres. fixed investment – computer and related equipment
EQICO	Expected desired computer investment
QICO	Desired computer investment – durable equipment
POTGDP	Potential GDP
RRC	Rental rate – computers
Y2KD	Post-Y2K dummy for 2001
AR1	First-order autocorrelation correction
IEXCO	Nonres. fixed investment – durable equip. excl. computers
EQIEXCO	Expected future desired investment – durable equip. excl. computers
QIEXCO	Desired investment – durable equip. excl. computers
GDPGAP	Percent real GDP gap
RRO	Rental rate of capital – other durable equipment
AR3	Third-order autocorrelation correction
IS	Nonres. fixed investment – structures
GDP	Real GDP
RRS	Rental rate – structures
D1986Q2	Dummy for Tax Reform Act of 1986
D2001Q4	Dummy for retroactive provision of Job Creation and Worker Assistance Act of 2002

Labor Demand: Hours Worked and Employment

In DOB/U.S., the level of national employment is determined by estimating equations for the number of hours worked and the length of the average work week, which together capture the nonfarm private business sector's demand for labor. Total employment, in turn, affects the movements of many other economic variables, such as output, wages, consumption, and inflation. Hours worked are estimated using a dynamic adjustment equation that includes an error-correction term composed of the difference between long-term equilibrium hours and actual hours, real U.S. GDP growth, the expected one-period-ahead value of the output gap, and dummy variables.

The estimating equation for the average length of the workweek in the private nonfarm business sector also contains an error-correction term and the expected one-period-ahead value of the output gap. In addition, the model includes growth in real private nonfarm business GDP and dummy variables. The level of total private nonfarm employment is determined by dividing hours worked by the average length of the workweek multiplied by the number of weeks in a year.

The Wage Rate

The average hourly wage rate is defined as total private employee compensation (cash wages and salaries plus additional costs such as medical insurance premiums and employer contributions for social insurance) divided by hours worked. The long-run equilibrium growth in the wage rate is assumed to depend on trend productivity growth and the inflation rate, where inflation is measured by the private nonfarm chain-weighted GDP deflator and productivity is private nonfarm output divided by hours worked adjusted to remove the effects of the business cycle. Thus, the equilibrium wage rate at time *t* is its value at time *t-1* plus the sum of the growth rates for productivity and inflation. The actual quarterly wage rate is modeled in an error correction framework but contains additional lags capturing the presence of "wage-stickiness." The model also includes the expected one-period-ahead value of the output gap to capture the impact of forward looking behavior on the speed of adjustment toward equilibrium.

Output Prices

The price level is represented by the private nonfarm chain-weighted GDP deflator. Its growth is modeled within a dynamic adjustment framework in which the price level adjusts gradually from its current level to its long-term equilibrium value. The model also includes the expected one- and two-period-ahead values of the output gap, again to capture the impact of forward looking behavior on the speed of adjustment toward equilibrium. In addition, the model contains the petroleum products component of the Producer Price Index (PPI) to capture the impact of wholesale energy prices, as well as dummy variables to capture the impact of the 1970s oil shocks above and beyond what is captured by the PPI.

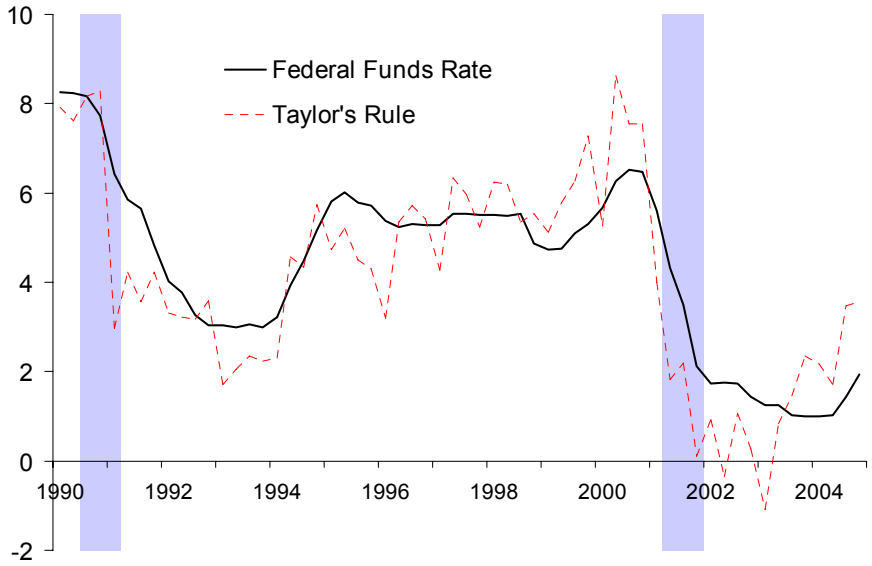
The Government Sector

Monetary policy affects economic and financial decisions made by agents in the economy. The objective of monetary policy is to stabilize the economy's performance — as reflected in the behavior of inflation, output, and employment — by balancing the twin goals of sustainable growth and price stability. This is accomplished by raising or lowering short-term interest rates through changes in the central bank's target federal funds rate in a manner that is consistent with Taylor's rule. Taylor's rule is a federal funds rate reaction function that responds to the deviation of inflation from its long-term target level and to the deviation of output growth from its potential level. As such, Taylor's rule approximates the way the Federal Reserve has historically conducted monetary policy, particularly when the classic rule is augmented by expectations over future inflation and output (see Figure 4). However, the rule also yields a "normative prescription" for the direction of future policy.[15]

[15] See Woodford (2002), p. 39.

Figure 4

Federal Funds Rate vs. Rate Implied by Taylor's Rule



Note: Shaded areas represent U.S. recessions.
Source: Economy.com; DOB staff estimates.

Taylor's rule has several desirable features. First, it is formulated in terms of the federal funds rate, a measure of inflation, and the output gap. Thus, the rule posits a direct relationship between the Federal Reserve's primary policy instrument and the two indicators most important in judging the success of the central bank's stabilization policy. No reference to intermediate targets is necessary, greatly increasing the rule's appeal to policy makers. Second, the rule possesses the simplicity of a linear relationship. Finally, although Taylor's rule represents an empirical relationship, it has also been demonstrated to possess desirable theoretical properties as well. For example, Taylor's rule leads to a determinate rational-expectations equilibrium that is robust to the introduction of a plausible dynamic learning process.

Within DOB/U.S., monetary policy is administered through a modified version of Taylor's classic monetary rule. We assume the Federal Reserve Board (FRB) weighs deviations from its inflation target about twice as heavily as deviations from its output growth target, so the inflation deviation has a weight of 1 while output-growth deviation has a weight of 0.5. In addition, the contemporaneous value of inflation is replaced by an average of actual inflation for the past three quarters and expected inflation for both the current quarter and the quarter ahead. A similar modification is made to the output growth term. Hence, this modified specification operationalizes the requirement that the central bank be able to project the effect of its policy alternatives on the output gap and inflation and that its policy choice be consistent with that projection. The DOB/U.S. specification of Taylor's rule appears in Table 4.

Table 4
Monetary Policy – Taylor's Rule

$$r_T = \bar{\pi}_t + R_t + 1(\bar{\pi}_t - \pi_T) + 0.5(\bar{g}_t - g_T)$$

$$\bar{\pi}_t = \frac{\pi_{t-3} + \pi_{t-2} + \pi_{t-1} + \pi_t + \pi_{t+1}}{5}$$

$$\bar{g}_t = \frac{g_{t-3} + g_{t-2} + g_{t-1} + g_t + g_{t+1}}{5}$$

$$\textit{where}, \quad R_t = r_t - \pi_t$$

r	Federal funds market rate	g	GDP growth rate
r_T	Federal funds target rate	$\bar{g}$	Average GDP growth rate
$\bar{\pi}$	Average GDP inflation	g_T	GDP target growth rate
π	GDP inflation	R	Real rate of interest
π_T	Inflation target		

DOB/U.S. also contains equations that estimate the contribution to GDP from Federal, state and local governments. Spending by both the Federal government and state and local governments depend on the revenues they collect. Although government revenues come from various taxes — the personal income tax, the sales tax, corporate taxes, and various fees — we find that personal income tax revenues act as an adequate proxy for revenues from all these sources. Since the components of personal income grow at varying rates, the models for both Federal and state and local revenues include these components separately, as well as effective tax rates. All government sector variables are modeled in first-differenced-logarithmic form.

Since government receipts are only available in nominal terms, final demand by the government sector is modeled in nominal terms as well. Real spending is calculated by deflating these nominal values by the appropriate price deflators. Since governments determine their budgets before they know how much revenue they will collect, they do not adjust quickly to current revenue shocks. In addition, Federal government spending is not constrained in the short run by contemporaneous-year revenues. Therefore, government spending models include past revenues with lags up to seven quarters, as well as the current period nonfarm GDP price deflator. Federal government spending model also includes the percentage GDP gap, capturing the countercyclicality of spending. Since most of state and local government contribution to final demand is comprised of employee compensation, the spending model also includes government employment.

In addition, DOB/U.S. estimates the impact of changes in fiscal policy on the macroeconomy. Since the primary determinant of consumer spending is households' long-term expectation for disposable income, modeling fiscal policy impacts plays an important role in forecasting household consumption when there is a policy change, as there was in 2001 and 2003. For this purpose, DOB/U.S. combines the most recent Joint Committee on Taxation and Congressional Budget Office estimates where available with results from the Current Expenditure Survey data, disaggregated by income level, to estimate how much of the change in disposable income will affect consumption.

The Financial Sector

The financial sector of DOB/U.S. is sub-divided into two blocks of equations: one determining equity prices and the other determining interest rates. Many analysts believe that short-run changes in stock market prices follow a random walk and therefore it is impossible to forecast the day-to-day movements of individual stocks with any accuracy. However,

long-run movements in price indices of large groups of stocks appear to move systematically with other economic variables. Much of the variation in the growth of the Standard & Poor's 500 price index can be explained by the contemporaneous and expected growth of pre-tax corporate profits after normalizing by the interest rate on Baa corporate bonds. A lead term is added to capture the influence of profit expectations on investors' decisions to buy and sell equities, and, consequently, on stock prices.

In addition to the federal funds rate, which is modeled based on Taylor's Rule, DOB/U.S. contains models for six interest rates: the three-month, one-year, five-year, and ten-year U.S. Treasury securities rates, as well as the Baa corporate bond rate and the 30-year conventional mortgage rate. These equations are specified within an error-correction model framework based on the expectations theory of the term structure of interest rates, which posits that the yield on the long-term bond equals the expected yield on a series of short-term bonds over the life of the long-term bond, plus term and risk premiums. The theory implies that the rate on 1-year government bonds can be used to explain the rate on five-year bonds, which, in turn, is used to explain the rate on bonds of longer maturities. Although the term and risk premiums are not explicitly captured in the estimated model, their impacts are embodied in the estimated coefficients. A real GDP gap term is added to most of the equations to capture the impact of expected (future) inflationary pressures on current yield curve.

The Foreign Sector

Real U.S. exports are determined by the level of foreign economic activity, as measured by an estimate of the growth rate of global GDP, and U.S. export prices relative to foreign prices. Real imports are divided into non-oil and oil goods and services. Non-oil imports are a function of real domestic demand and the ratio of import prices to domestic prices. Oil imports are a function of real domestic demand, as well as oil prices relative to domestic prices. Both imports and exports equations contain additional dummy variables to capture one-time shocks, such as the September 11 terrorist attacks and the oil shock of 1970s.

SATELLITE MODELS

Sectoral Employment

Total employment is disaggregated into 20 industrial sectors based on NAICS. Individual equations incorporate "structural" variables that are forecast in prior modules, such as hours worked, real GDP, real personal income, the S&P 500 Stock Index adjusted for inflation, interest rates, and demographic variables. The general approach is to estimate an error correction model (ECM), and if the level variables in the ECM are not significant, then to use a model in log differences. Some of the sectors are modeled in fourth differences to remove seasonality. In order to capture seasonality in those that were modeled in first differences, we add time-variant seasonal dummy variables, which are constructed using Census X11 procedure.

Other Prices

The nonfarm private GDP deflator and other deflators from the core model are used to forecast several implicit price deflators for consumption, as well as the overall Consumer Price Index (CPI) and some of its components. The Producer Price Index (PPI) for refined petroleum products and other implicit price deflators for consumption are used to forecast several components of PPI.

Other Interest Rates and the Wilshire 5000

DOB/U.S. also estimates eight additional interest rates, including commercial paper rates, Treasury bond rates, state and local municipal bond rates, LIBOR (London Interbank Offered Overnight Rate) rates, and mortgage rates. These rates are estimated in single-equation models using variables from the core model as inputs. The Wilshire 5000 stock price index is estimated using the S&P 500 stock price index as an explanatory variable.

Miscellaneous Variables

Many miscellaneous variables are forecast using variables from all the models discussed above, as well as the New York model. Forecasts of these miscellaneous variables are based on single-equation models.

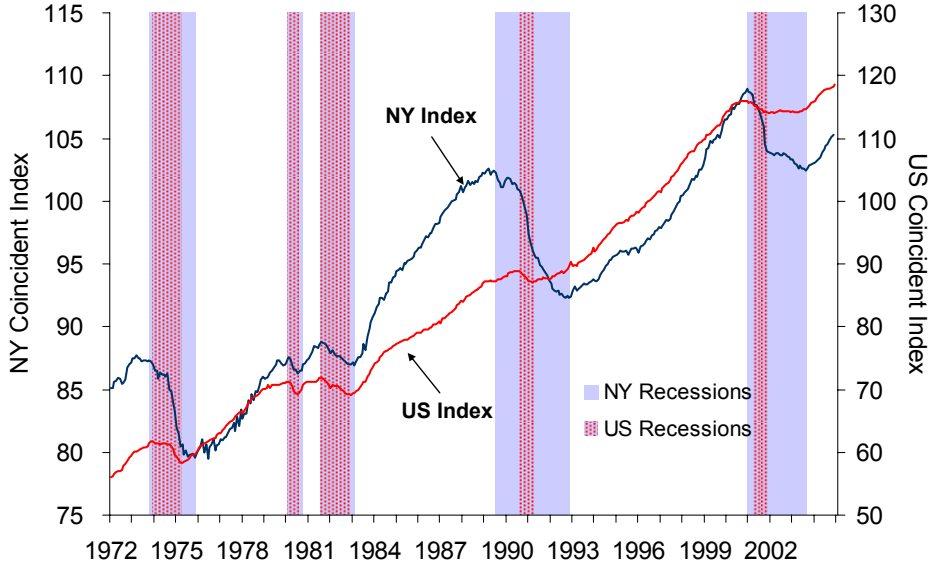
NEW YORK STATE MACROECONOMIC MODEL

The Division of the Budget's macroeconomic model for New York State attempts to capture the fundamental linkages between the New York and national economies. As with all states, New York's economy depends on economic developments in the U.S. economy, usually expanding when the national economy is growing and contracting when the nation is in recession. However, this relationship is neither simple nor static. The growth rate of the State economy can vary substantially from that of the national economy. For example, during the early 1990s, the State was in recession noticeably earlier than the nation and came out of recession significantly later. In contrast, during the early 1980's recession, the State economy fared better than the nation.

In the absence of an official mechanism for dating business cycles at the sub-national level, DOB staff constructed a New York State Index of Coincident Economic Indicators measuring overall economic conditions for New York.[16] The methodology used to construct the index is based on Stock and Watson (1991) and rests on the notion that co-movements in many macroeconomic time series can be captured by a single unobserved variable representing the overall state of the economy.[17] Four State data series — private sector employment, hours worked in the manufacturing sector, the unemployment rate, and sales tax receipts (as a proxy for retail sales) — are combined into a single index using the Kalman filter, a common approach to the estimation of unobserved variables. Based on the DOB Coincident Index, five business cycles have been identified for New York since the early 1970s, as reported in the table below. A recession is judged to have begun if the DOB Coincident Index sustains three to five consecutive declines of significant depth. A similar approach is used to date business cycle troughs. Figure 5 compares the lengths of the State's recessions as determined by the DOB methodology with those of the nation as defined by the NBER Business Cycle Dating Committee.

Figure 5

Index of Coincident Economic Indicators
US and New York



Source: Economy.com; DOB staff estimates.

[16] Megna, Robert and Qiang Xu (2003). "Forecasting the New York State Economy: The Coincident and Leading Indicators Approach," International Journal of Forecasting, Vol. 19, pp. 701-713.

[17] Stock, James .H., and Mark .W. Watson (1991). "A Probability Model of the Coincident Economic Indicators," in K. Lahiri and G. H. Moore (eds.), Leading Economic Indicators: New Approaches and Forecasting Records, New York: Cambridge University Press, pp. 63-85.

In order to gauge the future direction of the State economy, the Budget Division produces the New York State Index of Leading Economic Indicators, which yields a forecast for the Coincident Index up to 12 months ahead. The forecasting model includes the following five leading economic variables in a vector autoregressive framework: the U.S. Index of Leading Economic Indicators (excluding stock prices and the interest rate spread), New York housing permits, New York initial unemployment insurance claims, stock prices, and the spread between the ten-year and one-year U.S. Treasury rates. The leading index often provides an early signal that the State economy is approaching a turning point and often gives guidance as to how to evaluate, and possibly adjust, a model forecast.

NEW YORK STATE BUSINESS CYCLES

Peak Date	Trough Date	Recession Length (in months)	Private Sector Job Losses
October 1973	November 1975	25	384,800
February 1980	September 1980	7	54,800
August 1981	February 1983	18	76,600
June 1989	November 1992	41	551,700
December 2000	August 2003	32	327,300

Source: DOB staff estimates.

The DOB macroeconomic model for the State (DOB/N.Y.) quantifies the linkages between the national and State economies within an econometric framework that specifically identifies the unique aspects of economic conditions in New York. DOB/N.Y. is a structural time-series model, with most of the exogenous variables derived from DOB/U.S. In general, the long-run equilibrium relationships between State and national economic variables are captured using cointegration/error correction specifications, while the State's unique dynamics are modeled within a restricted VAR (RVAR) framework.[18]

MODEL STRUCTURE

DOB/N.Y. has six major components: a nonfarm payroll employment module, a real nonbonus average wage module, a bonus payment module, a nonwage income module, a price module, and an unemployment rate module. Because the state-level wage data published by BEA have proven unsatisfactory for the purpose of forecasting State personal income tax liability, the Budget Division constructs its own wage and personal income series based on Covered Employment and Wage data, also known as the ES 202 data. Moreover, because of the importance of trends in variable income — composed of bonus and stock options income — to the understanding of trends in State wages overall, the Budget Division has developed a methodology described below for decomposing its wage series into bonus and nonbonus wages.

EMPLOYMENT

New York employment is disaggregated into 15 industrial sectors, parallel to DOB/U.S. DOB/N.Y. is an "open economy" model with most production factors and outputs free to move across the State's borders. The relationship between the national economy and New York employment is captured through two channels. First, for those sectors where rates of State and national employment growth are significantly related, the national growth rate is

[18] Because the number of parameters to be estimated within an unrestricted VAR framework is often very large, the model can be expected to be unstable. To address this concern, those parameters found to be insignificant at the 5 percent level are constrained to equal zero. The resulting RVAR model is both more parsimonious and more stable.

specified as an exogenous variable in the equation. Second, overall U.S. economic conditions, as measured by the growth of real U.S. GDP, are included directly in the employment equations for some sectors and are allowed to influence employment of other sectors through the VAR relationships.

For 13 industrial sectors, New York's unique employment growth pattern is captured within an RVAR setting where the impact of one sector upon another is explicitly modeled. The choice as to which sectors to include on the right-hand side of a sectoral equation in the RVAR model is based on the results of an initial unrestricted VAR estimation. In the final RVAR specification, only those sectors that are well explained by the movements of other sectors are included in the final VAR model. Table 5 is an example of the sector employment.

Table 5
Manufacturing Employment

$$\Delta \ln E39_t = \underset{(0.00111)}{-0.00367} + \underset{(0.00680)}{0.00782}\,\Delta \ln E23_{t-2} + \underset{(0.0354)}{0.787}\,\Delta \ln EUS39_t - \underset{(0.00208)}{0.0150}\,DQ1_t + \underset{(0.00187)}{0.00846}\,DQ2_t$$

$$Adjusted\ R^2 = 0.940$$

E39	Manufacturing employment
E23	Construction employment
EUS39	National manufacturing employment
DQi	Seasonal dummy for quarter i

The two remaining industrial sectors are estimated individually. These equations are specified as autoregressive models, with a corresponding national employment term included in each equation as an exogenous variable.

BONUS AND STOCK INCENTIVE PAYMENTS

Total New York State wages are composed of two components: a base wage component which is relatively uniformly distributed over the course of the firm's fiscal year, and a more variable component comprised primarily of bonus payments and income derived from the exercise of employee stock options and other one-time payments. There are several reasons why the variable component of wages is modeled separately. First, bonuses have grown substantially in the 1990s as a proportion of total wages. The two factors most responsible for this strong growth are the robust performance of securities industry profits during that period and the shift in the corporate wage structure away from fixed pay and toward performance-based bonuses. Second, bonus payments play a significant role in the forecast of State government finances, since they tend to be concentrated among high-income taxpayers and, therefore, are taxed at the top income tax rate. Further, the timing of bonus payments affects the pattern of wage payments and consequently the State's cash flow. Tax collections from wages usually peak during December, January, and February, corresponding to the timing of bonus payments. Finally, because they are performance-based, bonus payments display a very different growth pattern from nonbonus average wages in that they tend to be much more volatile.

No government agency collects data on variable income as distinct from ordinary wages; therefore, it must be estimated. The Division of the Budget derives its estimate of bonuses from firm-level data as collected under the Unemployment Insurance program. Firms report their wages to the Unemployment Insurance program on a quarterly basis. The firm's average wage per employee is calculated for each quarter. The average over the two quarters with the lowest average wages is assumed to reflect the firm's base pay, that is, wages excluding variable pay. If the average wage for either of the remaining quarters is

significantly above the base wage, then that quarter is assumed to contain variable income.[19] The average variable payment is then defined as total average wage minus the base average wage, after allowing for an inflation adjustment to base wages. Total variable pay is then calculated by multiplying the average bonus payment by the total number of firm employees. It is assumed that only private sector employees, excluding those of private educational institutions, earn variable pay.

Bonus payments are modeled in two steps. First, a bonus payments model for the finance and insurance sector is estimated. The forecast results of the first step are then used to project bonus payments for other sectors. Finance and insurance sector wages, particularly from bonus payments, represent a significant share of total State wages and appear to have a leading influence on bonuses paid in other sectors. Second, the feedback effects of growth in this sector on other sectors of the economy, especially business services, can be substantial.

We have found that two indicators of Wall Street underwriting activities — the dollar volume of initial public offerings (IPOs) and the value of debt underwritings — can explain most of the variation in financial and insurance sector bonuses. Forecasts for these variables are based on interest rate and equity market forecasts provided by DOB/U.S. The finance and insurance sector bonus model is then constructed by using these underwriting activities as explanatory variables with an error-correction term. The finance and insurance sector bonus equation appears in Table 6.

Table 6
Finance and Insurance Sector Bonuses

$$\ln B52_t = \underset{(0.280)}{-1.71} + \underset{(0.0552)}{0.179}\ln IPO_{t-4} + \underset{(0.173)}{0.267}\,\Delta_4 \ln DEBT_t + \underset{(0.00314)}{0.0228}\,T + \underset{(0.132)}{1.35}\,DQ1_t$$

$$Adjusted\ R^2 = 0.801$$

B52	Finance and insurance sector bonus
IPO	Value of initial public offering
DEBT	Value of debt underwriting
T	Time trend
DQ1	Seasonal dummy for quarter 1

Our analysis shows that finance and insurance sector bonuses are a good predictor of bonus-payment behavior in other sectors. More technically, bonus payments in the financial services sector are cointegrated with bonuses paid in most other sectors. Therefore, we use a cointegration/error correction framework in the second step to estimate bonuses for all of the other sectors. Table 7 gives an example of the specification for bonuses in manufacturing.

[19] The threshold adopted for this purpose was 25 percent. However, the variable income estimates are fairly robust to even a five percentage-point swing in this criterion.

Table 7
Manufacturing Bonuses

$$\Delta B39_t = \underset{(0.116)}{0.457} - \underset{(0.122)}{0.423}\,\Delta B39_{t-1} - \underset{(0.123)}{0.427}\,\Delta B39_{t-2} - \underset{(0.117)}{0.311}\,\Delta B39_{t-3} + \underset{(0.0949)}{0.290}\,\Delta B39_{t-4} + \underset{(0.00532)}{0.0321}\,\Delta B52_t$$
$$- \underset{(0.00534)}{0.0219}\,\Delta B52_{t-4} - \underset{(0.193)}{0.435}\,DQ1_t - \underset{(0.174)}{0.522}\,DQ2_t - \underset{(0.174)}{0.789}\,DQ3_t - \underset{(0.109)}{0.324}$$
$$\left(B39_{t-1} - \underset{(0.0860)}{1.232} - \underset{(0.00492)}{0.0367}\,B52_{t-1} \right)$$

Adjusted $R^2 = 0.932$

B39	Manufacturing bonuses
B52	Finance and insurance bonuses
DQ_i	Seasonal dummy for quarter i

NONBONUS REAL AVERAGE WAGES

Once average nonbonus wages have been identified, they are divided by a price deflator estimated specifically for the New York economy (see "New York State Inflation Measure" below) to create nonbonus real average wages. To forecast nonbonus real average wages, DOB/N.Y. estimates 15 stochastic equations, one for each major industrial sector.

Statistical evidence suggests the existence of a long-run equilibrium relationship between the State nonbonus real average wage for most sectors and the national real average wage. Thus, the State nonbonus real average wage for most sectors is modeled in a cointegration/error-correction framework. This modeling approach is based on the belief that, since both labor and capital are free to move in a market economy, regional differences in labor costs will tend to disappear, although this process may take quite a long time. This formulation allows for short-run adjustments toward long-run equilibrium. These short-run dynamics account for the State's unique economic conditions. Table 8 gives an example of the formulation for the nonbonus real average wage.

For a few sectors, average real nonbonus wages are not modeled in the cointegration/ error correction framework, since there is no statistical evidence that they are cointegrated with the national real average wage. These sectors are modeled within an autoregressive framework, with one or more U.S. variables (current or lagged values) used as explanatory variables to capture the impact of national economic conditions.

Table 8
Finance and Insurance Sector Real Nonbonus Average Wage

$$\Delta RWA52_t = \underset{(0.986)}{-0.371}\,\Delta RWA52_{t-1} \underset{(0.101)}{-0.467}\,\Delta RWA52_{t-2} \underset{(0.102)}{-0.227}\,\Delta RWA52_{t-3} + \underset{(0.0987)}{0.274}\,\Delta RWA52_{t-4} + \underset{(0.00127)}{0.00272}\,\Delta USRA_{t-1}$$
$$\underset{(0.00133)}{0.000250}\,\Delta USRA_{t-2} + \underset{(0.00131)}{0.00300}\,\Delta USRA_{t-3} - \underset{(0.00135)}{0.000470}\,\Delta USRA_{t-4} + \underset{(0.470)}{1.59}\,DQ1_t + \underset{(0.469)}{0.455}\,DQ2_t + \underset{(0.462)}{0.705}\,DQ3_t$$
$$+ \underset{(17.7)}{20.1}\,\Delta lnGDP_{t-1} - \underset{(0.0227)}{0.0112}\,RTRATE3_t - \underset{(0.00000705)}{0.0000130}\,(RWA52_{t-1} - 29.790 - 3.287\,USRA_{t-1})$$

$Adjusted\ R^2 = 0.567$

RWA52	Real average wage for New York finance and insurance sector
USRA	U.S. real average wage
GDP	Real U.S. gross domestic product
RTRATE3	Real interest rate on 3-month Treasury notes
DQi	Seasonal dummy variables for quarters i

NONWAGE INCOME

DOB/N.Y. estimates six components of nonwage income: transfer income; property income, which includes dividend, interest, and rental income; proprietors' income; other labor income; personal contributions to social insurance programs; and the residence adjustment, which corrects for the fact that wages are measured according to place of employment rather than place of residence. The two largest components, transfer payments and property income, together account for almost 80 percent of total nonwage income.

All New York nonwage income components, except for the residence adjustment, are driven by their national counterparts, since they are either governed by Federal regulations or influenced by national conditions. In each of these equations, the change in the New York component of nonwage income is estimated as a function of the change in its U.S. counterpart, along with lags of the independent and dependent variables to account for short-term dynamics. Table 9 gives an example of the specification for property income.

Some of the nonwage equations use the concept of New York as a share of the national total to help explain the trend in the New York variable relative to the U.S. variable. The transfer income equation includes New York's population share; while the equation for contributions for social insurance includes New York's wage share. The residence adjustment is modeled as a function of New York earned income, which is comprised of wages, other labor income, and personal contributions for social insurance.

Table 9
Property Income

$$\Delta \ln PROP_t = \underset{(0.00120)}{0.00167} + \underset{(0.0446)}{0.621}\,\Delta \ln P_t + \underset{(0.0694)}{0.234}\,\Delta \ln P_{t-1} - \underset{(0.0682)}{0.308}\,\Delta \ln P_{t-2} + \underset{(0.0992)}{0.0134}\,\Delta \ln PROP_{t-1}$$
$$+ \underset{(0.0882)}{0.350}\,\Delta \ln PROP_{t-2}$$

$Adjusted\ R^2 = 0.782$

PROP	New York State property income
P	U.S. property income*(New York employment / U.S. employment)

NEW YORK STATE INFLATION RATE

DOB/N.Y. estimates a measure of State inflation by constructing a composite consumer price index for New York State (CPINY). The CPINY is defined as a weighted average of the national CPI and the CPI for the New York City region. The CPINY equation, as shown in Table 10, is specified as a function of the U.S. CPI and its own lag, indicating that New York's rate of inflation can remain persistently above or below that of the nation.

Table 10
Composite CPI for New York

$$\Delta_4 CPINY_t = \underset{(0.00147)}{0.00540} + \underset{(0.0568)}{0.398}\ \Delta_4 CPINY_{t-1} - \underset{(0.0501)}{0.523}\ \Delta_4 CPI_t$$

$$Adjusted\ R^2 = 0.908$$

CPINY	New York consumer price index
CPI	National consumer price index

NEW YORK STATE UNEMPLOYMENT RATE

The New York unemployment rate equation, shown in Table 11, is specified as a simple autoregressive process with the national unemployment rate (current and lagged) as an explanatory variable.

Table 11
New York Unemployment Rate

$$RUNY_t = \underset{(0.0222)}{0.942}\ RUNY_{t-1} + \underset{(0.0738)}{0.713}\ RUUS_t - \underset{(0.0769)}{0.670}\ RUUS_{t-1} + \underset{(0.0609)}{0.851}\ DQ1_t - \underset{(0.0624)}{0.644}\ DQ2_t + \underset{(0.0609)}{0.183}\ DQ3_t$$

$$Adjusted\ R^2 = 0.977$$

RUNY	New York unemployment rate
RUUS	U.S. unemployment rate
DQi	Seasonal dummy for quarter i

NEW YORK STATE ADJUSTED GROSS INCOME

Annual data pertaining to the number of tax returns and the components of New York State adjusted gross income (NYSAGI) are obtained from samples taken from the State taxpayer population by the New York State Department of Taxation and Finance. Single-equation econometric models are used to project the future number of returns, as well as all the components of income except for the largest component, wages. To ensure consistency with DOB's New York economic forecast, the forecast growth rate for State wages and salaries derived from DOB/N.Y. is applied to the wage base obtained from the taxpayer sample.

In almost all cases, the data series on the components of NYSAGI are found to be nonstationary. Therefore, to avoid being misled by spurious regression results, a logarithmic transformation is performed and then first-differenced for all series for which at least 20 observations are available. Shorter series are modeled in levels.

In constructing the sample, the Department of Taxation and Finance tries to capture as accurately as possible the characteristics of the State taxpayer population. However, it is unreasonable to expect that every component of income will be perfectly represented for each and every year. Dummy variables are incorporated into models where anomalies in the data are thought to be the product of sampling error. Detailed descriptions of the models for the number of returns and for the major components of NYSAGI, other than wages, are presented below.

TAX RETURNS

The number of tax returns is expected to vary with the number of households that earn any kind of income during the year. The number of such households, in turn, should be closely associated with the number of individuals who are either self-employed, employed by others, or earn taxable income from a source other than labor. Since most taxable income is earned as wages and salaries and thus related to employment, total State payroll employment, which is forecast within DOB/N.Y., is a key input to this model.

New Yorkers can earn taxable income from sources other than payroll employment, such as self-employment and real and financial assets. Self-employment is expected to be closely related to proprietors' income, a component of the NIPA definition of State personal income that is available from BEA and forecast within DOB/N.Y. Another component of personal income that is forecast within DOB/N.Y., State property income, includes interest, dividend, and rental income. The DOB tax return model incorporates the sum of proprietors' and property income for New York, deflated by the consumer price index for New York as constructed by DOB.

A one-time upward shift in the number of tax returns is observed in 1987, believed to be related to the Tax Reform Act of 1986. Beginning in 1987, the two-earner deduction for married couples was eliminated, reducing the incentive for married couples to file joint tax returns. To capture this effect, a dummy variable for 1987 is added to the model. A dummy variable for 2000 is also included to account for a change in the way tax returns were processed and sampled starting that year. The equation specification is shown in Table 12.

Table 12
Tax Returns

$$\Delta \ln RET_t = \underset{(0.00108)}{0.00221} + \underset{(0.0741)}{0.430}\,\Delta \ln NYSEMP_t + \underset{(0.0293)}{0.0980}\,\Delta \ln((PROPNY + YENTNY)/CPINY)_t + \underset{(0.00484)}{0.0186}\,D87_t + \underset{(0.00499)}{0.0378}\,D00_t$$

$$Adjusted\ R^2 = 0.897$$

RET	Number of tax returns
NYSEMP	Total State employment
PROPNY	State property income
YENTNY	State proprietors' income
CPINY	Consumer Price Index for New York State
D87	Dummy variable for 1987 tax law change
D00	Dummy variable for 2000 processing changes

POSITIVE CAPITAL GAINS REALIZATIONS

New York State's positive capital gains realizations forecasting model incorporates those factors that are most likely to influence realization behavior: expected and actual tax law changes, equity market activity, and, as of this forecasting cycle, real estate market activity. Realization behavior appears to exhibit two types of responses to changes in tax law: a transitory response to an expected change in the law and a steady-state response to an actual change. For example, if the tax rate is expected to rise next year, then taxpayers may realize additional gains this year, in order to take advantage of the lower rate. However, in the long run, the higher tax rate should result in a lower level of current realizations, all things being equal. Based on Miller and Ozanne (2000)[20], the transitory response variable is specified as the square of the difference between the rate expected to take effect next period and the current period rate, with the sign of the difference preserved. The long-term or steady-state response variable is the actual tax rate.

The growth in realizations is also expected to be directly related to growth in equity prices. To capture the effect of equity prices, the average price of all stocks traded is incorporated into the model. Forecasts of the average stock price are based on the forecast for the S&P 500 from DOB/U.S. A measure of real estate market activity has been added to the model in acknowledgement of another large and possibly growing contributor to capital gains realizations: real estate transactions. Taxpayers can exempt gains from the sale of a primary residence of up to $250,000 ($500,000 if filing jointly), but all other capital gains from real estate transactions are fully taxable. Conditions in the real estate market are captured by including New York State real estate transfer tax collections. The model specification is shown in Table 13.

Two years of dramatic declines in equity prices have resulted in very large loss carryover amounts that appear not to have diminished in 2003 despite considerable growth in capital gains realizations. These carryover losses pose significant risk to the model forecast, particularly because of the lack of historical experience with respect to the magnitude of the loss carryover amounts. Adjustments are made to the capital gains forecast to balance these risks.

[20] Miller, Preston and Larry Ozanne (2000). "Forecasting Capital Gains Realizations," Congressional Budget Office, August.

Table 13
Positive Capital Gains Realizations

$$\Delta \ln CG_t = \underset{(0.0290)}{0.0604} - \underset{(2.31)}{6.33}\,\Delta TRSTX_t - \underset{(0.688)}{2.65}\,\Delta PRMTX_t + \underset{(0.192)}{1.38}\,\Delta \ln EQTYP_t + \underset{(0.164)}{0.449}\,\Delta \ln RETT_t - \underset{(0.138)}{0.326}\,D90_t$$

$$Adjusted\ R^2 = 0.818$$

CG	Positive capital gains realizations
TRSTX	Transitory tax measure
PRMTX	Permanent tax rate
EQTYP	Average price of stocks traded
RETT	Real estate transfer tax collections
D90	Dummy variable for 1990

POSITIVE RENT, ROYALTY, PARTNERSHIP, S CORPORATION, AND TRUST INCOME

The largest component of New York's positive partnership, S corporation, rent, royalty, estate and trust gains (PSG) is partnership income, much of which originates within the finance industry. Therefore, growth in PSG is believed to be related closely to overall economic conditions, as represented by real U.S. GDP, as well as to the performance of the stock market, as represented by the S&P 500.

An almost equally large contributor to this income category is income from closely held corporations organized under subchapter S of the Internal Revenue Code, and known as S corporations. Selection of S corporation status allows firms to pass earnings through to a limited number of shareholders and to avoid corporate taxation. Empirical work shows that the differential between personal income tax and corporate income tax rates can significantly affect election of S corporation status.[21] As more firms choose S corporation status over C corporation status, which is taxed under the corporate franchise tax, personal income increases, all else equal. Consequently, DOB's forecast model includes the difference between the corporate franchise tax rate and the maximum marginal personal income tax rate, where the rates are composites of both State and Federal rates.

Changes in tax law are believed to account for some of the volatility in PSG. The enactment of the Tax Reform Act of 1986, which created additional incentives to elect S corporation status, is likely to have resulted in an unusually high rate of growth in this component of income in the late 1980s. In particular, we observe an unusually high rate of growth in this component in 1988 that was followed by extremely low growth in 1989. Possible explanations are the expectation of a large tax increase after 1988, or an increase in the fee for electing S corporation status in 1989. This effect is captured by a dummy variable that assumes a value of one for 1988 and minus one for 1989. The equation specification is shown in Table 14.

[21] See for example R. Carroll and D. Joulfaian "Taxes and Corporate Choice of Organizational Form," OTA Paper 73, Office of Tax Analysis, U.S. Treasury Department, Washington, DC, October 1997.

Table 14
Positive Partnership, S Corporation,
Rent, Royalty, Estate and Trust Income

$$\Delta \ln PSG_t = \underset{(0.0159)}{0.000317} + \underset{(0.0817)}{0.477}\ \Delta MTR_t + \underset{(0.0637)}{0.264}\ \Delta \ln JS_t + \underset{(0.453)}{2.23}\ \Delta \ln GDP_t + \underset{(.0279)}{0.228}\ D88\_89_t$$

$Adjusted\ R^2 = 0.840$

PSG	Partnership, S corporation, Rent, Royalty, Estate and Trust income
MTR	Difference in Maximum Marginal Tax Rate between Corporate and Personal Income Tax
JS	Standard and Poor's 500 stock index
GDP	Real U.S. GDP
D88_89	Dummy variable, 1 for 1988, -1 for 1989

DIVIDEND INCOME

Dividend income is expected to rise with the fortunes of publicly held U.S. firms, which, in turn, are expected to vary with the business cycle. For example, during the State's last recession, dividend income declined for four consecutive years from 1989 to 1992. Because a strong (or weak) economy, as measured by growth in real U.S. gross domestic product, might have a sustained impact on the payout of dividends, the impact of the business cycle on dividend income is modeled as a polynomial lag of real U.S. GDP. In a polynomial lag estimation, the coefficients on the various lags of GDP are estimated as functions of the length of the lag. As specified in the model shown in Table 15, the coefficient on the i^{th} lag of GDP is equal to $- 0.131\ i + 0.18\ i^2$. For example, the coefficient on the second lag (i=2) of GDP is $0.457 = - 0.131 \cdot 2 + 0.18 \cdot 4$.

Dividend income is also thought to be associated with firms' expectations pertaining to their future profitability, which is expected to be tied to the future strength of the economy. Because interest rates incorporate inflation expectations, which in turn incorporate expectations regarding the future strength of the economy, they represent a proxy for the latter. Interest rates are represented by the rate on the 10-year Treasury note.

Historically, State dividend income has ranged from a decline of 6 percent in 1991 to an increase of 22 percent in 1981, proving much more variable than U.S. dividend income, a component of the NIPA definition of U.S. personal income. This may suggest the importance of factors affecting the way taxpayers report their income, rather than changes in the payment of dividends by firms. The most obvious impact of a change in the tax law occurred in 1988, when reported dividend income grew 21.8 percent, followed by a decline of 2.6 percent the following year. A dummy variable is included to control for what is assumed to be the impact of the Tax Reform Act of 1986 on the reporting of taxable dividend income. A dummy variable is also included to capture the extraordinary impact of recessions (1975, 1990, 1991, 1992, 2001, half of 2002) beyond what is captured by fluctuations in real U.S. GDP.

Table 15
Dividend Income

$$\Delta \ln DIV_t = \underset{(0.00965)}{0.0367}\ \Delta TRATE10_t + \underset{(0.0825)}{0.209}\ \Delta \ln JS_t + \underset{(0.249)}{0.0488}\ \Delta \ln GDP_{t-1} + \underset{(0.172)}{0.457}\ \Delta \ln GDP_{t-2}$$
$$\underset{(0.434)}{1.22}\ \Delta \ln GDP_{t-3} - \underset{(0.030)}{0.127}\ DREC_t + \underset{(0.0399)}{0.121}\ D88\_89_t$$

$Adjusted\ R^2 = 0.683$

DIV	Dividend income
TRATE10	Interest rate on 10-year Treasury notes
JS	Standard and Poor's 500 stock Index
GDP	Real U.S. GDP
DREC	Recession dummy variable
D88_89	Dummy variable, 1 for 1988, -1 for 1989

INTEREST INCOME

For a given amount of assets, an increase in interest rates will increase interest income. DOB's interest income forecasting model is based on this simple concept and accordingly includes the ten-year Treasury rate. In addition, the overall trend in taxable interest income for New York is found to closely track that of U.S. interest income, another component of the NIPA definition of U.S. personal income. However, taxable interest income for New York is much more volatile than the latter measure. For the period from 1976 to 2002, the average growth rate for U.S. interest income was 8.0 percent, with a standard deviation of 8.4 percentage points. In contrast, New York's interest income over the same period averaged 4.8 percent growth, with a standard deviation of over 14.7 percentage points. The additional volatility in the New York series could be related to the behavioral response of State taxpayers to past changes in the tax law, as well as to sampling error. Dummy variables are included to capture extraordinary declines in 1992 and 2002 beyond what would have been expected due to the changes in interest rates. The model specification is shown in Table 16.

Table 16
Interest Income

$$\Delta \ln INT_t = -\underset{(0.0209)}{0.0168} + \underset{(0.202)}{0.967}\ \Delta \ln USINT_t + \underset{(0.0119)}{0.0389}\ \Delta TRATE10_t - \underset{(0.0679)}{0.204}\ D92_t - \underset{(0.0703)}{0.214}\ D02_t$$

$Adjusted\ R^2 = 0.816$

INT	Interest income
USINT	U.S. interest income (NIPA definition)
TRATE10	Interest rate on 10-year Treasury notes
D92	Dummy variable for 1992
D02	Dummy variable for 2002

BUSINESS INCOME

Business income combines income earned and reported as a result of operating a business or practicing a profession as a sole proprietor, or from operating a farm. Such income is expected to vary with the overall strength of the State and national economies. The inclusion in the model of State proprietors' income, a component of the NIPA definition of New York personal income, which is forecast within DOB/N.Y., insures consistency between DOB's New York forecast and the forecast of this component of NYSAGI. Real U.S. GDP, forecast under DOB/U.S., captures the impact of the national business cycle, which might not be captured by the NIPA definition of State proprietors' income. In addition, a dummy

variable is included to capture the downward shift in reported business income growth for the period from 1989 onward, perhaps due to new firms registering as S corporations rather than sole proprietorships, in order to take advantage of more favorable laws pertaining to liability. The equation specification is shown in Table 17.

Table 17
Business Income

$$\Delta \ln BUS_t = \underset{(0.0249)}{0.0873} - \underset{(0.146)}{0.349}\,\Delta \ln BUS_{t-1} + \underset{(0.207)}{0.297}\,\Delta \ln YENTNY_t + \underset{(0.600)}{1.68}\,\Delta \ln GDP_t - \underset{(.0215)}{0.102}\,D89_t$$

$$Adjusted\ R^2 = 0.647$$

BUS	Sole proprietor and farm income
YENTNY	State proprietor income (NIPA definition)
GDP	Real U.S. GDP
D89	Dummy variable for 1989 onward

PENSION INCOME

Pension income includes payments from retirement plans, life insurance annuity contracts, profit-sharing plans, military retirement pay, and employee savings plans. Pension income is linked to growth in the New York State population and to long-term interest rates, suggesting that firms base the level of pension and life-insurance benefits they offer to employees on their expectations of future profitability, which is tied to the future strength of the economy. As indicated above, interest rates represent a proxy for the latter. Pension income has grown steadily over the years with a growing New York State population, although the growth rate has declined considerably over time. While the average annual growth rate between 1978 and 1989 was 13.4 percent, it fell to 7.6 percent between 1990 and 2002. This coincides with a decline in the 10-year Treasury rate from 10.3 percent in the earlier years to 6.3 percent in the later years. The equation specification is shown in Table 18.

Table 18
Pension Income

$$\Delta \ln PEN_t = \underset{(1.53)}{-4.45}\,\Delta \ln NRNY_t + \underset{(0.00712)}{0.0129}\,\Delta TRATE10_{t-1} - \underset{(0.181)}{0.660}\,AR1 - \underset{(0.0299)}{0.0866}\,D89_t + \underset{(0.0309)}{0.152}\,D94_t$$

$$Adjusted\ R^2 = 0.684$$

NRNY	New York State population
PEN	Pension income
TRATE10	Interest rate on 10-year Treasury notes
AR1	First order autoregressive term
D89	Dummy variable for 1989
D94	Dummy variable for 1994

PERSONAL INCOME TAX

BACKGROUND

Historical

The New York State (NYS) personal income tax was originally enacted in 1919, six years after the ratification of the 16th Amendment to the U.S. Constitution allowed the Federal government to levy a personal income tax. A top rate of three percent was imposed on taxable income over $50,000, and remained in force until 1930. The present system of conformity to the Federal definition of adjusted gross income and of itemized deductions, however, did not begin until 1960. At one point during the 1970s the top rate reached 15.375 percent on taxable incomes over $25,000. Over the years, the State has undergone several major tax law reforms.

The Nature of the Forecasting Problem

Forecasting personal income tax (PIT) receipts presents unique challenges. One key factor is the complicated linkage between economic activity and PIT revenue. Individual taxpayer activities generate the various components of taxable income, such as wages and salaries, dividends, interest income, etc. that, through the operation of the tax code, give rise to tax liability and, in turn, generate tax payments ("cash") to the State.

Another challenge arises from the timing of available data. The Tax Department provides current information on the flow of PIT receipts through out the tax year, but it does not have current information on the income components that generate PIT liability. Setting aside the fact that taxpayers can request extensions on filing their returns, taxpayers generally must settle tax due at the time their returns are filed (minus any prepayments such as withholding or estimated tax), but it takes time to process the data and determine income components and liability. For example, quarterly cash information on withholding, which tracks the income component "wages and salaries" closely, and quarterly data on estimated payments for the 2004 tax year are compiled throughout 2004. In 2005, as taxpayers file their taxes, cash collections are completed and by December of 2005 a good estimate of 2004 liability is available. However, analysts do not have current information on income tax components that generated 2004 liability, because this information will not be available until the fall of 2006 when the income tax study file is completed. Because of the progressive nature of the State's tax system, detailed knowledge of these income components is needed to forecast future tax liability.

Detailed information on liability components such as wages and salaries, capital gains, dividends and interest earned is also necessary for analyzing the impact of possible policy changes on PIT liability. Tax changes that affect certain income components may have variable effects on taxpayers in different income groups. For example, a change in the tax treatment of capital gains would tend to affect higher-income taxpayers more then lower-income taxpayers, all things being equal. Therefore we need to be able to project the income components across the income distribution of State taxpayers before we can forecast liability.

Computing the Personal Income Tax

The computation of the personal income tax starts with the addition of income components to arrive at Federal gross income[1]. The Internal Revenue Code permits certain exclusions and adjustments in arriving at Federal adjusted gross income (FEDAGI). In addition, the State requires certain modifications to FEDAGI in order to calculate NYS adjusted gross income (NYSAGI). NYSAGI is reduced by the larger of the NYS standard deduction or itemized deductions. NYS itemized deductions generally conform to Federal itemized deductions, with certain modifications, such as the add-back of State and local income taxes. NYS conforms to Federal law by limiting itemized deductions for taxpayers with FEDAGI above a certain amount. Upper-income taxpayers are subject to a further deduction limitation under State law. NYS taxpayers may also subtract from NYSAGI a $1,000 exemption for each dependent, not including the taxpayer and spouse, in determining taxable income.

A graduated tax rate schedule is applied to taxable income to compute the tax owed. Those with NYSAGI above $100,000 must calculate a supplemental tax to recapture the benefit of the lower brackets. Finally, qualified taxpayers arrive at their final tax liability after subtracting certain credits.[2]

DATA SOURCES

Data on the personal income tax (PIT) comes from two main sources: the NYS Department of Taxation and Finance, and the Internal Revenue Service (IRS). The information is provided in the form of data files and various reports, detailed below.

PIT Study Files

PIT study files are created every year by the NYS Department of Taxation and Finance. The study file is a stratified statistical sample of about 100,000 income tax returns with detailed information, including: marital and resident status, components of income, and Federal and NYS adjusted gross incomes, either the standard deduction or the components of itemized deductions, the number and amount of exemptions, and tax liability and credits. Since the study files contain only a sample of the taxpayer universe, each record has a weight assigned to it so that, when file components are multiplied by the weights the file reflects the approximately nine million PIT returns in New York State.

Cash Collection and Processing Reports

Daily, weekly, and monthly collection reports of withholding, estimated payments, and other components of collections are used extensively to keep track of PIT receipts on both a calendar and a fiscal year basis. These reports are generated by the Department of Taxation and Finance.

[1] The income components include: wages, salaries and tips; interest and dividend incomes; State and local income tax refunds; alimony received; net business and farm incomes; capital gains and losses; IRA distributions and pensions and annuities; rents and royalties; incomes from partnerships, S corporations and trusts; unemployment compensation; and taxable Social Security benefits.

[2] Current State law allows the following major credits: earned income tax credit; household credit; child and dependent care credit; real property tax circuit breaker credit; agricultural property tax credit; long-term care insurance credit; college tuition credit; investment credit; and Empire Zone credit.

Each component of receipts follows a different reporting schedule. Withholding information is reported on a daily basis[3] while estimated payments follow a quarterly schedule (April-June-September-January). Final payments come mostly during the March-April-May period, but also in August and October, when returns are due for taxpayers receiving extensions. Refunds on timely filed returns must be issued within 45 days of the due date or within 45 days of the filing date, whichever is later. As a result, most refunds on timely filed returns are paid during the March-April-May period. Regardless of their individual schedules, all components of receipts are tracked monthly for cash flow purposes.

Federal Sources of Information

The Internal Revenue Service's Statistics of Income (SOI) program makes available Federal data on State resident taxpayers, through data files and reports. For instance, 2002 information on some of the income components for NYS residents was published in late spring of 2004 in the *SOI Bulletin*. Detailed information on the 2002 SOI public use data file became available during October 2004. The IRS plans to have 2003 tax year data available by August 2005. The SOI information is useful for a number of reasons: it can be used when the PIT study file is not available; it serves as a benchmark against which the reasonableness of the PIT study file can be checked; finally, it provides valuable Federal tax information that is missing from the New York study file.

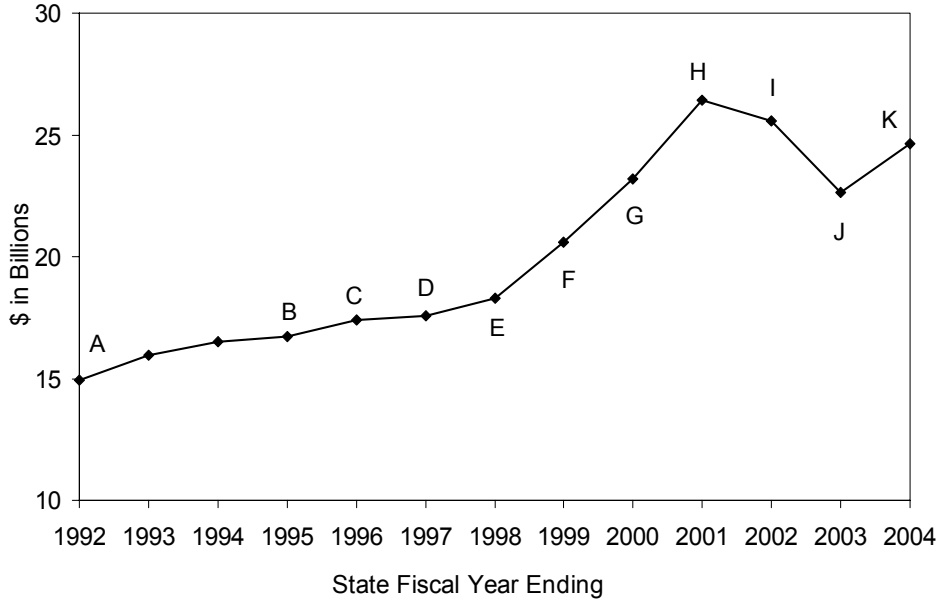
STATUTORY CHANGES

As indicated in the "Background" section, the State personal income tax law has been subjected to many changes over its history. The figure in this section shows actual PIT tax receipts for fiscal years 1991-92 to 2003-04. The graph also shows the changes in law that occurred in that period, thus indicating when PIT receipts were first affected. Note that the receipts are not adjusted for inflation.

[3] If an employer was required to remit $15,000 or more of withholding tax during the calendar year preceding the previous year, the employer must remit the tax on or before the third business day following the payroll date. If an employer was required to remit less than $15,000, the employer has up to five business days following the date of payroll to send payment for the withholding tax. Employers who are qualified educational organizations or health care providers must remit the tax on or before the fifth business day following the date of payment. Employers who have withheld, but not paid over, a cumulative aggregate amount of less than $700 at the close of a calendar quarter must remit the tax quarterly.

Current Law Personal Income Tax Receipts

SFY 1991-92 to 2003-04



A. 1991-92: Changed rate schedule for taxpayers with taxable wages in excess of $90,000 annually to account for the Federal limitation on itemized deductions and for the State tax table benefit recapture.

B. 1994-95: Reflects the enactment of the State earned income tax credit (EITC) at 7.5 percent of the Federal credit, effective for the 1994 tax year.

C. 1995-96: Reflects these changes for the 1995 tax year: standard deduction increased to $6,600 for single individuals, $10,800 for married couples; maximum rate lowered to 7.59 percent and number of tax brackets reduced; EITC increased to 10 percent of the Federal credit.

D. 1996-97: Reflects these changes for 1996 tax year: standard deduction increased to $7,400 for single individuals, $12,350 for married couples; maximum rate lowered to 7 percent while the wage brackets to which the rates apply were broadened; EITC increased to 20 percent of the Federal credit, income levels for the Child and Dependent Care Credit increased and the credit was made refundable.

E. 1997-98: Reflects creation of the Agricultural Property Tax Credit for the 1997 tax year. In addition, reflects these changes for the 1997 tax year: standard deduction raised to $7,500 for single individuals, $13,000 for married couples; maximum rate reduced to 6.85 percent and broadening of the wage brackets to which the rate is applied.

F. 1998-99: Reflects these changes for the 1998 tax year: increase in the Child and Dependent Care Credit to 100 percent of the Federal credit for taxpayers with AGI up to $17,000 and phased down to 20 percent for incomes of $30,000 or more; changed calculation of the Agricultural Property Tax Credit; creation of the Solar Energy Credit; and of the College Choice Tuition Savings Program.

G. 1999-2000: For the Child and Dependent Care Credit, reflects increases in the income levels for the range of the phasedown from 100 percent to 20 percent of the Federal credit, setting the range at $35,000 to $50,000 for the 1999 tax year.

H. 2000-01: Reflects these changes for the 2000 tax year: an increase in the Child and Dependent Care Credit raising the maximum to 110 percent of the Federal credit for incomes up to $25,000, with a phase down from 110 percent to 20 percent for incomes above $25,000; an increase in the State EITC to 22.5 percent of the Federal credit; and extension of the Qualified Emerging Technology Credit (QETC) to individuals in partnerships or S corporations.

I. 2001-02: Reflects these changes for the 2001 tax year: another increase in the State EITC to 25 percent of the Federal credit; beginning the first phase of a three-year reduction of the marriage penalty; and providing the first phase of a four-year phase-in of the tuition deduction/credit

J. 2002-03: Reflects these changes for the 2002 tax year: a further increase of the State EITC to 27.5 percent of the Federal credit; providing the second phase of the three-year reduction of the marriage penalty; and the second phase of the four-year phase-in of the tuition deduction/credit.

K. 2003-04: Reflects the following changes: implementation of a three-year temporary surcharge on high-income taxpayers, adopted in 2003, with the second-highest rate falling from 7.5 percent in 2003 to 7.375 percent in 2004 and to 7.25 percent in 2005 and a top rate of 7.7 percent in all three years; an increase in the State EITC to 30 percent of the Federal credit; provision of the final phase of a three-year reduction of the marriage penalty; and of the third phase of a four-year phase-in of the tuition deduction/credit.

FORECAST METHODOLOGY

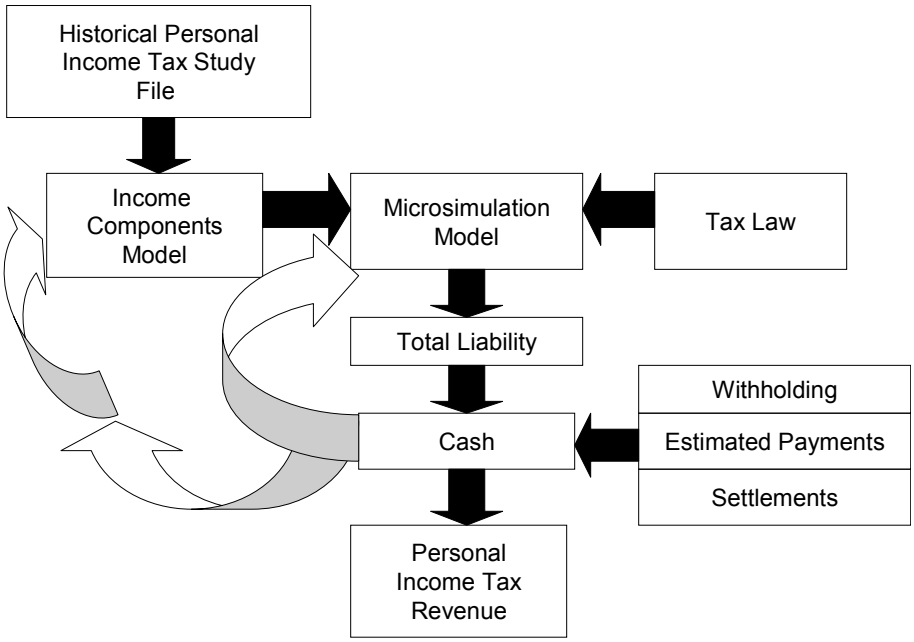
The estimating/forecasting process for the NYS personal income tax is composed of three major components. They are:

1. *The adjusted gross income (AGI) model*, which utilizes a set of econometric models to project the individual income components that make up gross income, and forecasts them over a five-year interval;
2. *The PIT micro-simulation model*, which uses the PIT study file and results from the AGI model to forecast PIT liability over the forecast interval. The simulation model is also used to assess the impact of tax law changes and perform "what-if" analyses.
3. *The liability-to-cash models*, which map calendar-year liability to fiscal-year cash estimates and monitor day-to-day actual cash receipts and refunds.

All three components of the estimation and forecasting process are closely interconnected. (See the figure below.)

- Information on individual income components from past PIT studies (up to tax year 2002 in the 2005-06 fiscal year budget cycle) serves as historical data for the AGI model of income components. In turn, forecast results from the AGI model, after necessary adjustments based on the latest available cash information (from tax year 2004), are fed into the PIT micro-simulation model.
- The most recent PIT study file is the starting point for the micro-simulation model. In order to compute liability beyond the base year, the study file weights are adjusted to reflect the results from the AGI model. The adjusted data enter the PIT micro-simulation model to forecast PIT liability, which, in turn, feeds into the cash-estimating process. However, where detailed information on PIT collections is already available (the 2003 and 2004 tax years in our instance), cash results help determine the income and liability targets for the PIT micro-simulation model.
- The liability forecast from the PIT micro-simulation model is used for projection of cash receipts for future years.

Components of the NYS PIT Forecasting Process



In the current fiscal year, cash information sets constraints on the income components analysis and the micro-simulation model outcome. (See white arrows in the figure above.) Conversely, for out-year projections, where no cash information is available, economic assumptions and micro-simulation estimates of liability drive the cash estimates. (See black arrows in the figure.)

Detail on the AGI forecasting model can be found in the "New York State Adjusted Gross Income" chapter of this book. The following section describes each of the remaining components of the PIT forecasting process.

The PIT Micro-simulation Model

The PIT micro-simulation model can be used in two ways. One use is to generate forecasts of PIT liability for future years. Its second use is to explore the fiscal impact of different tax policy scenarios and to assess the impact of any proposals on different taxpayer groups.

Forecasts of liability using the micro-simulation model proceed in two steps. The first step is to "advance" or "trend" the most recent study file into future tax years. This is done sequentially — the 2002 study file is the basis for the "trended" 2003 data set, which in turn is used to create the trended 2004 data set, and so forth. Once this is done for any given year, the new "trended" data set can be submitted to the second step, which is to compute the tax liability that would be expected, given the AGI forecast and existing tax law, for that year. This second step is essentially a PIT tax liability calculator, and follows the structure of the State tax form.

For example, the 2005-06 Executive Budget PIT liability projections required forecasts of aggregate AGI components and the number of tax returns from the AGI model for 2003 and beyond, since the 2002 study file was the most recent one available. A set of separate econometric models generated forecasts of the *shares* of the major components of AGI (wages and salaries, dividend income, interest income, business and farm income, and positive capital gains) for income groups. For example, the shares of wage and salary income were forecast for the five income groups in that component.

Next, the information from these forecasts was combined with the study file in a two-step process. The first step consists of growing the PIT income components at the individual record level (using growth rates from the "share" forecasts) while at the same time reflecting the overall econometric forecast for each of the income components and numbers of returns (using growth rates from the AGI model). In the second step, the weight of each return is adjusted through a convergence algorithm that balances the need to hit overall growth and distribution targets against the goal of minimizing the adjustment to the weight. The process is critical because of the importance of the income distribution in determining liability, due to the progressive nature of the tax code. The distribution adjusts over time as the AGI components grow at different rates. In the current example, this process resulted in a "trended" or forecast version of the study file for 2003. This 2003 data set now becomes an input for trending forward to 2004, using the same process.

Once a "trended" data file has been created, it can then be submitted to the "liability calculator" part of the model. This portion of the model takes the individual income and deduction components from each record and computes AGI, the final amounts of deductions and exemptions allowed, taxable income, and taxes before and after credits, as well as the various allowable credits for each record in the file. Then it multiples the income and liability values by the weight assigned to the specific record. The grand total of the weighted records

corresponds to the entire taxpaying population of the State. Total simulated results for AGI, deductions, and liability closely match the aggregate corresponding values from the study file. Adjusting parameters within this program allows simulation of different tax policies, such as altering tax rates.

Incorporating Processing Information

A two-year lag exists between the current year and the year of the latest complete PIT study file. For instance, the 2002 PIT study file became available in the fall of 2004. Therefore, liability for calendar year 2003 must be estimated from the 2002 data file before liability for 2004 and the out years can be projected. As mentioned earlier, however, in the first year of the two-year span from 2002 to 2004 (the 2003 tax year in this case), much information is available from actual cash receipts and, by late December 2004, from the processing of actual 2003 returns by the Department of Taxation and Finance. This processing information includes the number of tax returns processed and liability reported to date on returns, as well as the distribution of returns by income class and by resident status. This data can be used as a check on the trending process. The micro-simulation model must reflect this processing information and "age" the study file for the 2003 liability year so the simulation results will match the available aggregate and distributional targets for that year.

Policy Analysis

Because of the detail available, a strength of the PIT micro-simulation model is that in addition to estimating/forecasting current law, it is an effective tool for policy analysis, allowing the exploration of different tax scenarios, and assessment of the impact of policy changes on various taxpayer groups. For instance, what if the law is changed to increase the standard deduction, the exemption amount, or the top tax rate? What if the current earned income tax credit is enriched? What would be the fiscal impact of any of these changes on State revenues? How would various income groups or filing statuses benefit or lose under a proposal? In general, who would gain or lose from a particular tax proposal and by how much?

The Cash-to-Liability Process

The cash-to-liability process involves monitoring all available collection information for the different components of the personal income tax to better estimate current year receipts and to improve our estimates of current year liability. Year-to-year liability growth, along with the actual daily, weekly and monthly collections, is used as a guide for growth in cash collections.

The components of PIT cash receipts include withholding (current year and prior year), estimated payments (current year vouchers and extensions), final returns, delinquencies (assessments and prior year returns), and refunds (current, prior, minor offsets, State/City offsets, credit to estimated payments). The "settlement" consists of final returns, extension payments, and refunds. The table below lists the actual components of PIT cash for the 2003-04 State fiscal year and the estimated components with 30-day changes for the 2004-05 State fiscal year.

COMPONENTS OF PIT CASH
2003-04 AND 2004-05 FISCAL YEARS
(millions of dollars)

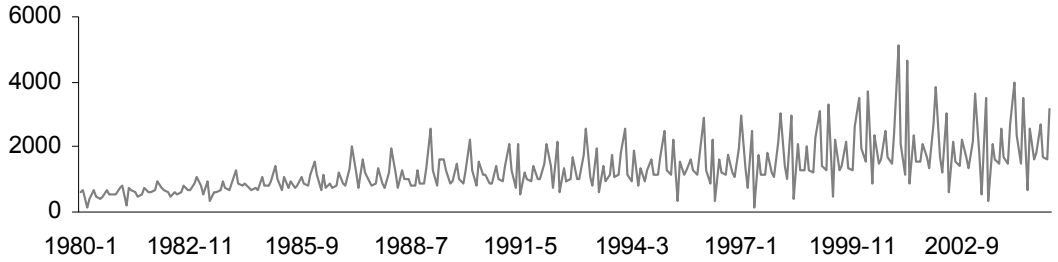
PIT Component	2003-04 Actuals	2004-05 Estimate	Change	Change(Percent)
Withholding	21,986	23,079	1,093	5.0
Estimated Tax	5,159	7,053	1,894	36.7
-- *Current*	4,325	5,518	1,193	27.6
-- *Prior* (IT-370)	834	1,535	701	84.1
Returns	1,313	1,610	297	22.6
-- *Current*	1,149	1,458	309	26.9
-- *Subsequent*	164	152	(12)	(7.3)
Delinquencies	631	658	27	4.3
-- *Assessed*	563	593	30	5.3
-- *Returns (prior)*	68	65	(3)	(5.5)
Gross	29,089	32,400	3,311	11.4
Refunds	4,442	4,643	201	4.5
Current	2,948	3,110	162	5.5
-- Refunds	2,843	2,989	146	5.1
-- Offsets	105	121	16	14.6
Subsequent	960	960	0	0.0
Prior w/offsets	272	227	(45)	(16.5)
State/City	261	346	85	32.6
Net Total	24,647	27,757	3,110	12.6
Reserves	(597)	531		
Reported	24,050	28,288	4,238	17.6
"STAR"				
Special Fund	(2,819)	(3,072)	(253)	9.0
RBTF	(5,457)	(6,172)	(715)	13.1
General Fund	15,774	19,044	3,270	20.7

The following two sets of figures with the heading Collection Components (see the description in Overview section of this report), display historical trends in total net income tax and withholding collections. This is not to be confused with the separate components of the income tax detailed in subsequent graphs. The first panel of this series shows actual receipts, while the second graph displays smoothed trends, with increases occurring even while major tax cuts were implemented in the mid to late nineties. The large decline in receipts following September 11th is also evident and the recovery of receipts growth in recent months including the impact of the temporary surcharge, is apparent. The third set shows the seasonality of net collections and withholding, with spikes in January and April for total collections, and in January for withholding, particularly noteworthy. The irregular component shows large values relative to trend in recent years reflecting the stock market boom in the late 1990s and early 2000 and the subsequent recession.

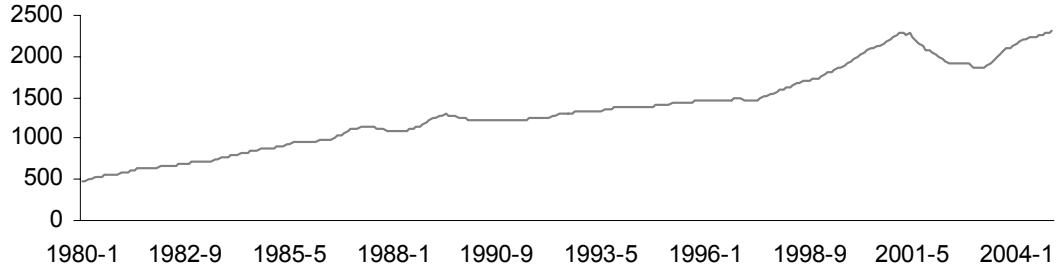
The last seven figures show the components of cash liability over time, estimated payments, withholding, extensions, and final return payments as a percentage of liability over time, refunds paid as a share of withholding collections, and the major components of PIT cash over the 2003-04 State fiscal year. Note the tendency for the cash components to return to an average percentage of liability. However, the components can deviate significantly from this average in a given year.

Collection Components
(millions of dollars)

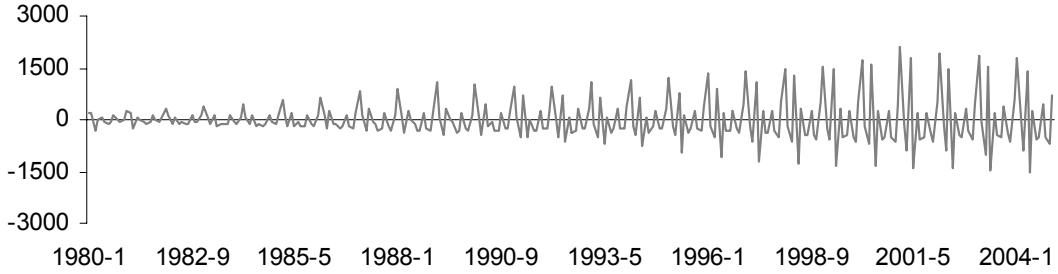
Net Income Tax
Collections



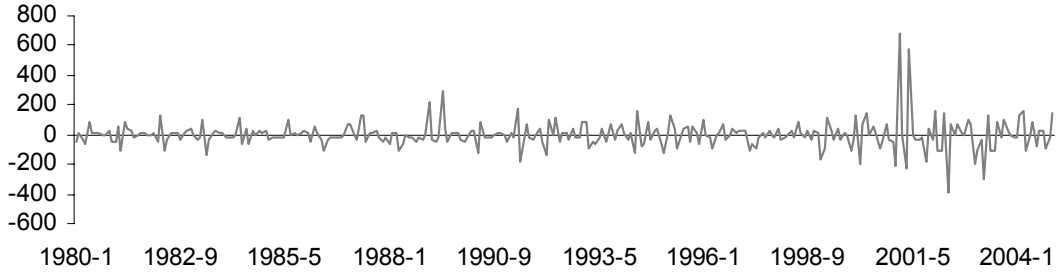
Trend



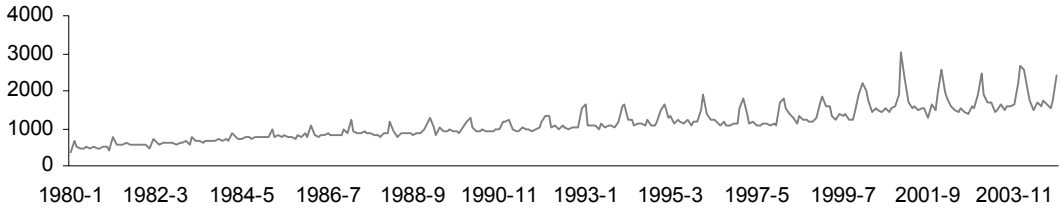
Seasonal



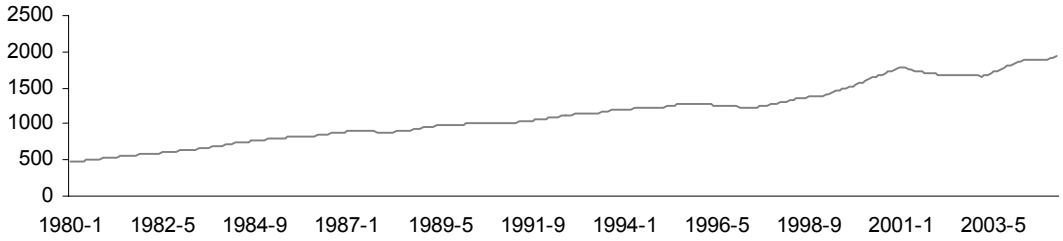
Irregular



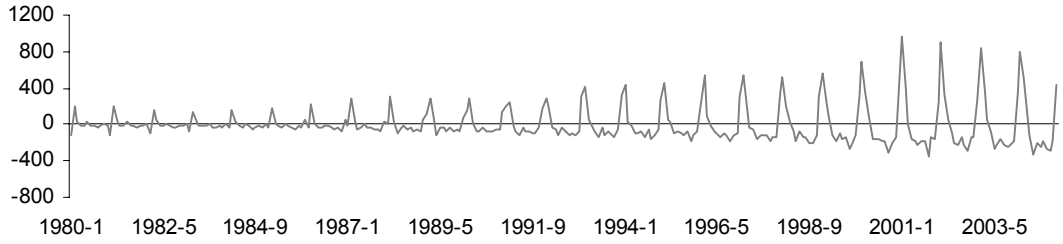
Withholding
Collections



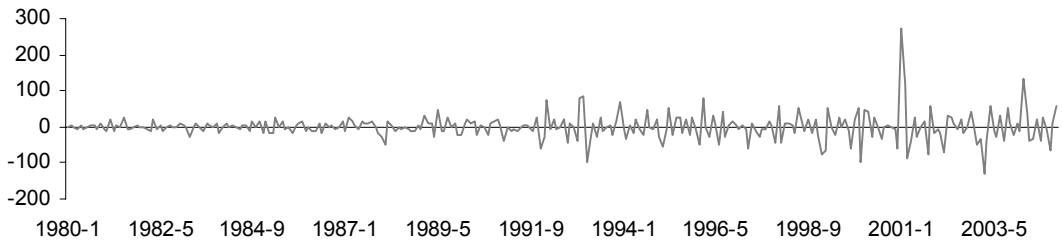
Trend



Seasonal

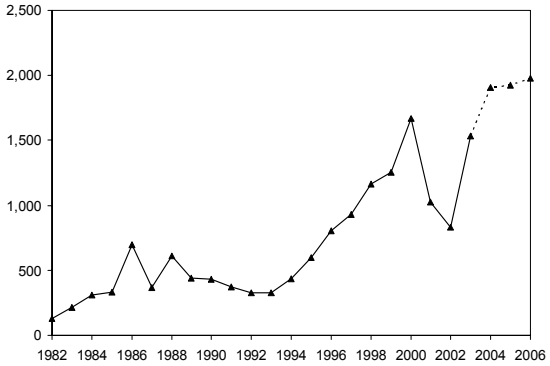


Irregular

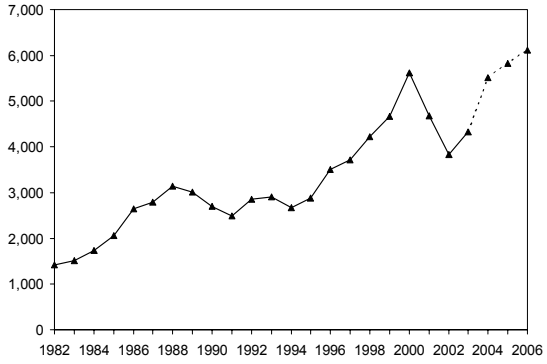


Components of PIT Cash Liability
1982 to 2006 Tax Years
(millions of dollars)

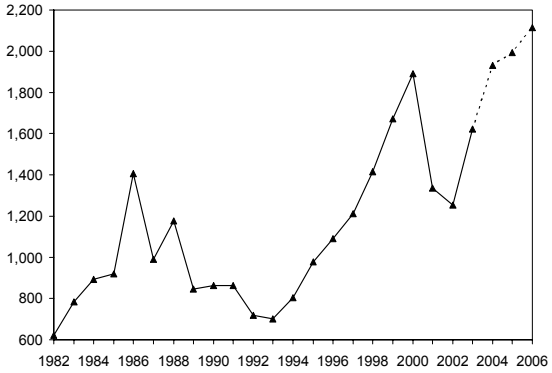
IT 370 Extensions



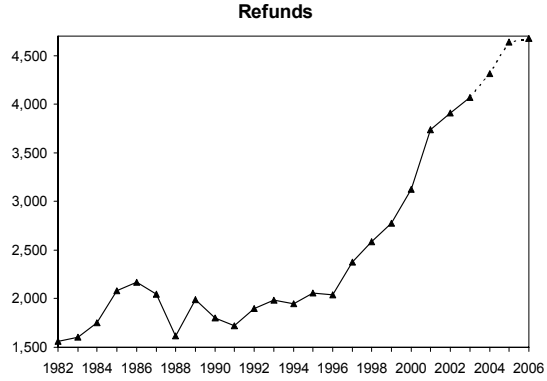
Current Year Estimated Payments



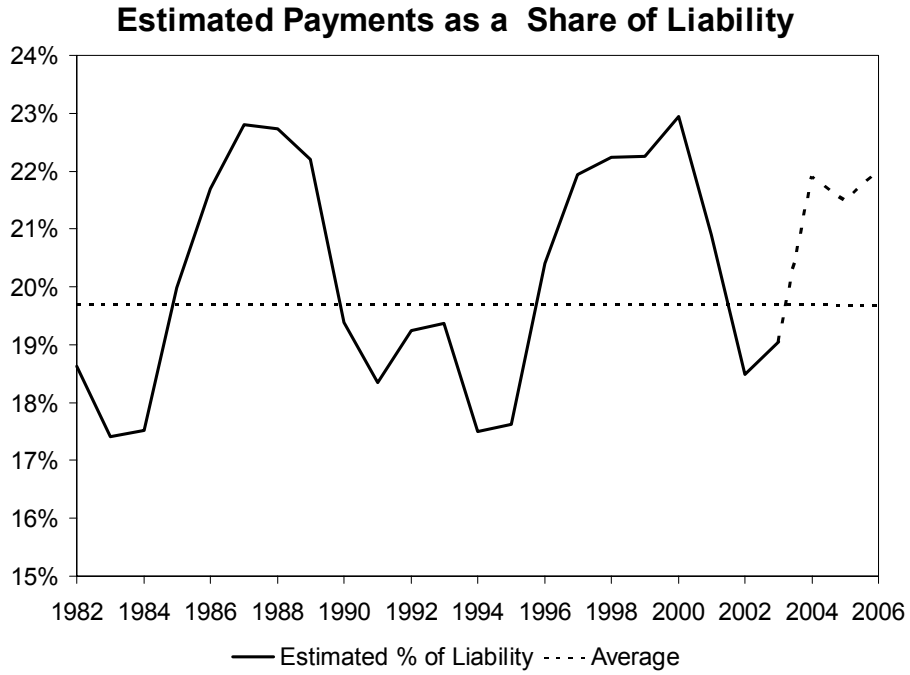
Final Payments

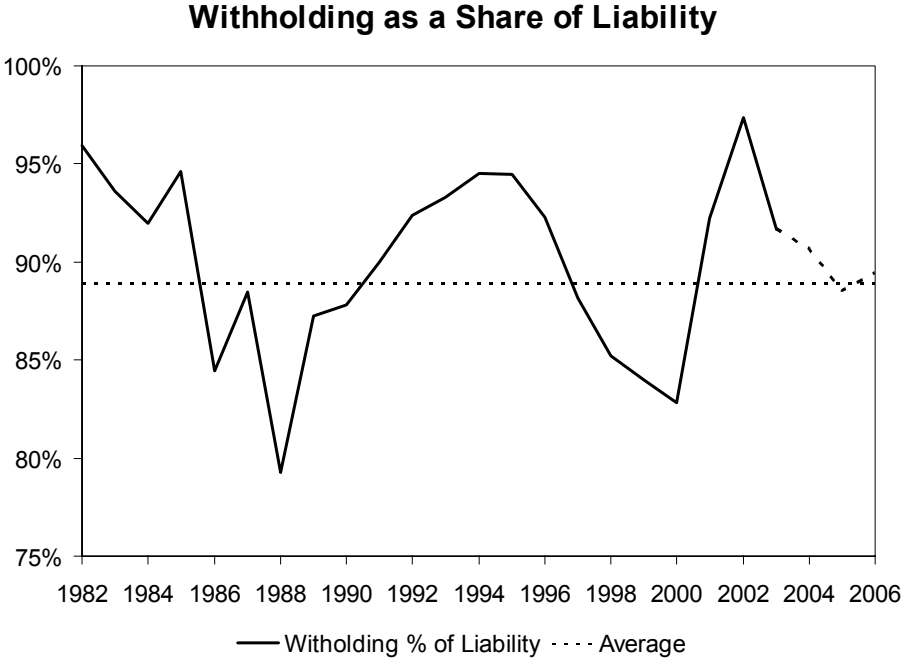


Refunds

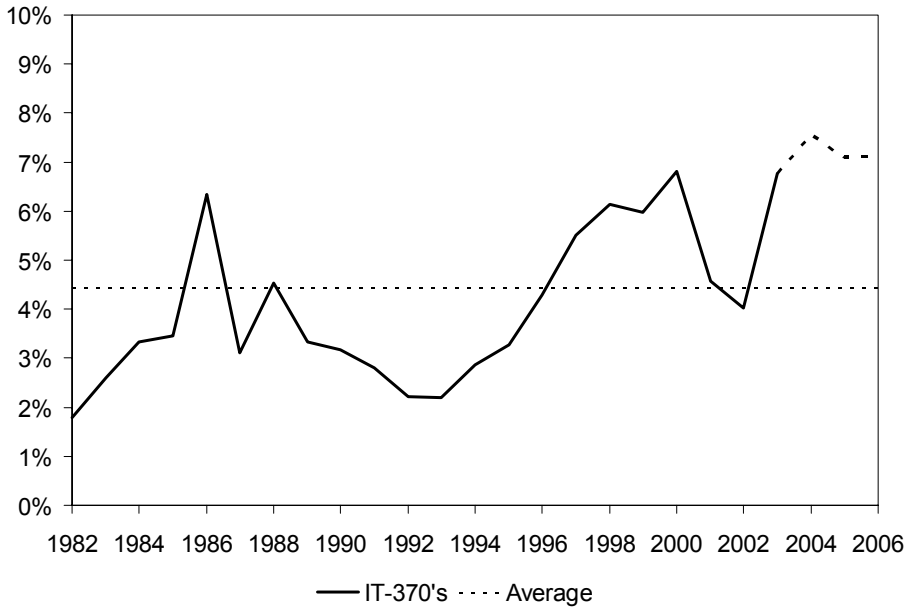


Estimated Payments and Withholding as a Percent of Liability
1982 to 2006 Tax Years

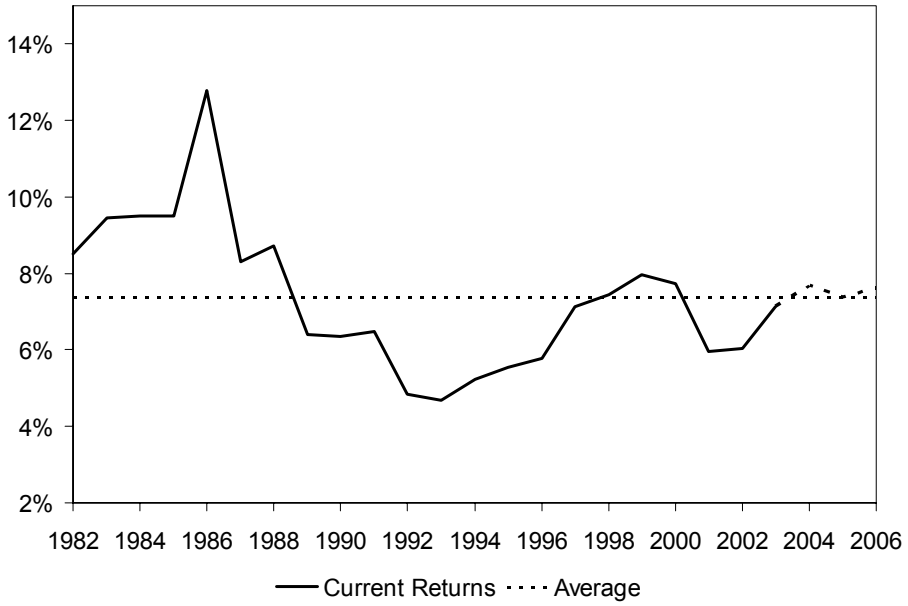


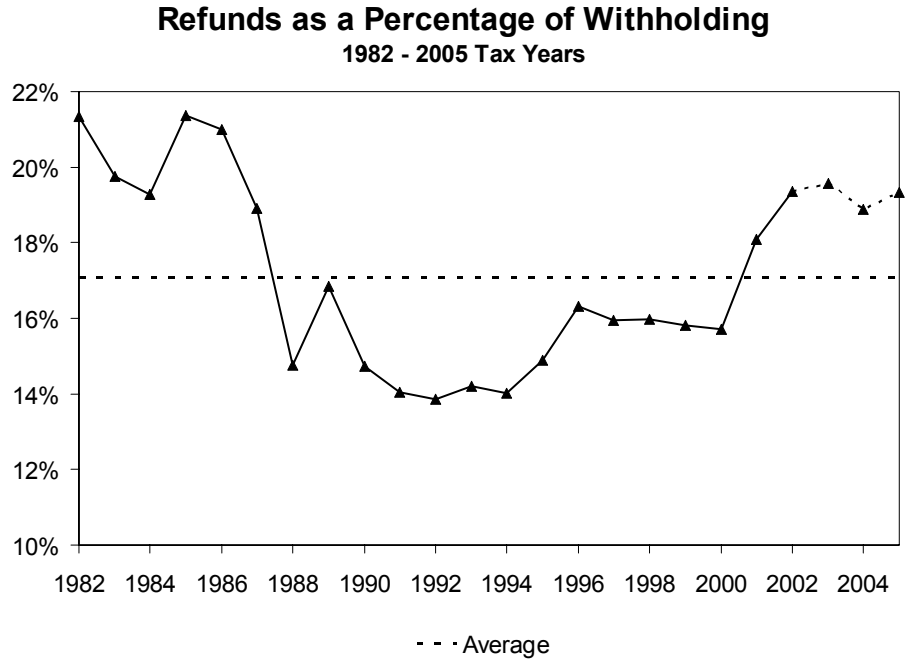


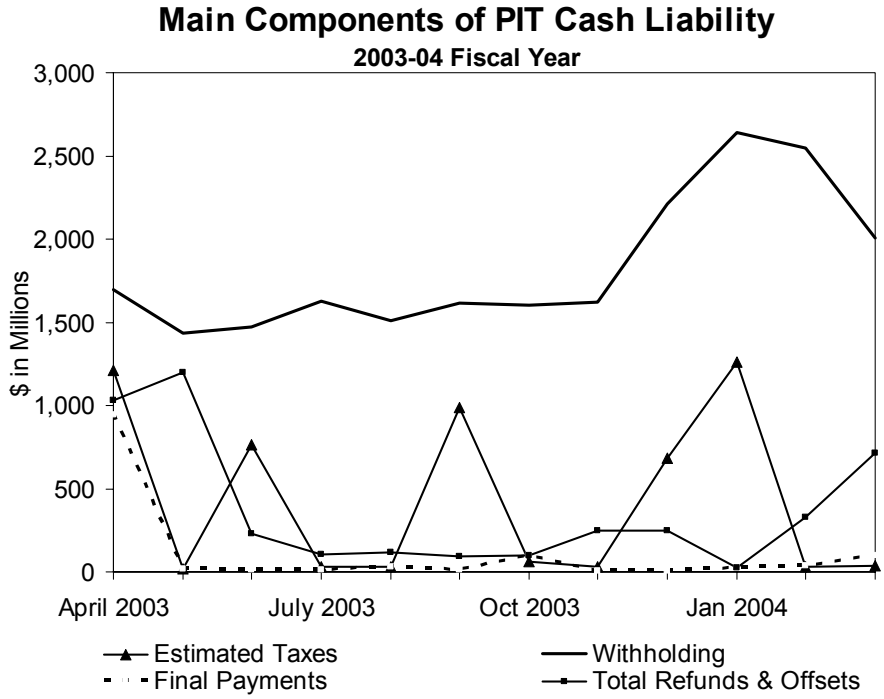
IT-370's as a Share of Liability



Current Returns as a Share of Liability




Refunds as a Percentage of Withholding
1982 - 2005 Tax Years
22%
20%
18%
16%
14%
12%
10%
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
Average


Main Components of PIT Cash Liability
2003-04 Fiscal Year
$ in Millions
3,000
2,500
2,000
1,500
1,000
500
0
April 2003
July 2003
Oct 2003
Jan 2004
Estimated Taxes
Withholding
Final Payments
Total Refunds & Offsets

As stated earlier, information regarding the various components of tax collections is received on a daily, weekly, and monthly basis. Staff monitors tax collections and other information closely throughout the year to assess the performance of the estimates. For example, as a nearly $25 billion component of collections, withholding collections generally are followed on a daily basis throughout the year, while payments with returns and extension requests as well as refunds are monitored most intensively in April and May of each year.

An all-encompassing report on cash collection components of the personal income tax is received from the Department of Taxation and Finance mid-month for the prior month. This report is used to determine the official cash flow for the month. Armed with this information, staff compares the original estimate for the month, and for the entire fiscal year, with all available actual cash information on each of the components. At the end of each quarter, this information is used, along with historical information and any pertinent legislative changes, to make necessary adjustments to the cash liability estimate.

Another critical aspect of the cash-to-liability process is forecasting the different components of receipts on a fiscal-year basis using results from the PIT simulation as a benchmark. Various methodologies are applied for different components of receipts.

The largest component of income tax collections, withholding tax, is estimated based on quarterly forecasts of NYS wages. Withholding is estimated using two alternative methodologies. One method applies a withholding-to-wage growth elasticity to the forecasted growth rates for wages on a quarterly basis to estimate withholding growth rates for each quarter in the forecast period. The elasticity used for each quarter is based on historical elasticity trends and expected future elasticity changes.

The second method employs an econometric model to forecast withholding based on independent variables, including wages and shift variables reflecting law changes. More specifically, withholding is a function of quarterly wages, seasonal effects, and dummy variables for tax law changes. The wage impact is expected to vary by quarter. This effect is captured by multiplying wages with quarterly dummies. The form of the estimating equation is outlined below. The error term exhibits autocorrelation at seasonal frequencies. An autocorrelation correction is applied to the error term and the structural parameters are reestimated. The results are summarized in the following table.

The model is estimated in levels using quarterly data starting in 1975 and running through the fourth quarter of 2003. The summary table shows that the model fit is good and there is no evidence of serial correlation after correction. The elasticity estimates derived from the model are consistent with *a priori* expectations — we expect withholding to increase (decrease) at a faster rate than wages as people move through the graduated tax brackets. Given that the model is estimated in levels, the elasticities are calculated as arc elasticities computed using a year of data. The elasticities for the most recent quarters fall in the range of 1.15 to 1.22. The tax dummies are of the right sign and for the most recent law changes (dating back to 1987) quite significant.

DERIVED ELASTICITIES — SUMMARY STATISTICS

Wage by Quarter	Derived Elasticity 2002	Coefficient Estimate *	t-statistic
Quarter 1	1.154	7.6	33.00
Quarter 2	1.215	6.8	24.15
Quarter 3	1.200	7.0	22.96
Quarter 4	1.205	6.4	25.57
Summary Statistic			
R2	.9946		
Durbin-Watson	1.6321		

* cents per dollar of wages

WITHHOLDING

$$W_t = \beta_0 + \beta_1 DWAGE1_t + \beta_2 DWAGE2_t + \beta_3 DWAGE3_t + \beta_4 DWAGE4_t + \alpha_1 TAX1_t + \alpha_2 TAX2_t + \alpha_3 TAX3_t + \alpha_4 TAX4_t + \alpha_5 TAX5_t + \alpha_6 TAX6_t + \alpha_7 TAX7_t + \alpha_8 TAX8_t + \alpha_9 TAX9_t + \alpha_{10} TAX10_t + \alpha_{11} TAX11_t + \alpha_{12} TAX12_t + \alpha_{13} TAX13_t + \delta_1 S1_t + \delta_2 S2_t + \delta_3 S3_t$$

W Withholding
DWAGEi… Equals wages if period t is the i^{th} quarter of the calendar year; 0 otherwise
***S**i* Seasonal dummies i = 1…3

Note: The dummy variables TAX1 through TAX13 equal 1 in the following time periods, 0 otherwise:

TAX1: second quarter of 1980 and thereafter, reduction in top tax rate.

TAX2: quarter of 1981 and thereafter, reduction in top tax rate.

TAX3: fourth quarter of 1981 and thereafter, increased personal exemption and standard deduction.

TAX4: third quarter of 1985 and thereafter, reduction in top tax rate, increased personal exemption and standard deduction.

TAX5: second quarter of 1987 and thereafter, reduction in top tax rate and broadened wage brackets, increased personal exemption and standard deduction.

TAX6: fourth quarter of 1987 and thereafter, reduction in top tax rate and adopted individual bracket structure for all, increased personal exemption and standard deduction.

TAX7: fourth quarter of 1988 and thereafter, reduction in the top tax rate, increased standard deduction.

TAX8: fourth quarter of 1989 and thereafter, adopted new rate schedule with top rate of 7.875, increased standard deduction.

TAX9: fourth quarter of 1991 and thereafter, change in rate schedule for State tax table benefit recapture.

TAX10: third quarter of 1995 and thereafter, reduction in the top tax rate and the number of wage brackets, increased standard deduction.

TAX11: second quarter of 1996 and thereafter, reduction in the top tax rate and broadened wage brackets, increased standard deduction.

TAX12: second quarter of 1997 and thereafter, reduction in the top rate and broadened wage brackets, increased standard deduction.

TAX13: third quarter of 2003 through fourth quarter of 2004. The dummy is reduced from 1 gradually over the phaseout range of the temporary surcharge.

Currently, the two alternative estimation procedures produce very similar results for the forecast period.

Non-withholding cash components are also estimated using two alternative methods. The first method uses historical patterns of growth rates and examines the share of non-withholding liability to total liability normally provided by each component. This analysis is referred to as the ratio method. It is combined with our estimates of liability growth to derive growth rates for the non-withholding cash components. These rates are then applied to the most recent actual cash information to forecast the outyears.

Structural cash component model

The second method uses an econometric approach or "cash model" to estimate the non-withholding components of income tax collections. The models follow the approach of Harvey (1989)[4] and can be described as a structural time series model. The general form of each equation can be written as follows:

$$\text{Cash Component}_t = \mu_t + \beta_t + \delta_t * \text{Liability}_t + \text{Error}_t$$

The model is estimated using the Kalman filter approach described in summary in Proietti (2002)[5]. This model allows the trend to change in a smooth manner over time to reflect changes in the tax environment apart from changes that impact liability. Each cash component includes income tax liability or adjusted income tax liability (liability minus withholding plus refunds) as an independent variable. This has the advantage of capturing the impact of law changes on the cash components. In addition, by including liability, the models tie back to our outyear projections of liability based on the AGI components and simulation models. The model is estimated in log form covering the period from 1980-2003, using annual observations. The discrepancy and credit to estimated variables are essentially random processes in the cash table and, thus, in the model they are estimated without a liability term. For forecasting purposes, the equations are solved recursively. The voucher estimate is solved first so that this variable can be used to help forecast extensions and final payments and create the adjusted liability variable. The results for the major cash components of income tax receipts are summarized in the following tables.

ESTIMATED ELASTICITIES
(t - statistics in parenthesis)

Dependent Variable (Cash Component)	Independent Variables		
	PIT Liability	Estimated Vouchers/Adjusted Liability	Withholding
Estimated Vouchers	1.39 (6.49)	–	–
Estimated Extensions	–	1.59 (3.84)	–
Final Payments	–	0.94 (3.56)	–
Refunds	-0.71 (-2.82)	–	1.92 (4.34)

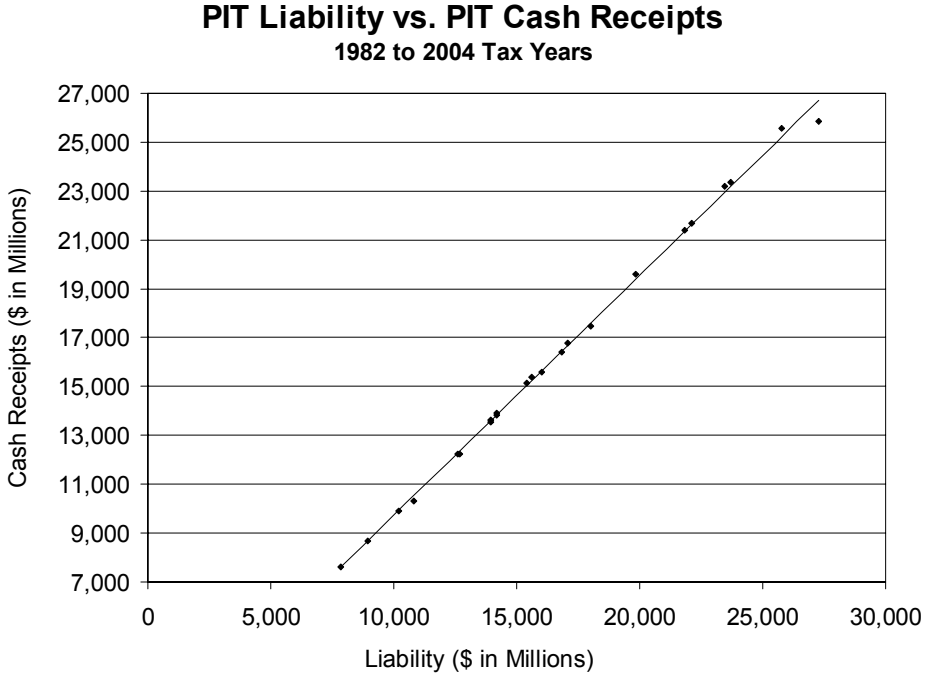
The elasticity for vouchers is larger than one, suggesting that this component is quite sensitive to changes in underlying liability. Both extensions and final payments are very significantly related to voucher payments (and adjusted liability). The extension elasticity is above one as taxpayers with increasing liability from non-withheld sources seem more likely to make large adjustments in their extension payments when their non-withholding pre-payments change. The final payment elasticity is about one, which is what we would expect — changes in estimated tax paid are matched by similar percentage changes in final payments. In the refunds model, withholding is an additional explanatory variable. The logic is that refunds and withholding tend to move together. As wages increase, a taxpayer's withholding increases and it is expected that, absent tax law changes and other behavioral changes, the value of refunds increases as well — the refund to withholding ratio should stay fairly constant over time correcting for law changes. The negative coefficient on the liability variable indicates that, holding withholding constant, an increase in tax liability will decrease refunds. The table of summary statistics reports measures of model fit and the

[4] Harvey, A.C. (1989), Forecasting, Structural Time Series and the Kalman Filter; Cambridge University Press.
[5] Proietti , Tommaso, (2002), Forecasting with Structural Time Series Models, in A Companion to Economic Forecasting, Blackwell.

Durbin-Watson test for serial correlation. The RD2 value is a measure of goodness of fit comparing predicted changes in the dependent variable to a random walk model. Overall, the models fit the data well and show no indication of significant autocorrelation.

SUMMARY STATISTICS

Dependent Variable (Cash Component)	R2	RD2	Durbin-Watson
Estimated Vouchers	.96	.70	1.4
Estimated Extensions	.93	.49	1.9
Final Payments	.90	.37	2.0
Refunds	.93	.47	1.7



While the ratio method was used to construct our estimates, the structural model is used as a check on the reasonableness of these results. Overall, both methods provide very similar estimates of cash collections by fiscal year. This reflects the fact that the sum of cash collections correlates very closely with overall liability. A significant source of estimation error arises from the difficulty in assigning the liability to the correct cash component in the appropriate fiscal year. In addition, forecast error results from the imprecision in our forecast of future tax liability.

RISKS TO LIABILITY FORECAST

The PIT liability forecast is subject to considerable risks. The national economy is still emerging from recession and therefore vulnerable to any significant shocks. Accelerating productivity has enabled firms to expand production without increasing payrolls. Consumer spending may also wane as the prior years' stimulus from tax cuts, home equity extraction, and interest rate cuts are spent. Additionally, the stock market and financial services industry may do much better or worse than envisioned.

The predominance of volatile income components (such as capital gains realizations, bonuses and stock incentive payouts) in AGI and the concentration of such income in the hands of a relatively small number of high-income taxpayers also pose enormous risks to the personal income tax forecast.

SALES AND USE TAX

BACKGROUND

Tax Base and Rate

New York State has imposed a general sales and use tax since 1965. It is currently the State's second largest tax revenue source at over $10 billion annually. The tax rate has been 4 percent since 1971 although a temporary surcharge to 4.25 percent was imposed from June 1, 2003, to May 31, 2005. Counties and cities within the State are authorized to impose an additional 3 percent sales and use tax, although many have temporary authorizations to impose at higher rates. The highest maximum combined State and local rate, including the 0.25 percent Metropolitan Commuter Transportation District tax, is 8.75 percent.

The tax applies to sales and uses within the State of tangible personal property (unless specifically exempt), certain utility service billings, restaurant meals, hotel and motel occupancy, and specified services and admission charges. Certain exemptions such as food, prescription drugs, residential energy, and college textbooks have been enacted to lessen the regressiveness of the tax. Other items, including machinery and equipment used in production and property purchased for resale, are excluded from tax to avoid tax pyramiding.

Administration

Persons selling taxable property or services are required to register with the Department of Taxation and Finance as sales tax vendors. Vendors generally are required to remit the tax that they have collected quarterly. However, vendors who record more than $300,000 of taxable sales in any of the immediately preceding four quarters must remit the tax monthly, by the twentieth of the month following the month of collection. Vendors collecting less than $3,000 yearly may elect to file annually, in March. Finally, monthly filers collecting more than $500,000 in tax annually are required to remit the tax by electronic funds transfer (EFT). This means that collections for the first 22 days of the month must be remitted electronically within three business days after the twenty second.

DATA SOURCES

The primary sources of data used in the estimation and forecasting methodology for the sales tax are as follows:

- *RS-43*, Department of Taxation and Finance Monthly Report of Receipts. This report contains gross and net receipts data.
- *Various reports, Department of Taxation and Finance.* Other reports supplementing the RS-43 provide information on data such as audit collections, prior period adjustments and daily receipts.
- *Various U.S. and New York government agencies, including the U.S. Bureau of Economic Analysis of the Commerce Department.* These agencies provide economic data used in the econometric equations.

STATUTORY CHANGES

The Division of the Budget has developed a series of State fiscal year sales and use tax receipts that has been adjusted for Tax Law, administrative and other changes to allow for year-to-year comparisons of the taxable sales base.

Major legislative and administrative events causing divergent growth in actual sales tax receipts from the constant law series include:

- large taxable base expansion in 1991-92;
- one-time spin-up due to the implementation of EFT in 1992;
- exceptional audit collections in 1994-95;
- implementation of vendor credit program in 1995-96;
- week-long exemptions for clothing and footwear biannually from 1997-98 to 1999-2000;
- exemption for promotional materials in 1997-98;
- exemption for college textbooks in 1998-99;
- expansion of the vendor's credit in 1999-2000;
- permanent exemption for clothing and footwear priced under $110 beginning March 1, 2000;
- lower tax rate on charges for separately purchased transmission and distribution of electricity and gas in 2000-01;
- rate surcharge from 4 percent to 4.25 percent effective June 1, 2003 to May 31, 2005; and
- suspension of the permanent clothing exemption between June 1, 2003, and May 31, 2005; replaced by two exemption weeks annually at a threshold of $110 per item.

FORECAST METHODOLOGY

Cash collections are reduced by credits and increased by collections from audits and other administrative processes, which, due to payment schedules, are unrelated to economic liability in the month remitted. To adjust the sales tax series to more closely correspond to the economic activity that generated the receipts, collections from the first ten days of the quarter are placed in the previous quarter, non-voluntary collections (audit collections, tax compliance) are removed from the series, the March prepayment (now repealed — applied to March 1976 through March 1990 only) is placed in April, and an adjustment is made for allocation errors made in prior periods.

Econometric Techniques

To generate a sales tax forecast, the Division of the Budget first estimates three single-equation econometric models, each representing a somewhat different approach to estimating the relationship between quarterly economic data and underlying sales tax collections. The year-over-year growth rates from each of the three equations are equally weighted to obtain a single growth rate forecast of the taxable sales base.

Consumption Equation

Two taxable consumption variables are used to explain the nominal level of collections in the regression equation.

Dependent Variable

- Adjusted Quarterly Collections. (See above.)

Consumption of Taxable Goods in New York

- Ratio of New York employment to U.S. employment multiplied by U.S. consumption of durable and non-durable goods that are taxable in New York.

Consumption of Taxable Services in New York

- Ratio of New York employment to U.S. employment multiplied by U.S. consumption of services that are taxable in New York.

Clothing Exemption Dummy

- Effective March 1, 2000, items of clothing and shoes costing less then $110 are exempt from the sales and use tax. The dummy variable is 0.33 for the first quarter of 2000, and 1.0 thereafter.

The National Income and Product Accounts data are used to distinguish between taxable and non-taxable goods and services. The ratio of New York employment to U.S. employment is included to share the national variables to produce an estimate of New York State's taxable consumption. Seasonal dummy variables are also used, since the sales tax base exhibits seasonal behavior with the school and Christmas shopping seasons being the busiest seasons.

The estimated equation takes the following form. The seasonal dummies are denoted by an "S."

CONSUMPTION EQUATION

$$\text{Adjusted Quarterly Collections}_t = \underset{(-0.14)}{-9{,}052} + \underset{(1.95)}{11.1} * \text{Consumption of Taxable Goods}_t + \underset{(6.24)}{20.602} *$$

$$\text{Consumption of Taxable Services}_t \underset{(-4.63)}{-40{,}276} * \text{S Quarter 1}_t \underset{(-1.78)}{- 17{,}408} * \text{S Quarter 2}_t$$

$$\underset{(5.21)}{+ 46{,}203} * \text{S Quarter 3}_t \underset{(-7.16)}{- 182{,}282} * (\text{Clothing Dummy}_t)$$

R-Bar Squared	0.992
Durbin-Watson Statistic	2.3
Standard Error of the Regression	$37.0 million
Number of Observations	90

PERCENT CHANGE IN EXOGENOUS VARIABLES — STATE FISCAL YEARS 1994-95 TO 2004-05

	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05 Estimated
Taxable consumption of goods in NY as shared by employment ratio	3.8	1.9	4.6	3.6	6.3	8.6	6.2	1.6	3.0	5.3	5.6
Taxable consumption of services in NY as shared by employment ratio	5.5	4.9	6.4	7.1	6.9	7.2	5.8	1.1	1.5	3.0	3.2

Dynamic Adjustment Income and Employment Equation

Equation 2 uses disposable income, employment and a term that allows for gradual dynamic adjustment in the relationship between income, employment and sales tax collections. Two exogenous variables, an error correction term (see Davidson, Hendry, et al.) and a dummy for the permanent clothing exemption are used to explain the nominal level of collections in the regression equation. All variables (excluding the dummy) are expressed in terms of the difference from the same quarter in the prior year to eliminate the need for seasonal dummies. Finally, a term representing lagged values of the dependent variable is employed to eliminate serial correlation.

Dependent Variable

- The logarithm of adjusted quarterly collections minus the logarithm of prior year (same quarter) collections.

Employment

- The logarithm of current-quarter New York employment numbers minus the logarithm of prior year (same quarter) New York employment.

Error Correction Term

- The estimated long-run equilibrium relationship between adjusted collections and employment and disposable income. The theory is that consumers make corrections in the current quarter for any over or under spending four quarters ago and move towards the long-run equilibrium result.

Lagged Dependent Variable

- The logarithm of adjusted New York sales tax collections lagged one quarter minus the logarithm of New York sales tax collections lagged five quarters.

Clothing Exemption Dummy

- Effective March 1, 2000, items of clothing and shoes costing less than $110 are exempt from the sales and use tax. The dummy variable is 0.33 for the first quarter of 2000, and 1.0 thereafter.

The form of the estimated equation is as follows with all variables (except the dummy) expressed in logs.

DYNAMIC ADJUSTMENT INCOME AND EMPLOYMENT

$$\text{Adjusted Quarterly Coll.}_{t} - \text{Adjusted Quarterly Coll}_{t-4} = \underset{(-0.17)}{-0.001} + \underset{(5.96)}{1.268} * (\text{Employment}_{t} - \text{Employment}_{t-4})$$

$$- \underset{(-5.54)}{0.38} * (\text{Adjusted Quarterly Coll.}_{t-4} - \underset{(-48.7)}{1.138} * \text{Employment}_{t-4} - \underset{(-20.65)}{0.683} * \text{Disposable Income}_{t-4}) +$$

$$\underset{(1.89)}{0.188} * (\text{Adjusted Quarterly Coll.}_{t-1} - \text{Adjusted Quarterly Coll.}_{t-5}) - \underset{(-1.6)}{0.01072} (\text{Clothing Dummy}_{t})$$

R-Bar Squared	0.6272
Durbin-Watson Statistic	2.07
Standard Error of the Regression	$38.1 million
Number of Observations	90

PERCENT CHANGE IN EXOGENOUS VARIABLES STATE FISCAL YEARS 1994-95 TO 2004-05

	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05 Estimated
NY Disposable Income	4.2	4.2	4.5	5.0	5.4	3.6	6.1	1.3	4.5	4.8	5.4
NY Employment	1.1	0.2	1.0	1.7	2.5	2.3	1.9	(1.6)	(1.2)	(0.5)	0.7

Auto Sales and Retail Trade Employment Equation

The final equation uses two measures of employment and the value of new automobiles and trucks sold to explain sales tax collections.

Dependent Variable

- The logarithm of current-quarter adjusted sales tax collections.

Nominal Value of Registered Autos and Light Trucks

- The logarithm of New York new auto and light truck registrations multiplied by the national average price of a new car. Non-seasonally adjusted.

Non-Trade Private Employment

- The logarithm of New York private non-trade employment multiplied by a measure of New York consumer price inflation. This is used as a proxy for business purchases. Trade employment is excluded to minimize multicollinearity. The consumer price index is included to create a nominal concept.

Retail Trade Employment

- Expressed in the same manner as non-trade private employment above. This variable attempts to capture all other retail activity excluded by the other exogenous variables.

Dummy Variable

- The "Value of Newly Registered Autos and Trucks" variable increases significantly after the first quarter of 1993, due to the inclusion of light trucks in the data series after that date. A dummy variable is required to account for this change. The dummy variable is zero prior to and including the first quarter of 1993, and one thereafter.

All variables except the price deflator are non-seasonally adjusted. The form of the estimated equation is as follows.

AUTO SALES AND RETAIL TRADE EMPLOYMENT

$$\text{(3) Adjusted Quarterly Coll.}_t = \underset{(17.9)}{5.14} + \underset{(5.29)}{0.085} * \text{Value of Newly Registered Autos and Trucks}_t$$

$$+ \underset{(2.20)}{0.272} * \text{Non-Trade Private Employment}_t + \underset{(6.42)}{0.757} * \text{Retail Trade Employment}_t$$

$$- \underset{(-2.52)}{0.031} * \text{Dummy}_t$$

R-Bar Squared	0.9909
Durbin-Watson Statistic	1.988
Standard Error of the Regression*	$44.4 million
Number of Observations	90

* Normalized.

PERCENT CHANGE IN EXOGENOUS VARIABLES — STATE FISCAL YEARS 1994-95 TO 2004-05

	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05 Estimated
Nominal Value of Registered Autos and Light Trucks*	15.7	0.9	12.9	3.5	13.5	13.0	(5.3)	8.2	4.2	4.3	0.9
Non-trade Private Employment	1.4	0.7	1.5	2.1	2.6	2.5	2.2	(1.9)	(1.7)	(0.6)	0.9
Retail Trade Employment	1.7	1.3	0.9	0.9	1.4	2.9	1.9	(2.2)	(0.6)	(0.1)	0.8

Elasticities

Elasticities have been calculated for the exogenous variables in equation 1. Elasticity is a measure which reports the percentage change in a variable given a 1 percent change in another variable. For example, a 1 percent change in the real price of a commodity may result in a 0.5 percent change in the consumption of that commodity. So the price elasticity of demand (consumption) would be 0.5. The elasticities reported here were calculated by taking the average of endogenous and exogenous variables over the last five years. Then the average percent change in the endogenous variable resulting from a one percent change in

exogenous variable was calculated. The stated elasticities for equation 2 are cointegrating coefficients, which represent long-run equilibrium relationships. Equation 3 is estimated in natural log terms. Therefore, the coefficients on the variables may be interpreted as elasticities.

ELASTICITY OF EXOGENOUS VARIABLES IN REGRESSION EQUATIONS

	Elasticity
Equation 1	
Taxable consumption of goods in New York	.76
Taxable consumption of services in New York	.33
Equation 2	
New York employment	1.14
New York Disposable Income	0.68
Equation 3	
Nominal value of registered autos and light trucks in New York	.09
New York non-trade private employment	.27
New York retail trade employment	.76

Adjustments

Once the Budget forecast of the relevant economic variables is used to produce an estimate of growth in base receipts, this growth rate is applied to a prior-year sales tax receipt base that has been adjusted for Tax Law and other changes to yield a raw current-year forecast. Then this is converted into a cash forecast by accounting for factors including Tax Law and administrative changes, audits, court decisions and prior-period adjustments.

It should be noted that the base growth forecasts produced by taking the average of the three estimates of the taxable sales base generated by the equations do not necessarily match the concept of growth in the continuing sales tax base in periods for which actual sales tax collections data are available. The models take no account of the value of tax cuts or other administrative changes that impact sales tax collections. Adjusting actual data, where available, for such impacts yields the continuing sales tax base concept that makes year-to-year comparisons more accurate.

Cash Receipts

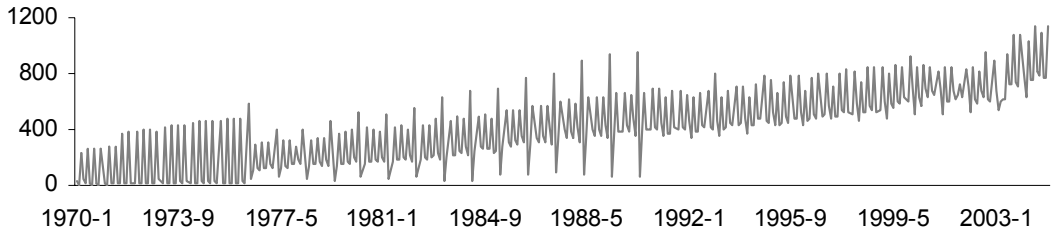
As is clear in the cash component graphs, the trend in sales tax collections has been fairly stable reflecting consistent growth in the underlying base. The recent increase in trend is due to the temporary surcharge imposed in 2003. The abrupt change in the seasonal pattern in the early 1990s reflects elimination of the March sales tax pre-payment of April receipts. The large irregular values in recent years reflect the impact of September 11th and other unpredictable shocks to the economy.

PERCENTAGE DISTRIBUTION OF CASH RECEIPTS

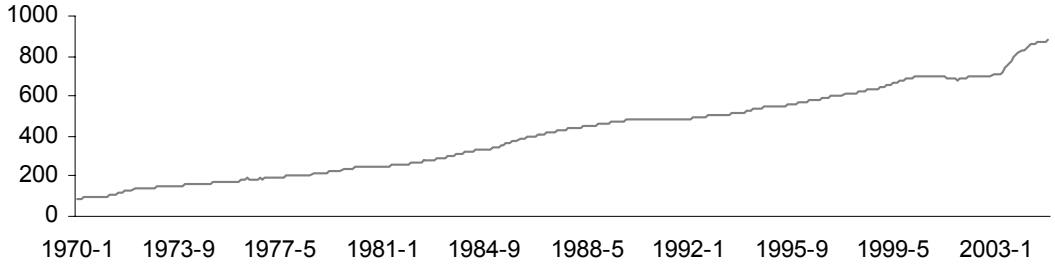
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	24.4	25.3	25.5	24.8
1997-98	24.5	25.8	25.3	24.4
1998-99	24.8	25.6	25.0	24.6
1999-2000	24.3	24.7	26.1	25.0
2000-01	24.4	25.7	25.4	24.5
2001-02	24.7	23.5	26.7	25.1
2002-03	23.9	26.6	24.8	24.7
2003-04	22.7	26.3	26.4	24.5
2004-05 (est.)	25.6	25.3	25.3	23.8

Collection Components
(millions of dollars)

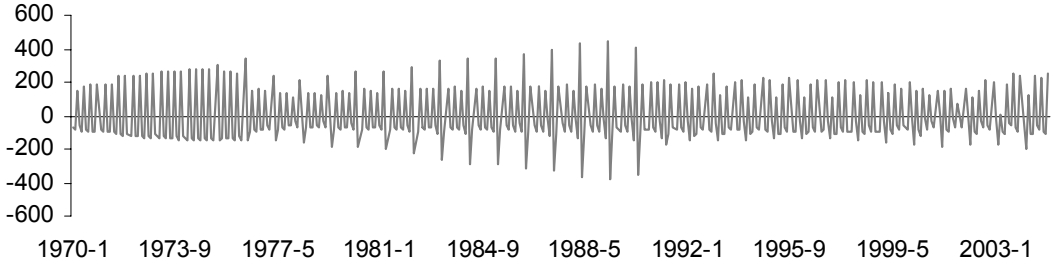
Sales and Use Tax
Collections



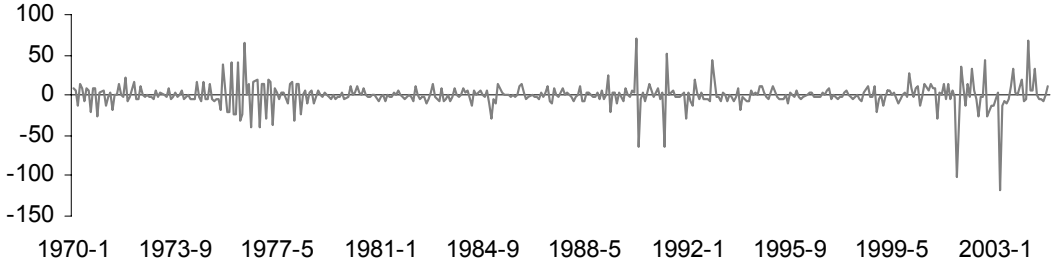
Trend



Seasonal



Irregular



Risks to the Forecast

Errors in the forecasts of the exogenous variables provide a degree of risk to the sales and use tax forecast. Forecast error in prior years can largely be attributed to the forecasts of the exogenous variables. Variation in the estimate may also occur as a result of administrative changes or unanticipated legislative action.

CIGARETTE AND TOBACCO TAXES

BACKGROUND

Tax Base and Rate

Legislation passed with the Health Care Reform Act of 2000 increased the tax on the sale or use of cigarettes within the State by 55 cents to $1.11 per pack on March 1, 2000. Legislation enacted in 2002 raised the tax rate to $1.50 per pack beginning on April 3, 2002. The tax on tobacco products increased from 20 percent to 37 percent of wholesale price on July 2, 2002. Prior to June 1, 1993, the cigarette tax was 39 cents per pack and the tobacco products tax was 15 percent of wholesale price.

The Federal government imposes a cigarette excise tax on manufacturers and first importers of cigarettes. The Federal tax rate, currently 39 cents per pack, was increased from 24 to 34 cents per pack on January 1, 2000, and increased again to 39 cents per pack on January 1, 2002. New York City also levies a separate cigarette excise tax, which increased from 8 cents to $1.50 per pack on July 2, 2002. The Federal government also imposes an excise tax on manufacturers and importers of tobacco products at various rates, depending on the type of product.

Sales on qualified Native American reservations to Native Americans are exempt from tax along with sales to State and national governmental entities, the Armed Forces, the United Nations and diplomatic personnel.

Administration

State-registered stamping agents, who are mostly wholesalers, purchase tax stamps from the State and affix the stamps to cigarette packages to be sold by New York State registered retailers. Purchasers of non-State stamped cigarettes, such as cigarettes sold out-of-State or on Native American reservations, must remit the cigarette excise tax directly to the Department of Taxation and Finance. Purchases of two cartons or less incur no use tax liability; however, purchases exceeding two cartons incur use tax liability on all cartons purchased.

DATA SOURCES

The primary sources of data used in the estimation and forecasting of the cigarette and tobacco tax are as follows:

- *RS-43, Department of Taxation and Finance Monthly Report of Receipts.* This report contains gross and net receipts data for each component of the cigarette and tobacco products tax.
- *New York State Department of Taxation and Finance Monthly and Fiscal Year Comparison of Cigarette Tax Collections.* This report includes the number of stamps sold, assessments and agents' commission.
- *The Tax Burden on Tobacco.* This annual data publication, previously published by the now-defunct Tobacco Institute, is produced by the economic consulting firm Orzechowski and Walker. It is the source of the consumption and cigarette price data used in the cigarette consumption forecasting equation.
- *Various U.S. and New York government agencies* provide the Consumer Price Index and population data used in the cigarette consumption equation.
- *United States Department of Agriculture Economic Research Service, Tobacco Situation and Outlook Report.* Published semi-annually. Used for national cigarette and tobacco products information.

STATUTORY CHANGES

Tax rate changes have had the most significant impact on cigarette tax revenues. As shown in the accompanying graph, revenues spiked in the months following tax rate increases in 1972, 1983, 1989, 1990, 1993, 2000, and 2002 before slowing in the subsequent months. Total tax-paid cigarette consumption in New York has declined significantly since the mid-1980s. This is largely due to steady price increases, awareness of the adverse health consequences of smoking, smoking restrictions, anti-smoking programs, tax-free purchases on Indian reservations, tax rates in surrounding states, and bootlegging. However, the consumption decline has also been affected by events including State, New York City and Federal cigarette tax increases, substantial enforcement efforts and the Tobacco Settlement.

Major recent events affecting overall taxable consumption include:

- Increase in the New York City cigarette excise tax from 8 cents per pack to $1.50 per pack effective July 2, 2002.
- Increase in the State cigarette tax from $1.11 per pack to $1.50 per pack, effective April 3, 2002.
- Increase in the State cigarette tax from 56 cents per pack to $1.11 per pack, effective March 1, 2000.
- Additional 18 cents per pack price increase and full-year impact of the 45 cents per pack price increase in 1999-2000, due primarily to the cost of the Tobacco Settlement on the industry.
- Ten-cent Federal excise tax increase, resulting in a 13 cent wholesale price increase in the last quarter of State fiscal year 1999-2000.
- Doubling of New Jersey's cigarette excise tax and part-year impact of a 45 cent price increase resulting from the Tobacco Settlement in 1998-99.
- State enforcement program enacted in 1997-98.

Since the latter half of 1998-99, receipts have been significantly affected by cigarette price increases imposed by the manufacturers following the finalization of the Tobacco Master Settlement Agreement in November 1998. Since the Tobacco Settlement was signed in November 1998, the producer price index (which does not include taxes) for cigarettes has increased 69 percent as tobacco companies have attempted to recoup both normal increases in operating costs and the cost of the settlement through price increases.

FORECAST METHODOLOGY

Econometric Model

TAXABLE CIGARETTE CONSUMPTION

$$\text{Per Capita Consumption}_t = \underset{(20.8)}{7.26} - \underset{(-6.6)}{0.021} * \text{Time Trend}_t - \underset{(-8.18)}{.59} * \text{Log(Real Price of Cigarettes)} + u_t$$

$$u_t = \underset{(-7.41)}{-.819} * u_{t-1}$$

R-Bar Squared	0.9904
Durbin-Watson Statistic	1.54
Standard Error of the Regression*	3.5 packs
Number of Observations	32

* Normalized.

The Division of the Budget has developed an econometric model to assist in forecasting State taxable cigarette consumption. A time trend and the real price of cigarettes are the exogenous variables used to explain consumption per capita of taxed cigarettes in New York. The price variable is the average annual price, including tax, of cigarettes in New York. This

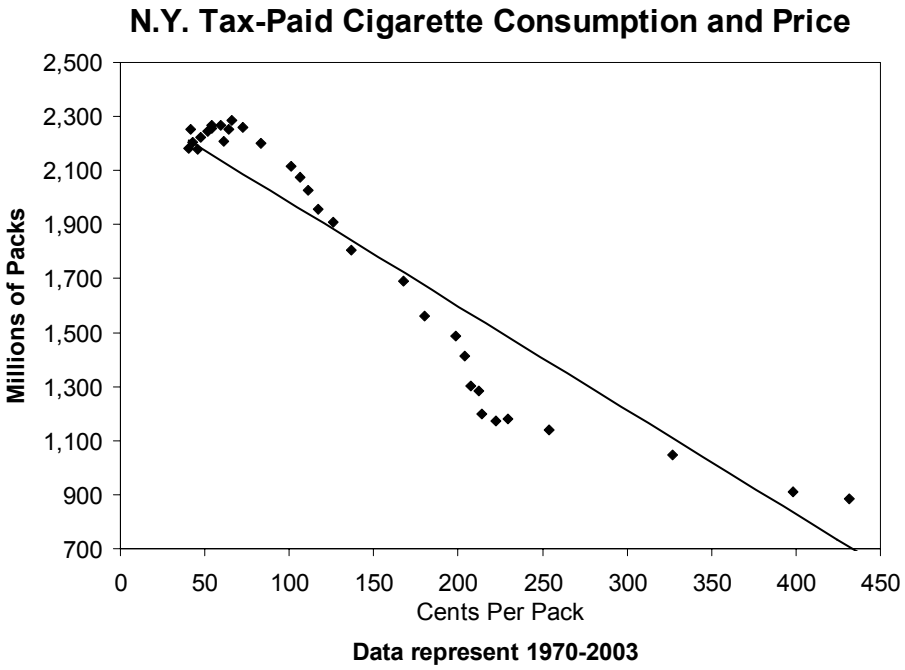
is indexed to 1982-84 and divided by the Consumer Price Index to measure the price of cigarettes relative to the overall prevailing price level. All variables except the time trend are in logarithmic form. An exogenous variable measuring the price of cigarettes in New York relative to surrounding states was attempted, but the results were less satisfactory. Specifically, the added variable was insignificant when used with the stand-alone price, and the fit was inferior when used alone. As an alternative to autocorrelation correction, a lagged dependent variable was added, but the results were inferior to the estimation method reported above.

The estimated price elasticity of the per capita consumption of cigarettes is -0.6 percent. This estimate is slightly out of the range of -0.3 percent to -0.5 percent typically noted in the economics literature[1]. The trend decline in cigarette consumption, holding prices constant, is estimated at -2.1 percent per year. In other words, holding the real price of cigarettes constant, consumption per capita has declined on average 2.1 percent per year. The Real Price of Cigarettes is expressed in logarithmic terms.

To produce an updated cigarette tax forecast, the equation's results are supplemented with the estimated impact of discrete events on cigarette tax revenues, such as large price increases by manufacturers, Federal and State cigarette excise tax increases and enforcement efforts. Prices increased 28.9 percent in 2002-03 and 1.3 percent in 2003-04.

To illustrate, consider tax receipts for State fiscal year 2000-01. In addition to the expectation of continuing declines in consumption from manufacturers' price increases and the growing aversion to smoking for health reasons, receipts in 2000-01 were affected by the near doubling of the State excise tax on March 1, 2000. Such a large effective price increase has had a negative impact on cigarette consumption beyond the price effect noted above. As the price of cigarettes was high in New York relative to each of the surrounding states, there was a significant incentive for bootlegging cigarettes into the State. Legal avoidance of the tax also undoubtedly proliferated in the form of out-of-State purchases and tax-free sales on Indian reservations. Finally, legislation has been enacted to prohibit all purchases of cigarettes via mail-order or via the Internet. This law became effective March 1, 2003, but it does not apply to the U.S. Postal Service. Receipts in 2000-01 were also affected by the ten cent Federal excise tax increase that began January 1, 2000. However, this had a less severe impact on New York cigarette tax receipts as this tax increase was nationwide, and therefore did not exacerbate price differentials between New York and surrounding states or Native American reservations that may be exploited by illegal activities or legal avoidance.

[1] See, for example, W. Evans, J. Ringel, and D. Stech, *Tobacco Taxes and Public Policy to Discourage Smoking*, Tax Policy & the Economy, 1999, Issue 13.



CIGARETTE TAX RATES AND TAXABLE CONSUMPTION
CHANGES IN NEW YORK AND BORDERING STATES
YEAR ENDING JUNE 30
(average cents per pack)

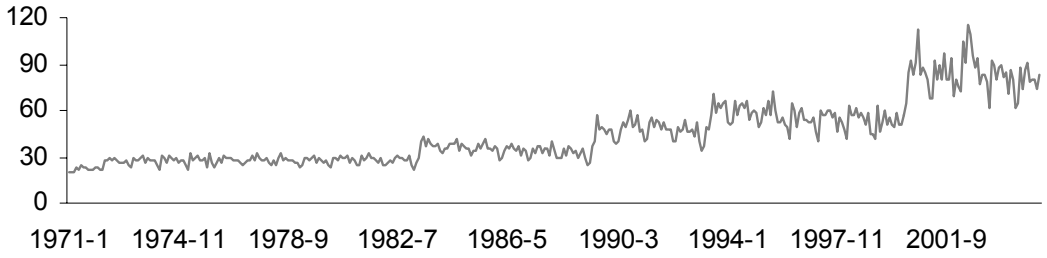
	2003	2002	2001	2000	1999
Connecticut	111	50	50	50	50
(percent change)	(10.1)	(2.8)	(0.2)	(2.3)	(2.9)
Massachusetts	151	76	76	76	76
(percent change)	(14.4)	1.8	(3.7)	(2.2)	(4.6)
New Jersey	150	80	80	80	80
(percent change)	(17.6)	1.9	(1.2)	(4.0)	(11.8)
New York	151	150	111	111	56
(percent change)	(24.2)	(2.9)	(13.2)	(8.1)	(3.3)
Pennsylvania	100	31	31	31	31
(percent change)	(14.0)	0.2	(0.7)	(2.1)	(0.8)
Vermont	93	44	44	44	44
(percent change)	(16.3)	(0.7)	4.7	(1.1	(0.7)

Cash Collections

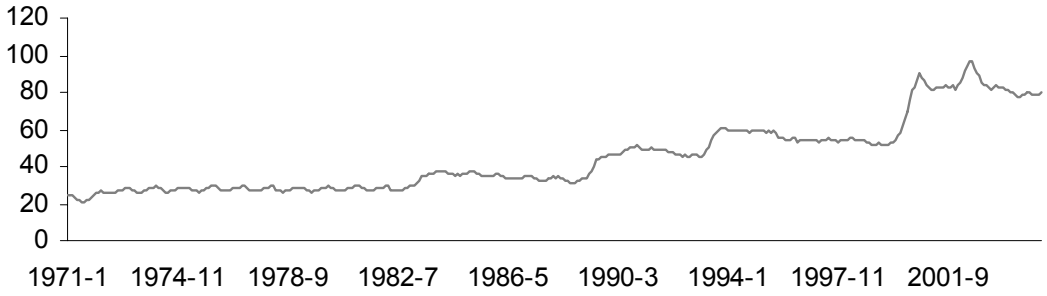
The accompanying component collection graphs clearly illustrate the impact of recent law changes on receipt results. The overall trend in collections is negative, which is difficult to see. This is because a series of tax increases beginning in the early 1980s have periodically driven receipts in upward steps. After the change the negative trend re-emerges.

Collection Components
(millions of dollars)

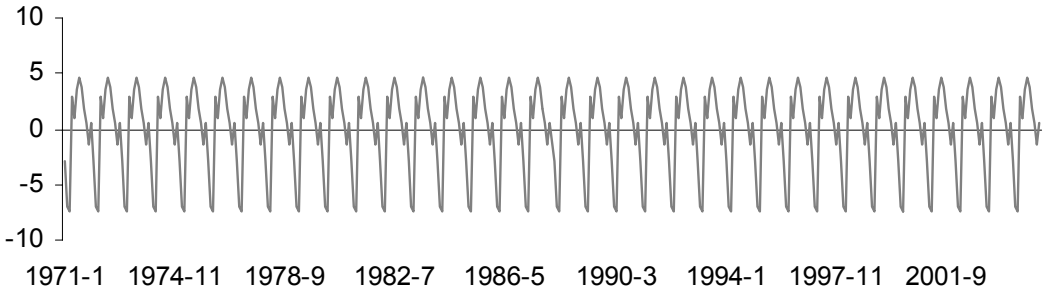
Cigarette Taxes
Collections



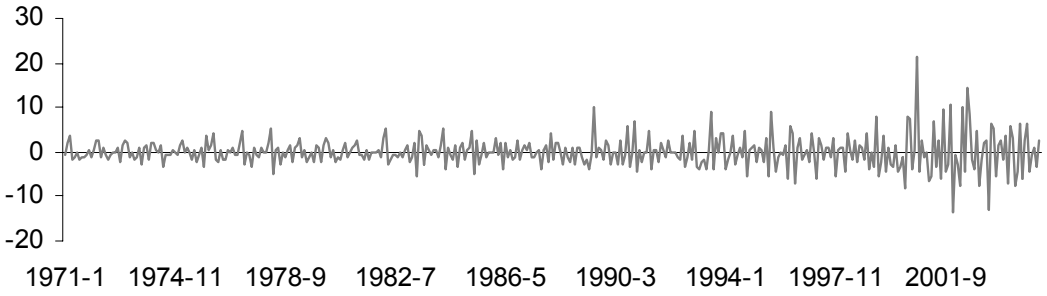
Trend



Seasonal

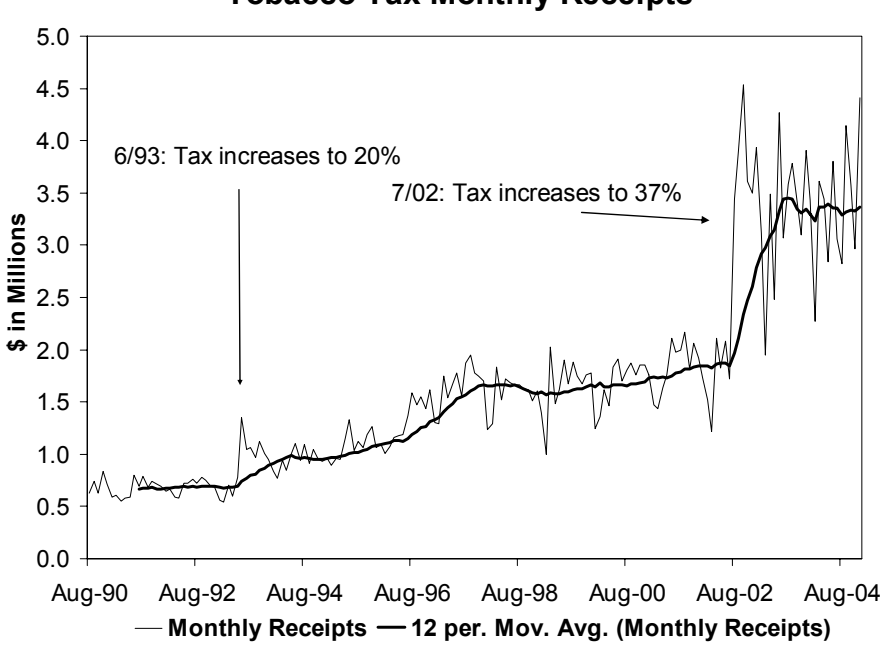


Irregular



Tobacco Products Tax Forecast Development

Tobacco products tax receipts are a small component of the cigarette and tobacco tax. In 2003-04, tobacco tax receipts of $40.4 million accounted for only 4 percent of total cigarette and tobacco tax collections. This tax is imposed on products such as cigars, pipe tobacco and chewing tobacco. The Division of the Budget uses trend analysis as well as data published by the United States Department of Agriculture[2] to construct a tobacco products tax forecast. The following graph shows monthly and 12-month moving average tobacco tax collections from August 1989 to December 2004.



PERCENTAGE DISTRIBUTION OF CASH RECEIPTS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	26.7	26.8	24.5	22.0
1997-98	26.7	26.9	24.5	21.9
1998-99	27.1	27.2	25.3	20.4
1999-2000	25.0	25.9	24.7	24.5
2000-01	24.2	28.7	25.6	21.5
2001-02	26.3	26.1	24.6	23.0
2002-03	28.4	27.2	23.7	20.7
2003-04	26.8	26.6	25.0	21.6
2004-05 (est.)	26.5	27.0	25.8	20.7

Risks to the Forecast

Several factors impart a substantial amount of uncertainty to the cigarette tax forecast. First, according to Securities and Exchange Commission (SEC) filings by Philip Morris, Inc., as of August 2002 there were hundreds of pending tobacco-related legal claims, including individual personal injury lawsuits, class action lawsuits and health care cost recovery lawsuits. In July 2000, a Florida jury in the Engle case awarded $145 billion in punitive

[2] United States Department of Agriculture Economic Research Service, *Tobacco Situation and Outlook Report*, Washington D.C. (This publication is available on the Internet at http://www.econ.ag.gov/briefing/tobacco/index.htm)

damages. Furthermore, action is being pursued by the United States Justice Department against cigarette manufacturers in an attempt to recover billions of dollars of health care costs. If ultimately successful, such litigation would likely cause another round of large wholesale price increases by the cigarette manufacturers. Such unanticipated price increases would decrease State and national taxable consumption.

Additional uncertainty originates from the effectiveness of new anti-smoking campaigns. As part of the Tobacco Master Settlement, participating cigarette manufacturers agreed to place limitations on advertising, sporting event sponsorship and "branded" merchandise, as well as contribute $1.5 billion over ten years to support anti-smoking programs. Also, the Health Care Reform Act of 2000 designates moneys to fund anti-smoking campaigns in New York State. Furthermore, legislation signed by the Governor in August 2000 required all cigarettes sold in New York to meet certain fire safety standards effective July 2004. If these requirements result in price increases or if smokers find the new product inferior, taxable consumption in New York could decline further.

MOTOR FUEL TAX

BACKGROUND

Tax Base and Rate

An 8 cent-per-gallon tax is imposed on the sale of gasoline and diesel motor fuel in the State. Prior to January 1, 1996, the diesel motor fuel tax was 10 cents per gallon. Non-highway uses of motor fuel, such as in construction machinery, agriculture, commercial marine activity, or vehicles operated on rails or tracks, are granted refunds of the tax. Thus, the tax is levied primarily on fuel used in motor vehicles operating on the public highways of the State or fuel used in recreational boats on the State's waterways.

Beginning in State fiscal year 2001-02, all motor fuel tax revenue was earmarked for deposit in the Dedicated Highway and Bridge Trust Fund, the Dedicated Mass Transportation Trust Fund, and the Emergency Highway Funds. In 2003-04, all motor fuel tax receipts are earmarked to the Dedicated Highway and Bridge Trust Fund and the Dedicated Mass Transportation Trust Fund.

Administration

The gasoline component of the motor fuel tax is remitted upon first import for sale, use, storage or distribution in New York State. The diesel motor fuel tax is collected on the first non-exempt sale in the State.

The tax is generally remitted monthly, although vendors whose average monthly tax is less than $200 may remit quarterly. Vendors with annual tax liability of more than $5 million for both the motor fuel tax and the petroleum business tax during the preceding year must remit the tax via electronic funds transfer (EFT) or by certified check by the third business day following the 22nd of each month.

DATA SOURCES

The primary sources of data used in the estimation and forecasting for the motor fuel tax are as follows:

- *RS-43, Department of Taxation and Finance Monthly Report of Receipts.* This report contains gross and net receipts data for gasoline and diesel motor fuel tax receipts.
- *United States Energy Information Administration.* Various publications, including the Short Term Energy Outlook, Petroleum Marketing Monthly and Annual Energy and Motor Gasoline Watch, contain useful information. Available on the Internet at http://www.eia.doe.gov.
- *Various U.S. and New York government agencies, including the U.S. Bureau of Economic Analysis of the Commerce Department.* These agencies provide economic data used to develop gasoline and diesel consumption forecasts.

STATUTORY CHANGES

The only significant law change in recent years has been the reduction in the diesel motor fuel tax from 10 cents per gallon to 8 cents per gallon, effective January 1, 1996.

FORECAST METHODOLOGY

Econometric Techniques

Generating the motor fuel revenue forecast is a two-step process. First, a forecast of demand (gallons) is produced at an annual (fiscal year) frequency and the appropriate tax rate is applied. Second, various adjustments are made to arrive at the forecast of cash collections, since a direct relationship does not exist between demand and cash collections. Both of these steps are discussed below.

Gallonage

Both of the following equations are explicitly shown in the petroleum business tax (PBT) methodology.

Gasoline

- The Energy Information Administration (EIA) has reported estimated relationships between changes in real gross domestic product (GDP), national fuel prices and national gasoline demand. They estimate that a 1 percent increase in GDP will raise gasoline demand by 0.1 percent, and a 10 percent increase in fuel prices will decrease demand by 0.3 percent. To derive a State level forecast, real New York disposable personal income growth is substituted for GDP. The following table contains percentage changes of real New York disposable personal income and gasoline price.

PERCENT CHANGE IN EXOGENOUS VARIABLES

	Real NY Disposable Income	Gasoline Price
1996-97	1.9	7.8
1997-98	2.4	(5.0)
1998-99	4.2	(12.4)
1999-2000	0.9	21.7
2000-01	4.1	18.6
2001-02	(0.1)	(9.3)
2002-03	3.0	5.7
2003-04	2.8	8.8
2004-05 (est.)	2.4	21.0

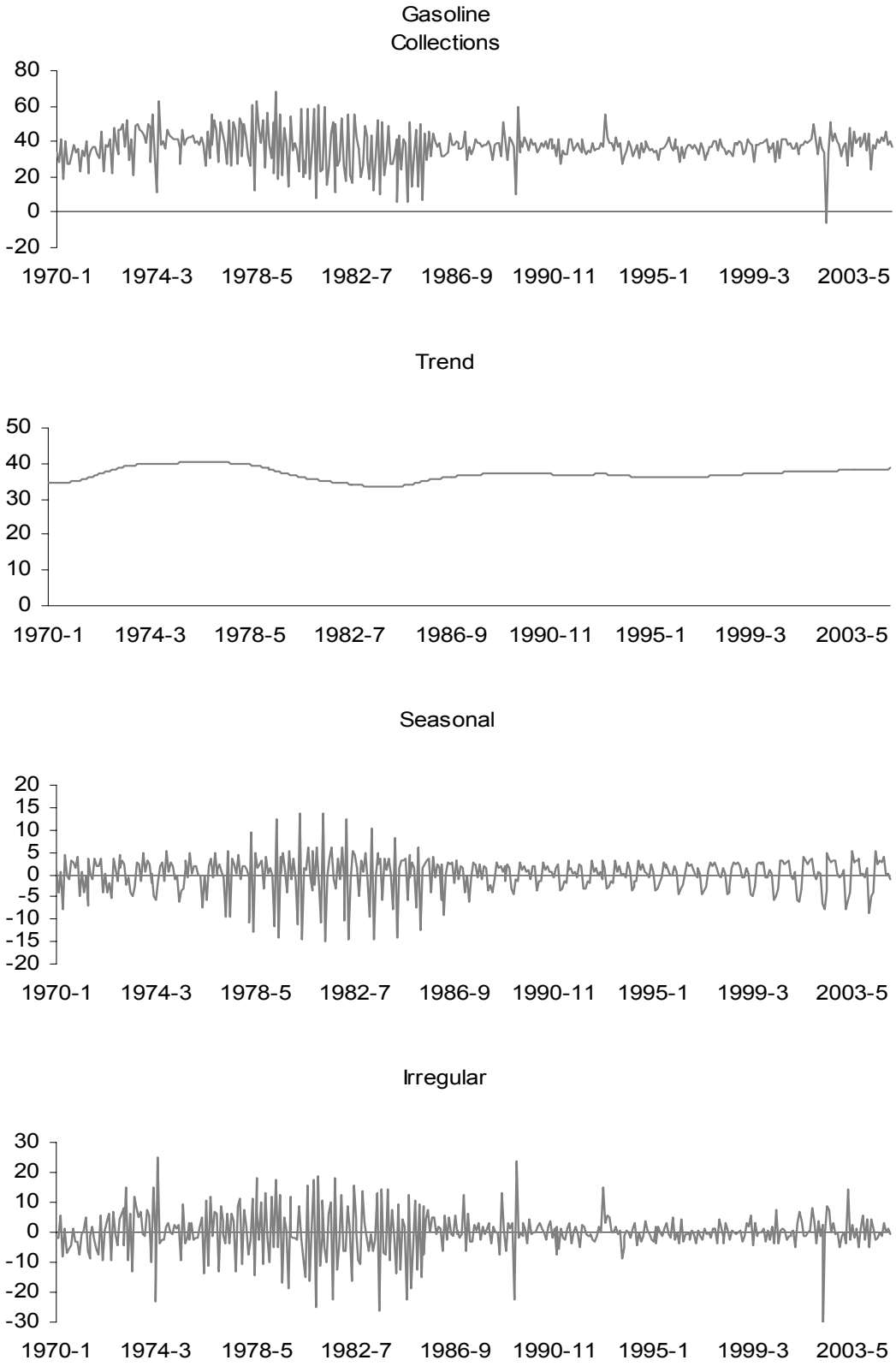
Diesel

- Consumption of diesel fuel is forecasted with a simple econometric model relating consumption to a broad measure of New York economic activity (real New York disposable personal income). The model was most recently estimated with 119 observations of quarterly data (1975:1 to 2004:3). A dummy variable is used to isolate the impact of changes in tax remittance in State fiscal year 1988-89. A quarterly dummy variable is also used to reflect quarterly consumption patterns.

Adjustments

After generating a demand forecast and applying the appropriate tax rates, adjustments are made for refunds, audits, credits, pay schedule lags, accounting delays, historical and year-to-date collection patterns, tax law changes, tax evasion and Federal and State enforcement measures.

Collection Components
(millions of dollars)



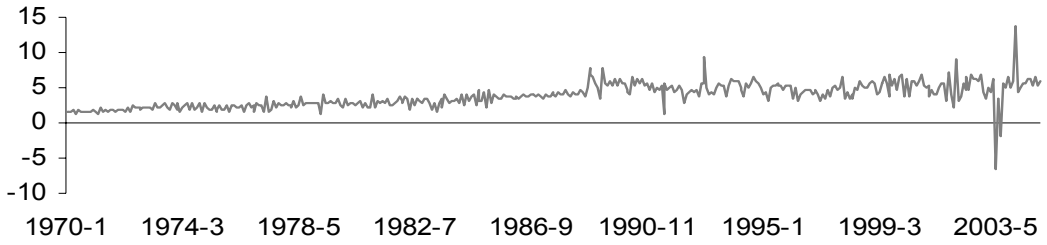
Cash Receipts

The Gasoline Motor Fuel Tax collection components show that gasoline motor fuel tax receipts display wide variation in monthly cash receipts, but the long-term trend has remained fairly stable since the mid-1980's, generally falling in the range of $35 million to $40 million per month. There is only a small seasonal pattern relative to total collections. The irregular component indicates there has been relatively large "outlier" months but only a few in recent years reflecting data adjustments between taxes.

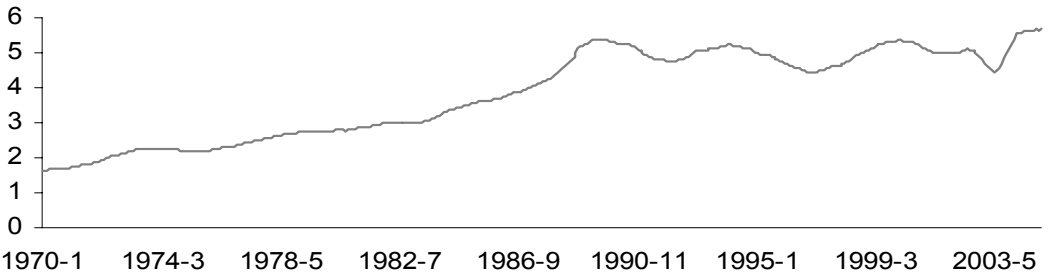
The Diesel Motor Fuel Tax collection component graphs show that diesel receipts have also remained fairly stable, usually falling between $4 million and $6 million per month since 1988. However, as expected, the trend for diesel collections appears more sensitive to economic cycles. Large jumps in irregular series in recent years reflect reporting anomalies associated with classifying receipts under the motor fuel or petroleum business tax.

Collection Components
(millions of dollars)

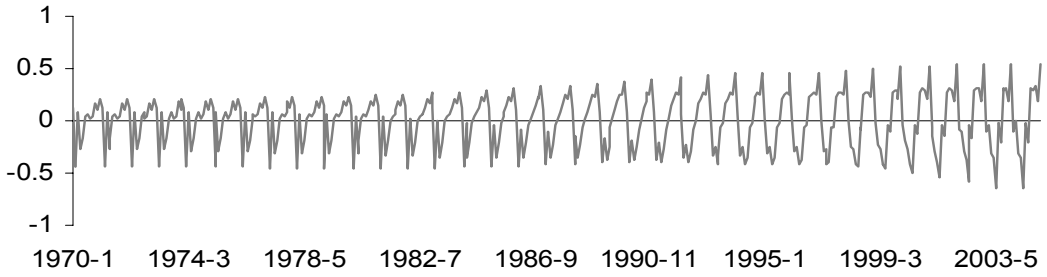
Diesel
Collections



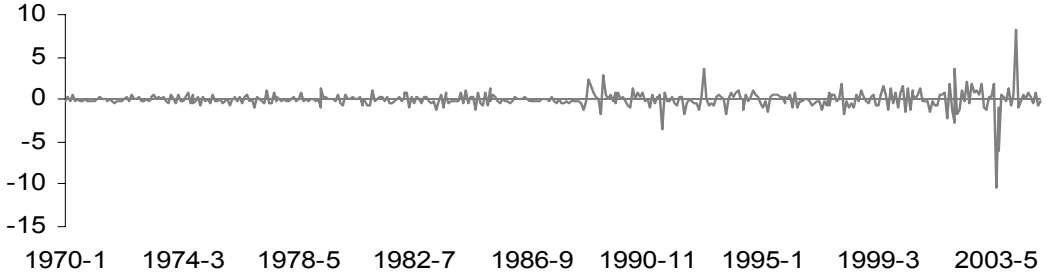
Trend



Seasonal



Irregular



PERCENTAGE DISTRIBUTION OF CASH RECEIPTS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	24.6	26.7	25.3	23.4
1997-98	24.2	26.4	26.3	23.1
1998-99	24.4	26.7	25.1	23.7
1999-2000	25.7	26.3	24.0	24.0
2000-01	25.2	26.6	24.9	23.3
2001-02	27.2	30.0	27.0	15.8
2002-03	27.5	26.6	22.8	23.1
2003-04	23.1	25.3	26.2	25.4
2004-05 (est.)	24.9	27.4	25.0	22.7

Risks to the Forecast

Due to the difficulty in predicting fuel prices, gasoline inventories, tax evasion and weather conditions, the revenue estimate has certain inherent risks. Global economic and political conditions as well as market forces can affect fuel prices. For example, the West Texas intermediate crude oil price increased from $11 per barrel in December 1998 to over $34 per barrel by June 2000. The war in Iraq adds a degree of uncertainty to the future price of oil.

MOTOR VEHICLE FEES

BACKGROUND

Motor vehicle fees are imposed by the Vehicle and Traffic Law. An early version, enacted in 1929, was itself derived from other laws pertaining to traffic, such as the General Highway Traffic Law. The latest codification, which with subsequent amendments remains current, was enacted in 1959 and became effective in October 1960.

Tax Base and Rate

Motor vehicle fees are derived from a variety of sources, but consist mainly of vehicle registration and driver licensing fees.

Most vehicle registration fees are based on vehicle weight; buses are charged according to seating capacity and semi-trailers are charged a flat fee. Registration for vehicles weighing less than 18,000 pounds is biennial.

Drivers' licenses are originally issued for five years and renewals for eight-year periods. Basic renewal rates, per annum, are $5 for an operator's license, $10 for a chauffeurs' license, and $15 for a commercial driver's license.

Numerous other fees, related to the processes of registration or licensing, are another component of motor vehicle fees. Such fees pertain to inspection and emission stickers, repair shop certificates, insurance civil penalties, etc.

Administration

Registration and licensing take place at the central and district offices of the Department of Motor Vehicles and by mail and at county clerks' offices in most counties.

DATA SOURCES

The primary source of data is Preliminary Motor Vehicle Transactions, Department of Motor Vehicles. This report contains monthly data on item volume and dollar receipts. The table below illustrates quarterly cash flow for Motor Vehicle Fees on an all funds basis.

STATUTORY CHANGES

The main statutory or administrative changes that have a bearing on actual cash receipts include:

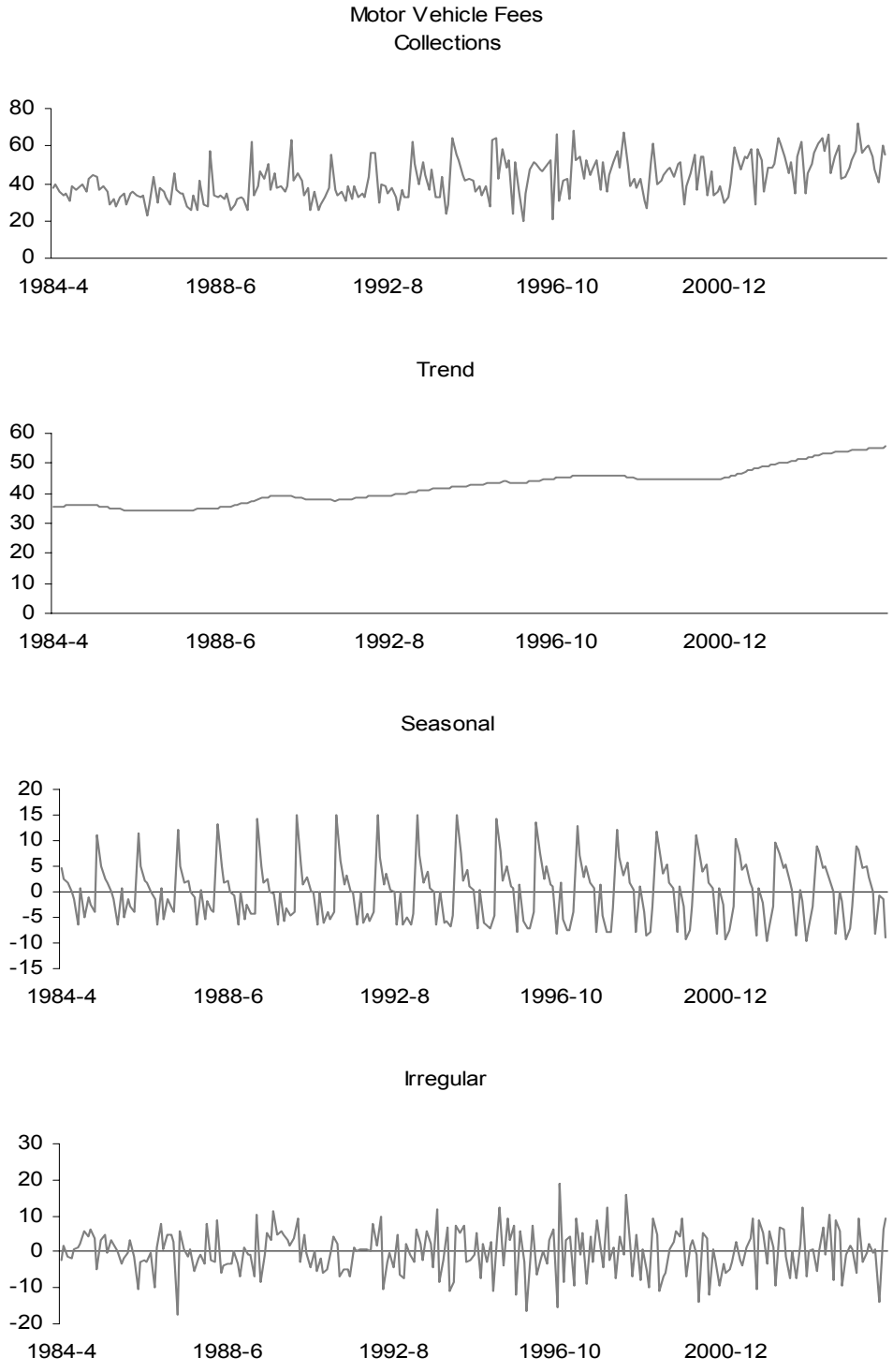
- Extension of license renewal period from four to five years (1996-97);
- Change in method and rate for paying county clerks (1996-97);
- Extension of validity of original licenses from four to five years (1997-98);
- Increase in the photo image fee (1997-98);
- Reduction of 25 percent in graduated rates on passenger cars (1998-99);
- Extension of license renewal period from five to eight years (2000-01); and
- Re-issuance of license plates (2000-01 through 2002-03).

FORECAST METHODOLOGY

Because the preponderant part of motor vehicle fees comes from registrations (70 percent) and licenses (20 percent), most attention is paid to the following variables:

- The number of passenger and commercial vehicles and the average weight of each type;
- The number of new and renewal licenses; and
- The cyclical pattern of registration, licensing, and renewal.

Collection Components
(millions of dollars)



Cash Receipts

As is clear from the components graphs, the overall trend in motor vehicle fee receipts has been fairly constant overtime. There is a pronounced seasonal pattern with peaks during the summer months. The irregular component is relatively large compared to trend.

The cash forecast is developed by applying to the existing base projected changes based in registrations and licenses. Furthermore, the statutory or administrative changes pertaining to any variable (see Statutory Changes) are taken into account. The result is a cash forecast for the period in question.

PERCENTAGE DISTRIBUTION OF CASH RECEIPTS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	26.3	22.3	25.3	26.1
1997-98	26.3	25.4	25.0	23.3
1998-99	31.2	23.5	20.1	25.2
1999-2000	23.6	26.0	24.4	26.0
2000-01	29.3	23.1	21.1	26.5
2001-02	26.1	23.9	25.0	25.0
2002-03	29.1	21.5	24.6	24.8
2003-04	27.9	25.5	22.4	24.2
2004-05 (est.)	29.3	25.4	24.4	20.9

ALCOHOLIC BEVERAGE TAXES AND ALCOHOLIC BEVERAGE CONTROL LICENSE FEES

BACKGROUND

Tax Base and Rate

Since 1933, after the repeal of National Prohibition, New York State has imposed excise taxes at various rates on liquor, beer, wine and specialty beverages. Licensed distributors and non-commercial importers of such beverages remit these taxes in the month following the month of delivery.

New York State distillers, brewers, wholesalers, retailers, and others who sell alcoholic beverages are required by law to be licensed by the State Liquor Authority.

Legislation enacted in 1990 increased the tax rate on all liquor with more than 2 percent alcohol by 21 percent. On July 1, 1994, the tax rates on natural sparkling and artificially carbonated sparkling wines were reduced from 25 cents per liter and 15 cents per liter, respectively, to 5 cents per liter, to equal the State excise tax rate on still wine. On January 1, 1996, the State excise tax rate on beer with at least 0.5 percent alcohol was reduced from 21 cents to 16 cents per gallon. On January 1, 1999, the State beer excise tax was further reduced to 13.5 cents per gallon. On April 1, 2001, the beer tax was cut an additional 1 cent per gallon. Effective September 1, 2003, the beer tax was further reduced to 11 cents per gallon.

State tax rates for 2004-05 are as follows (dollars per unit of measure):

Liquor over 24 percent alcohol	1.70 per liter
All other liquor with more than 2 percent alcohol	0.67 per liter
Liquor with not more than 2 percent alcohol	0.01 per liter
Natural sparkling wine	0.05 per liter
Artificially carbonated sparkling wine	0.05 per liter
Still wine	0.05 per liter
Beer with 0.5 percent or more alcohol	0.11 per gallon
Cider with more than 3.2 percent alcohol	0.01 per liter

Alcoholic beverage control license (ABCL) fees vary, depending upon the type and location of the establishment or premises operated as well as the class of beverage for which the license is issued.

DATA SOURCES

The primary sources of data used in the estimation and forecasting methodology for the alcoholic beverage tax are as follows:

- *RS-43, Department of Taxation and Finance Monthly Report of Receipts.* This report contains gross and net receipts data for alcoholic beverage taxes.
- *Alcoholic Beverage Tax Monthly Statistical Report, Department of Taxation and Finance.* This report contains alcoholic beverage monthly consumption data.
- *Alcoholic Beverage Control License Fees Monthly Report, Office of the State Comptroller.* This report contains gross and net receipts data for alcoholic beverage control license fee monthly collections.

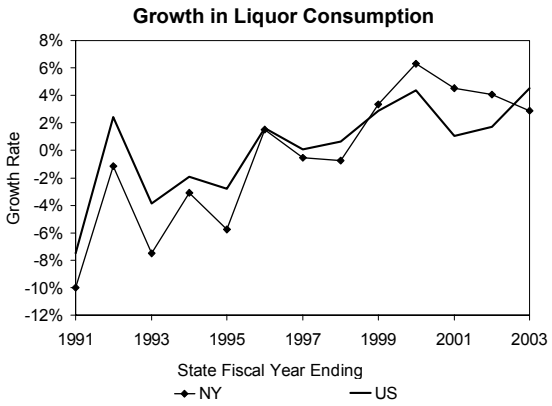
STATUTORY CHANGES

Historically, tax evasion has been a serious problem. Legislation enacted in 1993 added registration, invoice and manifest requirements, as well as seizure and forfeiture enforcement provisions. Additionally, the legislation provided higher fines based on the volumes of liquor bootlegged. These alcoholic beverage enforcement provisions have provided some protection to the State's liquor industry and tax base, moderating year-over-year declines in State alcoholic beverage tax receipts.

Legislation enacted in 1996, which required remittance of Alcohol Beverage Tax (ABT) liability through electronic funds transfer (EFT) by the State's largest vendors was repealed on April 8, 1997. The initial EFT provisions accelerated approximately $6.3 million into State fiscal year 1996-97, and the repeal of the provisions produced a similar one-time reduction in revenue in State fiscal year 1997-98.

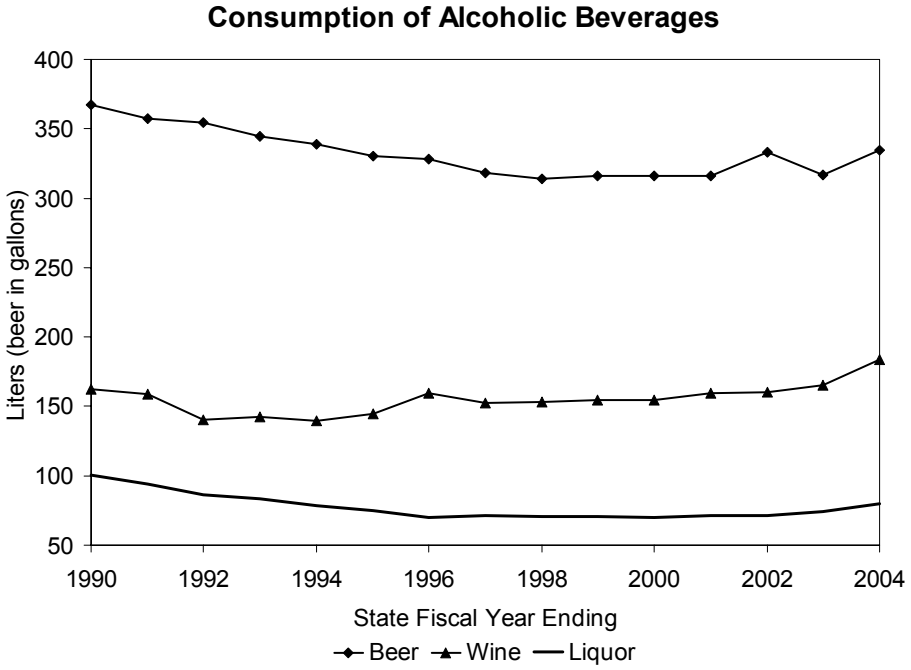
FORECAST METHODOLOGY

New York specific liquor consumption generally follows national trends. The chart below compares U.S. (using data from the Distilled Spirits Council of the U.S., Inc.) and New York consumption data. Consumption changes have a major effect on changes in excise tax receipts.



The forecast for this tax source is primarily based on an analysis of historical alcoholic beverage consumption trends. Data from the last several years indicate the secular decline in overall consumption has reversed. This can be attributed in part to tax reductions and enforcement efforts. Three time series models have been developed for the per capita consumption of beer, liquor and wine. These time series methods put more weight on recent observations reflecting shifts in recent trends. The actual annual per capita consumption data covers the period from fiscal year 1970-71 through fiscal year 2003-04. The level smoothing weight and the trend smoothing weight in the model are selected to maximize the Akaike Information Criterion — a measure of error variation corrected for the number of parameters estimated. A summary of the statistical results of these models are reported as follows:

Statistics	Beer: Damped Trend Exponential Smoothing	Liquor: Damped Trend Exponential Smoothing	Wine: Damped Trend Exponential Smoothing
Level Smoothing Weight	0.6752	0.6614	0.8830
Trend Smoothing Weight	0.6745	0.6441	0.9990
Adjusted R-Square	0.9480	0.9930	0.8910



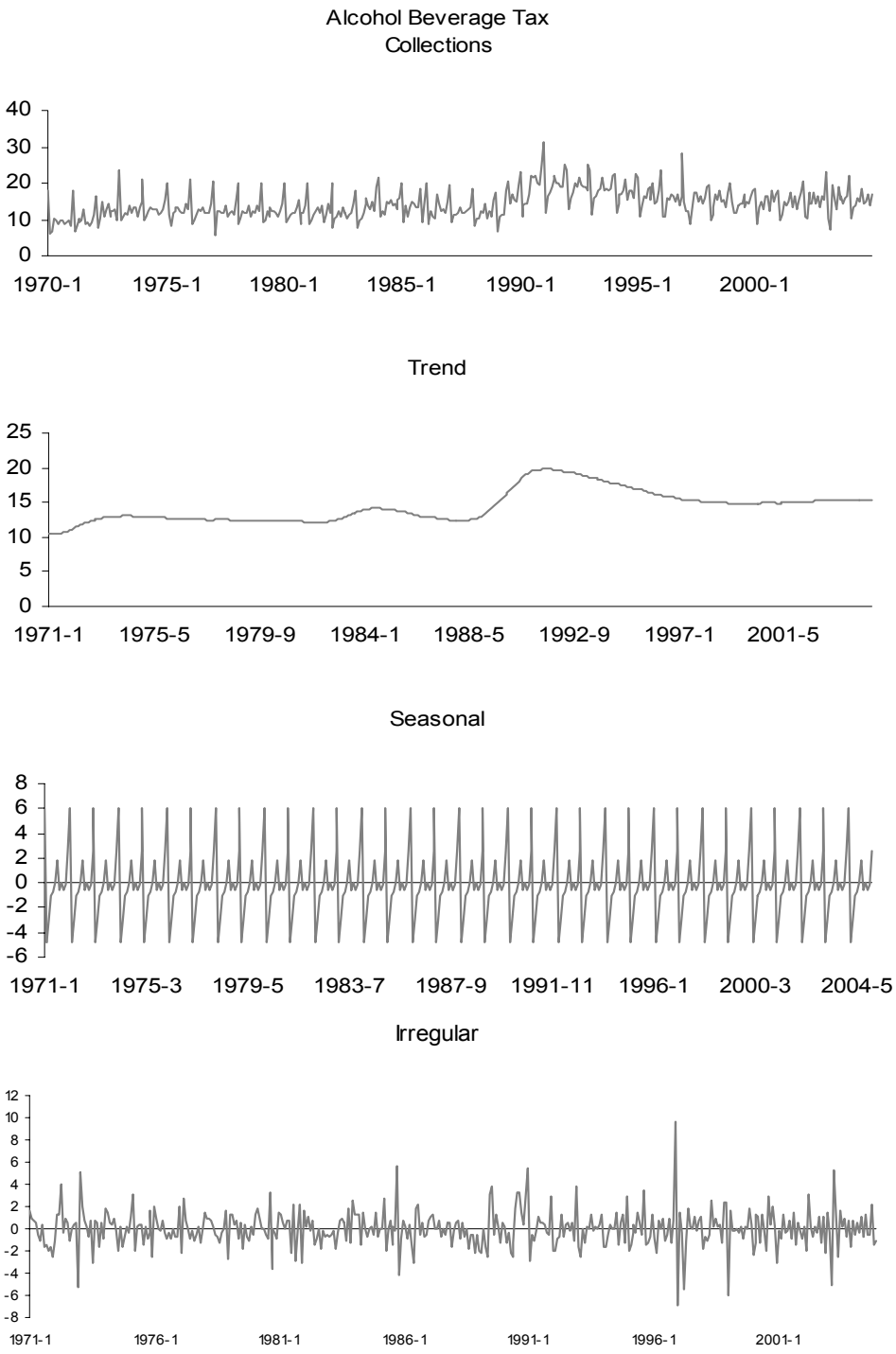
Final estimates are constructed using the time series model forecasts with the following adjustments:

- *Price Elasticity:* Price changes in different alcoholic beverages have different impacts on consumption. Currently, we are using the following price elasticities derived from the noted sources: beer, -0.3; liquor, -0.7; and wine, -0.7. (M. Grossman, J. L. Sinderlar, J. Mullahy and R. Anderson, Policy Watch: Alcohol and Cigarette Taxes, *Journal of Economic Perspectives*, V.7, Fall 1993; B. H. Baltagi and R. K. Goel, Quasi-Experimental Price Elasticity of Liquor Demand in the United States: 1960-83, *American Agricultural Economics Association*, May 1990.)
- *Cash Flow Results:* Tax collection experience and cash flow results are used to evaluate the estimate. Receipts year-to-date may indicate that the actual collections are slightly higher or lower than expected. From time-to-time, ABT receipts are understated or overstated due to misallocation to New York City. For instance, 1998-99 receipts were overstated by $1.8 million. Thus, we adjust the data before making the forecast.
- *Tax Policy Changes:* In the ABT collection history, legislative changes have been the main cause of significant revenue fluctuations. The beer tax rate was reduced from 16 cents per gallon to 13.5 cents per gallon, beginning January 1, 1999, to 12.5 cents per gallon, beginning April 1, 2001, and to 11 cents per gallon, beginning September 1, 2003. These reductions are estimated to have reduced revenue by $7.8 million, $3.1 million, and $4.9 million in 2004-05, respectively.
- *Enforcement:* The State continues to suffer tax evasion through the bootlegging of liquor from other states. As mentioned above, legislation enacted in 1997 extended the 1993 enforcement provisions from October 31, 1997, to October 31, 2002. Legislation enacted in 2002 extended these enforcement provisions from October 31, 2002, to October 31, 2007. ABT receipts in 2003-04 are estimated to have increased by $3 million due to enforcement efforts.

Cash Receipts

The trend in collections has been fairly stable aside from the increase in the early 1990s reflecting tax increase in this area. The gradual decline in subsequent years reflects tax reductions and slowing consumption patterns.

Collection Components
(millions of dollars)



PERCENTAGE DISTRIBUTION OF CASH RECEIPTS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	24.8	24.9	30.2	20.1
1997-98	22.3	27.3	27.8	22.6
1998-99	25.1	26.3	27.5	21.1
1999-2000	23.9	25.6	27.5	23.0
2000-01	24.6	26.2	27.4	21.8
2001-02	24.6	26.6	25.7	23.1
2002-03	25.8	26.6	25.1	22.5
2003-04	24.1	25.7	25.5	24.6
2004-05 (est.)	24.2	25.7	25.8	24.3

Risks to Forecast

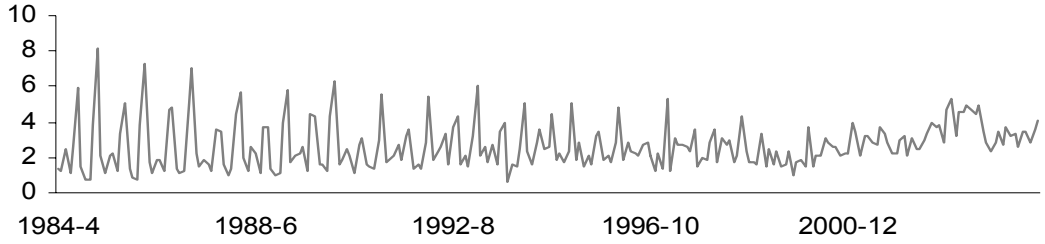
The forecast is based on time series models that are subject to error, especially due to the possible omission of exogenous factors that may influence collections. Also, the ABT is collected at the wholesale level, so taxable gallonage may also fluctuate due to the uncertainty of inventory levels.

ALCOHOLIC BEVERAGE CONTROL LICENSE FEES

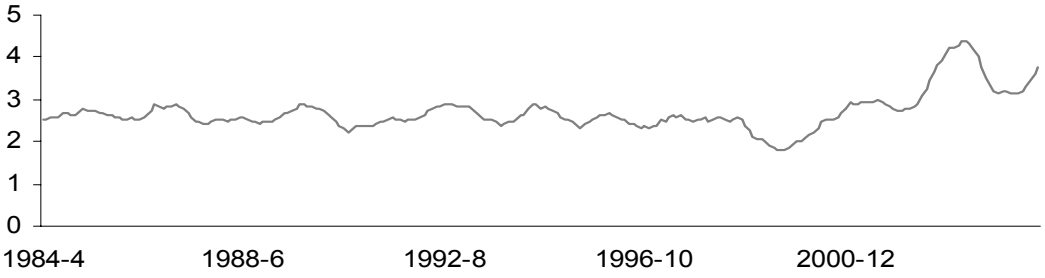
The estimate for ABCL fees is also based on collection trends. Historically, the base of the ABCL revenue has been declining. Until 1998-99, most license fees were issued for three-year periods. Legislative changes played a very important role in 1999-2000 ABCL fees collections. Legislation enacted in 1997 eliminated the three-year license and permitted on-premises alcoholic beverage retailers to revert to single-year or biennial licenses. The estimated decline in ABCL receipts due to these changes was $9 million in 1999-2000. Legislation enacted in 2002 increased license fees for most licensees by 28 percent, effective September 1, 2002. The estimated increase in ABCL fee receipts due to this change was $8 million in 2002-03 and more than $10 million in 2003-04. As a result of the distribution of two-year licenses, a new annual receipts trend was created in ABCL fees: State Fiscal Years ending in even numbers will have higher receipts, and State Fiscal Years ending in odd numbers will have lower receipts.

Collection Components
(millions of dollars)

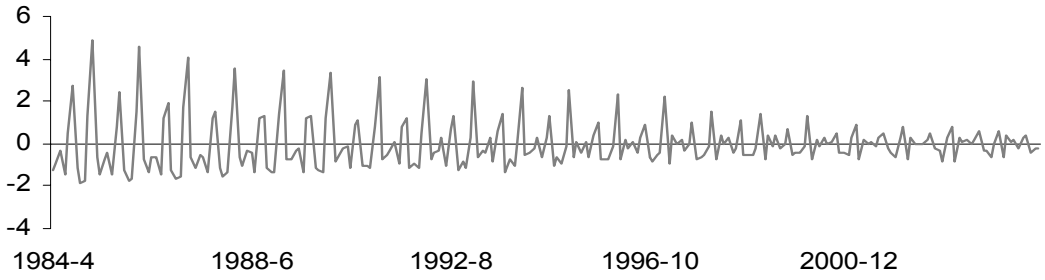
Alcohol Beverage License Fees
Collections



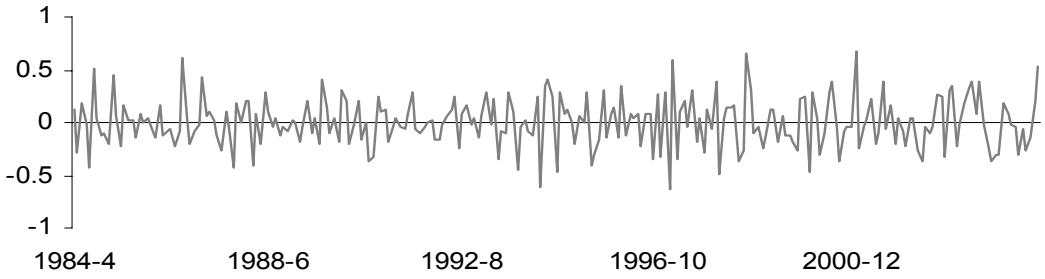
Trend



Seasonal



Irregular



Cash Receipts

The components graphs indicate a stable trend with a slight decline in recent years. A very stable seasonal pattern with a peak early in the calendar year and a smaller summer time spike is also evident.

PERCENTAGE DISTRIBUTION OF CASH RECEIPTS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	26.3	27.0	19.2	27.5
1997-98	27.9	27.7	17.8	26.6
1998-99	30.3	27.9	19.7	22.1
1999-2000	28.0	23.1	20.1	28.8
2000-01	17.8	27.8	21.9	32.5
2001-02	26.9	28.4	21.3	23.4
2002-03	19.6	24.6	24.6	31.2
2003-04	30.6	30.9	18.9	19.6
2004-05 (est.)	24.2	22.4	25.1	28.3

HIGHWAY USE TAX

BACKGROUND

Tax Base and Rate

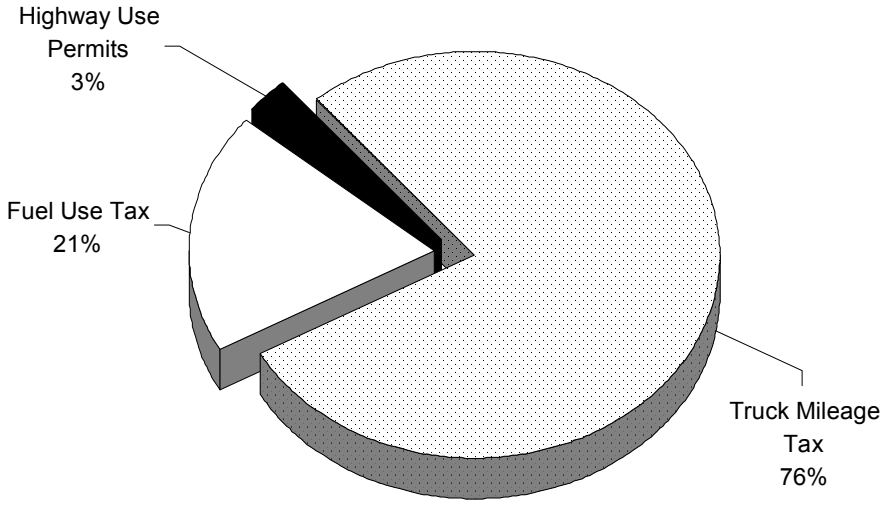
Articles 21 and 21A of the Tax Law impose a highway use tax on commercial vehicles using the public highways of the State. The highway use tax (HUT) includes three components: the truck mileage tax, the fuel use tax, and highway use permit fees. All highway use tax receipts are earmarked to the Dedicated Highway and Bridge Trust Fund.

The truck mileage tax (TMT) is levied on commercial vehicles having a loaded gross weight of more than 18,000 pounds or, at the option of the carrier, an unloaded weight in excess of 8,000 pounds for trucks and 4,000 pounds for tractors. The tax is imposed at rates graduated according to gross vehicle weight. The tax is calculated by multiplying the number of "laden" or "unladen" miles traveled on public highways of the State by the appropriate tax rate.

Highway use permits, used to denote those vehicles subject to the highway use tax, are issued triennially at $15 for an initial permit and $4 for a permit renewal. There are also special permits for the transportation of motor vehicles and for automotive fuel carriers, and for trips not to exceed 72 hours.

The fuel use tax is a complement to the motor fuel tax and the sales tax and is levied on commercial vehicles. In contrast to the motor fuel tax, which is imposed upon the amount of fuel purchased within the State, the fuel use tax is imposed on fuel purchased outside but used within New York. This tax is levied on the basis of the number of miles traveled on the public highways of the State. The aggregate fuel use tax rate is the sum of the appropriate motor fuel tax rate and the sales tax rate. The statewide rate of the sales tax component is 7 percent of the average price of fuel; a cents-per-gallon equivalent is set quarterly.

Components of Highway Use Tax Receipts
Estimated State Fiscal Year 2004-05



DATA SOURCES

The primary sources of data used in the estimation and forecasting methodology for the highway use tax are as follows:

- *RS-43, Department of Taxation and Finance Monthly Report of Receipts*. This report contains gross and net receipts data; and
- *Various U.S. and New York government agencies, including the U.S. Bureau of Economic Analysis of the Commerce Department.* These agencies provide economic data used in the econometric equation.

STATUTORY CHANGES

Truck Mileage Tax

Since 1951, the TMT has been levied on commercial vehicles having a loaded gross weight of more than 18,000 pounds. In 1961, the State gave carriers the option of using an unloaded weight basis to compute truck mileage tax liability. A motor carrier pays tax based on both the number of miles driven on the public highways of this State and the weight of the vehicle.

For State fiscal years 1990-91 through 1992-93, the economic recession retarded the demand for trucking. However, 1990 legislative changes contributed to large increases in highway use tax receipts. Legislation enacted in 1990 applied the truck mileage tax to New York State Thruway mileage. It also imposed a supplemental tax that effectively doubled truck mileage tax rates for all roadways other than the Thruway. Legislation enacted in 1994 reduced the truck mileage tax rates imposed on New York State Thruway mileage by one-half and eliminated such rates on January 1, 1996. The supplemental tax rate was reduced by 50 percent on January 1, 1999 (1998 legislation), and an additional 20 percent on April 1, 2001 (2000 legislation).

Fuel Use Tax

Legislation in 1977 expanded the fuel use tax to include a sales and use tax component. This law change altered the impact of fuel price changes on fuel use tax receipts. Increases in fuel prices tend to inhibit fuel consumption; in contrast, price increases raise the sales tax component rate and thereby fuel use tax collections.

Legislation in 1994 permitted taxpayers who purchase more fuel in New York State than they consume in the State to claim refunds or credits for all excess payments of State fuel use taxes beginning January 1, 1995, and authorized the State to join the federally mandated International Fuel Tax Agreement (IFTA) on January 1, 1996.

Legislation in 1995 reduced the automotive diesel fuel excise tax rate from 10 cents per gallon to 8 cents per gallon. As a result, the diesel fuel tax component of the fuel use tax was also reduced to 8 cents per gallon, effective January 1, 1996.

FORECAST METHODOLOGY

In formulating its estimates and projections, the Division of the Budget relies principally upon the relationship of real gross domestic product (GDP) and TMT receipts. A quarterly regression model with variables in logs is used to estimate TMT revenues.

TMT data are actual tax collections from the Department of Taxation and Finance, adjusted for tax policy changes and irregular audit receipts. Real GDP is gross domestic product chained to 2000 dollars from the DOB forecast. Two dummy variables are set for:

(1) the 1990 Tax Law change that applied the TMT rate to Thruway miles, which was eliminated in 1996; and (2) the 1990 Tax Law change that added a supplemental TMT, which was reduced by half in 1999 and an additional 20 percent in 2001. The model includes a correction for autocorrelation in the regression residuals. The equation with t-statistics is:

TRUCK MILEAGE TAX MODEL

$$\log (TMT_t) = \underset{(-4.32)}{-2.26} + \underset{(22.08)}{1.33} \log (GDP\ real_t) + \underset{(12.25)}{0.59} (dTMT_t) + \underset{(4.76)}{0.19} (dThruway_t) + u_t$$

$$u_t = \underset{(-6.56)}{-0.52} * u_{t-1}$$

R-Bar Squared	0.99
Durbin-Watson Statistic	2.18
Root Mean Squared Error	0.06
Number of Observations	120

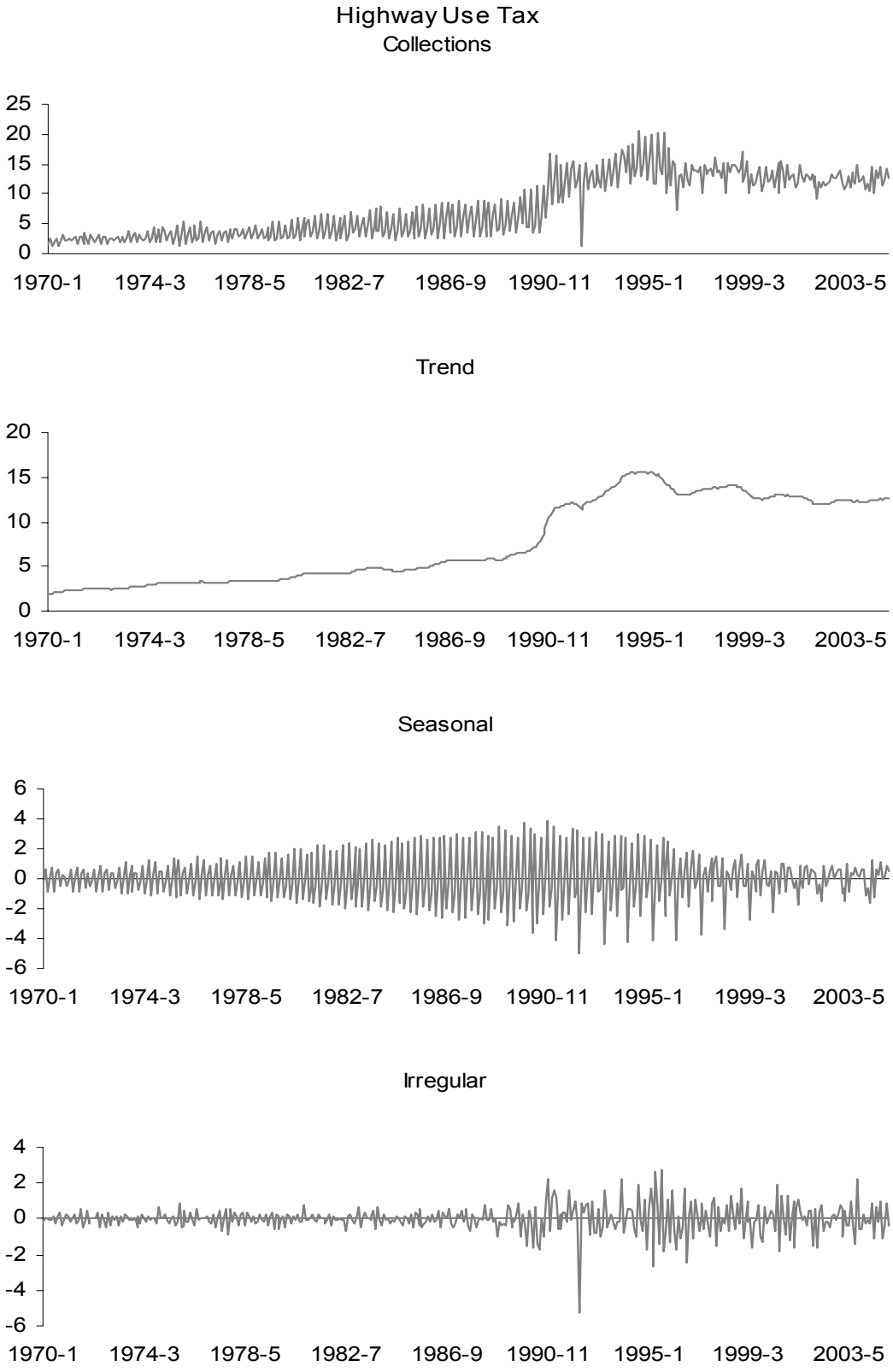
The model suggests a strong link between trucking industry performance and real GDP. The elasticity of TMT receipts to real GDP is estimated at 1.3.

Fuel use tax collections fluctuate with fuel consumption, especially diesel fuel, which is influenced by both economic conditions and fuel prices. As a motor fuel tax complement, it also is affected by the extent to which fuel use taxpayers purchase fuel within the State and thus pay New York motor fuel and sales taxes instead.

Cash Receipts

Highway use tax collections by constituent component are shown in the accompanying chart. The reductions in tax rates and elimination of the tax on the Thruway have resulted in a flattening out of trend growth and a reduction in the amplitude of the seasonal pattern in collections.

Collection Components
(millions of dollars)



PERCENTAGE DISTRIBUTION OF CASH RECEIPTS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	23.8	24.7	27.3	24.2
1997-98	25.3	24.9	26.5	23.2
1998-99	25.9	25.6	25.7	22.7
1999-2000	24.1	25.5	25.7	24.8
2000-01	24.6	26.2	25.9	23.3
2001-02	26.9	26.1	25.1	21.9
2002-03	24.0	25.8	27.0	23.2
2003-04	25.7	26.5	25.4	22.4
2004-05 (est.)	25.1	25.3	25.8	23.8

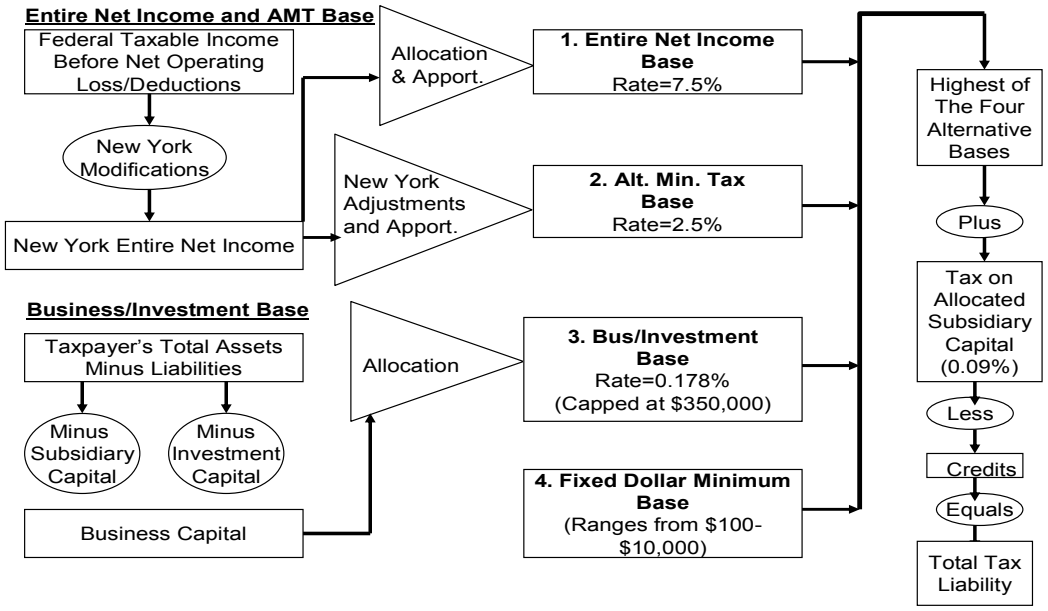
CORPORATION FRANCHISE TAX

BACKGROUND

Tax Base and Rate

Article 9-A of the Tax Law imposes a franchise tax on general business corporations for the privilege of conducting business in New York. The franchise tax has four separate bases: allocated entire net income (ENI), allocated alternative minimum taxable income (AMTI), allocated business and investment capital, and a fixed dollar minimum. Corporations pay on the base which results in the largest liability, plus a tax on allocated subsidiary capital. Additionally, New York State corporations doing business in the Metropolitan Commuter Transportation District (MCTD) must pay an additional surcharge of 17 percent of total tax liability allocable within the MCTD. The following diagram shows the computation of tax liability, and the applicable tax rates for each base.

Computation of Tax Liability
(Current Law)



The allocated entire net income and allocated minimum taxable income bases generally start with Federal taxable income. Significant modifications to Federal taxable income include[1]:

- Exclusions: interest, dividends, and capital gains from subsidiary capital.
- Deductions: net operating losses and fifty percent of dividends from non-subsidiary corporations.
- Credits: investment tax credit (ITC) and employment incentive credit/wage credit, Empire Zone credits, alternative minimum tax credit, farmer's school tax credit and special additional mortgage recording credit.

[1] For a discussion and accounting of tax expenditures and tax credits related to the corporate franchise tax, see: *New York State Tax Expenditure Report*, published by the New York State Division of the Budget and the New York State Department of Taxation and Finance and *Analysis of Article 9-A General Business Corporation Franchise Tax Credits* published by the New York State Department of Taxation and Finance.

DATA SOURCES

The major sources of data used to forecast this tax include:

- *S-43 Department of Taxation and Finance Monthly Report of Corporation Tax.* This report, issued by the Office of Tax Policy Analysis (OTPA), provides reconciled monthly collections of corporate franchise tax receipts by filing periods.
- *New York State Corporate Tax Statistical Report.* This publication is a statistical report published by OTPA. The report provides a detailed summary of corporate tax data.
- *Analysis of Article 9-A General Business Corporation Franchise Tax Credit Report.* This report, published by OTPA, provides an accounting of credit activity under Article 9-A.
- *Article 9-A Corporation Franchise Tax Study File.* These files are compiled by the Department of Taxation and Finance and include all corporations filing under Article 9-A, except S corporations and certain fixed dollar minimum tax filers. It includes selected data items from the tax returns of each corporation. The most recent data available are from the 2001 tax year.

STATUTORY CHANGES

A number of Tax Law changes have had a substantial impact on Article 9-A collections. For New York State statutory changes to the corporation franchise tax, see the most recent *New York State Executive Budget Financial Plan*.

FORECAST METHODOLOGY

Projecting corporate tax receipts is difficult given the large number of factors that can determine tax liability in any year, especially since, as reported above, the taxpayer computes tax under four different bases.

In theory, estimating corporate franchise tax cash receipts involves considering how general business conditions affect tax liability from year to year. While there is no single economic variable that mirrors the complexity of the tax code for corporations, corporate profits often serves as a proxy for taxable income under the ENI base that accounts for the bulk of liability in any tax year. It is important to note that the Bureau of Economic Analysis (BEA) defines corporate profits as the net income of organizations treated as corporations in the National Income and Product Accounts (NIPA). By contrast, taxable profits, or ENI, are a function of the tax code, and the two concepts differ significantly. The Division of the Budget uses corporate profits based on the BEA definition in a first step model for forecasting corporate tax receipts.

Tax Liability

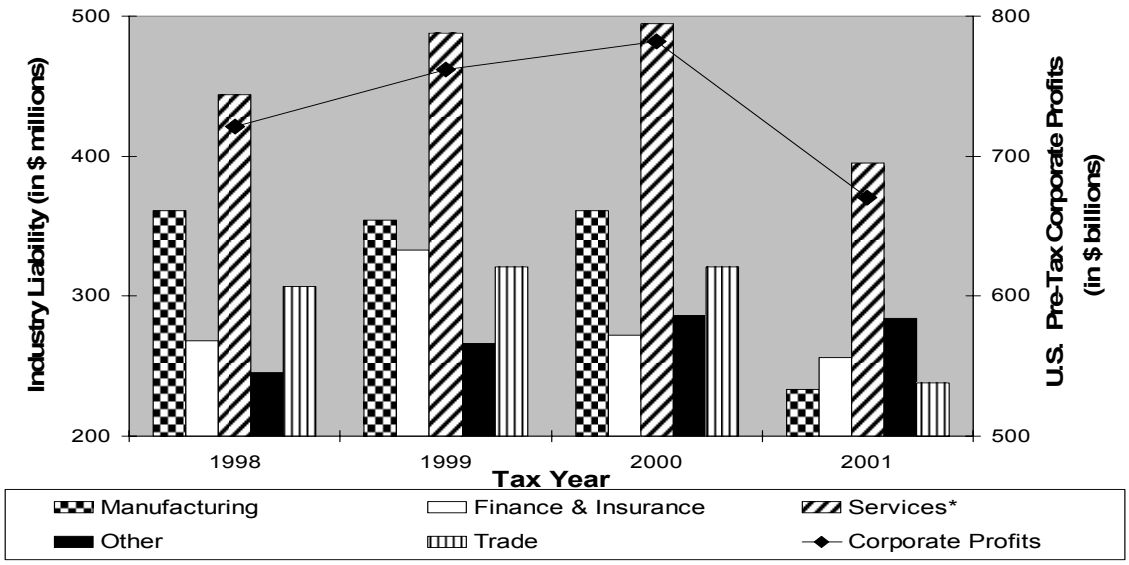
The estimation process is further complicated by the fact that the tax liabilities of different types of taxpayers do not exhibit a uniform relationship to any economic variable. The following chart illustrates the fluctuation in the tax liability of the major industry groups as compared to changes in corporate profits for the period of 1998 to 2001. Information on tax liability comes from the Article 9-A Corporation Franchise Tax Study File,[2] for which 2001 is the latest year Article 9-A tax return data are available. While certain individual industries may appear to have a loose relationship to corporate profits for the time period shown, no strong positive relationship is apparent when examining industries in the aggregate.

[2] Article 9-A Corporation Franchise Tax Study Files for 1998, 1999, 2000 and 2001.

Clearly as the mix of industries comprising the tax base changes over time, it makes extrapolating cash receipts more difficult. Accounting for these factors is an important part of managing the large uncertainties associated with estimating corporate franchise tax liability.

Elements of the Tax Law, such as tax credits, can also distort relationships between aggregate corporate profits and tax liability. For example, the investment tax credit allows manufacturing taxpayers to lessen liability during upswings in the business cycle, and credits are stockpiled during periods in which profits decline since liability itself often decreases. Again, factors such as law changes and the impact of tax credits are accounted for separately in the estimating process.

Liability Responsiveness by Industry Type



*Services consist of real estate and rental and leasing; professional, scientific, and technical services; management of companies and enterprises; administrative and support and waste management and remediation services; art, entertainment, and recreation services; accommodation and food services; and other services. (NAICS Sectors 53, 54, 55, 56, 71, 72, and 81)

Cash Receipts

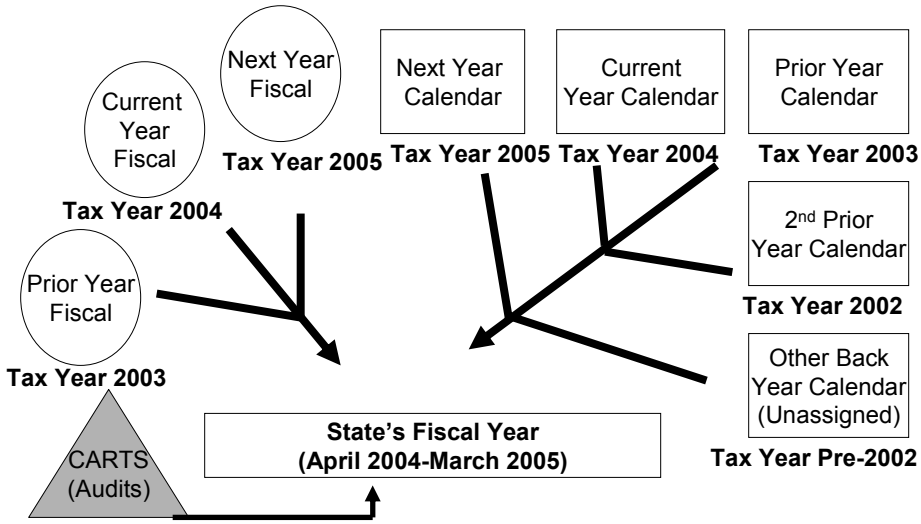
The cash estimation process involves attempting to allocate estimated liability to the State fiscal year in which it will be received. This is complicated by the complex payment system of the corporate franchise tax. State fiscal year cash collections of corporate franchise taxes are the result of an interplay between payments on estimated current year liability, and additional payments or refunds based on revised estimates of prior liability years.

In a given State fiscal year, net cash receipts are the result of payments and adjustments on liability from several different tax years. Separately estimated audit collections, that represent administrative adjustments to prior year liability, are part of cash collections. Changes in payment rules on estimated payments, as well as a degree of flexibility in allowing corporate franchise taxpayers numerous extensions to file amended returns, also impact cash collection patterns.

Finally, not all corporate taxpayers have matching liability years. Calendar year taxpayers base both their internal accounting and their accounting for tax purposes on the standard twelve month calendar year. By contrast, taxpayers may also choose a twelve month period which differs from the calendar year for both internal and tax accounting purposes. For the

purposes of the following chart, these taxpayers are known as fiscal year taxpayers, whose payments and adjustments on various liability years are depicted by ovals. The chart details how payments on liability from different tax years ultimately result in State fiscal year cash collections.

Conversion of Corporate Franchise Tax Estimated Liability to State Fiscal Year Collections

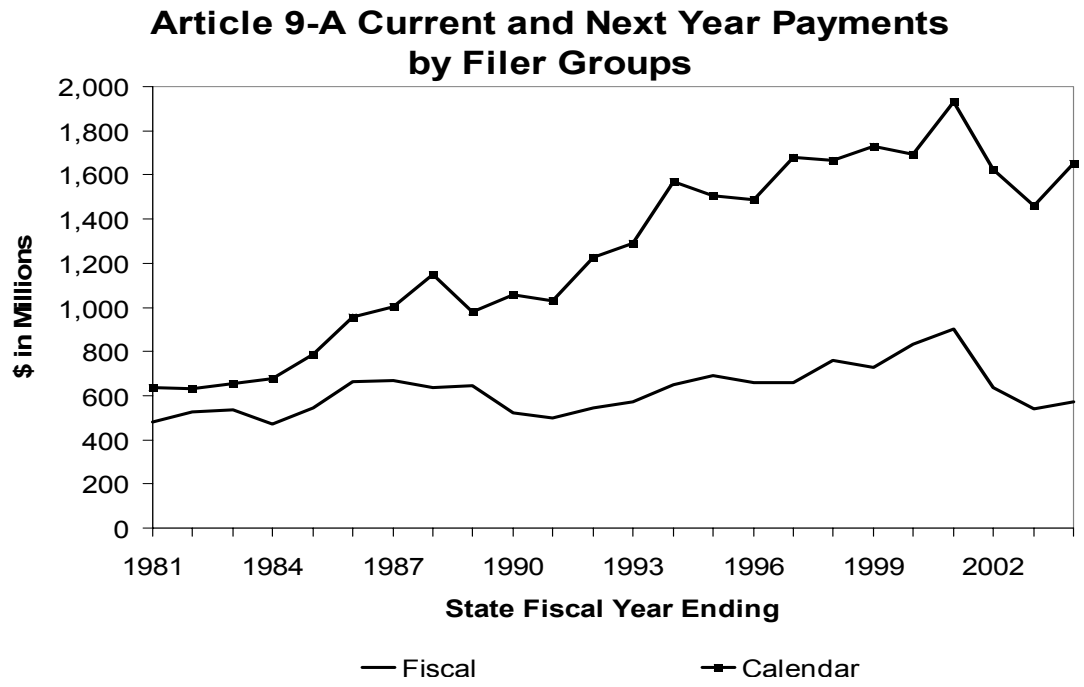


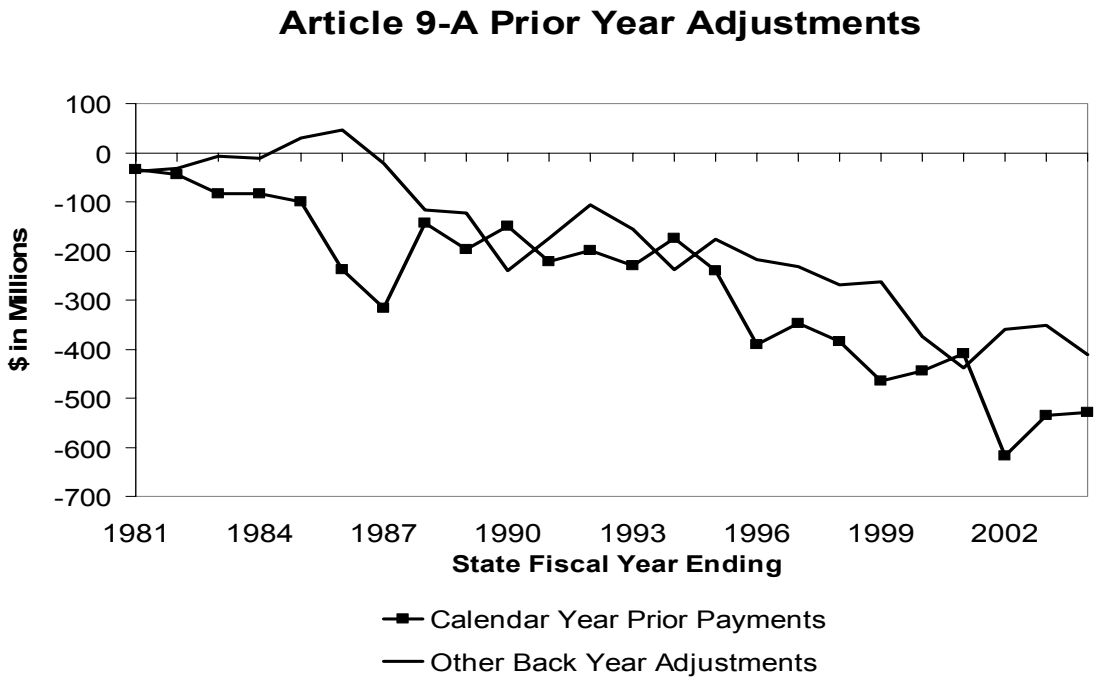
Current Year Forecast

For the current year forecast, we analyze trends in the cash components of collections. For example, current payments received, year to date, are compared to historical receipt amounts as a share of total payments for the State fiscal year, to estimate the remaining receipts for the year. By tracking each of the individual components that make up State fiscal year collections, we are able to apply historical trends to forecast the components.

Currently, the forecasting methodology employed tracks the seven liability payment streams and the other unassigned liability payments (Other Back Year Calendar and CARTS) indicated in the figure above to arrive at estimates of State fiscal year collections.

The following two graphs illustrate the major payment streams analyzed within a State fiscal year (2nd Prior Calendar payments and Other Back Year payments have been combined). The first graph shows the relatively stable upward trend in payments on current year estimated tax from calendar year tax payments. However, the second graph shows the large and somewhat erratic largely negative adjustments to cash based on prior year adjustments.





Most importantly, the tracking of the payments from different periods helps establish a link between tax liability and underlying economic fundamentals as previously discussed. This becomes a starting point for the outyear projections.

Outyear Forecast

Several approaches are used to forecast outyear receipts:

- Examining the public profit forecasts for large multinational corporations with a significant presence in New York State.
- Employing an econometric model described below.
- Making adjustments to the model results to account separately for items such as tax law changes and known anomalies in cash results.

PERCENT CHANGE IN KEY VARIABLES
STATE FISCAL YEARS 1999-00 TO 2004-05

	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05 (Estimated)
Tax Collections*	(5.4)	14.6	(35.1)	(7.1)	5.3	13.0
Corporate Profits**	7.0	(2.0)	(-10.5)	10.3	20.9	7.0
Tax Rates***	8.5	8.0	7.5	7.5	7.5	7.5

* Tax collection growth also reflects Tax Law changes.
** Corporate Profits was adjusted for 2002-03 for Federal depreciation allowances.
*** The tax rate represents the actual tax rate paid under the entire net income base.

Corporate Franchise Tax Cash Receipts Model

The estimate of corporate franchise tax cash receipts is derived using an econometric model as a guide, the results of which serve as one step in the overall process. The econometric model relates gross corporate franchise tax collections to corporate profits, previous collection patterns and the nominal tax rate in effect at that time.

Dependent Variable

- The logarithm of gross corporate franchise tax receipts. Theoretically, gross receipts should exhibit more correlation to economic factors as some of the additional complexities involved in the process of arriving at net receipts are eliminated.

Corp. Prof.

- The logarithm of U.S. corporate profits, lagged one quarter.

Gross 9-A

- The logarithm of gross corporate franchise tax collections, lagged a full year (four quarters). This attempts to capture the effect of the cyclical element of the corporate franchise tax payment structure on future cash collections.

9-A Rate

- The nominal corporate franchise tax rate applied to the ENI base for a given period, lagged one year (four quarters). The ENI base is the base under which the majority of tax liability is incurred.

d803

- A dummy variable that accounts for an anomaly in cash receipts in the 3rd quarter of 1980.

d013

- A dummy variable that accounts for an anomaly in cash receipts in the 3rd quarter of 2001. Cash collections were disrupted due to the events of September 11th, 2001.

dQ1

- A dummy variable representing the typically larger first calendar year quarter (last State Fiscal Year quarter) cash receipts. Calendar year tax filers typically incur the bulk of tax liability. In March, both the final payment on the closing tax year's liability as well as a pre-payment on the new tax year's liability (currently calculated as 30 percent of the previous tax year's liability) is due for these taxpayers.

The model corrects for first-order serial correlation, as shown by the second equation below.

CORPORATE FRANCHISE TAX CASH RECEIPTS MODEL

$$\text{Log(Gross 9-A}_t\text{)} = \underset{(1.99)}{0.849} + \underset{(4.10)}{0.204} * \text{log(Corp. Prof.}_{t-1}\text{)} + \underset{(10.36)}{0.603} * \text{log(Gross 9-A}_{t-4}\text{)}$$

$$+ \underset{(1.78)}{3.54} * \text{(9-A Rate}_{t-4}\text{)} - \underset{(-3.90)}{0.477} * (d803_t) - \underset{(-3.08)}{0.370} * (d013_t) + \underset{(3.60)}{0.117} * (dQ1_t) + \text{error}_t$$

$$\text{error}_t = \underset{(2.45)}{0.237} * \text{error}_{t-1} + \text{error}_t$$

R-Bar Squared	0.8707
Durbin-Watson Statistic	2.0450
Root Mean Squared Error	0.1224
Number of Observations	114

The model fits the volatile cash series reasonably well and implies a long run elasticity with respect to profits of about 0.5. As expected, rates are positively related to cash collections. An estimate for refunds is derived using a historical average of forecasted gross receipts from the econometric model. Historically, refunds have consistently totaled approximately 9.5 percent of the two prior calendar years' gross receipts.

The refunds estimate is then subtracted from the estimated gross amount to arrive at a baseline, net cash receipts estimate.

Adjustment of Baseline Estimate

The baseline estimate is next adjusted for the estimated impact of Tax Law changes that are not captured by the tax rate variable. Additional adjustments are made for current cash receipts as the model generally fails to fully incorporate recent payment trends. While economic and business conditions are themselves volatile, so are the taxpayer's estimates of their tax liability, as a result, adjustments for recent trends in the quarterly payment process are therefore an important step in the estimation process.

PERCENTAGE DISTRIBUTION OF GENERAL FUND COLLECTIONS

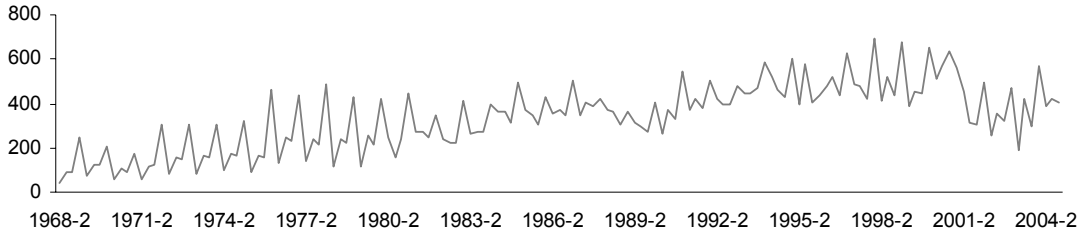
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	23.14	25.11	21.20	30.55
1997-98	23.54	22.94	20.11	33.41
1998-99	20.30	25.29	21.27	33.14
1999-00	20.41	23.22	22.89	33.48
2000-01	23.65	25.86	23.69	26.80
2001-02	30.01	21.35	21.66	26.98
2002-03	18.44	25.44	22.75	33.36
2003-04	12.83	28.62	19.88	38.67
2004-05 (est.)	23.34	25.06	25.98	25.62

Cash Receipts

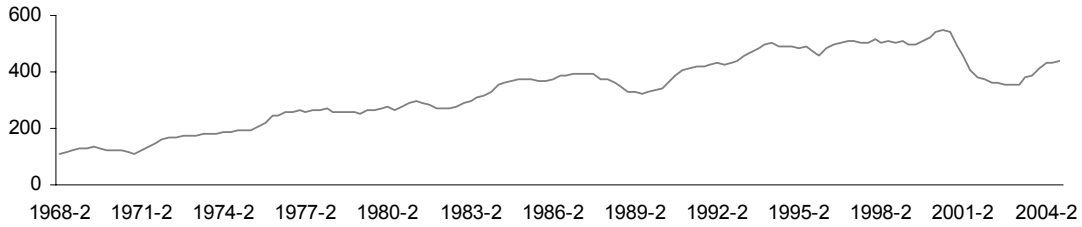
The following graphs report the quarterly collection data and break the series into constituent components. The trend panel illustrates that the growth in collections is more moderate and less volatile than we would expect when just examining quarterly collections. It is apparent, however, that there has been significant cyclical behavior in corporate collections corresponding roughly with changes in overall economic activity. The large values for the irregular component indicate that shocks (unexpected) to this tax are substantial relative to trend.

Collection Components
(millions of dollars)

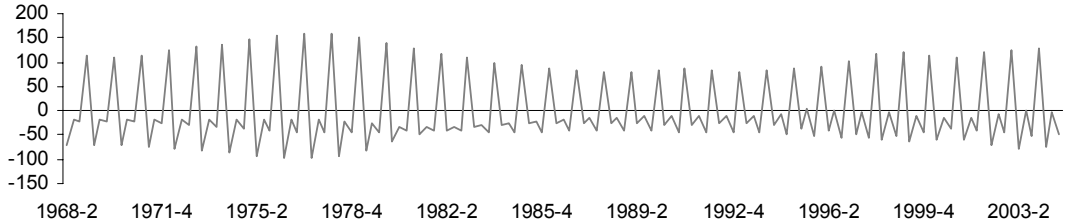
Corporate Franchise Tax
Collections



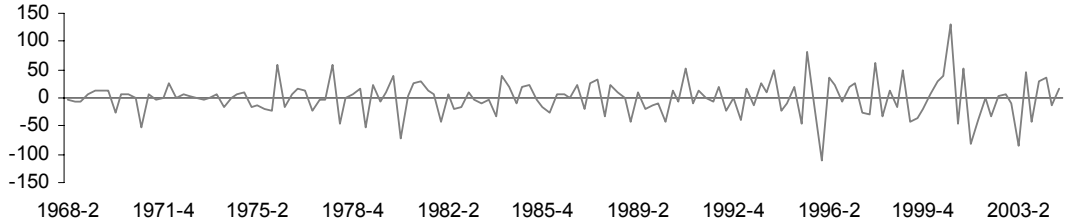
Trend



Seasonal



Irregular



Current year collections can be strongly influenced by transactions occurring in earlier tax years, particularly by refunds and credit carryforwards resulting from the overpayment of tax in prior years. The collection of assessments following the audit of returns filed for past years can strongly influence cash results in any particular year.

Risks to the Forecast

The corporate franchise tax forecasts involve, in large part, managing uncertainties, as follows:

- The most significant risks to the forecast come first from the volatile relationships between economic and liability factors, and second from differences in liability and cash receipts. These relationships can be significantly altered by numerous factors through time.
- Error in the forecast of the corporate profits variable itself provides an additional risk to the corporate franchise tax estimate.

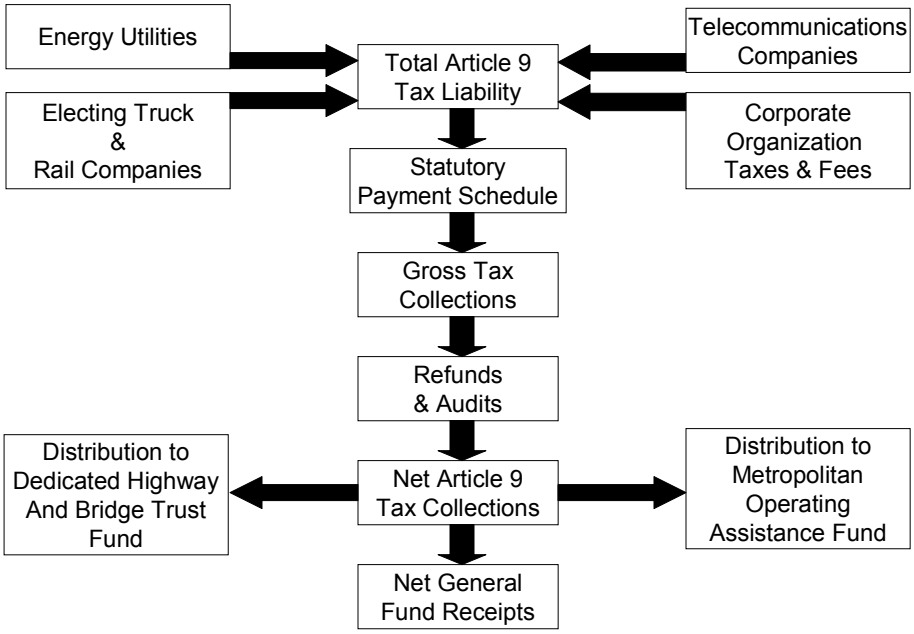
As a result, analyzing industry trends and assessing risks are quite important in adjusting the Division of the Budget corporate franchise tax forecast.

CORPORATION AND UTILITIES TAXES

BACKGROUND

Tax Base and Rate

Article 9 of the Tax Law imposes taxes on a number of different industries, including telecommunications companies, newly organized or reorganized corporations, out-of-State corporations doing business in New York State, transportation and transmission companies, and agricultural cooperatives. The primary source of Article 9 State revenue comes from gross receipts taxes on telecommunications services, transportation companies and public utilities. Statutory changes enacted in 2000 that changed the tax base of the traditional energy utilities from this tax base to the corporate franchise tax, significantly diminished their role as the primary source of Article 9 receipts. In addition, as of April 1, 2004, the remaining 20 percent of sections 183 and 184 of Article 9 are earmarked to the Dedicated Highway and Bridge Trust Fund (DHBTF). The following chart shows the sources and disposition of Article 9 receipts.



The gross income of a utility includes receipts from the sale of services, receipts from rents, royalties, interest and dividends, as well as profits from the sale of securities, real property or other assets. Historically, there have been very few asset sales. However, as a result of deregulation, companies were required to sell their generating facilities, including their nuclear plants. Typically, the forecasts deal with revenues from sales of energy, water and telecommunications services. Tax Law changes enacted in 2000 have had a significant effect on Article 9 receipts, especially the utility tax base. It is anticipated that the methodology will be reevaluated in the future to reflect these base changes.

DATA SOURCES

The corporation and utility tax estimate is derived using a variety of data sources from both public and private sources, including the following:

- *S-43 Department of Taxation and Finance Monthly Report of Corporation Tax.* This report, issued by the Office of Tax Policy Analysis (OTPA) at the New York State Department of Taxation and Finance, provides reconciled monthly collections of corporation and utilities taxes receipts by filing periods.
- *New York State Corporate Tax Statistical Report.* This report is published by the Department of Taxation and Finance's OTPA and provides a detailed summary of corporation and utilities taxes data.
- *Value Line Investment Survey.* Electricity, Natural Gas, and the Telecommunication Industries summaries are used in the estimation process.
- *Securities and Exchange (SEC) Web Site (http://www.sec.gov).* This web site is monitored for relevant quarterly (10-Q) and annual (10-K) financial reports.
- *Public Service Commission.* Reports annual utility data.
- *Other Publications.* Wall Street Journal, New York Times, Business Week, Barrons, and Crain's.

STATUTORY CHANGES

A number of Tax Law changes have had a substantial impact on Article 9 collections. For New York State statutory changes to the corporation and utilities taxes, see the most recent *New York State Executive Budget Financial Plan.*

FORECAST METHODOLOGY

Current Year Forecast

In the current year, the forecast process is based on a blend of historical collection patterns, simple trending, estimates of underlying company liability, econometric models for key components of the base sensitive to economic or consumption changes, and statutory changes or other occurrences that may affect collections.

Outyear Forecast

Econometric models are used to forecast outyear receipts. Steam and water revenues are forecast using a set of simple econometric models. The structures of these models are as follows:

Steam

- Steam revenues = function (wholesale price of fuels and related products, and power).

Water

- Water revenues = function (New York specific employment, consumer price index).

Electricity and Natural Gas

Energy revenues (electricity and natural gas) are a summation of separately forecasted quantities and prices by general customer class. This approach is necessary because of different pricing structures between residential and business utility services. Also, natural gas sales may offset changes in electric demand, as in years with mild summers, reducing cooling demand, but with severe winters increasing heating demand. The following model structure is employed:

Electricity

- Residential Price = function (residential electric price for New York).
- Residential Quantity = function (cooling degree days, U.S. electricity sales to end users shared to New York by the ratio of New York population to U.S. population, and a dummy variable).
- Commercial & Industrial Quantity = function (New York specific commercial and industrial price).
- Commercial & Industrial Price = function (commercial and industrial electric price for New York; and a weighted average of such prices is used in the current forecast for the period after 2003).

Natural Gas

- Residential Price = function (U.S. price deflator for residential natural gas used shared by the ratio of New York consumer price inflation to U.S. consumer price inflation).
- Residential Quantity = function (heating degree days, real consumption - natural gas, the ratio of New York population to U.S. population, PPI - refined petroleum products, 1975-80 curtailment dummy, time trend, deregulation dummy).
- Commercial & Industrial Quantity = function (New York specific employment, time trend, heating degree days, wholesale price for refined petroleum products).
- Commercial & Industrial Price = function (wholesale price index for utility natural gas, time trend).

The following table reports the percent changes for the major economic variables impacting the receipts estimates.

EXOGENOUS VARIABLES
Percent Change

	1998	1999	2000	2001	2002	2003	2004 (Estimated)	2005 (Projected)
New York Specific Employment	2.40	2.47	2.15	(0.59)	(1.77)	(0.60)	0.38	1.06
Utility Natural Gas Price Index	(3.47)	0.57	23.26	20.70	(19.37)	31.15	8.79	2.23
Electric Power Price Index	(1.20)	(1.02)	1.66	6.00	(1.24)	3.11	1.57	3.55
Cooling Degree Days[1]	32.51	16.05	(37.03)	39.75	14.16	(56.88)	49.66	NA
Heating Degree Days[1]	(16.71)	9.22	8.25	(9.57)	4.50	10.24	(2.99)	NA
Population	0.55	0.67	0.58	0.39	0.31	0.28	0.20	0.17
New York Specific Consumer Price Index	1.62	2.04	3.22	2.65	2.19	2.78	3.28	2.69

[1] Heating and cooling degree-days (from Economy.com) are included in our model, but only through the period for which we have actuals.

Forecast prices and quantities are then combined to derive gross receipts growth rates for each Article 9 Tax Law section for current and outyears.

The liability growth rates are then applied to the current year's tax base to derive calendar year estimates. Tax rates are applied to projections of gross receipts to generate tax liability estimates for each section of law. Payment schedules are applied to the liability estimates to derive State fiscal year cash receipts. Fiscal year receipts are then adjusted to reflect the estimated effects of law revisions and other non-economic factors that affect collections. Historical monthly patterns are applied to the fiscal year projections to derive monthly cash flow estimates. Although the payment schedules are fixed in statute, a small number of returns (delayed returns, taxpayer fiscal year basis other than calendar year, adjusted returns, etc.) and refunds or audits paid occur during the months not ending a quarter.

The table below summarizes the forecast results from the model described above. The various tax rates for each section of the tax are applied to the results and distributed to the proper fiscal year.

NEW YORK UTILITY MODEL RESULTS

Calendar Year	New York Electricity (Sales * Price)	Percent Change	New York Natural Gas (Sales * Price)	Percent Change	New York Steam & Water (Sales * Price)	Percent Change
2002	15,347	0.5	4,743	(11.2)	585	(1.7)
2003	14,620	(4.7)	5,434	14.6	600	2.6
2004	15,390	5.3	5,357	(1.4)	618	3.0
2005	16,132	4.8	5,353	(0.1)	640	3.6

The forecast assumes growth in the outyears in the telecommunication sectors. The following table reports the history and forecasted revenues of the telecommunications industry and Verizon from Value Line. These growth rates are considered in generating the telecommunications forecast.

PERCENT GROWTH OF TELECOMMUNICATIONS REVENUES

	2001	2002	2003	2004 (Estimated)	2005 (Projected)
Telecommunications	(33.82)	43.43	(3.92)	(2.05)	0.39
Verizon	3.84	0.65	0.19	5.38	4.34

The tables below report annual consumption and price data for electricity and natural gas. The information shown for the years 1995 to 2002 is based on published reports of the Public Service Commission (PSC). Calendar year 2002 represents the most recent year for which data are available for both electricity and natural gas. The quantities in the table report sales to ultimate consumers and include sales for resale. The electric and gas prices reflect an average of residential, commercial and industrial prices. The figures below represent sales of electricity to full-service customers who receive their commodity and transportation services from the utility. The reduction in electricity sales represents, in part, the migration of some full-service customers to partial-service status as energy service company (ESCO) customers, which are not included in the PSC publication.

CALENDAR YEAR HISTORY OF ELECTRICITY AND NATURAL GAS SALES
1995 TO 2002
(quantity in millions)

Year	Electricity Sales (kilowatt hours)	Percent Change	Gas Sales (MCF)	Percent Change
1995	134,609	0.8	622.9	17.5
1996	135,256	0.5	603.6	(3.1)
1997	135,605	0.3	638.2	5.7
1998	116,305	(14.2)	482.5	(24.4)
1999	115,059	(1.1)	531.4	10.1
2000	105,637	(8.2)	636.1	19.7
2001	103,390	(2.1)	551.6	(13.3)
2002	97,360	(5.8)	580.7	5.3

CALENDAR YEAR HISTORY OF ELECTRICITY AND NATURAL GAS PRICES
1995 TO 2002

	Electricity Price Per Kilowatt Hour Sold (cents)	Percent Change	Gas Price Per MCF Sold ($)	Percent Change
1995	11.88	(2.83)	7.10	(6.21)
1996	11.91	0.23	8.06	13.57
1997	11.87	(0.35)	8.22	1.94
1998	11.51	(3.03)	8.42	2.48
1999	11.42	(0.77)	8.12	(3.57)
2000	11.00	(3.64)	7.57	(6.75)
2001	11.71	6.43	10.55	39.34
2002	11.20	(4.35)	9.02	(14.48)

The table below shows selected equations for residential electricity and natural gas prices and consumption used to forecast prices and quantities from which revenue estimates are derived.

ELECTRICITY AND GAS EQUATIONS

PELCRES_NY = -0.50 + 0.36*SEDESRCDNY
(1.79) (46.90)
DW = 1.7454 adj. R^2 = 0.9856

SQELCRES_NY = -28.64+1.78*D88+ 8.22*(DENDUSE_ELC*NR_NY/NN)+0.002*(DDCNS_NY)
(0.14) (7.86) (2.07) (7.60)
DW = 2.0085 adj. R^2 = 0.9870

PNGRES_NY = 7.08 + 1.27 * (PCWCSHHOPG * (CPINY/PCWC))
(8.36) (4.76)
DW = 1.9122 adj. R^2 = 0.9369

SQNGRES_NY = 11625.76 + 35.96 * DDHNS_NY + 56522.82 * (CSHHOPG96C * (NR_NY/NN)) - 23831.5 * WPI057 -
(0.58) (11.94) (12.81) (4.78)

18314.7 * NGCURTAIL + 48.23 *TIME - 274.42 * DELECDEREG98
(7.12) (0.15) (0.07)
DW = 1.9891 adj. R^2 = 0.8157

PELCRES_NY	Price - Residential Electricity, NY
SEDESRCDNY	Price - Residential Electricity, NY (EIA)
SQELCRES_NY	Quantity - Residential Electricity, NY (KWH)
D88	Dummy Variable
DENDUSE_ELC	End-Use Electricity Demand, US
NR_NY	Population, NY
NN	Population, US
DDCNS_NY	Cooling Degree Days
PNGRES_NY	Price, $ per residential MCF
SQNGRES_NY	Residential gas quantity sold, MCF
CPINY	New York Specific Consumer Price Index
DDHNS	Heating Degree Days
DELECDEREG98	Deregulation Dummy
CSHHOPG96C	Real Consumption - Natural Gas
WPI057	PPI- Refined Petroleum Products
NGCURTAIL	1975-80 Curtailment dummy
PCWCSHHOPG	Price Deflator for Consumption - Natural Gas
PCWC	Price Deflator for Consumption
TIME	Time Trend

Cash Receipts

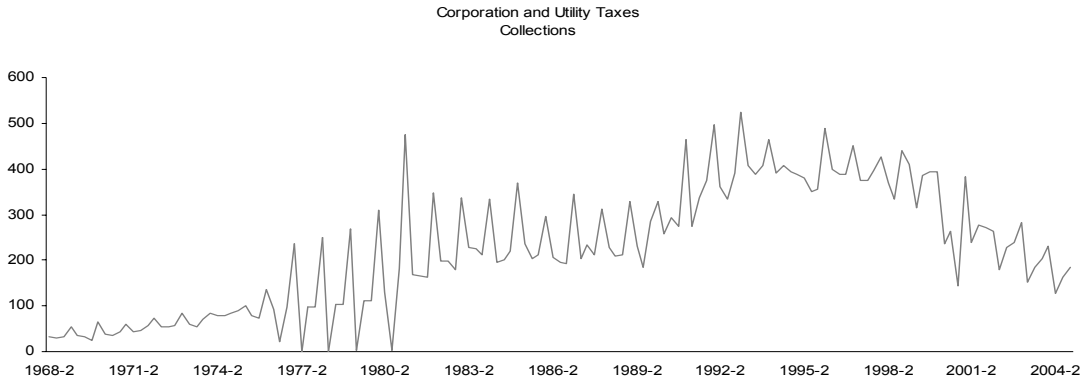
The table below illustrates the General Fund collections on a quarterly basis.

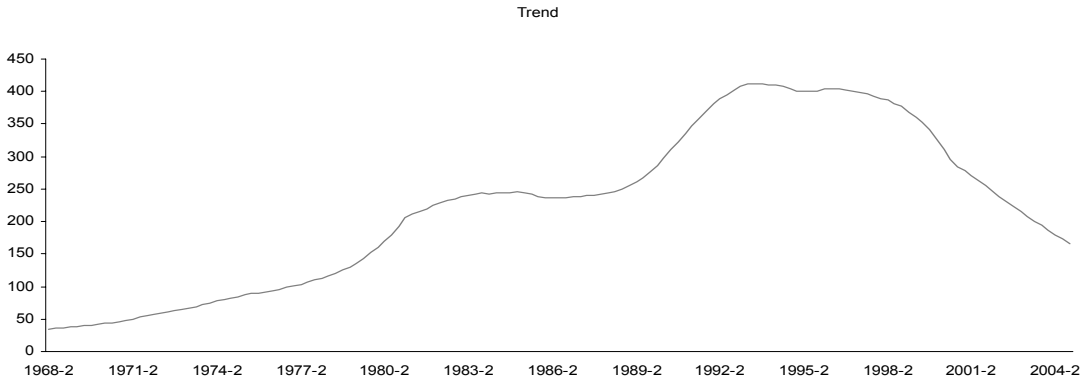
PERCENT DISTRIBUTION OF GENERAL FUND COLLECTIONS

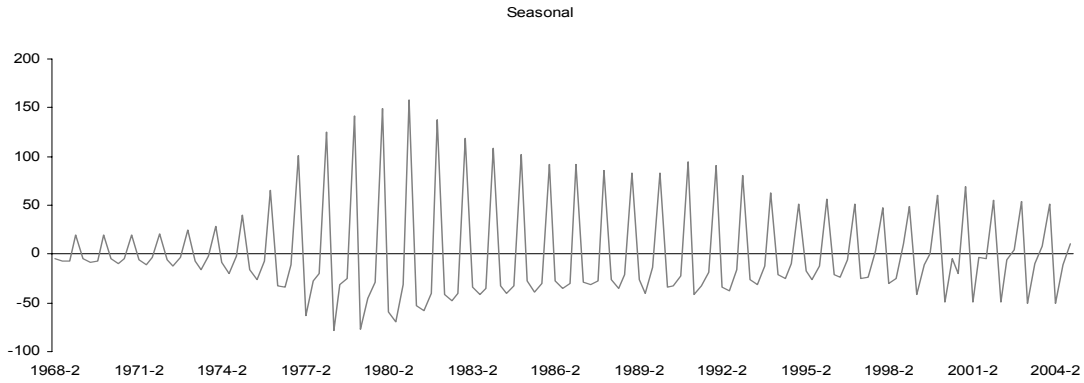
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	24.48	25.01	23.96	26.55
1997-98	24.26	24.62	24.93	26.19
1998-99	23.45	21.72	28.51	25.66
1999-2000	21.37	26.26	27.14	25.23
2000-01	27.92	29.31	16.34	25.73
2001-02	23.60	26.00	27.10	23.30
2002-03	18.94	23.54	27.10	30.42
2003-04	19.79	24.29	27.42	28.50
2004-05 (est.)	20.05	24.23	31.00	24.72

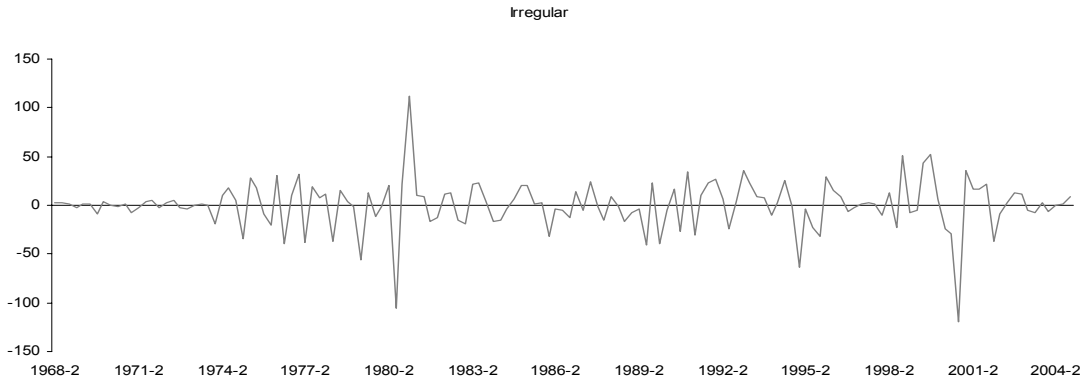
Article 9 tax collections are shown in the accompanying graphs. There is a modest peak in the fourth quarter of the fiscal year when final payments and the first installment on current year tax is due. The trend in collections is down, reflecting recent law changes reducing or eliminating gross receipts taxes imposed on electric utilities. Large irregular values correspond to past changes in energy market prices and associated economic events.

Collection Components
(millions of dollars)









Risks to the Forecast

The corporate and utilities forecasts involve managing uncertainties as follows:

- examining economic factors such as energy prices, changes in supply and demand, business market conditions, changes in technology, and general inflation; and
- analyzing statutory, regulatory and administrative changes, including Federal tax law changes, that affect tax rates and bases.

INSURANCE TAXES

BACKGROUND

Tax Base and Rate

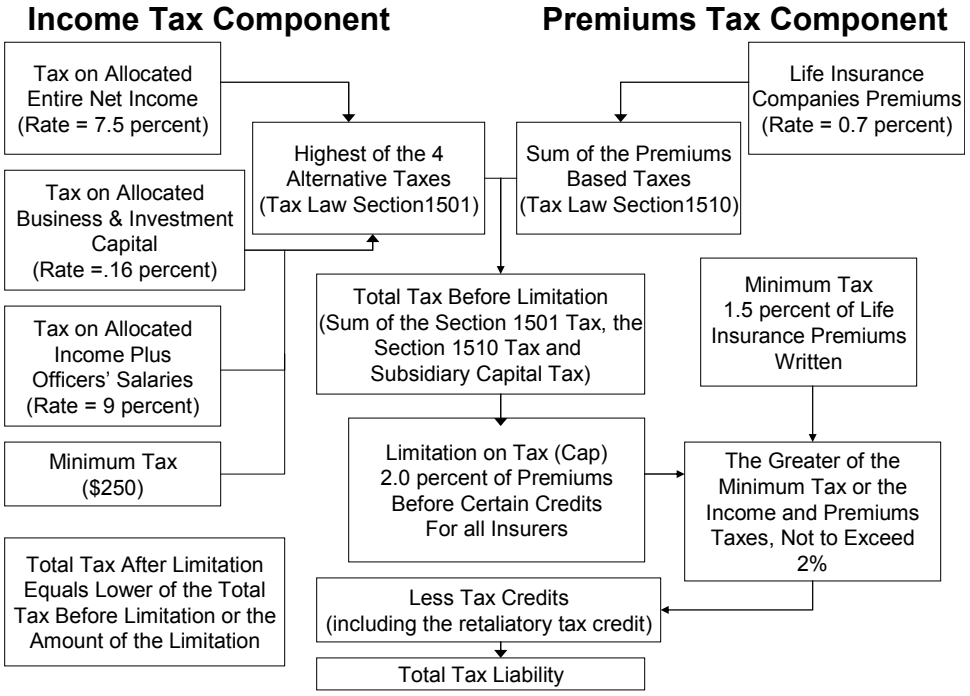
Article 33 of the Tax Law imposes a franchise tax on insurance companies. Legislation included in the 2003-04 Enacted Budget changed the insurance tax structure effective for tax years beginning on or after January 1, 2003. Generally, the new structure imposes a premiums only tax on non-life insurers and a new minimum tax on life insurers.

Life Insurers

For life insurers, the tax structure includes two components. The first component is an income based tax computed on the highest of four bases, plus a tax on subsidiary capital. The second component is a tax based on gross direct premiums, less return premiums thereon, written on risks located or resident in New York. Minimum and maximum limitations are applied to total tax liability before credits. The minimum limitation is 1.5 percent of premiums and the maximum limitation is 2 percent of premiums.

The income component is imposed on one of several measures of an insurance corporation's economic activity within the State. Most taxpayers pay under the entire net income (ENI) base. The current tax rate on ENI equals 7.5 percent. Taxpayers allocate receipts according to the ratio of New York premiums and payroll to total premiums and payroll nationwide.

The chart below depicts the structure of the Article 33 insurance tax on life insurers.

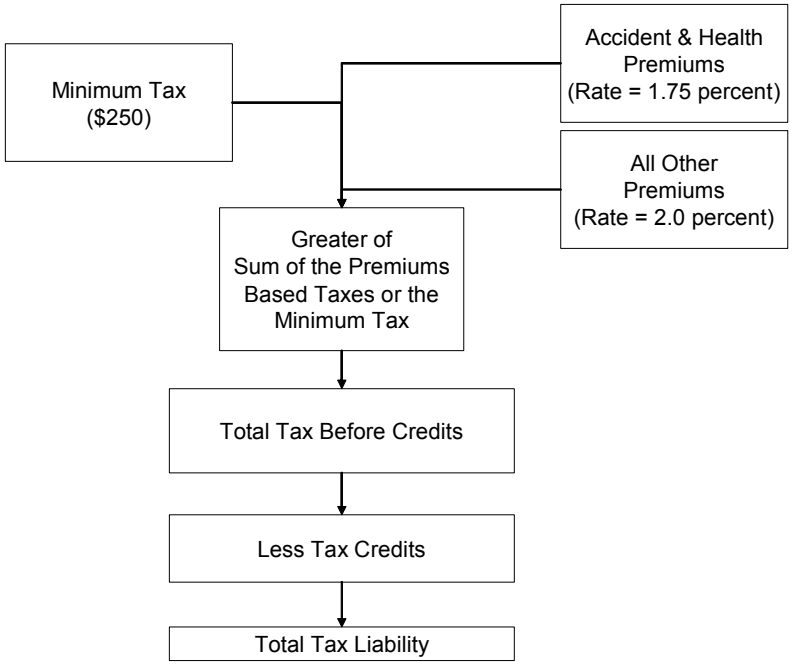


Non-Life Insurers

For all non-life insurers, the income base was eliminated, as well as other non-premium bases besides the fixed dollar minimum. Non-life insurance companies pay tax solely on gross direct premiums, less return premiums written on risks located or resident in the State. The premiums base tax is 1.75 percent for accident and health premiums and 2.0 percent for all other premiums.

The chart below depicts the structure of the Article 33 insurance tax for all non-life insurers.

Non-Life Insurers



Taxes Imposed by the New York State Insurance Department

The Insurance Law authorizes the Superintendent of Insurance to assess and collect retaliatory taxes from a foreign insurance corporation when the overall tax rate imposed by its home jurisdiction on New York companies exceeds the comparable tax rate imposed by New York on such foreign insurance companies.

Retaliatory taxes have been used by the states since the nineteenth century, ostensibly to ensure a measure of fairness in the interstate taxation of their domestic insurance corporations. Retaliatory taxes deter other states from discriminating against foreign corporations and effectively require states with a domestic insurance industry to maintain an overall tax rate on insurance corporations that is generally consistent with other states.

Nevertheless, there are a variety of mechanisms for taxing insurance corporations throughout the states, and differences in overall tax rates among the states are inevitable. New York provides an additional measure of protection for its domestic insurance industry by allowing domestic corporations to claim a credit under Article 33 of the Tax Law for 90 percent of the retaliatory taxes legally required to be paid to other states.

The Insurance Law also imposes a premiums tax on licensed excess lines insurance brokers when policies covering New York risks are procured through such brokers from unauthorized insurers. Transactions involving licensed excess lines brokers and insurers not authorized to do business in New York are permissible under limited circumstances delineated in Article 21 of the Insurance Law. The tax is imposed at a rate of 3.6 percent of premiums covering risks located in New York.

DATA SOURCES

The insurance tax estimate is derived using a variety of data sources from both the public and private sectors, including the following:

- *Article 33 Insurance Tax Study File.* This file, compiled by the Department of Taxation and Finance, includes selected data from all businesses filing tax returns under Article 33.
- *S-43 Department of Taxation and Finance Monthly Report of Corporation Tax.* This report, issued by the Office of Tax Policy Analysis (OTPA) at the New York State Department of Taxation and Finance, provides reconciled monthly collections of insurance tax receipts by filing periods.
- *New York State Corporate Tax Statistical Report.* This report is published by the Department of Taxation and Finance's OTPA. It provides a detailed summary of insurance tax data.
- *Value Line Investment Survey.* Insurance Industry.
- *Securities and Exchange Commission (SEC) Website.* This web site is monitored for relevant quarterly (10-Q) and annual (10-K) financial reports.
- *New York State Insurance Department.* Detail on lines of property and casualty insurance.
- *Other Publications.* Wall Street Journal, New York Times, Business Week, Barrons, A.M. Best Review, and Crain's.

STATUTORY CHANGES

A number of Tax Law changes have had a substantial impact on Article 33 collections. For New York State statutory changes to the insurance tax, see the most recent *New York State Executive Budget Financial Plan*.

FORECAST METHODOLOGY

Current Year Forecast

In the current year, the estimation process is based on a blend of historical collection patterns, trend analysis, the econometric models linking collections to changes in relevant economic variables, and statutory changes or other occurrences that may affect collections.

Outyear Forecast

Our methodology utilizes variables from our economic models to forecast liability for future years. Data from the Insurance Department for the most recent two years are used to fill the gap with more dated study file information.

Insurance premiums are divided into three broad categories: property and casualty, life and health, and accident and health, sold by non-life insurance companies. Net income is aggregated over all firms and modeled separately. Because of the short length of the available data series, a premium was placed on parsimony in the specification of econometric models. The form of the models is relatively simple. The dependent variable is the log of the first difference (an approximation to percent growth). The independent variables include the

medical care component of the Consumer Price Index, ten-year treasury note rates, New York resident population ages 25-64, the tax rate on entire net income (ENI), and dummy variables for 2000 and 2001 to smooth anomalies between 1999 and 2000 and to account for September 11th. Due to the significant statutory changes affecting the tax structure of insurers, it is anticipated that the insurance model will be reevaluated in the near future.

Property/Casualty Premiums

Total property and casualty premiums are made up of premiums written in each line of insurance. The five largest lines of business — automobile, workers' compensation, commercial multi-peril, general liability, and homeowners' multi-peril — accounted for more than 80 percent of premiums from the Article 33 Study File during the 2001 period.

CPIMED

- A large portion of property and casualty premium payouts are related to the treatment of injury, therefore, medical care cost inflation has tended to be a significant driving force explaining premium growth over time. To capture the impact of rising medical costs on premium growth, the model includes the first difference in the log of the medical care component of the Consumer Price Index.

Dummy Variable 2000

- The model also includes a dummy variable for 2000 to account for significant changes in ENI between 1999 and 2000.

The historical growth rates of the major lines of property and casualty premiums are shown in the table below. This information is provided by the Insurance Department.

CALENDAR YEAR PREMIUMS GROWTH
(GROWTH RATE PERCENTAGES)
1996 TO 2003

	1996	1997	1998	1999	2000	2001	2002	2003
Property/Casualty (Total Premiums)	0.3	(0.3)	3.9	(4.1)	4.9	11.7	12.9	5.4
Automobile	6.2	0.3	1.5	(0.4)	0.7	11.5	10.6	3.9
Workers Compensation	(14.5)	(12.7)	(1.4)	1.4	15.8	4.1	4.0	9.4
Commercial Multi-Peril	(2.0)	(3.2)	2.0	(3.3)	4.2	4.5	23.1	3.3
General Liability	(0.1)	13.0	30.9	(33.3)	17.7	14.3	35.2	2.2
Homeowners Multi-Peril	4.4	3.9	2.3	2.3	4.3	6.2	7.8	4.1

Life/Health Premiums

A significant driving force behind life and health insurance premiums is population growth in the State.

NR2564NY

- This variable is growth in the State working age population between the ages of 25 and 64. The first difference in the log of this variable is used in the model.

World Trade Center Dummy

- The model includes a dummy variable for 2001 to account for anomalies related to September 11th.

Accident/Health Premiums

Premium growth in this category was flat between 1985 and 1992, after which growth appears to closely track medical care inflation.

CPIMED

- This effect is captured by creating an interaction dummy variable that is equal to zero between 1985 and 1992 and equal to the first difference in the log of the medical care component of the Consumer Price Index for the period from 1993 and beyond.

Dummy Variable 2000

- The model also includes a dummy variable for 2000 to account for significant changes in ENI between 1999 and 2000.

Net Income

Net income earned by insurance carriers tends to vary inversely with long-term interest rates.

TRATE10

- The first difference in the ten-year Treasury note is included in the model.

TRENI

- The first difference in the tax rate on net income is also included to capture the behavioral response by firms to changes in the tax rate.

World Trade Center Dummy

- The model includes a dummy variable for 2001 to account for anomalies related to September 11th.

To further refine the net income estimate, an analysis of industry trends with particular attention to industry leaders is used. Several publications, including Value Line and Best's, provide estimates of the future earnings of the industry as a whole and industry leaders with a large New York presence.

The table below shows the insurance model forecasting equations using insurance data from 1985 to 2003 with t-values in parenthesis.

INSURANCE MODEL FORMULAS FOR GENERATING FORECAST

$\triangle \ln(PRPC_t) = 0.64 * \triangle \ln(CPIMED_t) - 0.20 * D00_t$ (2.61) (3.48)	DW = 1.4589	adj. R^2 = 0.40
$\triangle \ln(PRLH_t) = 5.94 * \triangle \ln(NR2564NY)_t + 0.10 * D01_t$ (4.34) (2.42)	DW = 1.1507	adj. R^2 = 0.28
$\triangle \ln(PRAL_t) = 0.20 + 2.55 * DCPIMED_t - 0.68 * D00_t$ (.82) (2.29) (7.05)	DW = 2.3809	adj. R^2 = 0.81
$\triangle \ln(ENI_t) = -0.27 * \triangle TRATE10_t - 0.20 * TRENI_t - 0.86 * D01_t$ (5.70) (1.46) (4.25)	DW = 2.1308	adj. R^2 = 0.71

PRPC	Property/Casualty premiums
PRLH	Life/Health premiums
PRAL	Accident/Health premiums
ENI	Entire net income
CPIMED	Medical care component of CPI
NR2564NY	New York population ages 25 to 64
DCPIMED	Equals first-differenced log of CPIMED from 1993 onward; 0 otherwise
D00	Dummy variable 2000
D01	World Trade Center Dummy
TRATE10	10-year Treasury rate
TRENI	Tax rate on net income

The growth rates generated from these models are then entered into a simulation model that calculates liability for taxpayers included in the most recent study file. This approach is compared to publicly available industry estimates to provide a test against model results.

State fiscal year net General Fund collections are the sum of taxpayers' payments on current liability, installments on the following year's liability, and adjustments to prior year's estimated liability. In addition, the timing of these payments and adjustments to prior estimated liabilities make comparisons between the earnings, tax liability, and actual payments difficult to untangle when estimating future receipts, especially for the life insurance industry where the profit performance of firms still partially determines liability.

For example, based on statutory payment rules, calendar year insurance corporations make a first installment in March based on 30 percent of their prior year's liability effective January 1, 2003. The first installment for life and health companies was increased to 40 percent in 1999. This first installment is captured in one fiscal year, while the subsequent payments on liability are part of the next State fiscal year. As a result, collections growth rates in a period can vary significantly from underlying liability growth rates.

COMPARISON OF GROWTH RATES IN ESTIMATED LIABILITY, FINAL LIABILITY, AND STATE FISCAL YEAR COLLECTIONS

Calendar Year	Estimated Liability Growth Rate[1]	Final Liability Growth Rate[2]	State Fiscal Year	*General Fund* Net Collections Growth Rate[3]
1996	(2.93)	(6.90)	1996-97	(4.60)
1997	(1.37)	(3.33)	1997-98	(1.84)
1998	3.08	(3.61)	1998-99	4.99
1999	(7.28)	(1.25)	1999-2000	(12.48)
2000	(0.85)	1.39	2000-01	(1.02)
2001	(3.15)	(1.20)	2001-02	8.58
2002 (est.)	14.76	NA	2002-03	9.95
2003 (est.)[4]	15.88	NA	2003-04	33.62
2004 (est.)	14.02	NA	2004-05	(1.94)

[1] Estimated liability is the sum of the taxpayers' first installment and the June, September, December, and March payments on current liability.
[2] Information from Department of Taxation and Finance Insurance Tax Study File.
[3] State fiscal year General Fund collections are reported on the Department of Taxation and Finance Monthly Report of Corporation Tax: S-43.
[4] Insurance Tax Law restructuring changes enacted with the 2003-04 Budget affect 2003 calendar year liability and 2003-04 collections.

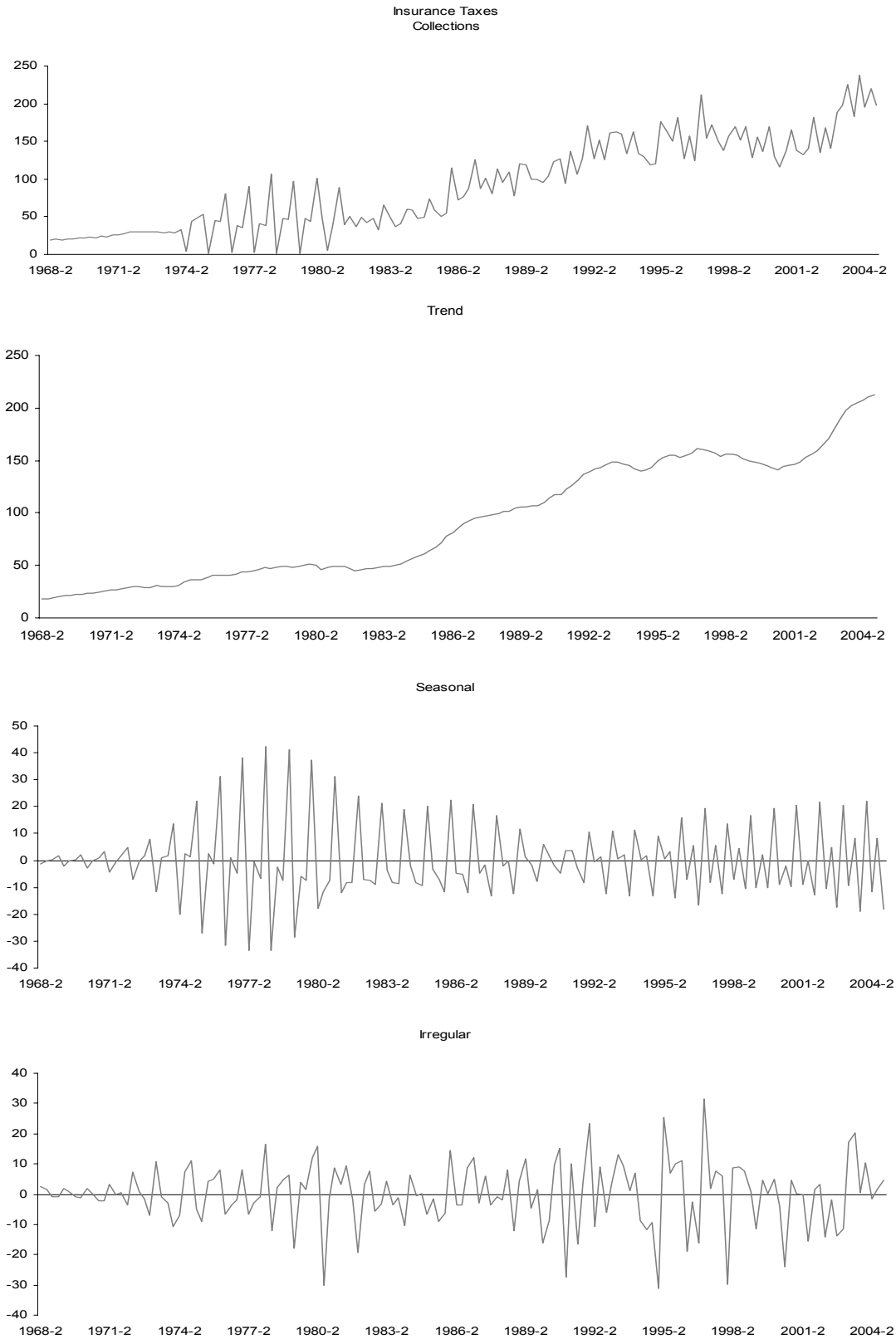
Cash Receipts

The accelerated trend in recent years reflects the shift to a purely premiums based tax for property and casualty insurers. Periods of slower growth (a flat trend) tend to be associated with periods of intense competitive pricing by property and casualty companies.

PERCENT DISTRIBUTION OF GENERAL FUND COLLECTIONS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	20.52	25.39	19.93	34.16
1997-98	24.52	26.98	24.62	23.88
1998-99	23.31	24.98	22.54	29.17
1999-2000	19.79	26.37	22.72	31.12
2000-01	24.38	19.04	24.71	31.87
2001-02	24.41	21.31	21.35	32.93
2002-03	22.17	24.15	19.89	33.79
2003-04	21.19	24.15	20.85	33.81
2004-05 (est.)	22.09	24.63	20.21	33.07

Collection Components
(millions of dollars)



Risks to the Forecast

The insurance forecast involves managing uncertainties as follows:

- analyzing premium growth and the economic performance of industry members;
- examining changes in investment income affecting investment portfolios and annuity sales;
- reviewing changes in the demographic and competitive environment; and
- examining weather-related catastrophes.

BANK TAX

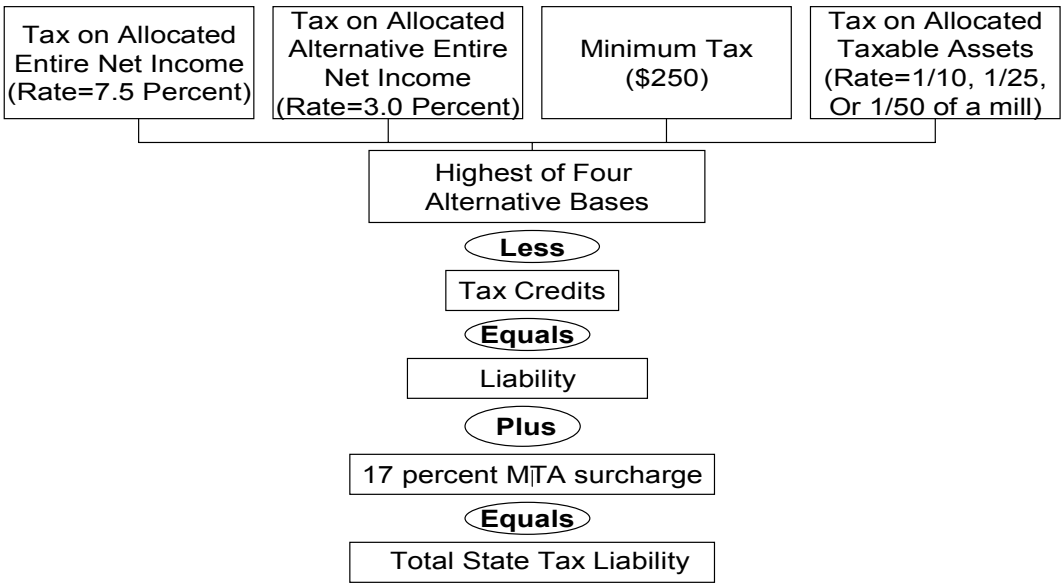
BACKGROUND

Tax Base and Rate

Article 32 of the Tax Law imposes a franchise tax on banking corporations. Historically, Article 32 receipts have been quite volatile, reflecting statutory and regulatory changes and the variable profit performance of the banking sector. The basic tax rate is currently 7.5 percent of entire net income (ENI) with certain exclusions, discussed below. A fixed minimum tax of $250 or one of two alternative taxes applies if a greater tax results. The first alternative tax calculation is on each dollar of taxable assets apportioned to the State, at a rate generally determined by the taxpayer's net worth and lines of business conducted. The second alternative tax calculation is 3 percent of alternative entire net income, which is net income calculated without regard to certain exclusions.

In addition to the liability resulting from the highest of the four alternative base calculations, taxpayers doing business in the Metropolitan Commuter Transportation District (MCTD) are subject to a 17 percent surcharge on the portion of total tax liability allocable to the MCTD. Collections resulting from this surcharge are deposited to the Mass Transportation Operating Assistance Fund (MTOAF) to support the Metropolitan Transportation Authority (MTA).

Computation of Tax Liability
(Current Law)



DATA SOURCES

The major sources of data used in the estimation and forecasting methodology for the bank tax are as follows:

- *S-43, Department of Taxation and Finance Monthly Report of Corporation Tax.* This report, issued by the Office of Tax Policy Analysis (OTPA), provides reconciled monthly collections of bank tax receipts by filing periods.

- *New York State Corporate Tax Statistical Report.* This report is published by OTPA. It includes a detailed summary of bank tax data.
- *Federal Deposit Insurance Corporation.* New York Regional Outlook, Bank Trends, and Statistics on Banking.
- *Value Line Investment Survey.* Bank Industry.
- *Securities and Exchange (SEC) Web Site (http://www.sec.gov).* This web site is monitored for relevant quarterly (10-Q) and annual (10-K) financial reports.
- *Article 32 Bank Tax Study File.* This file is compiled by the Department of Taxation and Finance and includes all corporations filing under Article 32. It includes selected data items from the tax returns of each corporation.

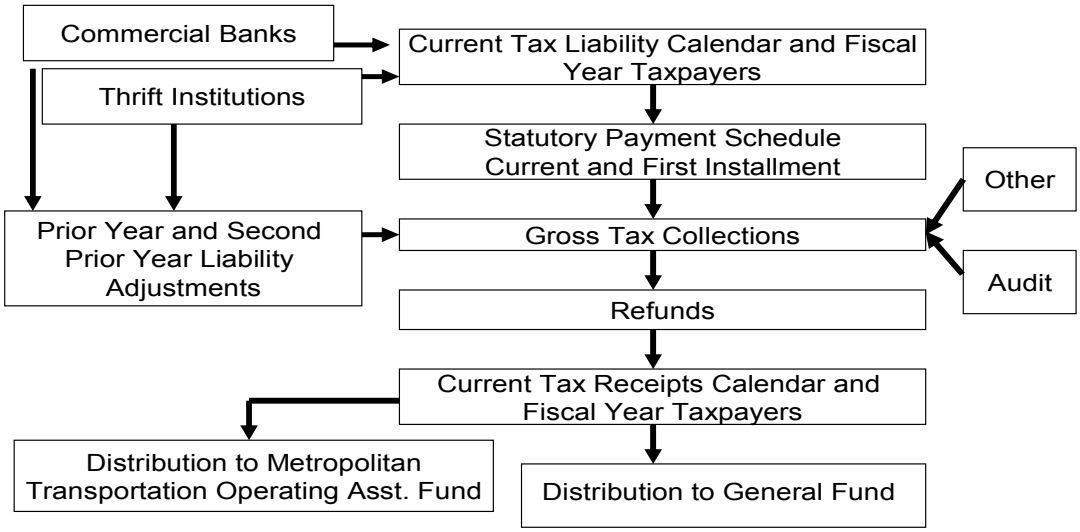
STATUTORY CHANGES

For New York State statutory changes to the bank tax, see the *New York State Executive Budget Financial Plan*. In 1999, Congress passed the Gramm-Leach-Bliley Act (GLBA). This legislation essentially repealed the Glass-Steagall Act of 1933, which had prohibited certain affiliations between securities, bank, and insurance companies. As a result, legislation was enacted at the State level, first in 2000, and in subsequent years, allowing corporations and banks to maintain their original tax filing status. The 2004-05 Enacted Budget extended the State GLBA transitional provisions until 2006.

FORECAST METHODOLOGY

The following flowchart highlights the components of Article 32 State fiscal year collections as reported by the New York State Department of Taxation and Finance.

Components of the Bank Tax



The forecast for bank tax collections is driven by a taxpayer's payments on estimated liability. As a result, the forecast methodology begins by constructing a historical liability series for each type of taxpayer. The forecast breaks collections into groups by taxpayer type: commercial banks, savings institutions, and savings and loan institutions. Based on its Federal tax return, the taxpayer is either a calendar-year or fiscal-year taxpayer.

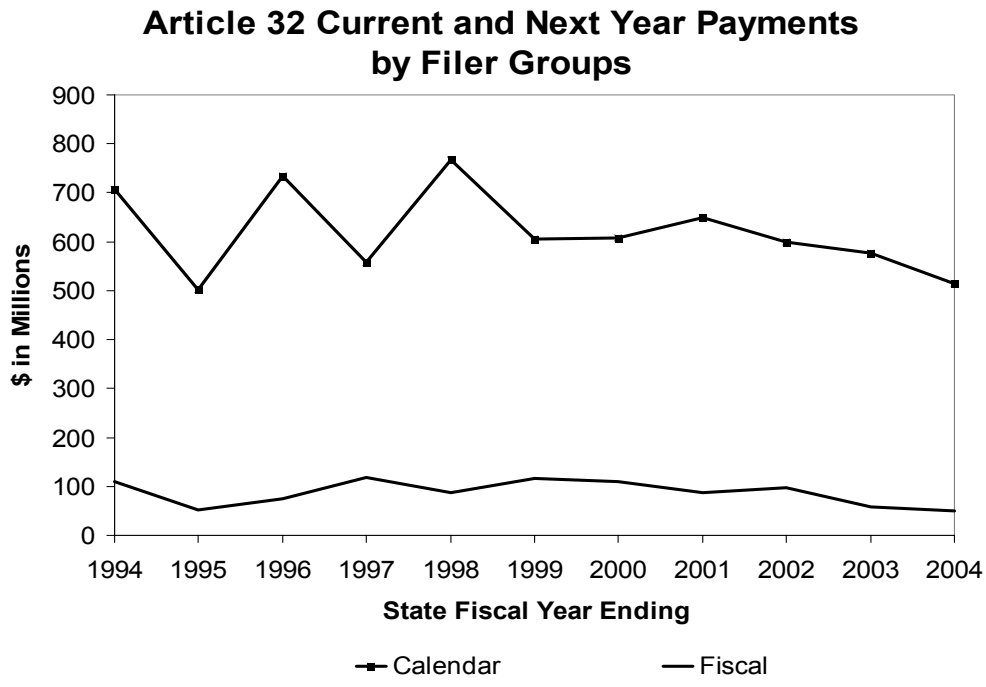
In addition, in any given year, taxpayers make adjustments to estimated liability from prior periods. These adjustments are either credit carryforwards, if the money is used to offset a current liability, or refunds, if the taxpayer has requested that overpayments on prior liability be returned. Both types of prior year adjustments place downward pressure on State fiscal year cash collections. The following table highlights the fiscal periods in which banks are making payments during a given State fiscal year.

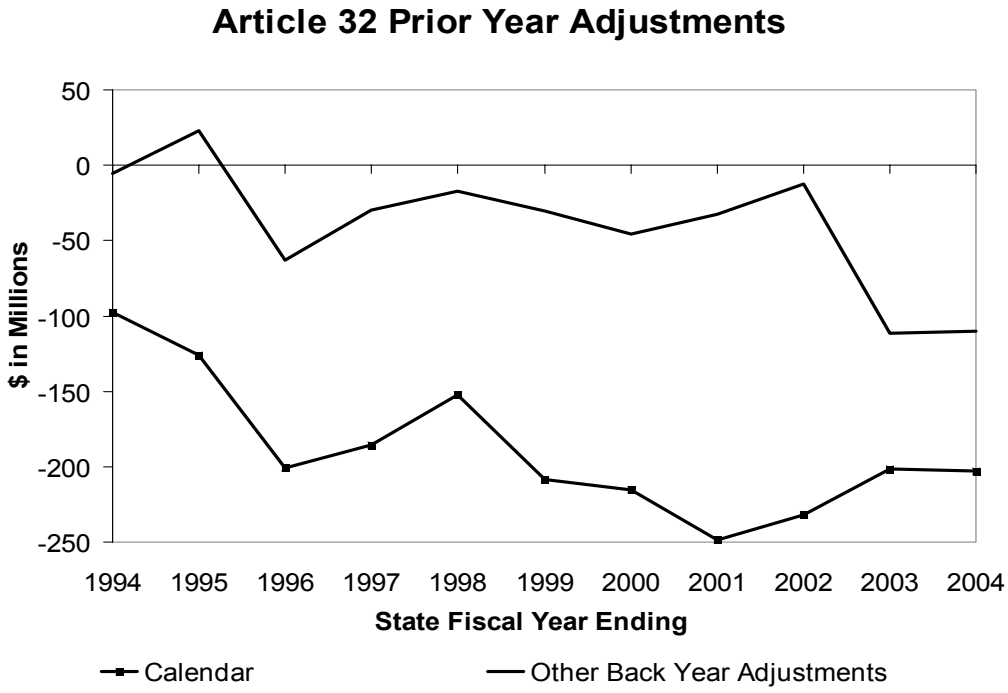
STATE FISCAL YEAR 2003-2004
NET COLLECTIONS BY FISCAL PERIOD
(million of dollars)

	Savings	Savings & Loan	Commercial
Prior Fiscal Year	(0.1)	0.0	(17.3)
Current Fiscal Year	0.0	0.0	15.8
Next Fiscal Year (1st Installment)	0.0	0.0	33.0
Second Prior Calendar Year	0.1	0.0	(49.8)
First Prior Calendar Year	(2.8)	(0.3)	(199.8)
Current Calendar Year	3.2	3.2	406.7
Next Year Calendar (1st Installment)	1.1	1.5	98.7
Other Collections	0.0	0.0	3.6
Prior Years	(0.1)	0.5	(43.3)
CARTS (Audits)	0.3	(1.3)	33.0
Total Net Collections	1.8	3.6	280.6

The table illustrates that calendar-year, commercial bank payments have the greatest influence on State fiscal year net collections. The forecast methodology tracks estimated liability, adjustments to estimated liability, and the first installment on the subsequent tax year. By focusing on the taxpayer's liability and converting this to the State fiscal year, the methodology attempts to establish a link between the underlying economic and financial conditions of the banking industry and resulting cash payments.

The following graphs illustrate the increasing impact that adjustments to prior years' liability have on collections during the State fiscal year. The first graph illustrates that, in spite of an overall decline for the period in question, payments on current and next year's liability have leveled off in recent years. The second graph shows that prior year adjustments have had an increasingly negative impact on net receipts, but similarly have recently leveled off.


Article 32 Current and Next Year Payments
by Filer Groups
900
800
700
600
500
400
300
200
100
0
$ in Millions
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
State Fiscal Year Ending
Calendar
Fiscal


Article 32 Prior Year Adjustments
50
0
-50
-100
-150
-200
-250
$ in Millions
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
State Fiscal Year Ending
Calendar
Other Back Year Adjustments

Outyear Forecast

Two approaches are used to forecast outyear receipts:

- Examining the public profit forecasts for large multinational banking corporations with a significant presence in New York State. This helps focus the analysis on the behavior of New York companies.
- Utilizing an econometric model that uses corporate profits to forecast receipts over the forecast period. Corporate profits, while a crude indication of banking sector activity, does appear to have a measure of explanatory power in predicting the path of future receipts. This model operates on the principle that profits and ENI rate changes ultimately determine outyear cash collections with a lag.

PERCENT CHANGE IN KEY VARIABLES
STATE FISCAL YEARS 1999-00 TO 2004-05

	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05 (Estimated)
Tax Collections*	(3.4)	(3.8)	(1.9)	(17.5)	(30.1)	102.1
Corporate Profits**	7.0	(2.0)	(10.5)	10.3	20.9	7.0
Tax Rates***	9.0	8.5	8.0	7.5	7.5	7.5

* Tax collections also reflect Tax Law changes.
** Corporate Profits was adjusted for 2002-03 for Federal depreciation allowances.
*** The tax rate represents the actual tax rate paid under the entire net income base.

Econometric Model

The estimate of bank tax cash receipts is derived using an econometric model as a guide, the results of which serve as one step in the overall forecast process. The econometric model uses the logarithm of the taxable base for the dependent variable. The taxable base is constructed by dividing annual cash receipts by the nominal tax rate imposed on the ENI base for that year. Utilization of this method provides historical values for the dependent variable that exhibit a stronger correlation to the model regressors through time, as they are free of exogenous tax rate effects. The estimated bank tax base is then multiplied by the current law nominal tax rate on the ENI base to provide a baseline, net bank tax cash receipts estimate.

Dependent Variable

- The logarithm of the taxable bank tax base, calculated as described above.

Corp. Prof.

- The logarithm of U.S. corporate profits, lagged two quarters.

Art. 32 Base

- Net bank tax collections divided by that year's nominal ENI tax rate, converted to logs and lagged one full year (four quarters). This attempts to capture the effect of the cyclical element of the bank tax payment structure on future cash collections.

32 Rate

- The nominal bank tax rate applied to the ENI base for a given period, currently 7.5 percent. The ENI base is the base under which the majority of tax liability is incurred.

The model corrects for serial correlation, as shown by the second equation below. The model implies a long-run elasticity with respect to corporate profits of about 1.

BANK TAX CASH RECEIPTS MODEL

$$\text{Log(Art. 32 Base}_t) = 0.261 + 0.431 * \text{log(Corp. Prof.}_{t-2}) + 0.581 * \text{log(Art. 32 Base}_{t-4}) + \text{error}_t$$
(0.41) (3.03) (7.62)

$$\text{error}_t = 0.175 * \text{error}_{t-2} + \text{error}_t$$
(1.81)

$$\text{Net Bank Tax Cash Receipts}_t = \text{Art. 32 Base}_t * 32 \text{ Rate } (0.075)$$

R-Bar Squared	0.6901
Durbin-Watson Statistic	1.8896
Root Mean Squared Error	0.4831
Number of Observations	114

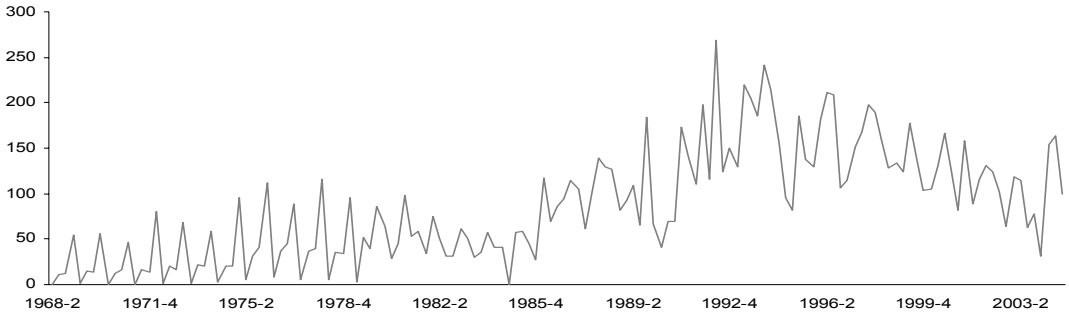
Cash Receipts

The component graphs show that bank tax collections have tended to shrink in recent years, at least in part, reflecting tax rate cuts. The large irregular component relative to trend demonstrates the extreme volatility of this tax.

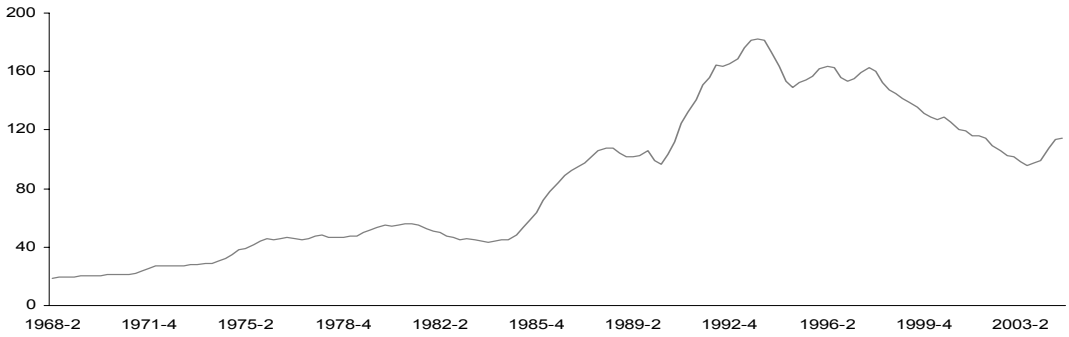
While the baseline cash receipts estimate derived from the econometric model provides a good starting point in the outyear forecasting process, bank tax collections have historically been extremely volatile, as shown by the graphs below. This volatility often necessitates substantial revision to the model-driven estimates. These revisions are based upon roughly the same methodology used in estimating current year cash receipts, which is essentially an examination of recent trends in the quarterly payment cycle.

Collection Components
(millions of dollars)

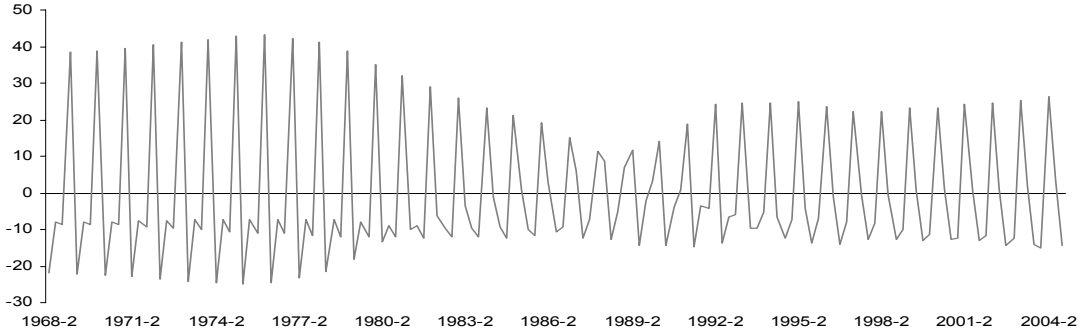
Bank Tax
Collections



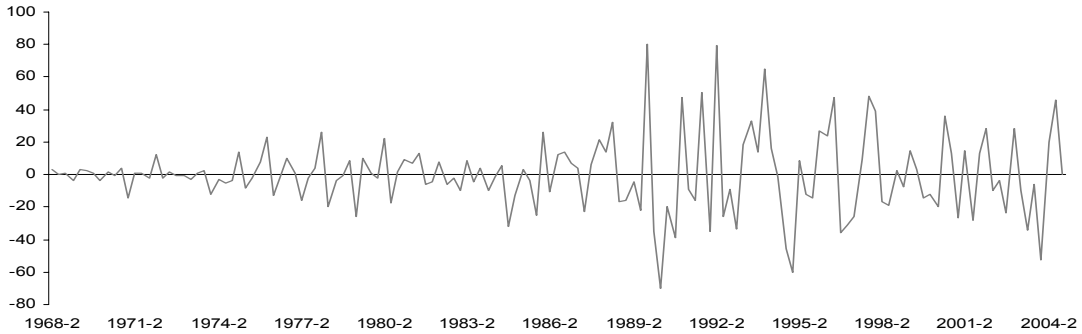
Trend



Seasonal



Irregular



Based on statutory payment schedules, banking companies make quarterly payments on estimated liability during March, June, September, and December. The preceding graphs highlight a change in the volatility of bank tax receipts beginning in 1986, which coincides with the year that a substantial number of changes to the bank tax took effect The increased volatility evident graphically since 1986 makes it difficult to establish links between underlying economic fundamentals and cash receipts. The following table illustrates the distribution of cash collections by quarter during the State fiscal year. Again, we see the pattern is quite volatile.

PERCENTAGE DISTRIBUTION OF BANK TAX GENERAL FUND COLLECTIONS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	33.01	32.68	16.55	17.76
1997-98	21.35	23.77	27.97	26.91
1998-99	28.97	23.54	24.63	22.87
1999-00	33.72	26.54	19.77	19.97
2000-01	25.99	32.84	24.86	16.31
2001-02	31.95	17.81	25.10	25.14
2002-03	30.22	25.17	15.72	28.89
2003-04	39.82	22.06	27.04	11.08
2004-05 (est.)	26.63	28.33	17.30	27.74

The following table reports cash collections attributable to the first installment, three quarterly estimated payments, March final payment and adjustments made in subsequent years on a particular tax year's liability. For tax years starting January 1, 2003 through tax years starting January 1, 2005, taxpayers pay a first installment based on 30 percent of the prior year's tax liability, rather than 25 percent. The 2001 tax year represents the latest year for which taxpayers may no longer statutorily file extensions. The table shows that, as previously discussed, payments and adjustments to liability continue for several fiscal years. The total payments on a tax year's liability are shown in the far right column. However, the table does not attempt to show the net interaction of payments on liability from different tax years, which would represent net cash collections at a point in time.

CALENDAR YEAR COMMERCIAL BANK TAX PAYMENTS ON LIABILITY ($ MILLIONS)

Tax Year	March Pre-Payment	1st Qtr. Installment	2nd Qtr. Installment	3rd Qtr. Installment	March Final	Total 2nd Year Adj.	Total 3rd Year Adj.	Total Payments
1995	89.0	202.3	184.6	186.2	15.0	(185.3)	(13.5)	478.3
1996	146.0	153.5	187.2	133.6	(29.4)	(152.3)	(5.9)	432.6
1997	112.0	136.7	198.8	199.1	67.7	(208.7)	3.3	509.1
1998	165.5	131.1	195.9	162.6	(14.2)	(215.2)	1.4	427.0
1999	130.4	141.3	146.3	204.4	(4.3)	(248.8)	25.6	394.9
2000	119.3	92.9	178.9	217.3	50.0	(232.3)	(52.1)	373.9
2001	109.6	117.6	89.6	215.5	57.8	(148.6)	(49.8)	391.8
2002	118.9	116.3	130.0	147.9	7.9	(199.8)	n/a	n/a
2003	143.7	113.2	145.5	115.9	32.1	n/a	n/a	n/a
2004	98.7	147.4	196.6	159.7	n/a	n/a	n/a	n/a

The tables in this section have attempted to demonstrate the relationship between taxpayers' cash payments and underlying liability. For example, State fiscal year 2004-05 current year estimated liability and the next year's first installment are computed from a forecast of the taxpayer's 2004 estimated liability and converted to the State fiscal year based on the statutory rules discussed earlier. These relationships are used to estimate current year cash based on historical growth ratios.

Risks to the Forecast

The bank tax forecasts involve, in large part, managing uncertainties, as follows:

- The volatile relationships between the economic and liability factors, which ultimately determine cash receipts. These relationships can be significantly altered due to collection patterns and adjustments made to prior year liability.
- Errors in the forecasts of the profits that are used to drive outyear receipts provide an additional risk to the bank tax estimate.

Analyzing industry trends and assessing risks are quite important in adjusting the bank tax forecast.

PETROLEUM BUSINESS TAX

BACKGROUND

Tax Base and Rate

Article 13-A of the Tax Law imposes a privilege tax on petroleum businesses operating in the State, based upon the quantity of various petroleum products imported for sale or use in the State. Petroleum business tax (PBT) rates have two components: (1) the base tax, whose rates vary by product type; and (2) the supplemental tax, which is imposed, in general, at a uniform rate. Both components are indexed to reflect petroleum price changes. Exemptions include sales for export from the State, sales of fuel oil for manufacturing, residential or not-for-profit organization heating use, and sales to governmental entities when such entities buy petroleum for their own use. Sales of kerosene (other than kero-jet fuel), liquefied petroleum gas, and residual fuel oil used as bunker fuel, and crude oil are also exempted.

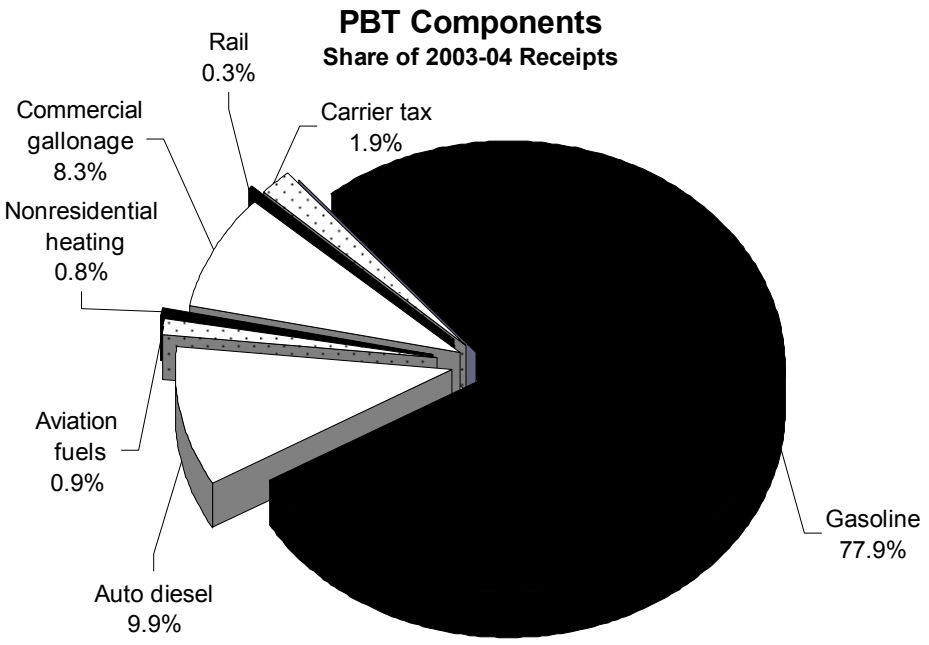
Article 13-A also imposes a petroleum business carrier tax on petroleum products purchased out-of-State but consumed in-State. This is a complement to, and administratively collected with, the fuel use tax portion of the highway use tax.

The following table displays the per gallon PBT rates for 2004 and 2005 and estimated rates for 2006. The 2006 rates reflect anticipated changes due to indexing.

PETROLEUM BUSINESS TAX RATES
(cents per gallon)

Petroleum Products	2004			2005			2006*		
	Base	Supp	Total	Base	Supp	Total	Base	Supp	Total
Automotive fuel									
Gasoline and other non-diesel	8.80	5.80	**14.60**	9.20	6.00	**15.20**	9.60	6.30	**15.90**
Diesel	8.80	4.05	**12.85**	9.20	4.25	**13.45**	9.60	4.55	**14.15**
Aviation gasoline	8.80	5.80	**14.60**	9.20	6.00	**15.20**	9.60	6.30	**15.90**
Net rate after credit	5.80	none	**5.80**	6.00	none	**6.00**	6.30	none	**6.30**
Kero-jet fuel	5.80	none	**5.80**	6.00	none	**6.00**	6.30	none	**6.30**
Nonautomotive diesel fuels	7.90	5.80	**13.70**	8.20	6.00	**14.20**	8.60	6.30	**14.90**
Commercial gallonage after credit	7.90	none	**7.90**	8.20	none	**8.20**	8.60	none	**8.60**
Nonresidential heating	4.30	none	**4.30**	4.40	none	**4.40**	4.60	none	**4.60**
Residual petroleum products	6.00	5.80	**11.80**	6.30	6.00	**12.30**	6.60	6.30	**12.90**
Commercial gallonage after credit	6.00	none	**6.00**	6.30	none	**6.30**	6.60	none	**6.60**
Nonresidential heating	3.20	none	**3.20**	3.40	none	**3.40**	3.60	none	**3.60**
Railroad diesel fuel	8.80	4.05	**12.85**	9.20	4.25	**13.45**	9.60	4.55	**14.15**
Net rate after exemption/refund	7.50	none	**7.50**	7.90	none	**7.90**	8.30	none	**8.30**

* Projected — A fuel price increase of 20.4 percent through August 2005 will result in an increase of 5 percent in the PBT rates on January 1, 2006.



Administration

The tax is collected monthly along with State motor fuel taxes. Imposition of the tax occurs at different points in the distribution chain, depending upon the type of product. Gasoline, which represents the preponderance of automotive fuel sales in the State, is taxed upon importation into the State for sale or upon manufacture in the State. Other non-diesel fuels such as compressed natural gas, methanol and ethanol become subject to the tax on their first sale as motor fuel in the State. Automotive diesel motor fuel is taxed upon its first non-exempt sale or use in the State. Non-automotive diesel fuel (such as #2 fuel oil used for commercial heating) and residual fuel usually become taxable upon the first taxable sale to the consumer or use of the product in the State.

DATA SOURCES

The primary sources of data used in the estimation and forecasting methodology for the petroleum business tax are as follows:

- *RS-43, Department of Taxation and Finance Monthly Report of Receipts.* This report contains gross and net receipts data for gasoline and diesel tax receipts.
- *Gasoline and Petroleum Business Tax Monthly Statistical Report, Department of Taxation and Finance.* This report contains monthly gallonage data for gasoline, diesel and other PBT fuels.
- *United States Energy Information Administration.* Various publications, including *the Short Term Energy Outlook, Petroleum Marketing Monthly and Annual Energy* and *Motor Gasoline Watch,* contain useful information. Available on the Internet at http://www.eia.doe.gov.
- *Various U.S. and New York government agencies, including the U.S. Bureau of Economic Analysis of the Commerce Department.* These agencies provide economic data used to develop gasoline, diesel and other fuels consumption forecasts.

STATUTORY CHANGES

Since 1983, the State has substantially changed its taxation of petroleum businesses. These revisions altered collection mechanisms, modified tax bases, and increased the level of taxation. The most significant changes occurred in 1990 with the restructuring of a gross receipts tax to a cents-per-gallon tax and the indexing of the tax rates to maintain price sensitivity. Full-year revenue history under the gallonage-based PBT, therefore, only exists starting with State fiscal year 1991-92. Full-year collections of both the basic PBT and the supplemental PBT began in State fiscal year 1992-93.

Major legislative changes under the PBT since 1994-95 are listed as follows:

- Legislation in 1995 eliminated the supplemental tax imposed on aviation gasoline and kero-jet fuel and reduced the base tax rate for those products;
- Legislation in 1996 provided a full exemption from the supplemental tax on commercial gallons, expanded to a full exemption on fuels used for manufacturing, and reduced the supplemental tax on diesel fuel by 1.75 cents per gallon;
- Legislation in 1999 reduced the tax rate on commercial heating by 20 percent; and
- Legislation in 2000 further reduced the tax rate on commercial heating by 33 percent.

FORECAST METHODOLOGY

Forecasting PBT revenue is a two-step process. First, a forecast of demand (gallons) is produced from annual (fiscal year) data and the various tax rates, adjusted for indexing, for different petroleum products are applied. Second, various adjustments are made to arrive at the forecast of cash collections, since a direct relationship does not exist between reported gallonage and cash collections. Both of these steps are discussed below.

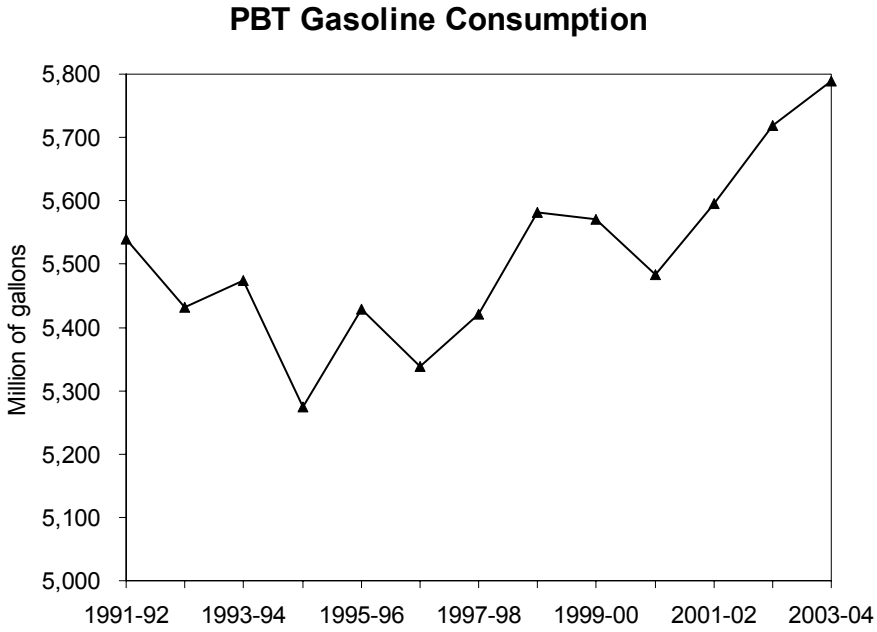
Gallonage

Gasoline

The estimate of gasoline consumption for the PBT is derived in the same manner as for the motor fuel tax. The Energy Information Administration (EIA) has reported estimated relationships between changes in real gross domestic product (GDP), national fuel prices and national gasoline demand. They estimate that a 1 percent increase in real GDP will raise gasoline demand by 0.1 percent, and a 10 percent increase in fuel prices will decrease demand by 0.3 percent. To derive a State level forecast, real New York disposable income growth is substituted for GDP.

PERCENT CHANGE IN EXOGENOUS VARIABLES

	Real NY Disposable Income	Gasoline Price
1996-97	1.9	7.8
1997-98	2.4	(5.0)
1998-99	4.2	(12.4)
1999-2000	0.9	21.7
2000-01	4.1	18.6
2001-02	(0.1)	(9.3)
2002-03	3.0	5.7
2003-04	2.8	8.8
2004-05 (est.)	2.4	21.0



Diesel

The estimate of automotive diesel consumption for the PBT is derived in the same manner as for the motor fuel tax. Consumption of diesel fuel is forecast with a simple econometric model relating consumption to a broad measure of economic activity. The dependent variable is the number of gallons of diesel taxed in New York State. The explanatory variable is real GDP. The model was most recently estimated with 119 observations of quarterly data (1975:1 to 2004:3). A dummy variable is used to isolate the impact of changes in tax remittance procedures in State fiscal year 1988-89. A quarterly dummy variable is used to reflect seasonal consumption patterns. The equation is estimated in log form and is corrected for first-order serial correlation. The estimated equation, with t-statistics in parentheses, is as follows:

DIESEL CONSUMPTION MODEL

$$\text{Log(Diesel gallons}_t) = \underset{(15.92)}{6.88} + \underset{(27.44)}{1.34}\ \text{log(GDPreal}_t) + \underset{(10.07)}{0.63}\ \text{Dummy}_t - \underset{(-6.93)}{0.10}\ \text{Dqt1}_t + u_t$$

$$u_t = \underset{(-5.0)}{-.42} * u_{t-1}$$

R-Bar Squared	0.9584
Durbin-Watson Statistic	1.9949
Root Mean Squared Error	0.0834
Number of Observations	119

Utility Residual Fuels

Residual fuels are burned by electric utilities to produce electricity. They can switch to natural gas (which is not subject to the PBT) depending upon relative prices and State regulatory policy, which requires utilities to burn residual fuels during times of high residential demand for natural gas.

Rates/Indexing

Since 1990, basic and supplemental PBT tax rates have been subject to separately computed annual adjustments on January 1 of each year to reflect the change in the Producer Price Index for refined petroleum products (PPI) for the 12 months ending August 31 of the immediately preceding year. The tax rates, therefore, increase as prices rise and decrease as prices fall. The monthly history of the PPI is published by the Bureau of Labor Statistics of the United States Department of Labor. The Division of the Budget forecasts the PPI based on historical data. Beginning January 1, 1996, the PBT rate index has been adjusted annually subject to a maximum change of 5 percent of the current rate in any year. As a result, the PBT rate index decreased by 5 percent on January 1, 2003, and increased by 5 percent on January 1, 2004 and January 1, 2005. The PPI for January 1, 2006, is projected to increase by 20.4 percent, triggering a tax rate index increase of 5 percent for 2006.

It should be noted that, in general, the statute also requires the base and the supplemental gasoline rates to be rounded to the nearest tenth of one cent. As a result, the actual increases or decreases in the tax rates from indexing are usually slightly different than the full percentage change dictated by the tax rate index. Rates are also affected by statutory changes that may complement or offset the changes due to indexing.

Adjustments

After generating a demand forecast and applying the appropriate tax rates, adjustments are made for refunds, credits, pay schedule lags, accounting delays, historical and year-to-date collection patterns, tax law changes, tax evasion and Federal and State enforcement measures.

Cash Receipts

See Motor Fuel section for component graphs for gasoline and diesel taxes.

PERCENTAGE DISTRIBUTION OF CASH RECEIPTS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	25.1	24.7	24.2	26.0
1997-98	24.4	25.6	24.8	25.2
1998-99	24.5	26.6	25.0	23.9
1999-2000	25.8	26.6	25.6	22.0
2000-01	24.4	25.4	25.2	25.0
2001-02	24.2	24.1	24.8	26.9
2002-03	24.7	27.7	24.0	23.6
2003-04	24.6	26.8	22.8	25.7
2004-05 (est.)	24.6	25.6	24.3	25.5

Risks to the Forecast

Historically, PBT receipts have remained relatively stable under a wide variety of political and economic conditions. However, due to the difficulty in predicting fuel prices, inventories, and weather conditions, the current PBT revenue estimate has some inherent risks. Among these risks, the variation of fuel prices is the most noteworthy. Global economic and political conditions, as well as market forces, can affect fuel prices. For example, between January 1999 and October 1999, the world crude oil price increased by 116 percent. Changes in fuel prices may change fuel consumption, especially residual fuel consumption. The growth rate of utility residual fuel consumption exhibited volatility during the last five years ranging from -27 percent to 126 percent. Fuel price changes may also change fuel inventories, the PBT index, and tax rates. Fortunately, the portions of the PBT most affected by price changes comprise a small portion of overall receipts.

ESTATE TAX

BACKGROUND

Tax Base and Rate

New York imposes a tax on estates of deceased New York residents, and on that part of a nonresident's net estate made up of real and tangible personal property located within New York State. The tax applies to that portion of the estate in excess of any taxable gifts already made. Until February 1, 2000, the tax had progressive rates, ranging from 2 percent of the first $50,000 of net taxable transfers to 21 percent of net taxable transfers in excess of $10.1 million. For those dying on or after October 1, 1998, and before February 1, 2000, a non-refundable unified tax credit of $10,000 eliminated the State estate tax for estates valued up to $300,000.

Since February 1, 2000, the estate tax has been equal to the Federal credit allowable for state death taxes paid. New York also automatically conformed State law to the unified credit provisions specified in Federal law, but capped the maximum credit to exempt the first $1 million in the taxable value of an estate. In February 2000, Federal law set the unified credit at $675,000 and contained a schedule that increased the credit to $1 million by 2006. (See table below.) In addition, consistent with Federal law, 100 percent of tax liability is due within nine months of the decedent's death.

Estates of decedents dying after 2004 will be subject to a graduated rate structure with tax rates that range from 0.8 percent on adjusted taxable estates in excess of $40,000 but less than $90,000, and up to 16 percent on adjusted taxable estates of $10,040,000 or more.

Current Federal law converted the old unified credit to an exemption and will continue to increase the value of the exemption until it reaches $3.5 million in 2009. As reported, State law capped the exemption at $1 million, effective in 2002. (See table below.)

STATE UNIFIED CREDIT/EXEMPTION AMOUNTS
(thousands of dollars)

Year	Prior to 2001 Federal Tax Reduction Program	After 2001 Federal Tax Reduction Program
2000, 2001	675,000	675,000
2002, 2003	700,000	1,000,000
2004	850,000	1,000,000 [1]
2005	950,000	1,000,000 [1]
2006 and thereafter	1,000,000	1,000,000 [1]

[1] New York State law caps the unified exemption set in Federal law at $1 million. The Federal law increases the amount to $1.5 million in 2004 and 2005; $2 million in 2006, 2007, and 2008; and $3.5 million in 2009.

In addition, the Federal law phases out the Federal credit for state death taxes over four years, by 25 percent per year. The credit is repealed for the estates of decedents dying after 2004. In 2005, it will become a deduction until the phase-out of the Federal estate tax in 2010. The provisions of New York's law setting the estate tax liability equal to the Federal credit for state death taxes conforms to the Federal law as it existed on July 22, 1998. As a result, New York estate tax liability will be unaffected by the phase-out of the Federal credit for state death taxes.

Administration

The estate tax is due on or before the date fixed for filing the return. To avoid interest charges, payment must be made within nine months after the date of death. The Commissioner of Taxation and Finance may grant an extension of 12 months from the date fixed for payment and, in extreme cases, may extend the time of payment to four years from the date of death.

DATA SOURCES

The primary sources of data used in the estimation and forecasting of the estate tax are as follows:

- *Monthly estate tax receipts from the Department of Taxation and Finance on report AM043.*
- *Monthly estate tax receipts from the State of New York Office of the State Comptroller.*
- *New York State Estate Tax, Analysis of Final Returns OTPA.*
- *Daily Collections OTPA.*
- *Various U.S. and New York government agencies, including the U.S. Bureau of Economic Analysis of the Commerce Department.*

STATUTORY CHANGES

Legislation enacted in 1990 modernized the administration of the estate tax, imposed a State generation-skipping transfer tax, and revised the method for computing liability.

Legislation enacted in 1991 increased the estimated estate tax payable within six months of the date of death from 80 percent to 90 percent, with the balance of the tax due payable within nine months of the date of death.

Legislation enacted in 1994 provided a special estate tax credit of 5 percent of the first $15 million of qualified assets for estates consisting of small business interest, and increased the maximum unified credit allowed against State estate tax liability from $2,750 to $2,950.

Legislation enacted in 1995 protects the value of a decedent's principal residence from estate tax liability. A maximum of $250,000 of equity in the decedent's principal residence may be deducted from the value of the New York gross estate. This special deduction reduces the tax burden of transferring family homes, particularly those which are the primary asset of the estate.

Legislation enacted in 1997 significantly reduced State estate tax collections and changed the way the New York State estate tax is imposed. In two steps, the State's estate tax rate structure, credits and exemptions were eliminated and, instead, the State will only receive an amount equal to the maximum Federal credit for state death taxes (the "pick-up tax").

The first phase of the estate tax legislation increased the amount of the tax credit from $2,950 to $10,000. In addition, the provision requiring 90 percent of the estate tax to be paid within six months of death to avoid underpayment interest was changed to allow seven months.

In the second phase, for those dying on or after February 1, 2000, the estate tax was converted to a "pick-up tax", and the requirement for 90 percent of the estate tax to be paid within seven months of death to avoid underpayment interest was changed to allow nine months for payment of total liability, which is consistent with Federal law.

The enacted legislation also conforms with increases in Federal unified credit and gradually increases the State's unified credit to exempt taxable estates of up to $1 million.

On March 23, 2001, the Federal estate law was amended to repeal the tax over a ten-year period. The unified credit was converted to an exemption and New York State automatically conforms up to $1 million. The Federal credit for state death tax is reduced by 25 percent per year beginning in 2002 and is eliminated in 2005 (New York does not automatically conform to the change). The New York estate tax is imposed pursuant to the Internal Revenue Code of July 22, 1998; therefore, New York residents will generally not be affected by any changes to Federal statute after that date.

FORECASTING METHODOLOGY

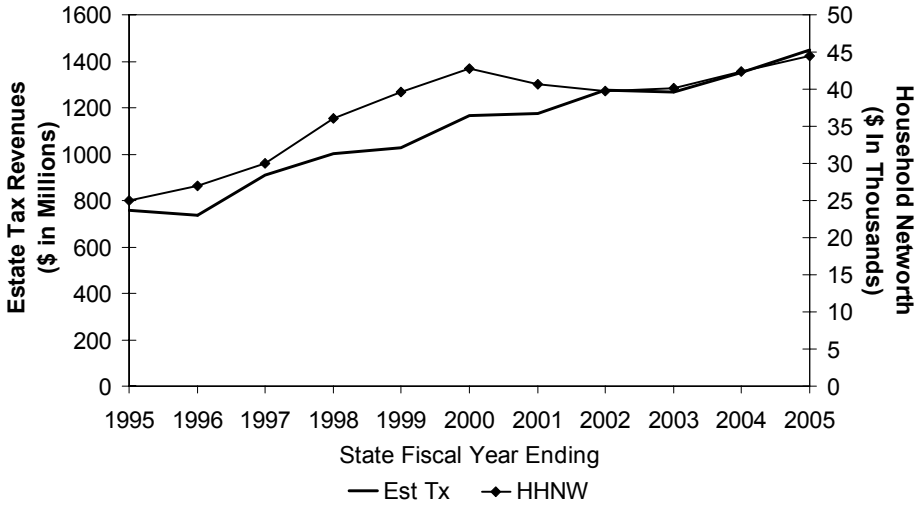
Economic variables alone cannot explain variances in revenues from this source. Not only is it difficult to forecast wealthy taxpayer mortality, it is also difficult to forecast the taxability of the decedent's estate. To the extent that the estate is left to a spouse, or to a charitable trust, there is no liability. In addition, less than one-half of one percent of estates account for over 51 percent of the tax liability. The number of estates required to pay the tax has also declined over time, in part because of the change to a "pick-up tax", the conversion of the unified credit to an exemption and its increase from $700,000 to $1 million on January 1, 2002. While a model (see below) using household assets and stock market indicators fits the payment data for the smaller estates, the value of new Federal exemptions and the rapidly increasing unified credit complicate the estimate. In projecting current year receipts, an analysis of historical trends supplements the econometric analysis.

Econometric and Statistical Analysis

For purposes of projecting estate taxes, collections are separated into categories of super large (tax payment of at least $25 million), extra large (tax payment of at least $4 million but less than $25 million), large estate (tax payment of at least $500,000 but less than $4 million), and small estates (less than $500,000). To forecast collections in the super- and extra-large categories, the number of super-large and extra-large estates over the last 15 years are fitted to a statistical distribution. This distribution is then used to predict the number of super- and extra-large filers in future fiscal years. The same method is applied to the average real payment in each category. Once the predicted number of estates is multiplied by the average payment, an inflation factor, based on household net worth, is applied to determine the nominal growth rate of the taxable base.

For the remainder of estate tax payments, a regression equation is estimated with quarterly collections as the dependent variable. The main independent variable is a measure of household net worth which proxies for the value of the estates. The measure uses household net worth at the minimum of the value at time of death or its value nine months later. This corresponds to the valuation methodology in State statute. The revenue elasticity with respect to household net worth measured over the last five years of data is 0.7.

Constant Law Estate Collections vs. Nationwide Household Net Worth



	2001-02	2002-03	2003-04	2004-05
Min. Household Net Worth (percent change)	(4.8)	(4.0)	6.2	3.2
Total Collections (millions)	761.4	700.9	732.3	800.3
Impact of Law Change	(392.5)	(428.4)	(483.3)	(502.4)
Average Revenue Elasticity[1]	0.7	0.7	0.8	0.7

[1]This elasticity is derived using the last five years of annual fiscal year data and taking the average of endogenous and exogenous variables. Then, one calculates the percent change in the endogenous variable resulting from a 1 percent change in the exogenous variable.

Revenue History

ESTATE TAX RECEIPTS
STATE FISCAL YEAR ENDING MARCH 31
(millions of dollars)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 (Estimated)
No. of Estates	20,869	20,252	18,704	20,946	20,760	18,205	12,505	6,242	4,484	3,225	2,317
Actual Receipts	696	679	792	919	946	975	717	761	701	732	800
Constant Law Receipts	758	738	909	1,001	1,029	1,165	1,174	1,274	1,262	1,353	1,450
Growth %	.04	(2.6)	23.1	10.1	2.8	13.2	0.7	8.5	(0.9)	7.2	7.2
Small Estate[1]	401	416	397	407	465	461	332	313	262	264	256
Large Estate	153	158	152	195	259	229	225	209	248	209	212
Super/ Extra-Large Estates	142	105	243	317	222	285	160	239	191	259	332

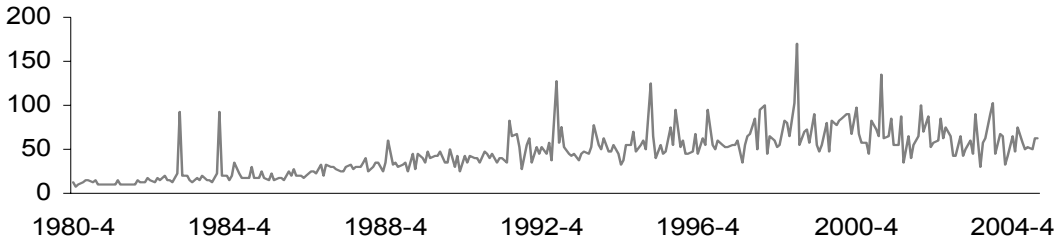
[1] Estimated small estates include CARTS and all refunds are subtracted from small estates.

Cash Receipts

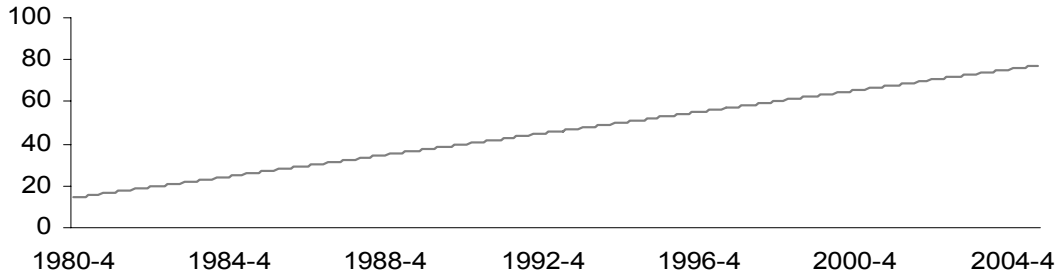
As expected, estate tax cash receipts are dominated by a large irregular component around a stable upward trend. Much of estate tax collections is dominated by random events.

Collection Components
(millions of dollars)

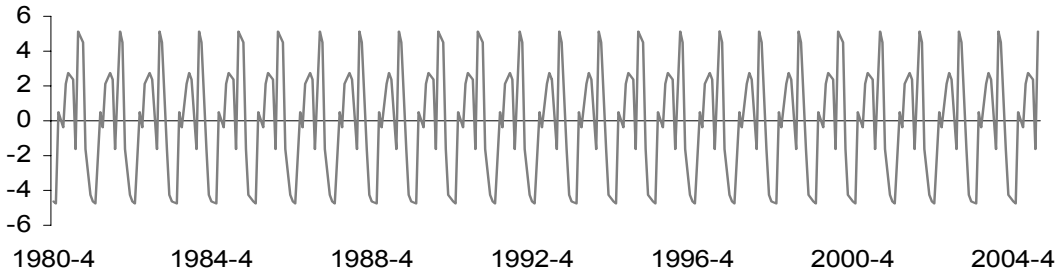
Estate Tax
Collections



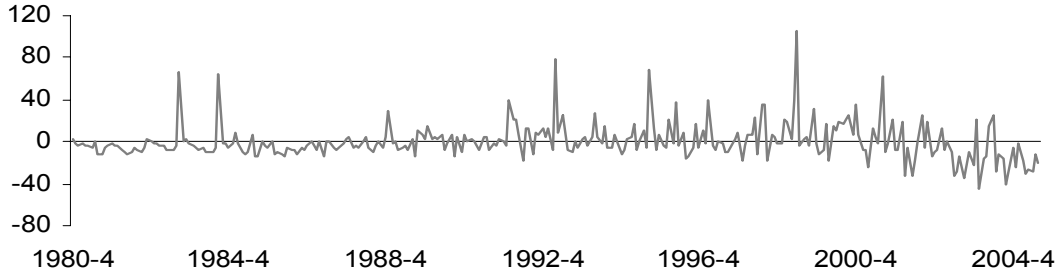
Trend



Seasonal



Irregular



PERCENTAGE DISTRIBUTION OF GENERAL FUND COLLECTIONS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	23.5	28.8	26.5	21.2
1997-98	26.9	32.1	23.6	17.4
1998-99	22.1	31.8	26.7	19.4
1999-00	20.5	26.8	27.2	25.5
2000-01	32.9	25.5	21.8	19.8
2001-02	25.7	18.3	28.6	27.4
2002-03	28.6	28.8	21.2	21.4
2003-04	22.5	27.6	28.3	21.6
2004-05 (est.)	26.7	22.7	24.8	25.8

REAL ESTATE TRANSFER TAX

BACKGROUND

Tax Base and Rate

The New York State real estate transfer tax (RETT) is imposed on each conveyance of real property or interest therein when the consideration exceeds $500, at a rate of $4.00 per $1,000 of consideration. The tax became effective August 1, 1968. Prior to May 1983, the rate was $1.10 per $1,000 of consideration. An additional "mansion" tax, effective July 1, 1989, is imposed on conveyances of residential real property for which the consideration is $1 million or more at a rate of one percent of the total consideration attributable to residential property.

The tax rate imposed on conveyances into new or existing real estate investment trusts (REITS) is $2.00 per $1,000 of consideration.

For deeded transfers, the tax is paid to a recording agent (generally the county clerk). For non-deeded transactions, payments are made directly to the Commissioner of the Department of Taxation and Finance. All payments are due within 15 days of the transfer. For counties that had more than $1.2 million in liability during the previous calendar year, payments received between the first and fifteenth day of the month are due to the Commissioner by the twenty-fifth day of the same month. Payments received in such counties between the sixteenth and final day of the month are due to the Commissioner by the tenth day of the following month. Payments from all other counties are due to the commissioner by the tenth day of the month following their receipt.

In the State fiscal year 2003-04, there were 520,681 conveyances, which generated $363 million in RETT (excluding mansion tax) liability. About 1.2 percent (6,150) of these were residential conveyances that involved consideration of $1 million or more and generated $150 million in mansion tax liability. Refunds and CARTS are insignificant.

DATA SOURCES

The primary sources of data used in the estimation and forecasting methodology for the RETT are as follows:

- *RS-43*, *Department of Taxation and Finance Monthly Report of Receipts*. This report contains gross and net receipts data.
- *RETT 7, Department of Taxation and Finance.* This form reports the monthly liability for each county. It is an important source of information since some counties do not remit payments to the Commissioner according to the statutory schedule.
- *Various U.S. and New York government agencies, including the U.S. Bureau of Economic Analysis of the Commerce Department.* These agencies provide economic data used in the econometric equations.

FORECAST METHODOLOGY

A regression equation is estimated with fiscal year liability (excluding the mansion tax) divided by the tax rate, which yields the dollar value of transfers, as the dependent variable. Independent variables in the model are: the mortgage rate, New York housing starts multiplied by an average New York housing price which yields a "value of sold housing" variable, Manhattan vacancy rates, and the national price deflator for nonresidential construction (buildings and other). Mansion tax receipts are estimated using a separate equation, in which the average New York housing price is the primary independent variable.

A dummy captures the large increase in collections in SFY 2001-02. The typical payment behavior of all counties is then used to estimate State cash receipts. As the fiscal year progresses, year-to-date collections and liability are additional factors that determine the current-year estimate.

RETT (NON-MANSION TAX EQUATION)

Dollar Value of Transfers = 11129 - 2415*[mortgage rate] + .0032*[value of sold housing] +
(3.45) (-10.0) (9.73)
58933*[U.S. construction deflator, buildings] - 10.40*[square of Manhattan vacancy rates]
(13.4) (-7.3)

R-Bar Squared	0.986
Durbin-Watson Statistic	1.9156
Standard Error of the Regression*	$12.0 million
Number of Observations	34

*Normalized

RETT (MANSION TAX EQUATION)

Mansion Tax Receipts = -119.4 + 1.0*[avg home price] + 22.63*[Dummy for SFY 2001 Increase]
(-10.3) (14.26) (2.13)

R-Bar Squared	0.944
Durbin-Watson Statistic	1.48
Standard Error of the Regression	$10.0 million
Number of Observations	14

PERCENT CHANGE IN EXOGENOUS VARIABLES
STATE FISCAL YEARS 1999-2000 TO 2004-05

Exogenous Variable	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05 (Estimated)
Mortgage rate (level)	7.6	7.8	7.0	6.4	5.8	6.0
Value of sold housing	18.7	14.5	19.6	11.1	7.8	8.9
U.S. construction deflator, buildings	4.1	3.9	3.6	2.4	2.4	6.0
Square of Manhattan vac. rates (level)	115.6	35.7	291.6	513.0	538.2	484.0
Average House Price	8.7	10.0	9.7	12.6	6.2	5.1

ELASTICITIES

Exogenous Variable	Revenue Elasticity - Last Five Years*
Mortgage rate (level)	(.21)
Value of sold housing	.34
U.S. Construction deflator, buildings	.76
Square of Manhattan vac. rates (level)	(.04)
Average House Price	2.27

* Using last five years of annual fiscal year data, take the average of endogenous and exogenous variables. Calculate the percent change in the endogenous variable resulting from a one percent change in the exogenous variable.

Recent Experience

As previously noted, actual State cash collections are dependent upon county payment behavior, particularly the counties comprising New York City and Long Island. Although the county payment schedule is statutory, there is no penalty for late payment. This becomes an important factor when the State closes its fiscal year. The closeout date (the last day receipts are attributed to the current fiscal year) for the real estate transfer tax is approximately March 25. Although these counties have payments due on the twenty-fifth of each month,

payment by this date is rare. Typically, though not always, the Long Island counties make this payment between the twenty-fifth and final day of the month (at the end of the State's fiscal year; this payment is therefore attributed to the following fiscal year), and except for Richmond County, New York City counties pay sometime during the following two months.

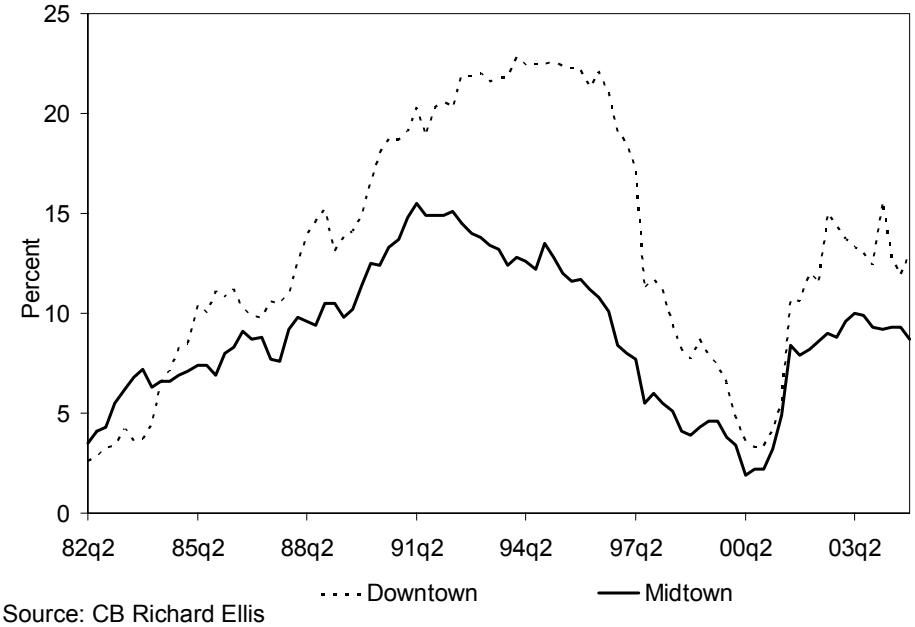
Real estate transfer tax collections are dependent on the total value of real estate conveyances, which in turn are a function of the number of conveyances and the price of each individual conveyance. Between fifty percent and sixty percent of monthly collections are the result of activity in New York City and Long Island. Real estate values and the number of transfers in this geographical area are subject to more cyclical behavior than in the remainder of the State. This is due to the nature of the local economy, which is more dependent on financial services than the remainder of the State and the nation as a whole, and to the sometimes speculative nature of expected returns on commercial real estate transactions.

During State fiscal year 2003-04, collections were driven by strong residential demand. Collections were also boosted by the increasing percentage of residential transfers subject to the "mansion tax."

Risks to the Forecast

Errors in the forecasts of the exogenous variables provide a degree of risk to the real estate transfer tax forecast. Forecast error in prior years can largely be attributed to the forecasts of the exogenous variables and large unanticipated transfers. Variation in the estimate may also occur as a result of administrative changes or unanticipated legislative action.

Manhattan Commercial Vacancy Rates



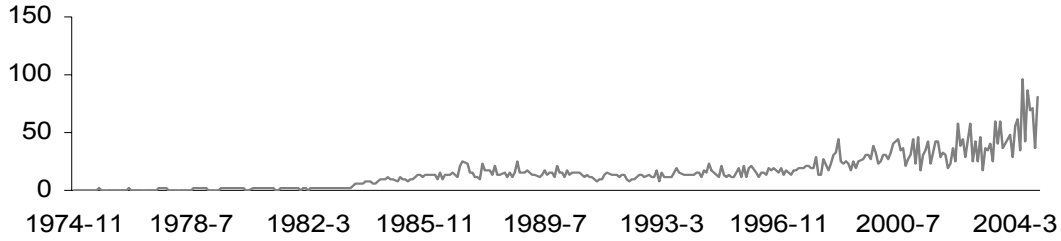
Source: CB Richard Ellis

Cash Receipts

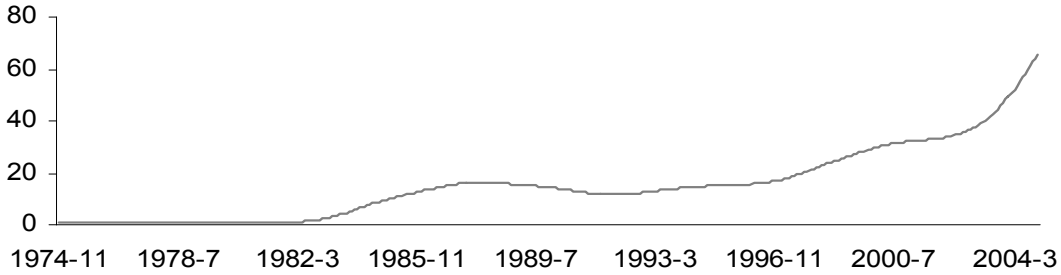
Note the accelerating trend in collections in recent years and large irregular values indicating the significant volatility in this series.

Collection Components
(millions of dollars)

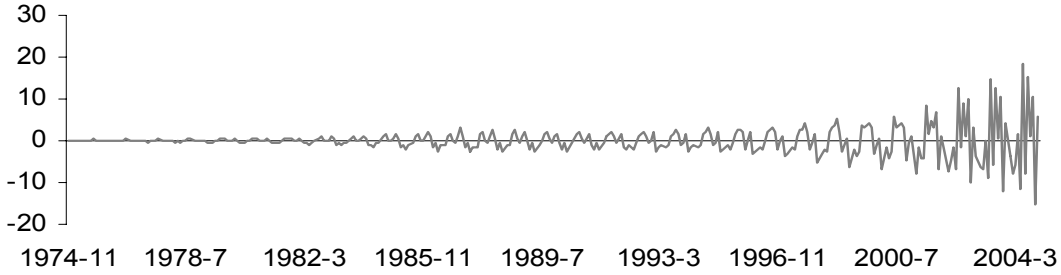
Real Estate Transfer Tax
Collections



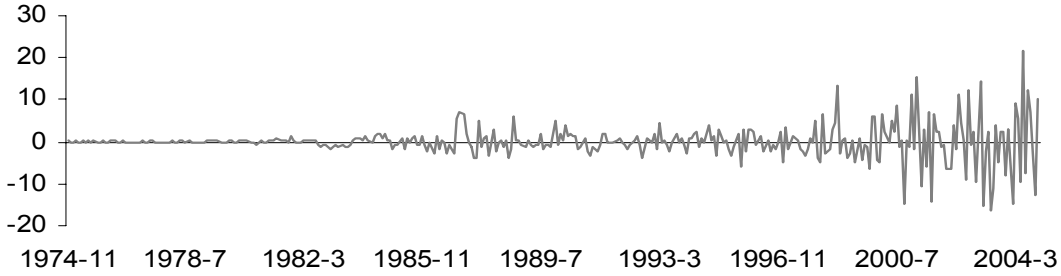
Trend



Seasonal



Irregular



PERCENTAGE DISTRIBUTION OF CASH RECEIPTS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	22.5	28.3	26.5	22.7
1997-98	23.5	26.6	26.1	23.8
1998-99	21.9	33.9	23.4	20.8
1999-2000	21.0	25.8	27.8	25.4
2000-01	24.5	28.0	19.4	28.1
2001-02	22.7	29.2	28.1	20.0
2002-03	27.0	24.8	27.6	20.6
2003-04	21.8	24.8	27.5	25.9
2004-05 (est.)	26.1	27.1	25.9	20.9

PARI-MUTUEL TAXES

BACKGROUND

Tax Base and Rate

Since 1940, the pari-mutuel tax has been levied on pari-mutuel wagering activity conducted first at horse racetracks and later at simulcast theaters and off-track betting (OTB) parlors throughout the State. Each racing association or corporation pays the State a portion of the commission (the "takeout") withheld from wagering pools (the "handle") as a tax for the privilege of conducting pari-mutuel wagering on horse races.

In general, the tax varies based on the type of racing (thoroughbred or harness), the place where the bet is made (on-track or off-track), and the type of wager (regular, multiple, or exotic). Currently, all tracks, other than the New York Racing Association (NYRA) tracks of Aqueduct, Belmont, and Saratoga, have an effective tax rate of 0.5 percent on all bets. NYRA has a flat tax rate of 1.6 percent, and off-track betting corporations have an effective tax rate of 0.92 percent.

In the 1980s, the on-track harness handle was over $850 million and the effective tax rate was over 8 percent. Currently, the handle is marginally over $100 million and the tax rate is 0.5 percent, providing taxes of $0.4 million. Similarly, the on-track thoroughbred racing handle has fallen from over $800 million to less than $600 million and its effective tax rate from over 9 percent to less than 2 percent. Off-track betting, which started in 1972, had rapid growth in the 1970s and 1980s, as new facilities came on line and the State increased the hours of operation and types of betting. Over this period, the OTB handle has grown to $1.8 billion, but its effective tax rate was reduced from over 3 percent to 0.94 percent by 2000 and now is 0.92 percent.

Administration

The tax is collected by each on-track and off-track racing association, or corporation, and remitted to the State Commissioner of Taxation and Finance each month on the last business day. Such taxes cover the liability due for the period from the 16th day of the preceding month through the 15th day of the current month.

DATA SOURCES

Data on the pari-mutuel tax come from various sources:

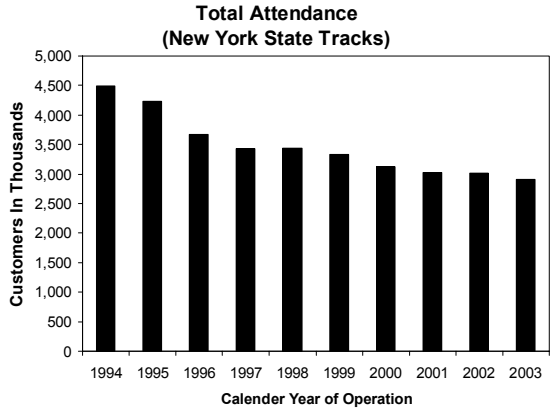
- *Department of Taxation and Finance.* Daily and monthly collection reports are received, compiled and analyzed.
- *OTB and Racetracks.* Monthly reports are collected from OTB, and various racetracks provide data upon request.
- *New York State Racing and Wagering Board.* The Board provides annual reports and additional information upon request.
- *Office of the State Comptroller.* Monthly collections reports are received and analyzed.

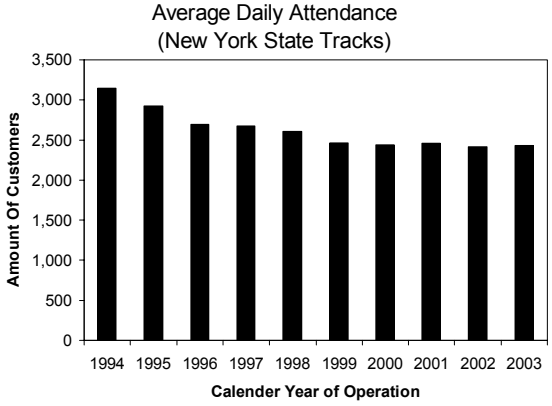
STATUTORY CHANGES

Over the last two decades, increases in OTB activity and simulcasts, which now account for 80 percent of the statewide handle, have been accompanied by a corresponding decline in handle and attendance at racetracks. To encourage the continuing viability of these tracks, the State authorized higher takeouts to support capital improvements at NYRA tracks and, more importantly, reduced its on-track tax rates by 30 percent to 90 percent at thoroughbred

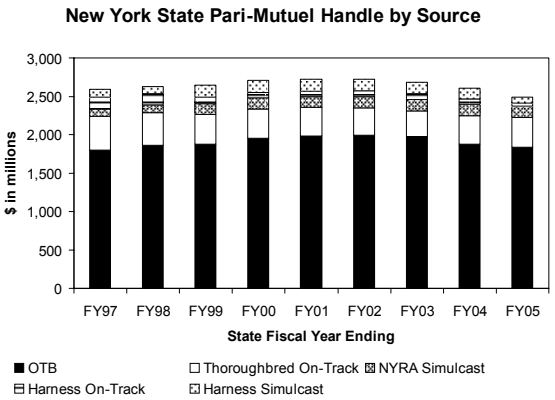
and harness tracks. The State also assumed the costs for regulation and drug testing. In 1995, the State increased the takeout on NYRA multiple wagers (involving two horses), while lowering the takeout on NYRA regular wagers (involving one horse). Recent legislation extended the authorization for telephone betting, in-home simulcasting experiments, expansion of track and OTB simulcasting through July 1, 2007, and lowered the tax rates on simulcast wagering. It also eliminated the State franchise fee on nonprofit racing associations (NYRA), effective January 1, 1998. In addition, the tax rate on NYRA bets was cut from 3.0 percent to 2.6 percent in 1999, and to 1.6 percent in 2001. The NYRA franchise would have been extended to 2013, if NYRA installed VLTs (Video Lottery Terminals) in Aqueduct racetrack on or before March 1, 2004. Since NYRA was not able to initiate VLT operation by that date, the NYRA franchise will expire on December 31, 2007. Legislation enacted on May 16, 2003, instituted a regulatory fee to directly fund the State's regulation of racing, authorized tracks to set their own takeout rates within a narrow range, allowed unlimited simulcasts, and eliminated mandatory fund balances for telephone betting accounts.

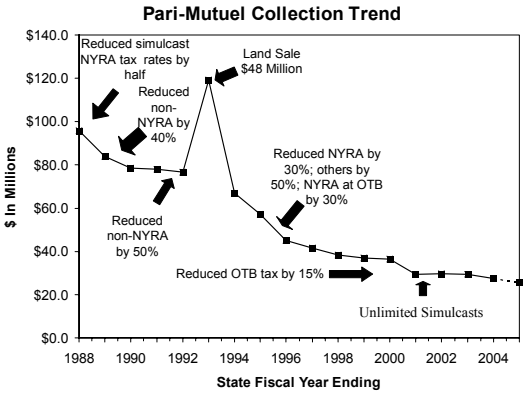
Trends in Attendance: All Tracks





Trends in Wagering





FORECAST METHODOLOGY

Since the tax is a function of the kind of wager (bet), type of race, and the place where wagers are made, the starting point is the analysis of the trends in the data on handle in the various modes of betting. Several econometric studies have been performed on this source. However, changes to the tax base, increased competition from new racing venues, VLTs (Video Lottery Terminals), and casino and Native American gaming have made traditional econometric estimation difficult. It now appears that variations in weather conditions and the length of racing seasons are the most relevant factors affecting the tax base.

While earlier periods witnessed significant changes in the distribution of regular, multiple, and exotic wagers as the State authorized increases in the number and types of wagers, evidence from recent periods suggests that the relative distribution has remained stable. In 2003, New York State tracks reported that 38 percent of the wagers were regular, 36 percent multiple, and 26 percent exotic. However, since statutory changes can affect this distribution, individual trends are monitored to improve forecasting accuracy.

The expansion of OTBs has contributed, in part, to the continuing downward trends in on-track handle and attendance. Increased simulcasting in recent years has been a factor in off-track wagering now being 80 percent of the statewide handle. Accordingly, time series models, with suitable adjustments for law changes and number of racing dates, are used to separately forecast thoroughbred, harness and OTB handles. At this point, tax rates are applied to the forecast of handles to determine tax revenues. In 2004-05, State taxes are estimated at $25.6 million on a handle of $2.7 billion, producing an effective tax rate of 0.9 percent. Given the low tax rates, a variance of $1 million in handle creates only a $9,000 variance in receipts. Thus, only factors that produce large and unexpected swings in bettor behavior will produce a significant error in the estimate.

Revenue History

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Actual	57.3	45.1	41.6	38.4	36.9	36.3	29.3	29.6	29.5	27.5	25.6
Constant Law	63.8	60.6	56.2	52.5	50.4	50.5	47.0	49.4	48.0	46.0	44.1
Constant Law Percent Growth	(5.2)	(5.0)	(7.3)	(6.6)	(4.0)	0.2	(6.9)	5.0	(3.0)	(4.2)	(4.1)

PERCENTAGE DISTRIBUTION OF GENERAL FUND COLLECTIONS

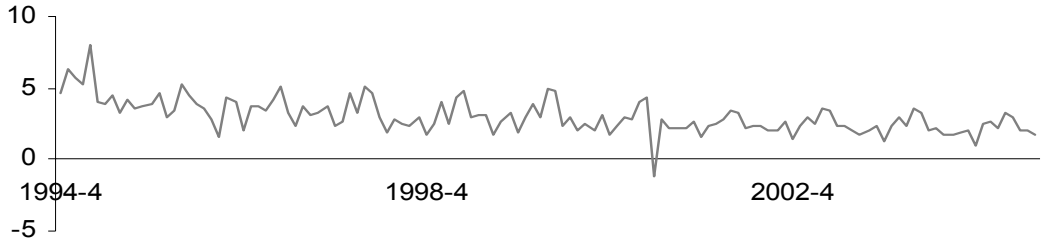
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1995-96	25.5	29.2	22.9	22.4
1996-97	22.8	30.6	22.3	24.3
1997-98	25.5	34.0	20.2	20.3
1998-99	22.6	31.9	24.8	20.7
1999-00	23.8	35.2	20.1	20.9
2000-01	24.5	38.4	12.9	24.2
2001-02	21.8	32.3	22.8	23.1
2002-03	23.4	32.2	23.2	21.2
2003-04	23.8	33.2	22.1	20.9
2004-05 (est.)	23.9	32.8	21.5	21.8

Cash Receipts

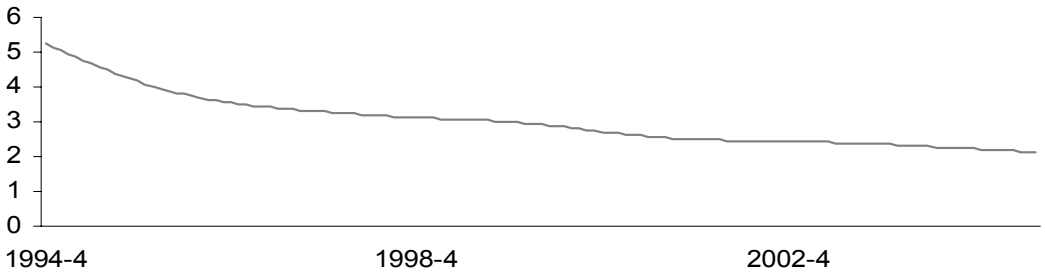
Clearly, the trend in collections continues to be negative, reflecting the factors discussed above including declining attendance and reductions in tax rates. There is a clear seasonal pattern with collections higher in the summer and fall.

Collection Components
(millions of dollars)

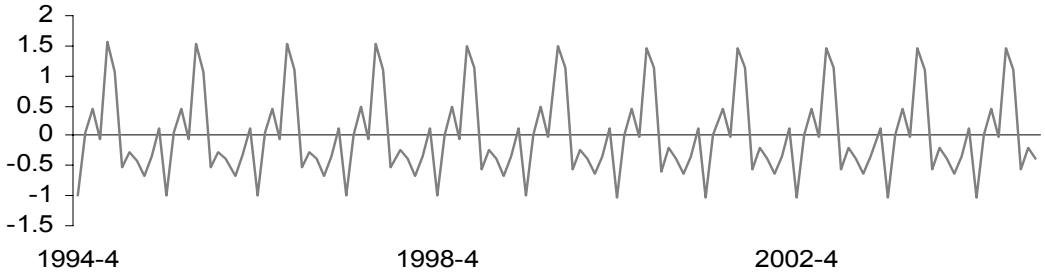
Pari-Mutuel Tax
Collections



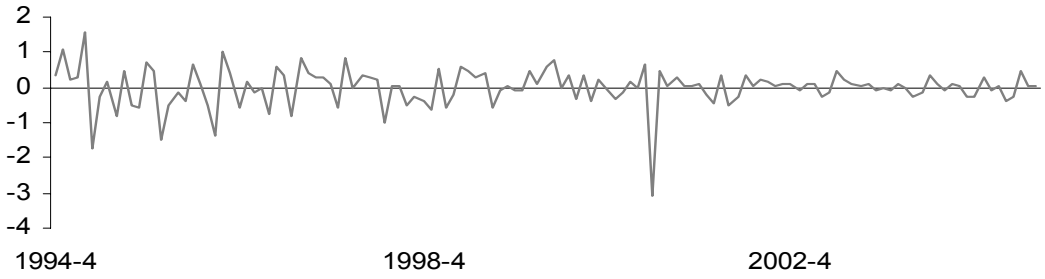
Trend



Seasonal



Irregular



Risks To Forecast

In October 2001, legislation authorized the operation of VLTs in several New York State racetracks. The Division of the Lottery began the VLT program at the Saratoga Equine Sports Center on January 28, 2004. The Finger Lakes Race Track started VLT operations on February 18, 2004, the Buffalo Trotting Association, Inc. began offering VLTs on March 17, 2004, and Monticello Raceway Management, Inc. commenced VLT services on July 1, 2004. Due to delays from financing difficulties and ownership issues, Batavia Downs and Vernon Downs tracks are expected to start VLT operations in the spring of 2006. Statute provides that the racetracks are paid a percentage commission from the revenue, after the prizes are paid, then a percentage of revenues is diverted to purses and breeders funds. A recent court ruling declared the VLT program to be unconstitutional; the ruling was appealed and a decision is expected in the spring of 2005. Aqueduct and Yonkers tracks are expected to wait for the court ruling and are anticipated to initiate VLT operations in the spring of 2006. There is a risk that the upcoming ruling would find the VLT program unconstitutional, requiring remedial legislation. In contrast, competition from VLTs and other gaming venues could cause some of the OTBs to close down a number of branches, or a reduction in the number of racing days due to continuing declines in handle at the tracks and increased competition from other forms of gambling such as casinos could decrease receipts.

LOTTERY

BACKGROUND

Tax Base and Rate

In 1966, New York State voters approved a referendum authorizing a State lottery, and ticket sales commenced under the auspices of the Division of the Lottery (the Division). The Division, which manages the sale of lottery tickets, currently operates five types of games.

1. Instant games, in which most prizes are paid immediately;
2. Lotto games, which are pari-mutuel, pick-your-own-numbers games offering large top prizes with drawings conducted eleven times weekly: seven 5-of-39 draws (Take 5), two 6-of-59 draws (Lotto 59), and two multi-jurisdictional drawings (Mega Millions). For the Lotto 59 game and Mega Millions game the value of any prize not won is added to the top prize in the subsequent drawing. For Take 5, if there is no first prize winner, the monies will be added to the second prize pool;
3. Daily numbers games, which are fixed-odds games with daily drawing in which players select either a three-digit number (Daily Numbers Game) or a four-digit (Win 4) game; and Instant Win, an add-on game to Daily Numbers and Win 4;
4. Keno-like games, which are pick-your-own 10 of 80 numbers games with drawings conducted either daily (Pick 10) or every four minutes (Quick Draw). Lottery pays top prizes of $500,000 in Pick 10 and $100,000 in Quick Draw; and
5. Video Lottery games, which are lottery games played on video gaming devices. They are allowed at selected thoroughbred and harness tracks.

Under current law, the Comptroller, pursuant to an appropriation, distributes all net receipts from the lottery directly to school districts for the purposes of providing school aid. This aid also provides special allowances for textbooks for all school children and additional amounts for pupils in approved State-supported schools for the deaf and the blind.

After earmarking for prizes, the Division uses a portion of net sales (not exceeding 15 percent) for its administration, and the remainder is available to support education. The statutory allocation for education for Lotto 59 and Instant Win games is 45 percent of ticket sales; for Take 5, Mega Millions, Daily Numbers, Win 4, and Pick 10 games, 35 percent; for Instant games, 20 percent and 10 percent for up to three Instant Games per year; for Quick Draw, 25 percent; and for VLTs 61 percent of net machine income. At the end of each fiscal year, any unspent portion of the 15 percent of ticket sales not used for administration (10 percent for the VLT program) is also used for education.

Administration

Sales agents are notified electronically by the Division's lottery game vendor by Monday of each week of the amount due the State from sales during the previous week. The agent has until Tuesday to deposit sufficient funds in specified joint bank accounts at which time the operations vendor sweeps the moneys and transfers them to Lottery by Wednesday morning. For VLTs, the Division sweeps the accounts daily and the State receives the revenues daily.

DATA SOURCES

Data are collected from the Division and the Department of Taxation and Finance on a weekly and monthly basis.

LOTTERY

STATUTORY CHANGES

Legislation enacted in 1987, 1988, 1991, and 1999 increased the prize allocation for Instant games from 45 percent, to 50 percent, to 55 percent, and finally to 65 percent, respectively. Legislation enacted in 1995 and renewed in 1999, 2001, and 2002 authorized the Quick Draw game through May 31, 2004.

Legislation enacted on October 29, 2001, allowed the Lottery Division to enter into multi-jurisdictional agreements to conduct multistate lotto games with a 50 percent prize payout. The State elected to join with the Big Game states, and afterward the name was changed to Mega Millions. In addition, this 2001 legislation allowed the Lottery Division to license the operation of VLTs at selected New York State racetracks.

Legislation enacted on January 28, 2002, allowed the Lottery Division to offer up to three 75 percent prize payout Instant ticket games during the fiscal year.

Legislation enacted on May 2, 2003, made the following adjustments to the VLT program:

- From total sales of video lottery terminals, 92 percent is paid out for prizes.
- Of the balance, the Lottery Division retains a 10 percent commission, the racetracks receive 29 percent, and 61 percent is dedicated to education.
- Of the commission paid to the tracks, the amount allocated to purses in years one through three is 25.9 percent; in years four and five, 26.7 percent; and in subsequent years, 34.5 percent.
- The Breeders' funds receive 4.3 percent in the first through fifth years and 5.2 percent in the following years. The racetracks are allowed to enter into agreements with the horsemen for no longer than five years of the VLT operation. The expiration date was changed to ten years after the start date of the program.

Legislation enacted in 2004 extended Quick Draw until May 31, 2005.

FORECAST METHODOLOGY

Economic conditions seem to have little explanatory power in predicting Lottery receipts. Accordingly, the various games are initially estimated using probability and time series models and are subsequently adjusted for marketing and operational plans, new game introductions, and law changes.

Lotto

The sales of Lotto tickets are volatile because the jackpots can randomly roll up to high amounts. High jackpots produce significant spikes in sales. The Lotto forecast uses a simulation model that mimics the actual Lotto process and simulates one year of Lotto drawings. The model is run for 1,000 iterations (1,000 years of Lotto results) to produce output distributions for total sales, total revenue and the seeding necessary to maintain the jackpot levels. Distribution averages are used to calculate the revenue estimate.

First, to run the model, the jackpot structure is input and then a regression model based on historical sales-to-jackpot ratios is used to obtain an estimate of sales at each jackpot level, correcting for seasonal effects and other factors. After the sales for a specific draw are calculated, another model predicts the coverage ratio (the combinations actually bet divided by the total number of combinations) at that sales level. To determine if the jackpot will be hit, a random number generator is used to generate numbers between zero and one. If the random number is less than or equal to the coverage ratio, the jackpot is hit. If the random number is greater than the coverage ratio, the jackpot rolls to the next level and the model goes through another iteration.

Each iteration calculates a full year of drawings. Performing the simulation 1,000 times essentially creates 1,000 potential years of results. This allows us to create distributions of possible results and evaluate the probability of achieving a given level of sales. The model also contains features that allow the simulation of numerous events that could affect sales such as introducing Mega Millions, changing the size of the matrix, the interest rate, the level of seeding and altering the jackpot structure.

Instant Games

Instant Games sales are forecast using an econometric model. The data for Instant Games are collected weekly and the model produces weekly estimates for the balance of the fiscal year. There are two exogenous variables: Weighted Average Prize Payout Percent and the number of Terminals. In addition, a trend variable and dummy variables to capture the impact of the One Week Sales Lag and the periodic use of 75 Percent Games are included.

Dependent Variable

- Current weekly sales of all Instant Games.

Weighted Average Prize Payout Percent

- Each Instant Game has a prize payout set in statute. Most games pay out 65 percent of sales, with up to three games paying out 75 percent. This variable is the average prize percent payout per week of all the Instant Games, weighted by the sales per game.

Terminals^2

- This variable is the number of terminals that sold Instant Games each week. The variable appears to have a non-linear impact on sales. The square of terminals picks up the decreasing returns resulting from the addition of new terminals beyond a certain threshold.

75 Percent Games Dummy

- On October 27, 2001, the Division launched a 75 percent Instant Game and experienced significant growth in sales. The Lottery Division has offered three 75 percent Instant Games each fiscal year since 2002-03. A dummy variable is used to account for the increase in Instant Game sales caused by the 75 percent Instant Game. The dummy variable is zero prior to and including October 20, 2001, and is one for the time-span of the first 75 percent Instant Game and for the duration of the 75 percent Instant Games instituted each year.

One-Week Sales Lag

- The one-week lag incorporates a delayed effect in sales from when a new Instant Game is injected into the market.

Trend

- This variable captures trend growth over time.

INSTANT GAME - MULTIPLE REGRESSION EQUATION

Instant Game Sales per Week$_t$ = 3,645+83.4165*Trend$_t$ -.00014*Terminals^2_t +0.3216*One-Wk SalesLag$_t$
t-values (0.21) (3.84) (-2.53) (7.31)

+48,516*Weighted Average Prize Percent Payout$_t$+990.2982*Percent Instant Games Dummy$_t$
(2.20) (2.32)

Total R Square =	.9725
Durbin-Watson =	2.08
Number of Observations =	441
Root Mean Squared Error =	2,390

Quick Draw

Quick Draw sales are estimated using a multiple regression equation with three independent variables: the number of terminals, a trend variable, and a dummy variable for the "Quick Draw Extra" initiative.

Dependent Variable

- Weekly Quick Draw sales.

Trend

- This variable captures trend growth over time.

Terminals

- The variable is the number of terminals selling Quick Draw.

Quick Draw Extra

- This is a dummy variable that represents a game enhancement employing on-premise promotions involving bonus payouts. These promotions typically require on-premise retail displays and educational radio support. The dummy variable is zero prior to and including November 10, 2000, and is one for duration of the initiative in fiscal years 2000-01 through 2003-04, and one for the scheduled time-span of operation in fiscal year 2004-05.

QUICK DRAW - MULTIPLE REGRESSION EQUATION

Quick Draw Sales per Week$_t$= 2,815 - 4.5162*Trend$_t$+2.6078*Terminals$_t$+649.6863*Quick Draw Extra$_t$
t-values (6.95) (-4.02) (22.06) (2.32)

Total R Square =	.91
Durbin-Watson =	1.9
Number of Observations =	490
Root Mean Squared Error =	622

Win 4

A multiple regression procedure is used to estimate Win 4 game sales. There are three independent variables: trend, a dummy variable representing the number of draws each day, and a dummy variable representing Bonus weeks.

Dependent Variable

- This variable represents current weekly Win 4 sales.

Trend

- This variable captures trend growth over time.

Draws Per Day

- A dummy variable reflecting the number of Win 4 draws per day. On December 2, 2001, the Division launched a second daily draw, a noon draw for the Numbers and the Win4 games. The dummy variable is zero prior to and including November 24, 2001, and one thereafter.

Bonus Week

- This is a dummy variable reflecting scheduled promotional Bonus weeks for this game. The dummy variable is zero in every week before and after scheduled Bonus weeks, and is one during the Bonus weeks.

WIN 4 - MULTIPLE REGRESSION EQUATION

$$\text{Win 4 Sales per Week}_t = 5{,}500 + 7.09*\text{Trend}_t + 1{,}017*\text{Draws Per Day}_t + 225.23*\text{Bonus Week}_t$$

t-values (26.19) (16.66) (8.58) (3.95)

Total R Square =	.97
Durbin-Watson =	2.03
Number of Observations =	774
Root Mean Squared Error =	300

Daily Numbers Game

The Daily Numbers sales are estimated by employing a multiple regression equation. There are three independent variables: the number of draws per day, a trend and a dummy variable representing Bonus weeks.

Dependent Variable

- This variable represents current weekly Daily Numbers sales.

Trend

- This variable captures trend growth over time.

Draws Per Day

- This dummy variable reflects the number of Daily numbers draws per day. On December 2, 2001, the Division launched a second daily draw, a noon draw, for the Numbers and the Win 4 games. The dummy variable is zero prior to and including November 24, 2001, and one thereafter.

Bonus Week

- This dummy variable reflects scheduled promotional Bonus weeks for this game. The dummy variable is zero in every week before and after scheduled Bonus weeks, and is one during the Bonus weeks.

DAILY NUMBERS - MULTIPLE REGRESSION EQUATION

$$\text{Daily Numbers Sales per Week}_t = 17{,}148 - 5.197*\text{Trend}_t + 495.26*\text{Draws Per Day}_t + 533.4917*\text{Bonus Week}_t$$

t-values (22.03) (-3.05) (0.99) (5.77)

Total R Square =	.94
Durbin-Watson =	2.09
Number of Observations =	827
Root Mean Squared Error =	594

Take 5

Take 5 sales are estimated using a multiple regression equation. There are three independent variables: a variable representing the change in prize payout percent from 40 percent to 50 percent, a variable reflecting the number of draws offered each week, and a dummy variable representing competition from the Mega Millions game. Essentially, these three special events explain most of the change in Take 5 sales.

Dependent Variable

- This variable represents current weekly Take 5 sales.

Change in Prize Payout Percent Dummy

- The variable represents the change in the game's prize payout percent from 40 percent at the game's inception to 50 percent on January 18, 1992. The dummy variable is zero prior to and including January 17, 1992, and one thereafter.

Draws Per Week

- This dummy variable represents the number of Take 5 draws available each week. The change from one to two draws per week on June 16, 1992, the growth from two to four draws per week on January 6, 1997, and the increase from four to seven draws on September 1, 2000, had significant effects on sales. The dummy variable is one prior to and including January 16, 1992, changed to two to reflect an additional draw per week until January 6, 1997, when it is changed to four, and has been seven since September 1, 2000, to represent seven draws per week.

Mega Millions Competition

- This dummy variable represents the negative impact on the sales of the Take 5 game from the introduction of the Mega Millions game. The dummy variable is zero prior to and including the week of May 18, 2002, and one thereafter.

TAKE 5 - MULTIPLE REGRESSION EQUATION

$$\text{Take 5 Sales per Week}_t = 2{,}695 + 2{,}061 * \text{ChangePayout}_t + 455.64 * \text{Draws Per Week}_t - 700.5 * \text{MegaMillionsCompetition}_t$$

t-values (7.52) (7.96) (8.1) (-2.88)

Total R Square =	.97
Durbin-Watson =	2.02
Number of Observations =	722
Root Mean Squared Error =	277

Mega Millions

The Mega Millions game forecast is estimated by calculating the average per capita sales and comparing the results to previous historical sales per capita in New York, New Jersey, and Georgia. (New Jersey and Georgia had sales history with the Big Game Group before New York State joined the group and the name changed to Mega Millions.) The per capita sales are then multiplied by New York State's population to obtain an estimate of weekly sales. Total estimated sales are multiplied by the statutory allocation for education to derive a revenue estimate. Lotto and Take 5 sales are expected to decline due to competition from Mega Millions. Based upon the historical experience of the original Big Game Group states with similar games, a reduction in the estimated revenues from the Lotto and Take 5 is expected. As with Lotto, Mega Millions receipts are expected to be volatile due to the random nature in the timing of extremely large jackpots.

BASE LOTTERY REVENUE FOR EDUCATION
STATE FISCAL YEAR ENDING MARCH 31
(millions of dollars)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 (Estimated)
Actual Receipts	1,162	1,441	1,533	1,534	1,442	1,349	1,440	1,599	1,826	1,884	1,920
Growth Percent	10.2	24.0	6.4	0.0	(6.0)	(6.4)	6.7	11.0	14.2	3.2	1.9

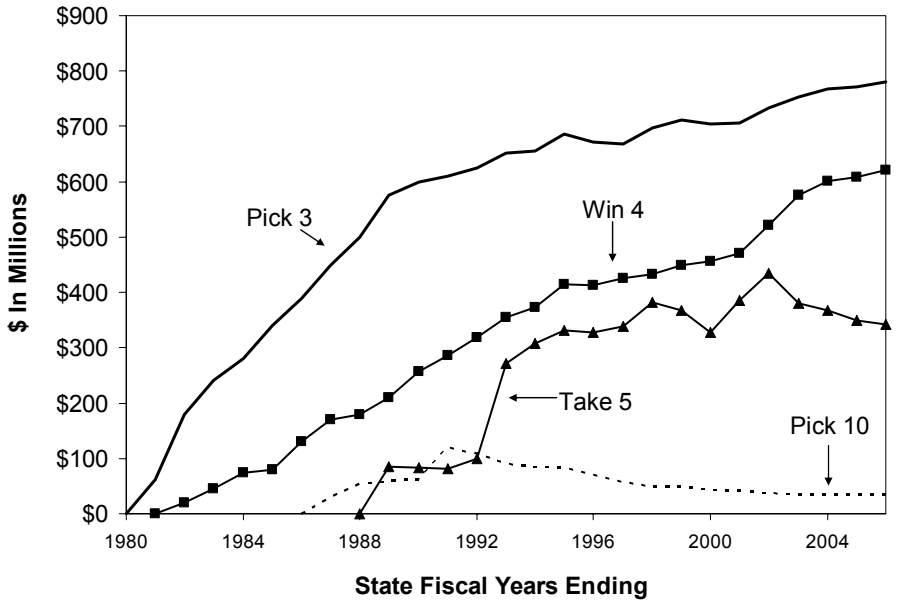
LOTTERY SALES OF PRIMARY GAMES
(millions of dollars)

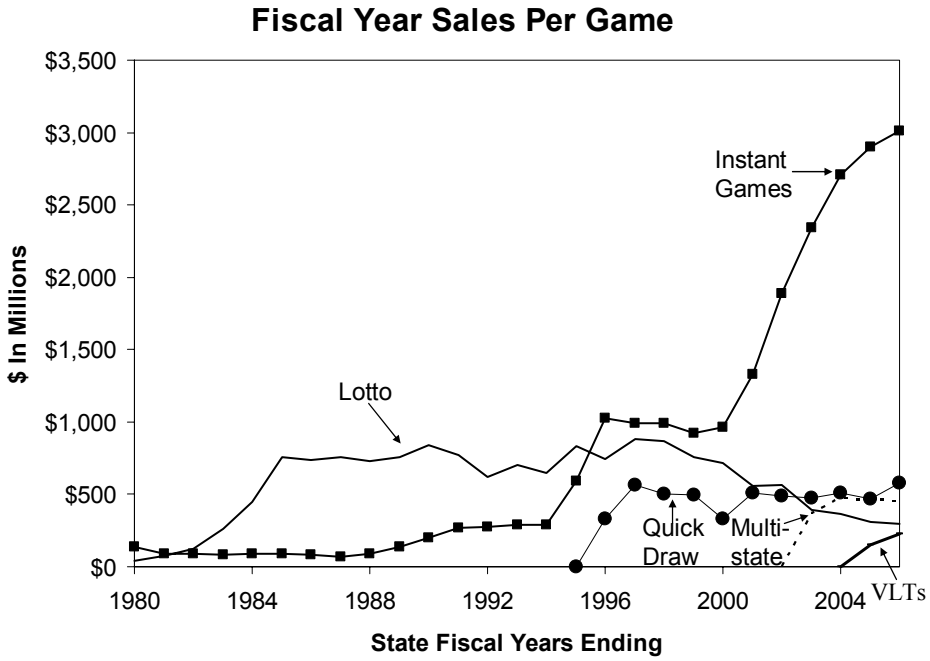
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 (Estimated)
Numbers	1,102	672	668	697	712	705	707	734	753	754	772
Win 4	415	414	426	433	449	456	470	521	577	599	609
Instant	593	1,026	995	994	926	967	1,327	1,886	2,346	2,801	2,898
Lotto	835	742	882	870	759	755	556	566	391	361	313
Quick Draw	0	328	563	503	493	329	507	488	474	500	468
Mega Millions	0	0	0	0	0	0	0	0	369	420	465

Lottery Revenue of Video Lottery Terminals
(millions of dollars)

	2004	2005 (Estimated)
VLT Receipts	13	142

Fiscal Year Sales per Game



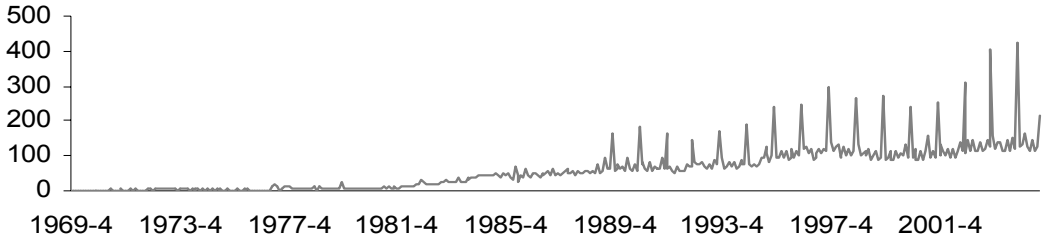


Cash Receipts

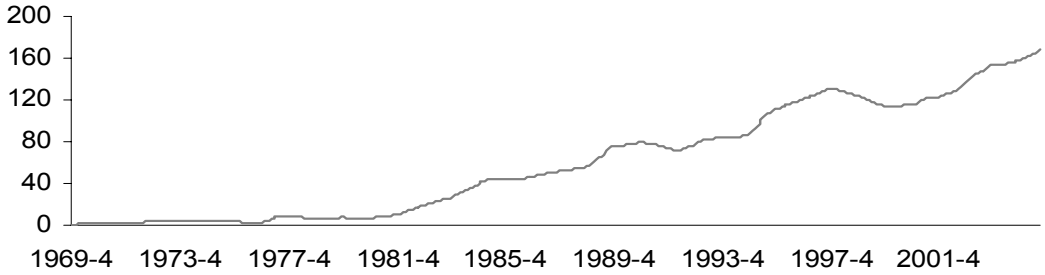
As is clear, in the following cash component charts, there has been a strong upward trend in overall lottery receipts. The spike in the seasonal graph is for March when the administrative surplus for the Division of the Lottery is recognized. The large irregular component relative to trend reflects the random nature of the big payout of Lotto and Mega Millions games.

Collection Components
(millions of dollars)

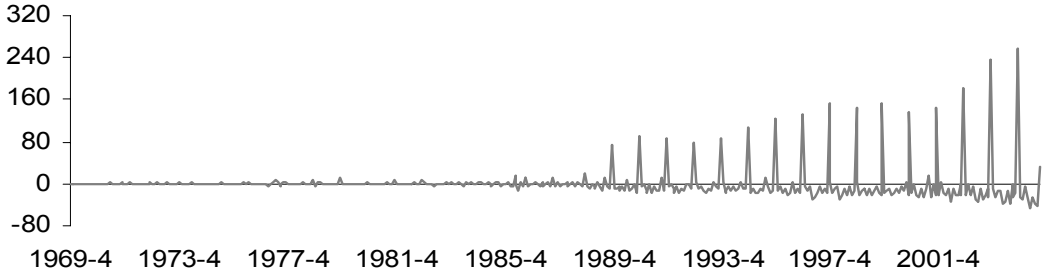
Lottery
Collections



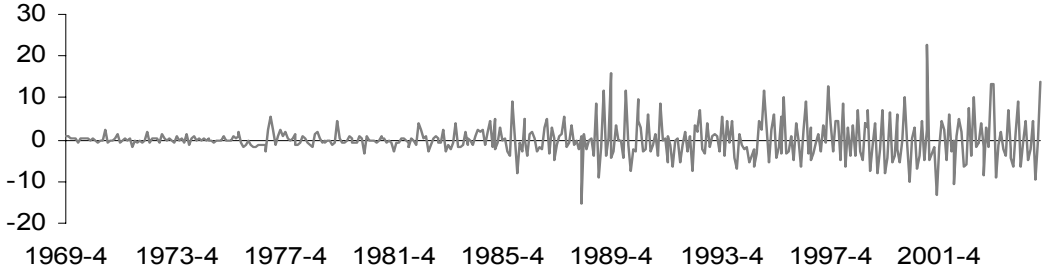
Trend



Seasonal



Irregular



PERCENTAGE DISTRIBUTION OF CASH RECEIPTS

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1996-97	21.4	18.8	19.2	40.6
1997-98	22.5	19.6	18.5	39.4
1998-99	21.9	20.4	18.6	39.1
1999-00	17.9	20.4	21.7	40.0
2000-01	19.0	18.6	21.0	41.4
2001-02	18.8	30.5	18.3	32.4
2002-03	19.4	20.0	19.9	40.7
2003-04	20.7	19.0	19.4	40.9
2004-05 (est.)	27.2	25.1	25.5	22.2

Risks To Forecast

An adverse ruling in a lawsuit contesting the constitutionality of legislation authorizing the Mega Millions game and VLTs could terminate both the game and the VLT program. Additional delays and unforeseen problems could reduce VLT revenues. The Mega Millions game may achieve lower sales than forecasted if the number of large jackpots is less than expected. Mega Millions cannibalization of sales for Lotto and Take-5 could be more severe than expected.

VIDEO LOTTERY

BACKGROUND

Chapter 383, Laws of 2001, first authorized video lottery terminals on October 29, 2001. This statute authorized the operation of video lottery terminals at selected racetracks throughout the State and set the initial operating parameters.

Tax Base and Rate

The tax base is the amount wagered at video lottery facilities. The amount dedicated to education is fixed in statute at 61 percent of net machine income (the amount wagered minus the prizes awarded). The tracks retain 29 percent of net machine income and the Division of the Lottery retains 10 percent for administration expenses. In addition, the statute provides that any amount not spent by the Division of the Lottery for administrative expenses is also earmarked for education. Under current law, the Comptroller, pursuant to an appropriation, distributes all net receipts from the lottery for the purposes of providing education aid. Legislation submitted with the 2005-06 Executive Budget provides for up to eight additional licenses to operate video lottery facilities.

Administration

The Division of the Lottery has the responsibility for the regulation and oversight of the video lottery program. The Division of the Lottery's central computer system controls all video lottery terminals and accounts.

DATA SOURCES

The data available on VLT operations are collected and reported by the Division of the Lottery.

STATUTORY CHANGES

Legislation was enacted on October 29, 2001, to allow the Division of the Lottery to license the operation of VLTs at selected New York State racetracks. Additional legislation enacted on May 2, 2003, made the following major adjustments to the VLT program:

- Of the revenue remaining after payment of prizes, the Division of the Lottery retains 10 percent commission, the racetracks receive 29 percent, and 61 percent is dedicated to education.
- Of the 29 percent commission paid to the tracks, the amount allocated to purses in years one through three is 25.9 percent; in years four and five, 26.7 percent; and in subsequent years, 34.5 percent.
- Of the 29 percent commission paid to the tracks, the harness and thoroughbred Breeders' funds receive 4.3 percent in the first through fifth years and 5.2 percent in all the following years.
- The racetracks are allowed to enter into agreements with the horse owners for no longer than five years, to allow the tracks to retain a portion of the revenue dedicated to purses for the operation of the facilities. The program expires after ten years.

FORECAST METHODOLOGY

The forecasting methodology used by the Division of the Budget falls into two broad categories. The first is a rather complex simulation model that is used to forecast potential revenues from facilities that do not exist yet. The second methodology is the more traditional econometric modeling that is used after a specific facility has operated long enough to produce historical data for modeling.

Potential Gaming Facilities

Current simulation estimates are based on an approach flexible enough to respond to a rapidly changing policy environment. The first step of this approach was to develop initial estimates of net machine income and, therefore, the revenue-generating potential of each (existing) facility, by incorporating the most current information available from the Division of the Lottery, the tracks, private sector consultants, and published reports. At this early stage of the VLT program, it was critical for the Budget Division to adopt a modeling strategy capable of evaluating the impacts of competition, alternative facility locations, varying numbers of facilities, and alternative plans for program expansion. This effort has required the development of a computer-based simulation model combining demographic, Geographical Information Systems (GIS), and marketing data. The purpose of the model is to simulate gambling behavior at the census tract level, resulting in an assessment of the underlying market for VLTs by facility over a multi-year forecast horizon.

The video lottery forecast begins by making certain assumptions concerning the structure and viability of the program. These assumptions include but are not limited to:

- The average prize payout averages 92 percent over the period of analysis.
- All facilities will operate for 365 days per year.
- All facilities, except for Monticello, will operate for 16 hours per day. Monticello has reduced to 14 hours per day, Sunday through Thursday.
- All facilities operate the expected number of machines.
- Marketing, advertising, food and beverage, entertainment, and the facilities' quality of experience are competitive.
- All facilities complete their currently anticipated expansion plans.
- All facilities qualifying for the VLT program begin operations and continue to operate throughout the period of analysis.
- The statutory distribution of revenue does not change over the period of analysis.
- Other than the facilities specifically accounted for in the model, no new casinos or racinos become operational in the market area during the period of analysis.

Defining the Market Area

Estimating revenues for an existing facility located in New York requires an assessment of the facility's capacity to attract participants, adjusting for the impact of potential competitors. Since most studies assume that a VLT facility's market can range as far as 150 miles, the market area for New York State facilities outside the New York metropolitan area includes any competing facility within either 150 miles or 150 minutes of a State-run facility. This leads to a definition of New York's market area that includes nine northeastern states — Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Rhode Island, Vermont, and New York — and eastern Canada. The latitude and longitude of all current and proposed facilities in this area and of the census tracts are key inputs of the DOB model. (The model assumes U.S. citizens may patronize Canadian facilities, but that Canadians do not patronize U.S. facilities.)

An evaluation of the market potential for video lottery terminals and slot machines in New York requires an assessment of three critical market characteristics:

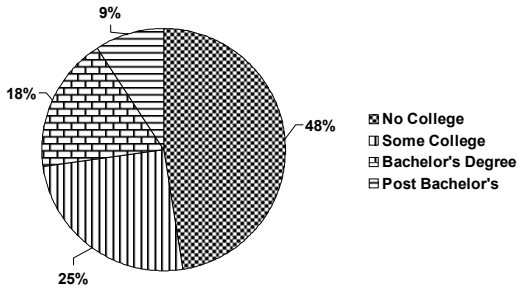
1. The number of potential participants living in the New York market area;
2. The frequency with which participants visit a casino or VLT facility;
3. The amount spent per visit to a facility.

Number of Participants

To estimate the potential number of participants, we begin with a national demographic profile of people who typically patronize casinos. These data indicate the percentage of potential gamblers for four demographic characteristics: age, income, gender, and education. The same data also give an aggregate participation rate for each state. To account for differences among the states' participation rates, national rates for each demographic variable are adjusted to reflect the state-specific participation rate. Using the adjusted data, we estimated the number of participants by applying state-specific participation rates for each of the four demographic characteristics to each census tract in the nine-state study area. This provides an indication by census tract of how many people are likely to participate in the nine-state market area.

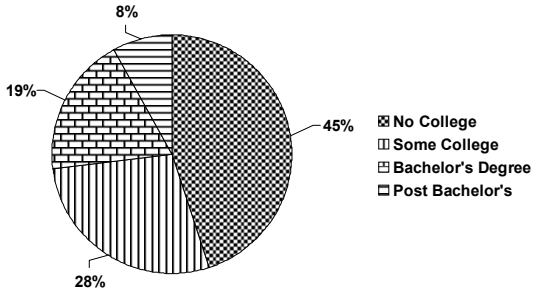
To arrive at a multi-year monthly forecast, demographic trends and participation rates are projected by month to March 2011. The appropriate monthly participation rate is applied to each of the four demographic categories in each census tract to arrive at four monthly estimates of the number of potential participants in each census tract. We use an unweighted average of the four estimates to arrive at a final estimate. We increase the estimated participation rates of some fully mature states, such as New Jersey and Connecticut, modestly over the projection period. This provides an estimate of the number of gamblers in each census tract by month through 2011.

UNITED STATES POPULATION EDUCATION (Age 25+)



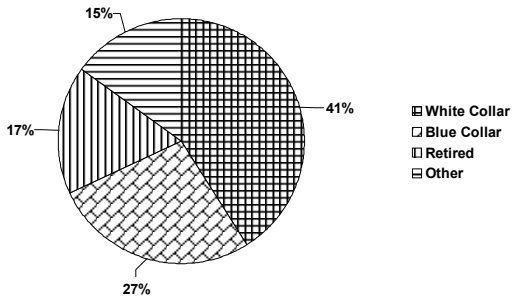
Source: The AGA Survey of USA Casino Entertainment 2004

UNITED STATES CASINO CUSTOMERS EDUCATION (Age 25+)



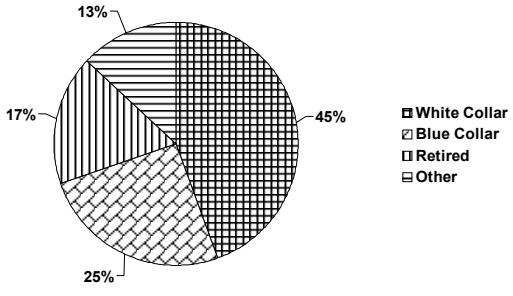
Source: The AGA Survey of USA Casino Entertainment 2004

TOTAL UNITED STATES EMPLOYMENT



Source: The AGA Survey of USA Casino Entertainment 2004

UNITED STATES CASINO CUSTOMERS EMPLOYMENT



Source: The AGA Survey of USA Casino Entertainment 2004

The data available provide estimates of participation rates only for people over 21. In New York, persons 18 and older can visit VLT facilities. To adjust for this, Census 2000 population estimates are used, with the participation rate from the next higher age bracket applied to estimate the number of participants in the 18 to 20 age bracket.

Applying this calculation to New York shows New York's population aged 21 years or older to be 13.5 million, with an estimated participation rate of 25.8 percent. However, participation rates vary by state from a high of 47 percent in Nevada to 6.4 percent in West Virginia. The participation rate appears correlated with the availability of casinos, suggesting that additional participants are encouraged by access to VLT venues. Therefore, we assume that as more VLTs become available over time, the participation rates in New York and some surrounding states will increase to between 35 percent and 40 percent, which seems to be the norm for states with easier access to these facilities.

PARTICIPATION RATES*

State	Participation Rates (percent)
Connecticut	38.2
Maine	9.7
Massachusetts	27.5
New Hampshire	17.4
New Jersey	39.5
New York	25.8
Pennsylvania	21.3
Rhode Island	32.2
Vermont	14.7

* Source: *"Profile of the American Casino Gambler." Harrah's Survey 2003*

This participation increase parallels the expected increase in the number of machines from about 7,000 today to roughly 65,000 in 2011, (depending upon the final disposition of the legislation submitted with the 2005-06 Budget). At that time, the industry will be fully mature and our participation rates should equal those of other states, such as Connecticut and New Jersey, whose residents have had full access to casinos for several years.

Number of Visits

To estimate the frequency of visits we combine two approaches. First, several published studies indicate that the closer an individual lives to a casino, the more frequent the visits. One study by KPMG postulated that a typical person within the primary market area of a casino (less than 50 miles) would visit on average ten times per year. A person within the secondary market area (50 miles to 100 miles) would visit six times per year on average and in the tertiary area (100 miles to 150 miles) would visit three times per year. The Harrah's Profile found that nationally the average casino player visits a casino 5.7 times per year. In the Northeast region, the average casino player visits 8.5 times per year. Again, the Profile gives the average number of visits by state; it appears that the number of visits increases in states with higher participation rates. We have calibrated the analysis using both studies, and the results from both approaches are relatively close. The number of visits is estimated monthly by census tract as population and participation rates rise over time, and are combined to produce a final forecast.

Amount Gambled

To determine the amount of income spent per visit, we relied on two studies. Oregon completed a study that indicated that the average person would gamble approximately 1.16 percent of annual income on all forms of gaming. On the other hand, KPMG, in its study of gambling in Michigan, postulated that people in the primary market area would be willing to

lose $40 each time they visited a casino, in the secondary market area $50 each time, and in the tertiary market area $65 each time. To derive the amount of gambling dollars using the KPMG methodology, we increased or decreased the loss per visit by indexing these amounts by the ratio of the per capita income of each census tract to the per capita income in Michigan. To grow the amount gambled in each census tract, we grew the personal income and population by the growth rate between the 1990 and 2000 census. This allowed us to grow the amount gambled in the primary, secondary, and tertiary market areas by month through 2011. This also allowed calculation of the total amount of gambling dollars in each census tract by multiplying personal income by the Oregon average percentage of income gambled. Somewhat surprisingly, these two methodologies produced similar results. The amount gambled in each census tract is forecast monthly to 2011 as a function of the growth in population, income, and participation rates.

Defining the Market Area for Each Facility

The VLT analysis next concentrates on allocating the aggregate number of visits and gaming dollars in New York's market area to the potential venues. There are several existing facilities in New York, the surrounding states and Canada, and over the next five years, New York could add a significant number of new facilities. Each facility will compete for potential VLT players and gaming dollars. The following describes two methods for determining the distribution of potential VLT customers and revenue among all the competing facilities.

Concentric Rings

One method to establish a facility's market area begins with the industry accepted norms. The primary, secondary and tertiary markets are set at 0 to 50 miles, 50 to 100 miles, and 100 to 150 miles, respectively. This produces three concentric rings around each facility. The arc distance is calculated from the latitude and longitude of the geographic centroid of each census tract to the latitude and longitude of each facility, or the centroid of the census tract containing the facility. Where the actual location of the facility is unknown, a geographically logical location within the appropriate municipality or region is assumed. It is then determined whether a given census tract falls within the primary, secondary or tertiary market area of another facility. The attractiveness factor is used to adjust the facility's primary, secondary, and tertiary market area to reflect its relative drawing power.

Most census tracts fall into the market areas of several facilities. To allocate the visits (and the potential revenue from each census tract) to each facility, we calculate the probability that the participants in a census tract would visit each casino. To determine the probability that an individual would visit a casino, a gravity model approach is used, which assumes that the propensity to visit a facility is inversely related to the square of the distance from the facility and directly related to the facility's attractiveness. This is a standard approach in location theory and is used widely by those in the gaming industry. Using probabilities similar to those shown in the following table, we calculate for each census tract the number of visits and gambling dollars to each facility. The table below indicates how a representative gambler of any given census tract might divide his time under seven possible scenarios. For example, the first scenario indicates that the gambler lives in the primary market area of only a single facility. Therefore, 100 percent of his gambling will take place at that facility. Under scenario four, the gambler lives in the primary market area of one facility, the secondary area of a second facility, and the tertiary market area of a third, and divides his gambling visits according to the probabilities listed in the table. Of course, many other scenarios are possible.

SAMPLE PROBABILITIES OF VISITING A CASINO
(percent)

	Primary	Primary Secondary	Primary Tertiary	Primary Secondary Tertiary	Secondary	Secondary Tertiary	Tertiary
Primary	100.0	88.2	96.1	85.2			
Secondary		11.8		11.4	100.0	76.8	
Tertiary			3.9	3.5		23.3	100.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Travel Time

The most accurate method to establish a facility's market area considers travel times. Here the model assumes that people are more responsive to the time it takes to travel to a facility than the straight line distance between their home and the facility. Again, following the norms in other studies, we established the primary, secondary and tertiary market areas as 0 to 50 minutes, 51 to 100 minutes and 101 to 150 minutes. Assuming an average speed of 50 miles per hour and allowing 15 minutes to get to a major highway from a home and another 15 minutes to get from a major highway to the facility make these market areas comparable in size to the concentric ring model. In this case, however, the market areas become irregular, generally following major highway systems, which could include census tracts with significantly different demographics than the census tracts identified using the concentric rings method. As already discussed, the size of the primary, secondary, and tertiary market areas is adjusted to reflect the attractiveness of facilities. The process for allocating visits and gambling dollars is identical to the concentric rings analysis (See table above). The preferred DOB model uses market areas defined by travel times in its simulations.

Facility Limits

To this point, the model produces estimates of the number of participants, the number of visits, and total gaming revenue spent at each facility. However, other factors limit usage. The industry standard assumption is that a participant will spend three hours at a VLT per visit. In New York, the hours of operation are limited to 16 hours per day. This implies that each machine can accommodate 5.33 players per day. For example, if a facility had 2,000 machines, the maximum number of average duration visits the facility could accommodate is 10,667 per day. If the model results indicate that a facility market area would only support 5,333 visits per day, half of the machines would stand idle on average. Likewise, if the facility's market area produces 21,333 visits per day, the waiting time to use machines would be significant and the revenue-generating capacity of the facility would be capped by its physical limits regardless of how many visitors the market produces.

Overall, industry experts estimate facility utilization at 80 percent. Looking at the facility limitations above, we combined these two parameters and created a sliding scale that compares the number of visits that the facility's market area will produce and adjust the facility's utilization factor to account for expected market demand. This allows us to uncover possible areas of market saturation and areas with the greatest potential for expansion.

Other Factors

Since the object of the model is to produce estimates of State fiscal year revenues, we need to be sensitive to the actual period of operation during each fiscal year and to the competitive effects of other facilities. For the tracks, the most recent information available from the Lottery Division is used to specify expected start dates and the initial number of

machines. The model also has the ability to add new facilities anywhere in the Northeast and to adjust to any expansion plans anticipated by the tracks or other facilities.

To attempt to reflect the competitive impact of the recently authorized Native American casinos on the State's VLT facilities and visa versa, start dates and the number of terminals at each anticipated facility are assumed. At this time, however, the start dates, the number of machines and other parameters for the new Native American casinos are highly speculative, but to avoid over-estimating revenues from VLT facilities this factor must be considered.

Aggregate results for this model depend upon the combination of gaming facilities open during a particular fiscal year and other factors such as start dates, quantity of VLTs or slots offered, additional amenities, and several other situational gaming factors. Given an almost infinite number of different scenarios, estimated results of the quantity of gamblers, total net machine income, and total visits can be illustrated in a low to high range. The higher numbers in the range assume a more mature gaming market in year 2011, when New York State's gaming participation has attained levels comparable to adjacent states.

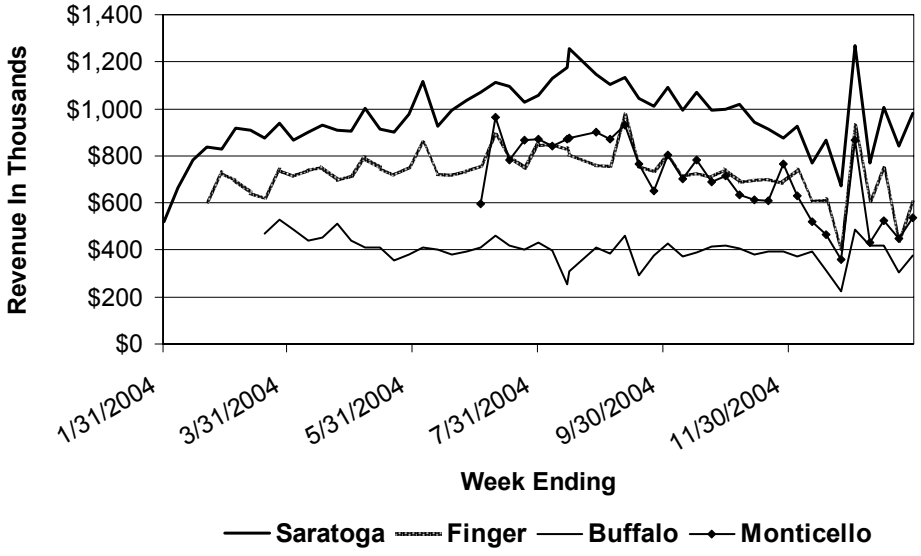
Estimated Aggregate Results Within the Market Analyzed Years 2003 - 2011:

Quantity of gamblers:	12 million to 16 million.
Net machine income:	$5.3 billion to $8.8 billion.
Total Visits:	102 million to 133 million

Forecast Methodology Subsequent to the Opening of a VLT or Casino Facility

After a facility has been opened long enough to compile an historic data series, VLT revenues are forecast using econometric models. VLT data are collected weekly and the model produces weekly estimates for the balance of the fiscal year. Currently, there are four VLT facilities in operation: Saratoga Gaming and Raceway, Finger Lakes Gaming and Racetrack, Fairgrounds Gaming and Raceway at Buffalo, and Mighty M Gaming at Monticello.

VLT RESULTS
WEEKLY EDUCATION REVENUE



Saratoga Gaming and Raceway

The education revenue collected from the Saratoga facility is estimated using a multiple regression equation. There are five independent variables: the week-to-week difference, prize payout percent, seasonal Dummy, Saturday Dummy, and Sunday Dummy.

Dependent Variable
- Daily Education receipts.

Week-to-Week Difference
- This variable is the week-to-week difference of education receipts. The forecast figure is the average of all previous week-to-week difference results.

Prize Payout Percent
- A minimum of 90 percent prize payout is set in statute. The prize payout percent fluctuates daily and weekly based upon the proportion of customer wins to losses within a time frame.

Seasonal Dummy
- During the months of June, July, and August, the facility has an increase in business because of the scheduled race days in the summer. The value of this variable is 0.5 in the month of June, and one from July through August.

Saturday Dummy
- Typically the busiest day in VLT sales, this dummy variable is one on every Saturday.

Sunday Dummy
- This variable represents the proportion of Sunday education receipts compared to the previous Saturday education receipts. The remaining forecast of the dummy variable is the average of Sunday's percent of Saturday education receipts.

SARATOGA GAMING AND RACEWAY MULTIPLE REGRESSION EQUATION

$$\text{Saratoga Education Receipts per Day}_t = 929.07 + .4466 * \text{Week-to-Week Difference}_t - 872.9 * \text{Prize Payout Percent}_t + 23.17 * \text{Seasonal Dummy}_t + 36.86 * \text{Saturday Dummy}_t + 30.32 * \text{Sunday Dummy}_t$$

t-values: (5.46) (12.61) (4.74) (7.2) (4.98)

Total R Square	=	.65
Durbin Watson	=	2.15
Number of Observations	=	375
Root Mean Squared Error	=	29.09

Finger Lakes Gaming and Racetrack

The education revenue collected from the Finger Lakes facility is forecasted using a multiple regression equation. There are five independent variables: the week-to-week difference, prize payout percent, seasonal Dummy, Saturday Dummy, and Sunday Dummy.

Dependent Variable
- Daily Education receipts.

Week-to-Week-Difference

- This variable is the week-to-week difference of education receipts. The forecast figure is the average of the all previous week-to-week difference results.

Prize Payout Percent

- A minimum of 90 percent prize payout is set in statute. The prize payout percent fluctuates daily and weekly based upon the proportion of customer wins to losses within a time frame.

Seasonal Dummy

- During the months of July and August, the facility has an increase in business because of the scheduled race days in the summer. The value of this variable is one from July through August.

Saturday Dummy

- Typically the busiest day in VLT sales, this dummy variable is one on every Saturday.

Sunday Dummy

- This variable represents the proportion of Sunday education receipts compared to the previous Saturday education receipts. The remaining forecast of the dummy variable is the average of Sunday's percent of Saturday education receipts.

FINGER LAKES GAMING AND RACETRACK MULTIPLE REGRESSION EQUATION

$$\text{Finger Lakes Education Receipts per Day}_t = 87.25 + .4794 * \text{Week-to-Week Difference}_t +$$
t-values (9.83) (14.35)

$$10.83 * \text{Prize Payout Percent}_t + 10.52 * \text{Seasonal Dummy}_t + 36.1 * \text{Saturday Dummy}_t +$$
(1.2) (5.11) (5.17)

$$23.51 * \text{Sunday Dummy}_t$$
(4.28)

Total R Square	=	.56
Durbin Watson	=	2.09
Number of Observations	=	354
Root Mean Squared Error	=	27.82

Fairgrounds Gaming and Raceway at Buffalo

The education revenue collected from the Buffalo facility is forecasted using a multiple regression equation. There are four independent variables: the week-to-week difference, prize payout percent, Saturday Dummy, and Sunday Dummy.

Dependent Variable

- Daily Education receipts.

Week-to-Week-Difference

- This variable is the week-to-week difference of education receipts. The forecast figure is the average of the all previous week-to-week difference results.

Prize Payout Percent

- A minimum of 90 percent prize payout is set in statute. The prize payout percent fluctuates daily and weekly based upon the proportion of customer wins to losses within a time frame.

Saturday Dummy

- Typically the busiest day in VLT sales, this dummy variable is one on every Saturday.

Sunday Dummy

- This variable represents the proportion of Sunday education receipts compared to the previous Saturday education receipts. The remaining forecast of the dummy variable is the average of Sunday's percent of Saturday education receipts.

FAIRGROUNDS GAMING AND RACEWAY AT BUFFALO
MULTIPLE REGRESSION EQUATION

$$\text{Buffalo Education Receipts per Day}_t = 40.03 + .4923 * \text{Week-to-Week Difference}_t +$$
t-values (4.36) (12.56)

$$15.73 * \text{Prize Payout Percent}_t + 10.52 * \text{Saturday Dummy}_t + 36.1 * \text{Sunday Dummy}_t +$$
(1.57) (7.87) (0.10)

Total R Square	=	.60
Durbin Watson	=	2.22
Number of Observations	=	311
Root Mean Squared Error	=	12.31

Mighty M Gaming at Monticello

The education revenue collected from the Monticello facility is projected using a multiple regression equation. There are four independent variables: the week-to-week difference, prize payout percent, Saturday Dummy, and Sunday Dummy.

Dependent Variable

- Daily Education receipts.

Week-to-Week Difference

- This variable is the week-to-week difference of education receipts. The forecast figure is the average of all previous week-to-week difference results.

Prize Payout Percent

- A minimum of 90 percent prize payout is set in statute. The prize payout percent fluctuates daily and weekly based upon the proportion of customer wins to losses within a time frame.

Saturday Dummy

- Typically the busiest day in VLT sales, this dummy variable is one on every Saturday.

Sunday Dummy

- This variable represents the proportion of Sunday education receipts compared to the previous Saturday education receipts. The remaining forecast of the dummy variable is the average of Sunday's percent of Saturday education receipts.

MIGHTY M GAMING AT MONTICELLO MULTIPLE REGRESSION EQUATION

$$\text{Monticello Education Receipts per Day}_t = 577.59 + .4319 * \text{Week-to-Week Difference}_t -$$
t-values (3.33) (8.44)

$$526.11 * \text{Prize Payout Percent}_t + 65.09 * \text{Saturday Dummy}_t + 21.94 * \text{Sunday Dummy}_t +$$
(-2.8) (13.42) (5.75)

Total R Square	=	.71
Durbin Watson	=	1.96
Number of Observations	=	221
Root Mean Squared Error	=	26.88

Risks to the Forecast

Clearly, the estimation process is highly dependent on a myriad of assumptions. Casinos compete by increasing the amount paid out in prizes. We are assuming 92 percent payouts, but, if competition drives this number up, it could have a significant impact on revenues. For example, if competition drives the prize payout up to 94 percent, the amount of revenue to New York would, holding other factors constant, fall by 25 percent. In addition, the estimate assumes no additional facilities will be built in New York State's market area. However, there are discussions about allowing slot machines at the Meadowlands, New Jersey, and in Maine. Other neighboring states are considering authorizing racinos, and there are continual expansions at Foxwoods, Mohegan Sun and Turning Stone. Pennsylvania recently passed legislation to allow up to 61,000 slot machines to operate in the state. Some slot-operated facilities are expected to be operating by 2006.

On the other hand, the market for video lottery gaming could be greater than anticipated, especially in the New York City metropolitan area. If this proves to be correct, the estimates of net machine income could be understated and the estimates of losses due to competition might be too high.

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