

State of Hawaii Department of Taxation Revenue Forecasting Phase I Report

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Econometric Model For Forecasting The State of Hawaii General Fund Tax Revenues

1. Statement of Work.

A multi-year project to analyze State of Hawaii tax revenue forecasting, develop new forecasting modeling and improve accuracy and informational content of forecasts

2. Milestones – Phase I

1. Existing model and data review – January 8-9, 2009
2. Research Strategy and Goals Approval – January 8-9, 2009
3. Phase I Draft Report Review– June 15-17 2009
4. Phase I Report Submittal – June 23, 2009
5. Phase I Report Presentation and Discussion – June 24-25, 2009
6. Phase I Forecast Implementation – July TBD, 2009

Project Team

Contractor:

UCLA Anderson Forecast
Anderson School of Management
University of California, Los Angeles

Team Members:

Jerry Nickelsburg, Senior Economist
and Team Leader

Patricia Nomura, Demographer and
Statistical Analyst

Akinori Tomahara, Economist

George Lee, Technical Support

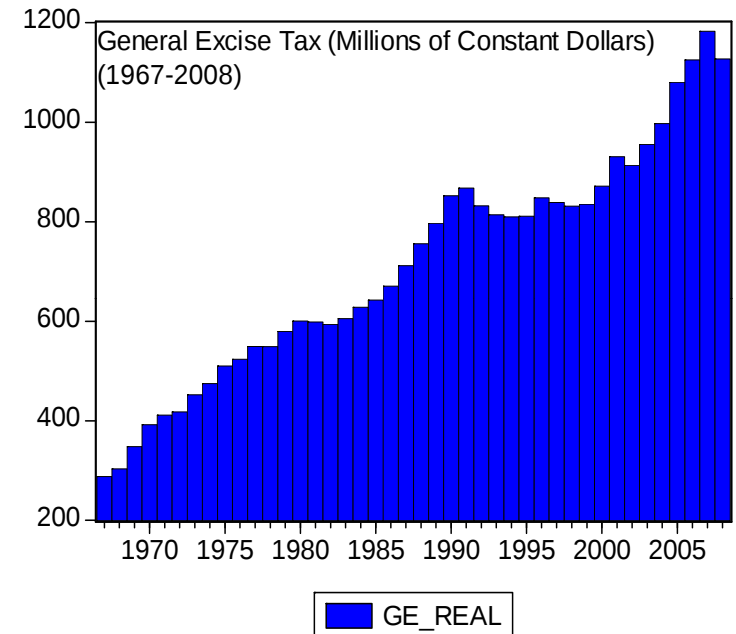
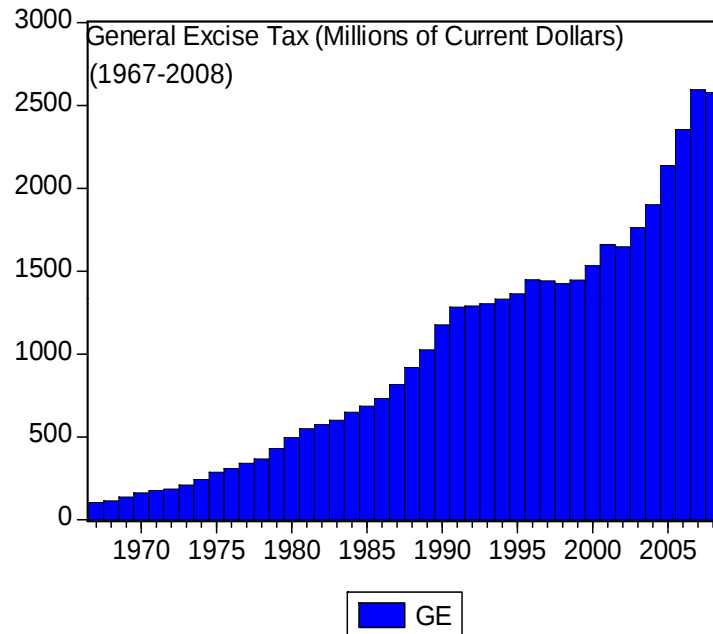
Research Strategy

- ◆ Structural and Time Series Models
 - Structural:
 - ◆ General Excise Tax
 - ◆ Personal Income Tax
 - ◆ Transient Accommodations Tax
 - ◆ Corporate Income Tax
 - Time Series:
 - ◆ Eight smaller taxes

Research Strategy

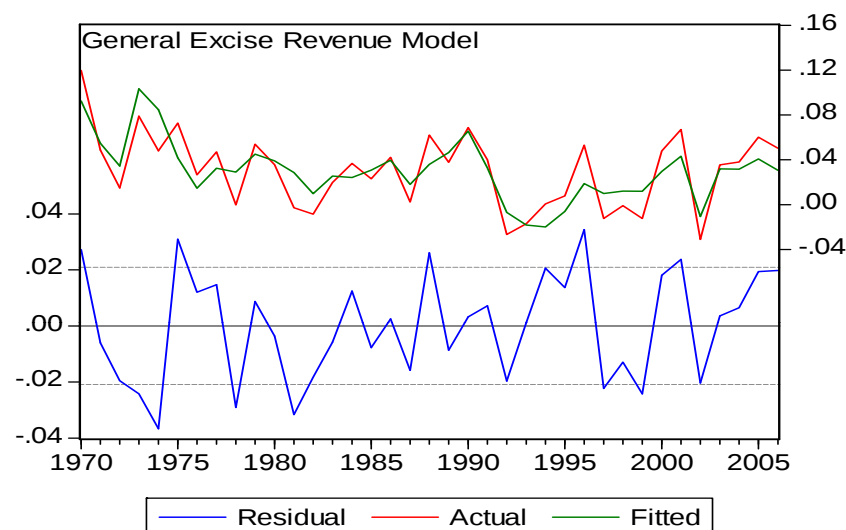
- ◆ Specification and Estimation
 - Structural
 - ◆ Convert Data to Real
 - ◆ Establish Stationarity of Data
 - ◆ Find principal determinates of variation
 - ◆ Evaluate Forecast Performance and Model Fit
 - Time Series Models
 - ◆ Establish Stationarity
 - ◆ Estimate VAR
 - ◆ Evaluate Residuals and Forecast Responses

General Excise Tax Model



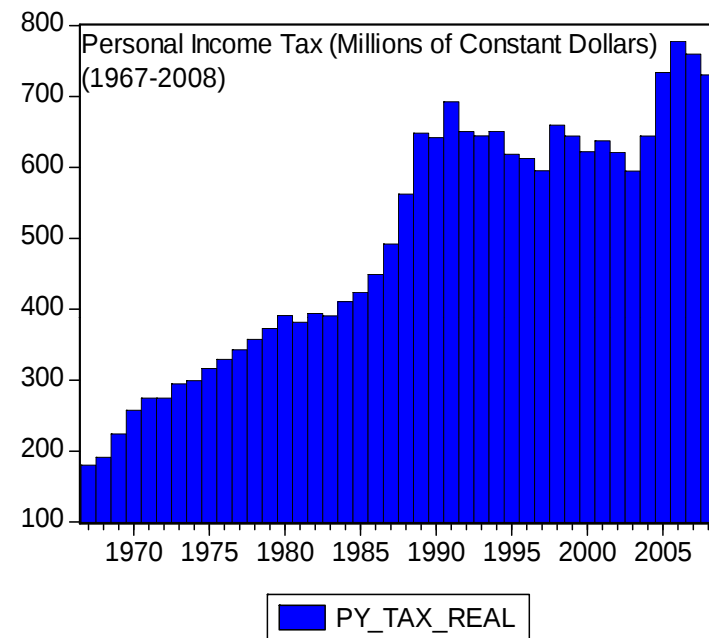
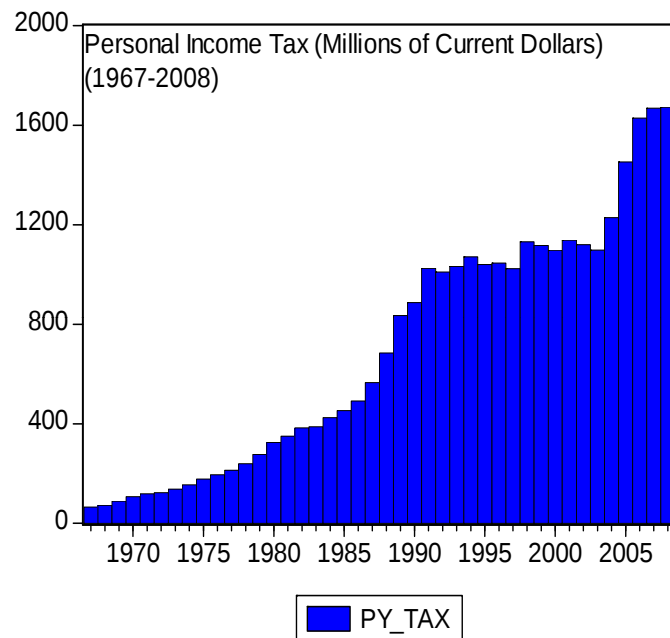
Real GE data shows impact of recessions
Data series not stationary

General Excise Tax Model



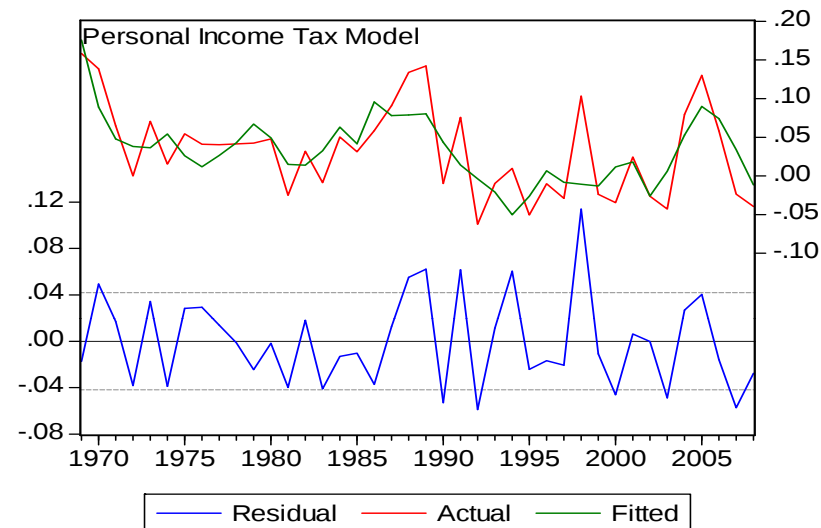
- Model: Differences of logarithmic transformed data
- Principal determinates of variation
 - Visitor Arrivals
 - Construction Employment
 - HI Real Personal Income
 - Recession
 - CA Recession

Personal Income Tax Model



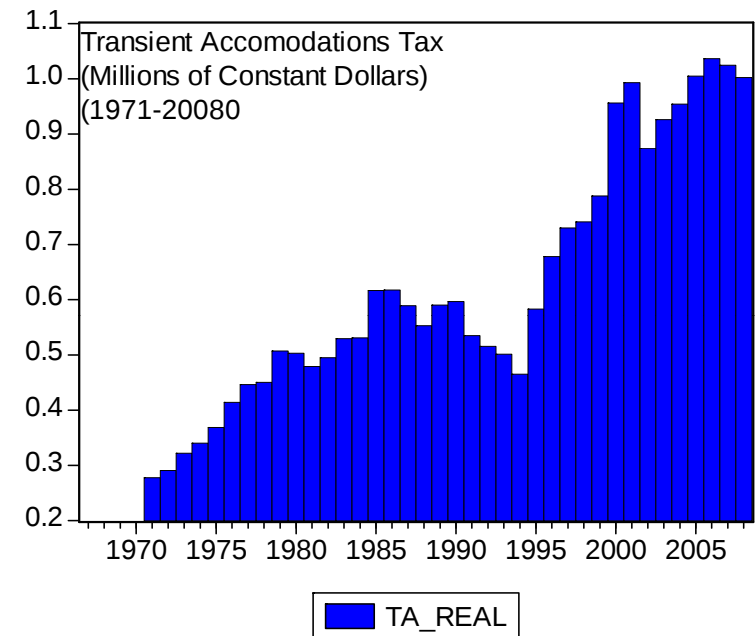
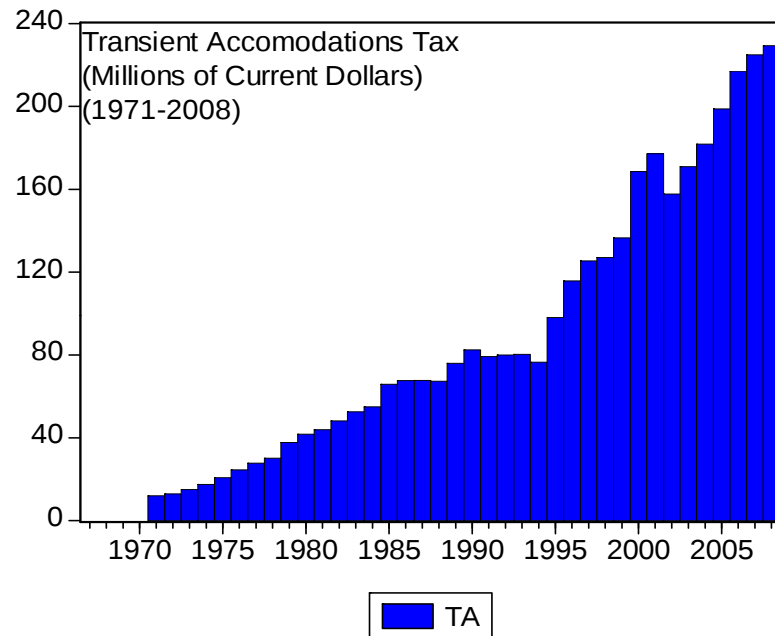
Real PY data shows impact of recessions
Data series not stationary

Personal Income Tax Model



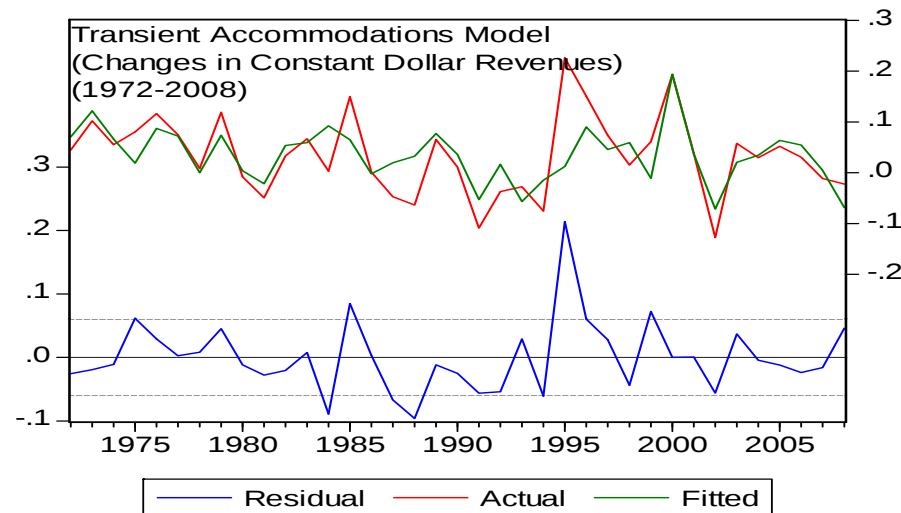
- Model: Differences of logarithmic transformed data
- Principal determinates of variation
 - Visitor Arrivals
 - Construction Completions
 - HI Real Personal Income
 - Recession
 - U.S. Defense Spending

Transient Accommodations Tax Model



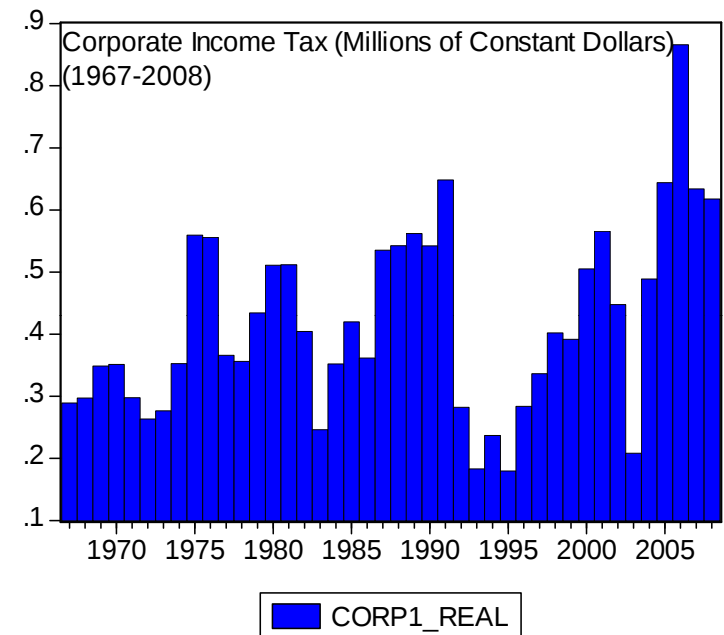
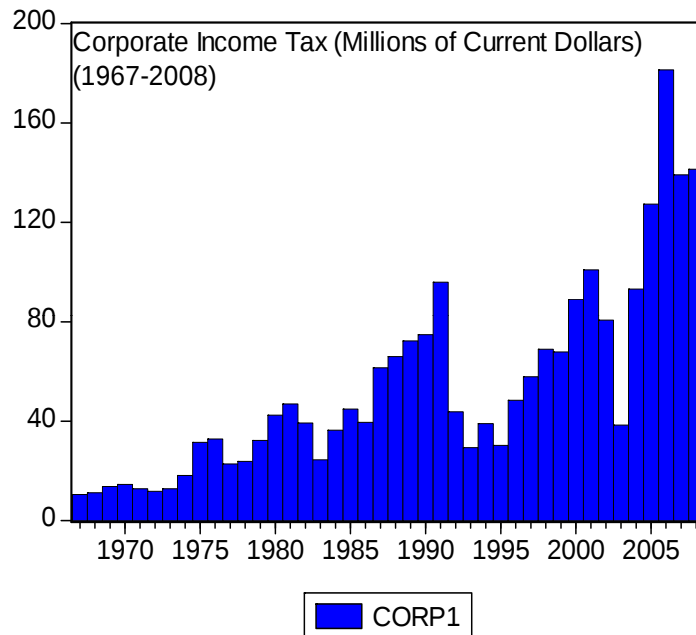
Real TA data shows impact of recessions
Data series not stationary

Transient Accommodations Tax Model



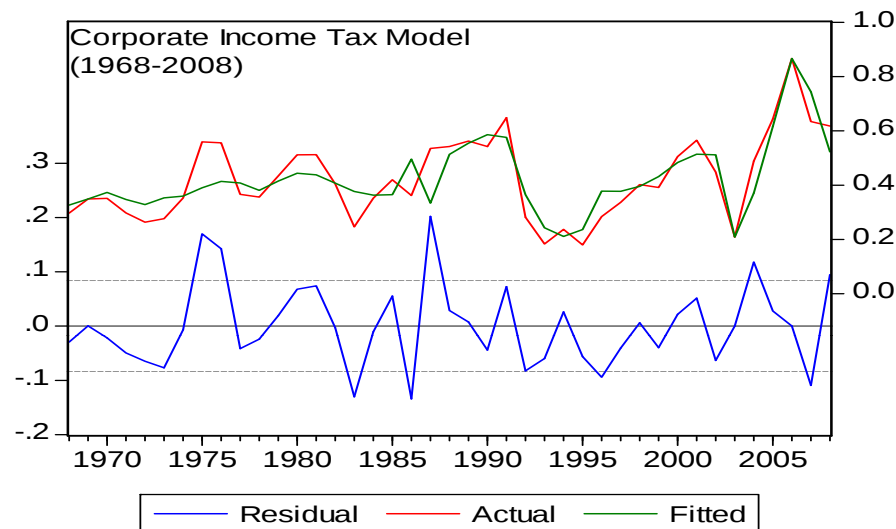
- Model: Differences of logarithmic transformed data
- Principal determinates of variation
 - Visitor Arrivals
 - Yen / Dollar Exchange Rate
 - U.S. Real Personal Income

Corporate Income Tax Model



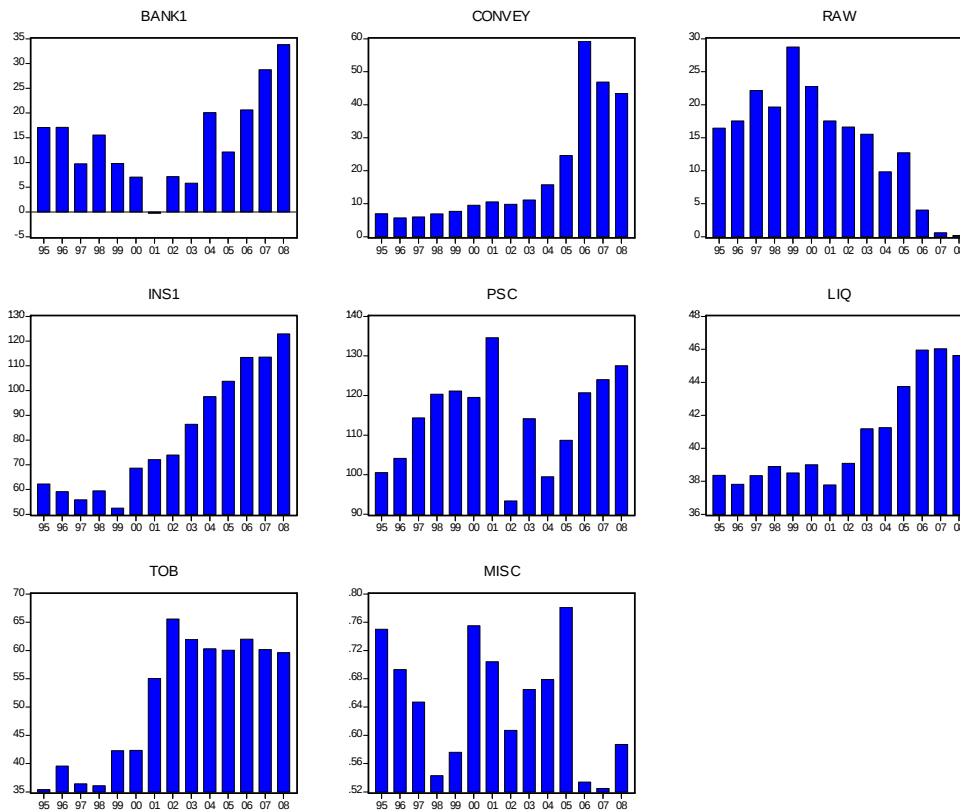
Real CY data possibly stationary
with autoregressive persistence

Corporate Income Tax Model



- Model: Data in levels with lagged endogenous CY
- Principal determinates of variation
 - Visitor Arrivals
 - Construction Completions
 - CA Recession

Minor Tax Models



- Series roughly correlated
- Frequent changes in legal structure
- Aggregate to 8% of revenues
- Knowledge of past two observations provides best forecast

$$\text{Model: } \text{tax}_{i,t} = \beta_{i,0} + \beta_{i,1} * \text{tax}_{i,t-1} + \beta_{i,2} * \text{tax}_{i,t-2} + \beta_{i,3} * \text{tax}_{k,t-1} + \beta_{i,4} * \text{tax}_{k,t-2} + \dots \quad (\text{for all } i, k)$$

Next Steps

- ◆ Implementation (July 2009)
- ◆ Phase II and Phase III
 - Define each Phase SoW
 - Phase II authorization
- ◆ Research Recommendations
 - HI real personal income model
 - Construction employment & completions models
 - Interval Forecasting
 - Quarterly Forecasting (advance warning)
 - Incorporation of Priors

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