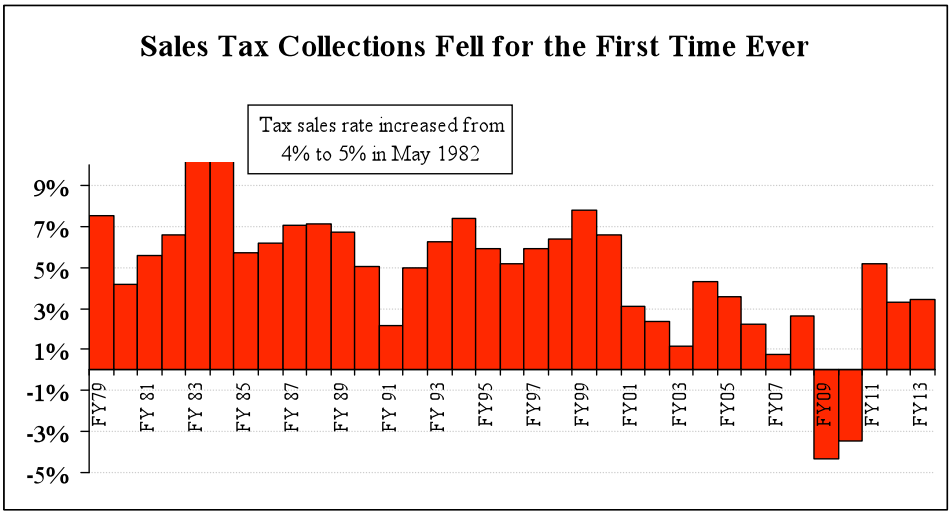
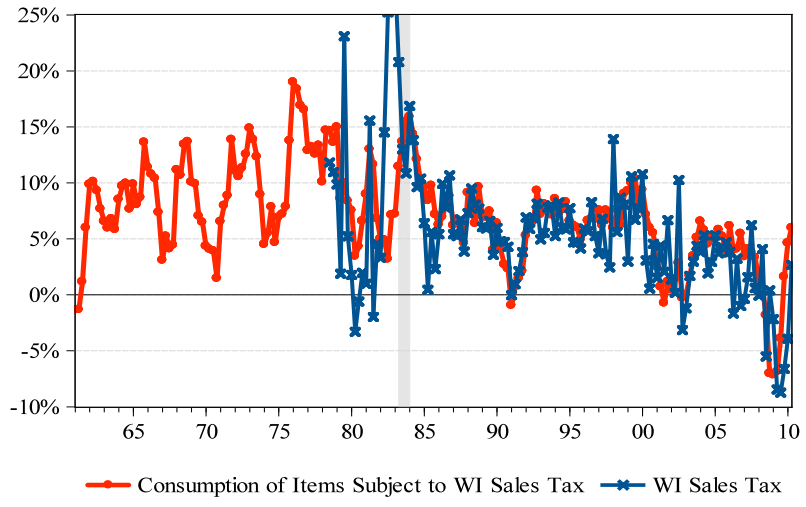
Forecasting Wisconsin Sales Tax Collections

FTA Revenue Estimating Conference
Ketchum, ID, September 2010

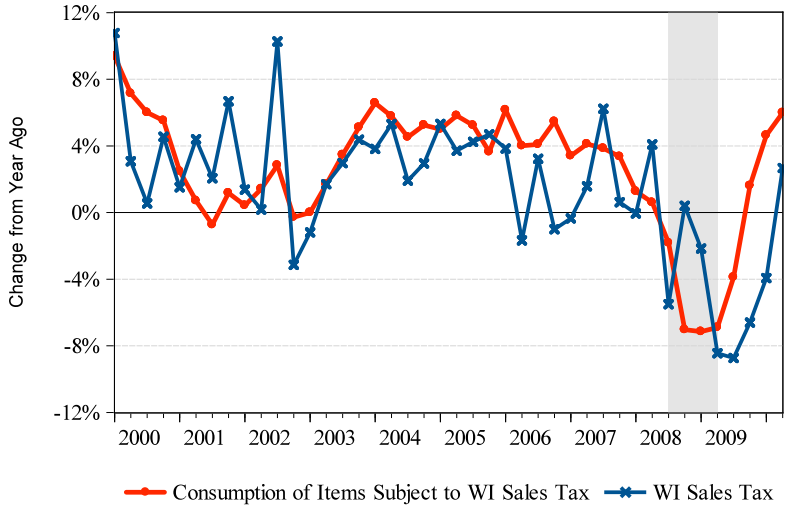
Wisconsin Department of Revenue
Romina Soria



U.S. Consumption vs. WI Sales Tax Collections



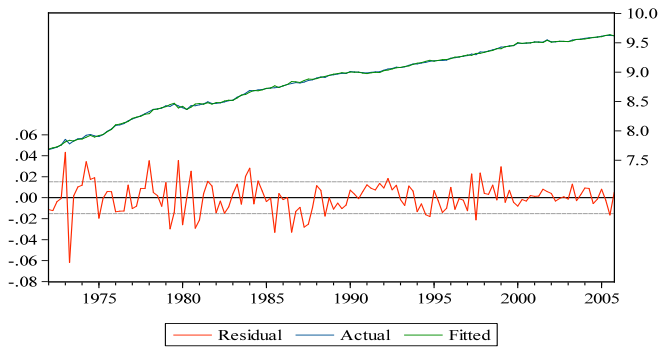
U.S. Consumption vs. WI Sales Tax Collections



Original Sales Model (2005)

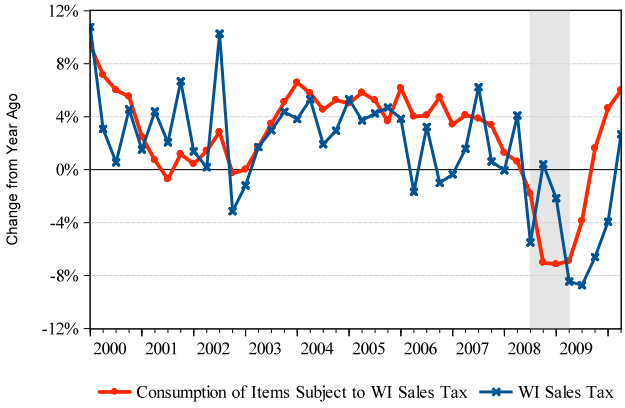
- LOG(TXGSSINTLW*(1+ECOMMRATIO) / (RTXGSSW
  *(1-RETAILERSPW))/NW) =

- LOG(US Adj. Cons/ US pop)
- (WI per capita Disposable Personal Income/ US Disposable Personal Income per capita)
- LOG(Core Prices/Total prices)
- Dummy and Autoregressor term: TIME<=131, (TIME>=213 AND TIME<=220), AR(1)



-Initial sales sample period= 1972-2005.
- Initial sales equation's mean absolute percent error (MAPE) for the period 1990-2006: 0.9%.
- Miscellaneous collections represented less than 5% of total sales tax collections.
- Miscellaneous equation's MAPE for 1990-2006: 11.8%

- By the end of 2006, the MAPE of the main equation increased and the sales tax collections started to depart from the U.S. consumption of items subject to WI sales tax.



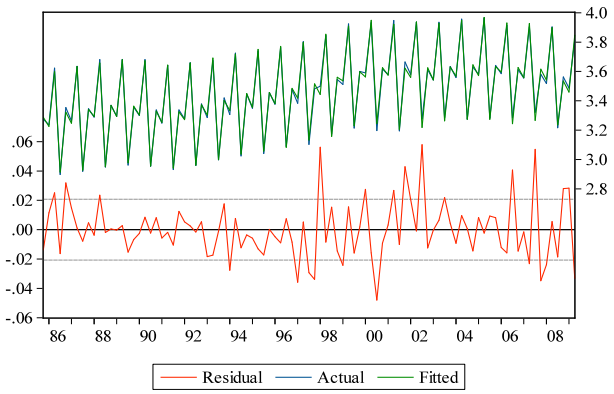
Modifications to the Sales Tax Model

- **Nov 2006**: Two equations; seasonally adjusted initial collections and miscellaneous collections. Revision of the definition of U.S. consumption of items subject to WI sales tax.
- **Nov 2007**: still have two equations, but
  - Initial sales collections series were not seasonally adjusted but four dummy variables were included to account for the seasonality, reducing the average error.
  - The consumption regressor was adjusted by the total price index, instead of having prices as an independent variable.
  - Includes the difference of the differentials of WI and U.S. unemployment rates
- **Nov 2008**: due to the introduction of a new tax processing system we lost the capacity to identify sales tax payments as initial vs. miscellaneous (delinquent and audit payments).
  - The 2008 model will include just one equation, total sales collections non-seasonally adjusted, with four dummies to account for seasonality.

Sales Tax Equation (2008)

- Shorter sample period: 1985-2008
- LOG(*TXSALES**(1+ECOMMRATIO) /(RTXGSSW * (1-RETAILERSPW)) /NW/JPCADJ)=
- Dummies to account for seasonality,
- LOG(US Adj. Cons/ US pop/ US Prices),
- LOG(WI Personal Income),
- D(WI unemployment rate) - D(US unemployment rate),
- LOG(WI sales of cars and trucks),
- Dummy and Autoregressor term: TIME=>238, AR(4)

Sales Tax Equation (2008)



R2: 0.995

S.E. equation: 0.02

Durbin-Watson: 2.3

Sample period: 1985-2009Q2

MAPE 1990-2008: 1.5%

Covariance Proportion: 0.996

WI Sales Tax Collections - Forecast Errors						
	ACTUAL	Nov-06	Nov-07	Nov-08	Jul-09	Nov-09
FY08	4268	4328	4267.8			
Error		1.4%	0.0%			
Period		20 months	8 months			
FY09	4084	4491	4376	4097		
Error		10.0%	7.1%	0.3%		
Period		32 months	20 months	8 months		
FY10	3944			3910	4099	3991
Error				-0.9%	3.9%	1.2%
Period				20 months	12 months	8 months

Global Insight Forecast of U.S. Consumption of Items Subject to WI Sales Tax Forecast Errors						
	ACTUAL	Nov-06	Nov-07	Nov-08	Jul-09	Nov-09
FY08	3990	4328	3977	3970	3970	3991
Error		8.5%	-0.3%	-0.5%	-0.5%	0.0%
Period		20 months	8 months			
FY09	3762	4491	4117	3830	3797	3790
Error		19.4%	9.5%	1.8%	0.9%	0.8%
Period		32 months	20 months	8 months		
FY10	3837		4312	3863	3787	3893
Error			12.4%	0.7%	-1.3%	1.4%
Period			32 months	20 months	12 months	8 months

Sales Tax Equation (2010)

- **Shorter sample period: 1985-2008**
- **LOG(*TXSALES**(1+ECOMMRATIO) / (RTXGSSW*(1-RETAILERSPW)) /NW/JPCADJ)=**
- **Dummies to account for seasonality,**
- **LOG(US Adj. Cons/ US pop/ US Prices),**
- **LOG(WI personal income),**
- **LOG (US credit)**
- **D(WI unemployment rate) - D(US unemployment rate),**
- **LOG(WI sales of cars and trucks),**
- **Dummy and Autoregressor term: TIME=>238, AR(4)**

- Comments,
- Questions,
- Suggestions…