Unemployment Insurance Forecasting Models

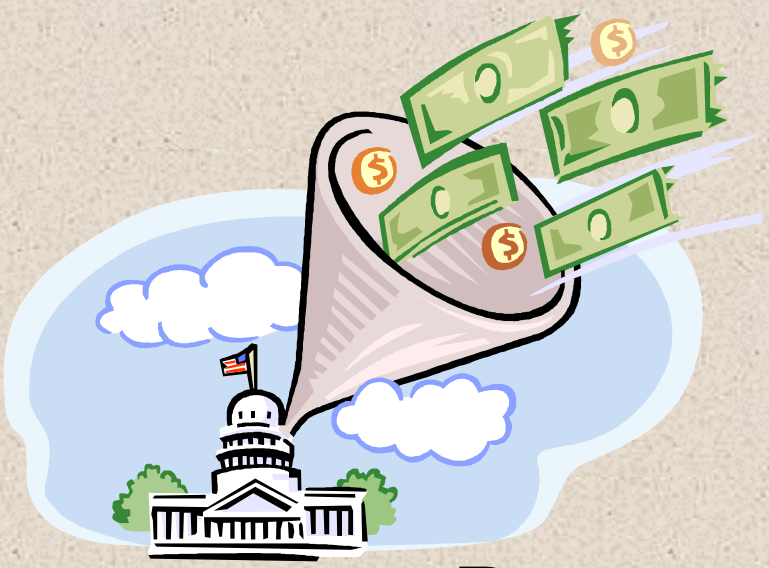
Presentation to
Unemployment Insurance Task Force

By Employment Security Department
July 26, 2005

Today's Topics

- Why is modeling necessary?
- What is a model?
- Why do we use models?
- How does a model work?
- What models do we use?
- How do we use the models together?
- What improvements can we make?

UI Trust Fund
our "bank account"



Beginning Balance

+ *Dollars In*

- *Dollars Out*

= Ending Balance

Reserves available for Bad Times

Accurate Projections

- Trust Fund Balance: 98% since 1985

Starts with 2 Forecasts…

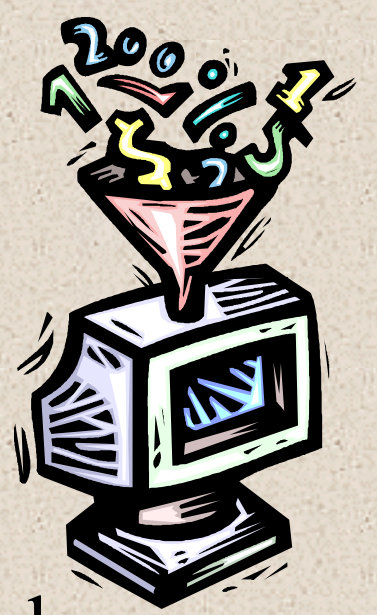
Total Wages ➔ Project ***Dollars In***

Weeks Claimed ➔ Project ***Dollars Out***

Accurate Projections

- Trust Fund Balance: 98% since 1985
- **Taxable Wage Base: 99.5% since 1988**
- **New Claims: 99.1% since 1971**
- **Weeks Claimed: 98.5% since 1971**

What is a Model?



- Collection of formulas and data
- Elaborate, computerized simulations of reality
- Data from reliable sources
- Standard statistical analysis methods
- Assumes that Past predicts Future
- Must be updated when UI Program changes

Accurate Projections

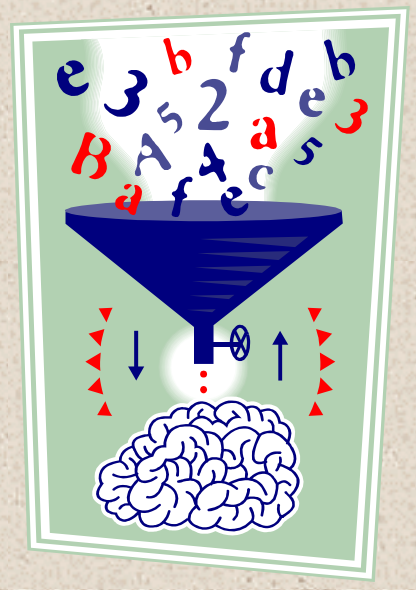
- Trust Fund Balance: 98% since 1985
- Taxable Wage Base: 99.5% since 1988
- New Claims: 99.1% since 1971
- Weeks Claimed: 98.5% since 1971
- **Average WBA: 99.8% for 2004**
  (after 2ESB 6097 law change)

Why do we use Models?

- Forecast workload for staffing purposes
- Project start/end of Extended Benefits for automation and notification purposes
- Inform public policy

How do Models work?

- Inputs – What if?
- Calculations
- Outputs – What will be?

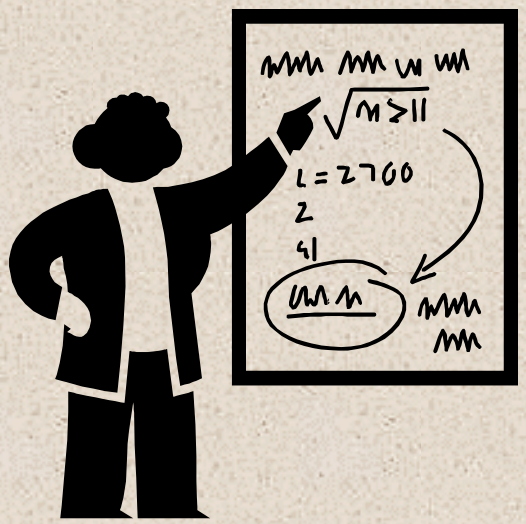


Inputs

- Historical Data
- Laws
- Assumptions

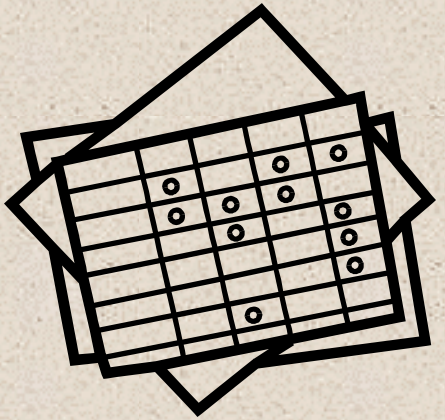
Calculations

- Simple and Complex
- Industry-standard methods



- Examples
  - Regressions
  - Simulations
  - Time series (e.g., ARIMA)

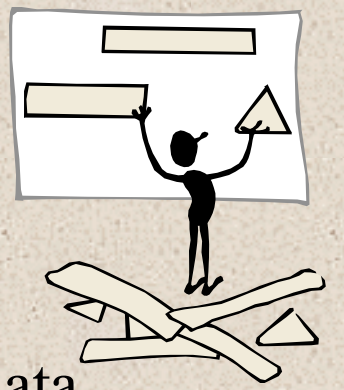
Outputs



- End Results of Calculations
- Examples
  - Taxes paid in
  - Benefits paid out
  - Trust Fund Balances

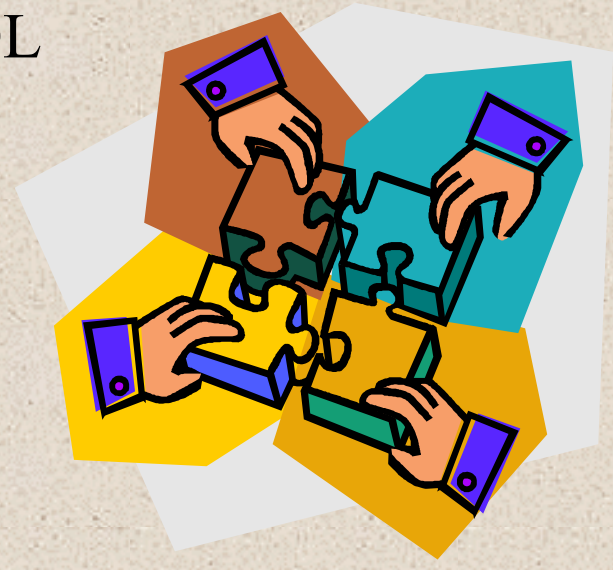
Importance of Inputs

- Historical wage and claim information
  (some detailed records are confidential)
- Forecasts from Forecast Council
- Assumptions in line with industry standards
- Some can be changed – "What if…?"
  - Usually laws
  - Sometimes assumptions
  - May require reconstruction of historical data



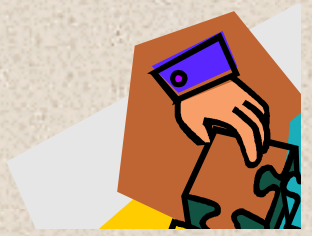
What Models do we use?

- 3 Models
  - Benefit Financing Model – DOL
  - Urban Institute Model
  - Washington ESD Model
- 2 Data Sets
  - Claimants
  - Employers



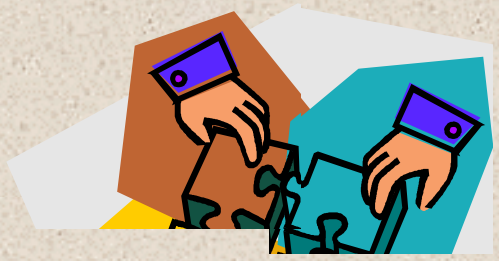
- Other confidential records from ESD's data warehouse
- Complement and Corroborate

Benefit Financing Model



- Developed in 1970s by US Department of Labor (DOL)
- Customized and updated for each state
- Prefilled, aggregated, historical data from state reports
- Authorized users input economic assumptions
- 129 variables in workload projection program
  139 variables in financial forecast program
- Output by year or quarter
- 23 states use currently; more joining
- Accuracy: 99% confidence levels for major variables
  Ensures integrity of inputs

Urban Institute Model

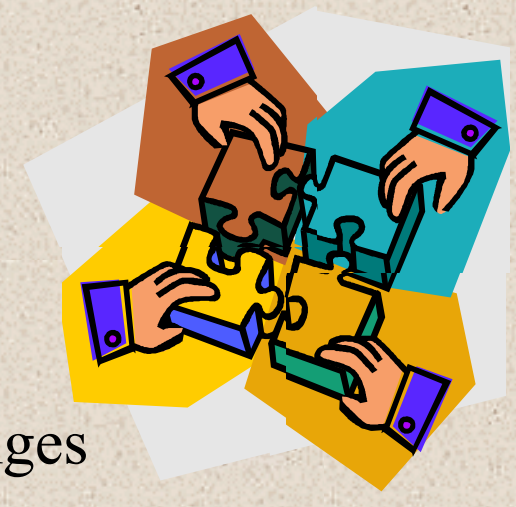


- Developed in 1990s by Dr. Wayne Vroman for WA State
- Historical information and WA's laws
- 120 equations
- Updated by ESD with information through 2004
  Projections through 2009
- Output also on Benefit Liability and Benefit Payments
- Monitor need for Extended Benefits
- Accuracy:
  - 99% confidence levels for major variables
  - Extended Benefits start/end dates

Accurate Projections

- Trust Fund Balance: 98% since 1985
- Taxable Wage Base: 99.5% since 1988
- New Claims: 99.1% since 1971
- Weeks Claimed: 98.5% since 1971
- Average WBA: 99.81% for 2004
  (after 2ESB 6097 law change)
- Extended Benefits Start/End dates: EXACT week

Washington ESD Model

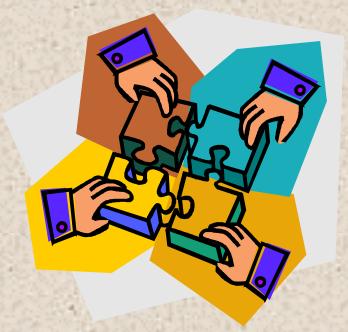


- Developed in early 1980s in response to new experience rating laws
- Can estimate consequences of policy changes
- Output by year or quarter
  Can provide glimpse of seasonal nature of system
- Fiscal years or calendar years
- 13 variables
- 2 data sets
  - Claimants from 2004: 187,000+ claims
  - Employers from 1995-2004: > 10 million records
- Confidential data warehouse records
- Accuracy: WBA and Tax Collection for 2004

Accurate Projections

- Trust Fund Balance: 98% since 1985
- Taxable Wage Base: 99.5% since 1988
- New Claims: 99.1% since 1971
- Weeks Claimed: 98.5% since 1971
- Average WBA: 99.8% for 2004
  (after 2ESB 6097 law change)
- Extended Benefits Start/End dates: EXACT week
- Tax Contributions: 98.8% for 2004
  (after 2ESB 6097 law change)

The Three Models Corroborate & Complement

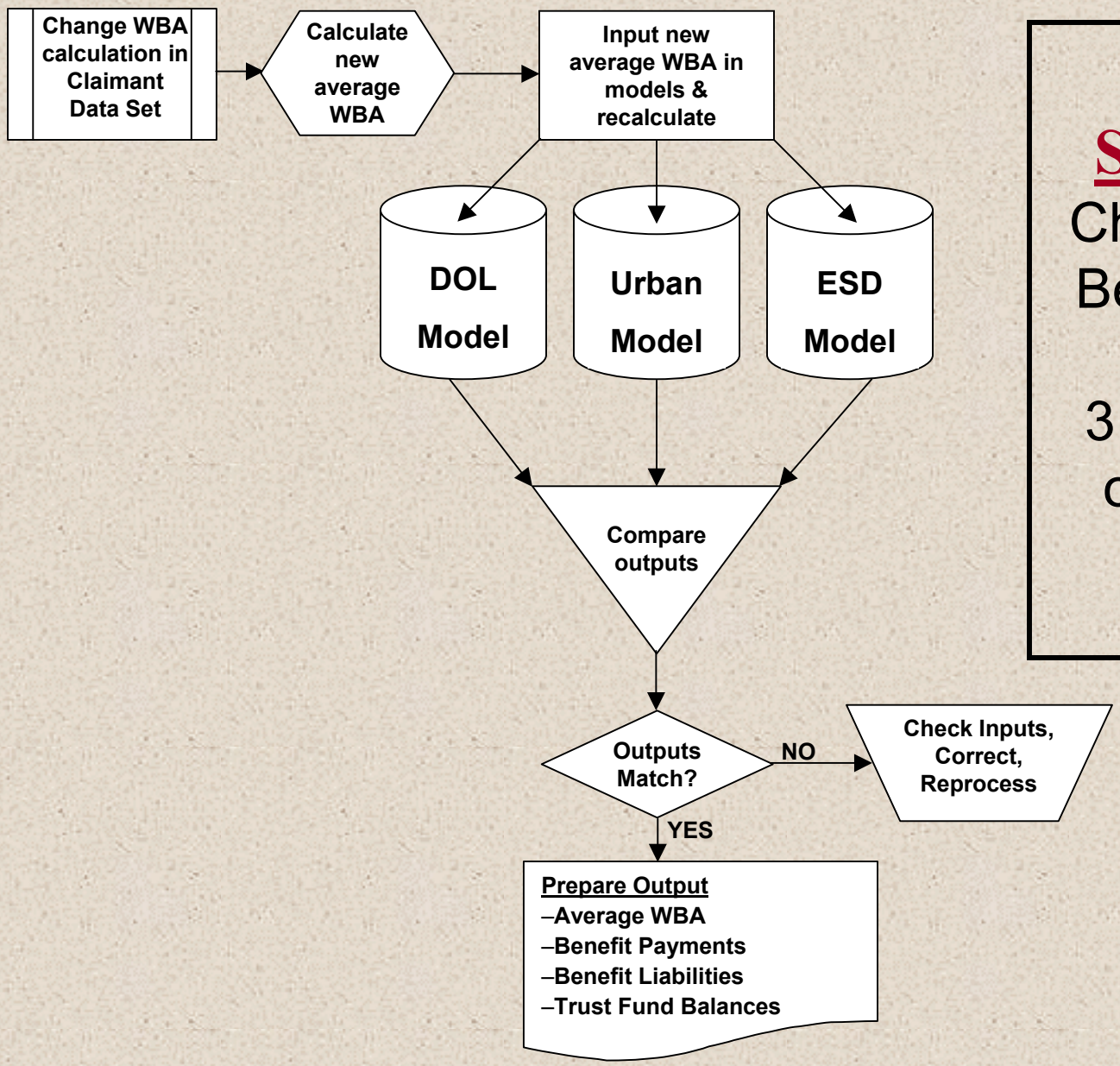


All three can project:

- Trust Fund Balance
- Tax Contributions
- Average Tax Rate
- Benefit Liability
- Average & Maximum Weekly Benefit Amounts
- Weeks Claimed
- Weeks Paid
- Outputs by Calendar Year

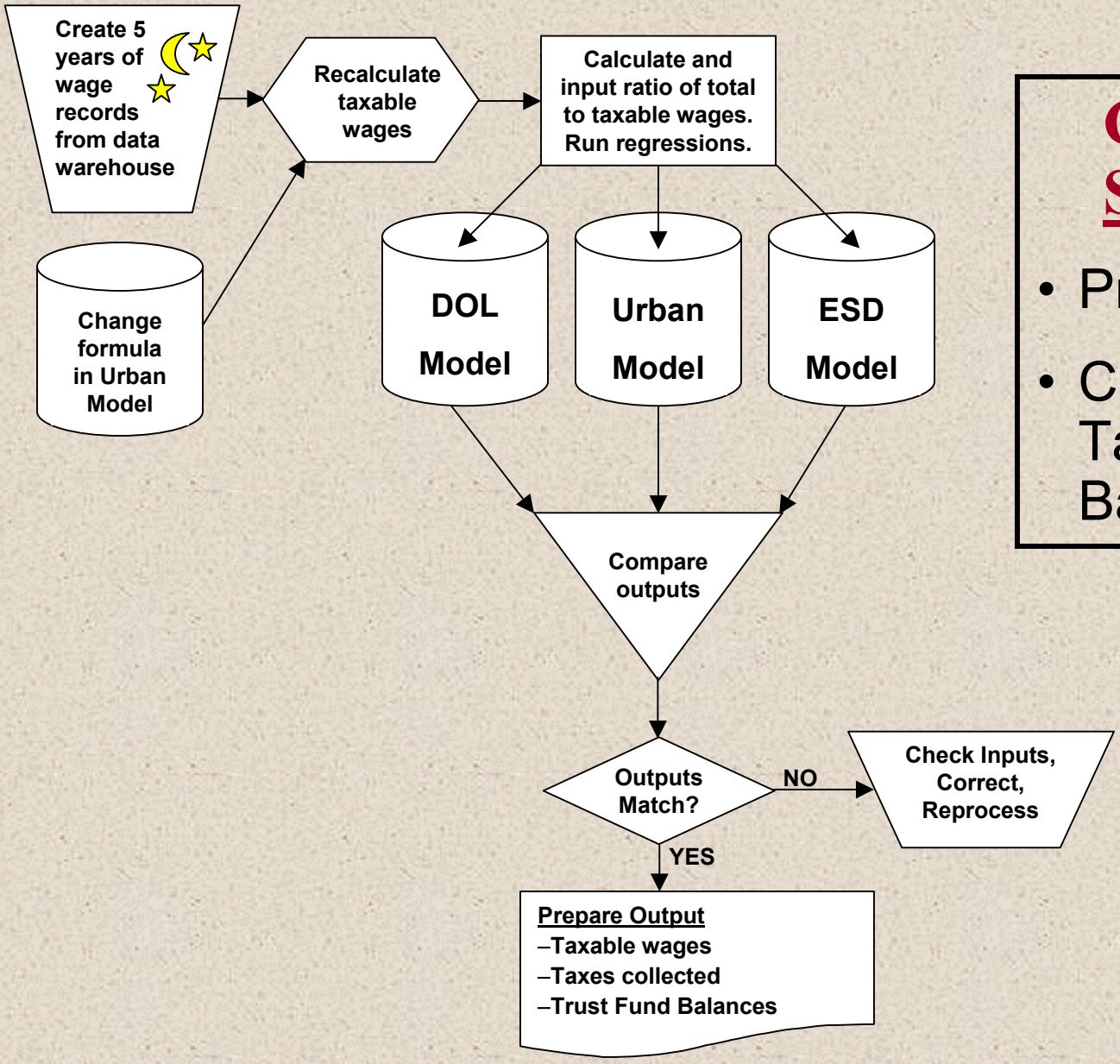
Not all three project:

- Benefit Payments
  - Only Urban Institute & ESD
- Seasonality & Outputs by Quarter or Fiscal Year
  - Only DOL & ESD Model
- Start & End Dates of Extended Benefit Periods
  - Only Urban Institute



SIMPLE SCENARIO

Change Weekly Benefit Amount (WBA) from 3.85% to 3.9% of average of highest 2 quarters



COMPLEX SCENARIO

- Project 5 years
- Change Taxable Wage Base (TWB)

Scenarios – Complexity & Turnaround

- Simple - Short Turnaround
  - One variable change AND
  - No demographic or industry drill-down AND
  - Uses existing data set
- Complex - Long Turnaround
  - More than one variable change OR
  - Demographic or industry drill-down OR
  - Needs new data set
    (must be created during non-business hours)

What Improvements can we make?

- Bottom line: Models are reliable
  - Accurate forecasts of Trust Fund solvency
  - Even after updates due to law changes
- Errors occur
  - Why do they happen?
  - What do we plan to do about them?

Why Errors Happen

- Framing the question
- Interpreting the answer
- Transferring the outputs from the models

Improving the Process

- Clarification:
  - Presentations
  - Glossary
  - Defined Process and Assumptions
- Validation and Verification:
  - Dr. Vroman and DOL
  - Internal checks on Questions, Data, and Answers before release
- Automation:
  - Locking down Excel workbooks
  - Automation of ESD model

Vision

- High Quality Information
- Informed Decisions
- Confidence in Models
- Trust Fund Solvency