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DO ACCOUNTING EARNINGS PROVIDE USEFUL INFORMATION FOR STATE TAX REVENUE FORECASTS?

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Research Question

Do accounting earnings provide useful information for state tax revenue forecasting?

Agenda

1. Survey: how many have taken accounting?
2. What is accounting? What is unique about it?
3. Prior literature: aggregate earnings growth and macroeconomic forecasting.
4. Can accounting earnings help improve revenue forecasts?
    1. Hypothesis development
    2. Data
    3. Research Design
    4. Findings

What is accounting?

Per Brady: measuring and communicating information about a firm's performance

What is accounting?

- Financial accounting
- Managerial accounting
- Tax accounting
- Governmental accounting
- Not-for-profit accounting

Financial accounting

- Authority: Financial Accounting Standards Board (FASB)
- Source: Generally Accepted Accounting Principles (GAAP)
- Purpose:
  - Provide decision-useful information to financial statement users
- Summary performance measure: Net income, Book income, Earnings

Financial accounting features

- Prepared on a global-firm basis
- Public
- Both rules- and principles-based
- Subject to audit/attestation
- Filed quarterly

More Fin. Acc. Features

- Accruals-based
  - Stem from revenue recognition & matching
  - Examples of specific accrual accounts:
    - Accounts receivable, unearned revenues
    - Accounts payable, prepaid expenses
  - Accruals increase the information content and usefulness of accounting earnings
    - Persistence helps predictability

More Fin. Acc. Features

- Conditional conservatism:
  - results in “bad news” being reflected in earnings more quickly than “good news”
  - Accountants tend to require more verification to record good news than bad news.
  - Examples:
    - Asset impairment (tangible and intangibles)
    - Lower of cost or market for inventory valuation

Literature: Aggregate earnings growth – Wave #1

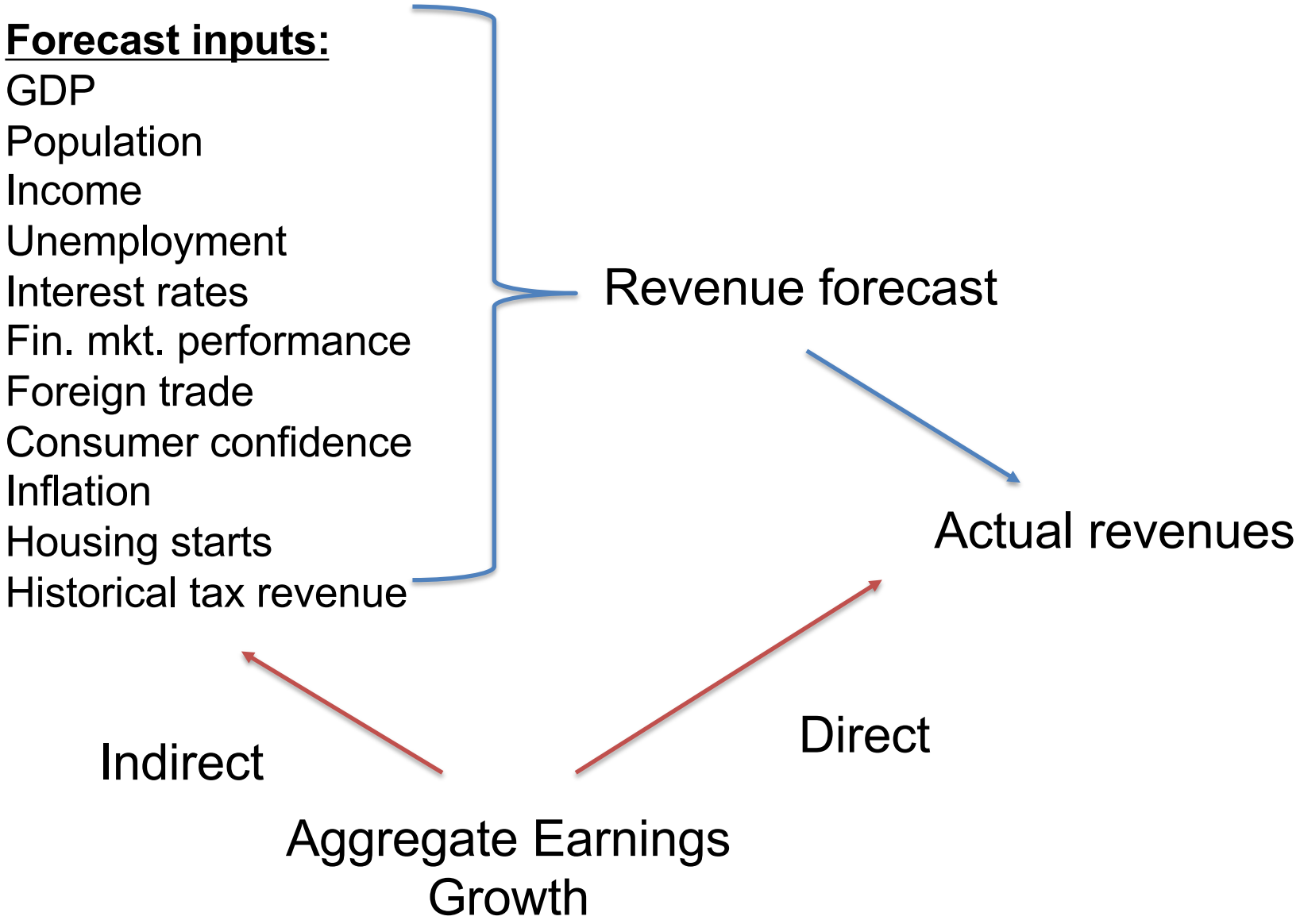
- Aggregate earnings growth is a very useful predictor of macroeconomic indicators:
  - Future investment (Kothari, Lewellen, and Warner 2014)
  - Future GDP (Konchitchki and Patatoukas 2014)
  - Future inflation (Shivakumar and Urcan 2014)
  - Future unemployment (Hann, Li, and Ogneva 2021)
- Incremental to current forecasts
- Literature generally uses growth rather than levels.

Aggregate earnings growth – Wave #2

- Recent evidence suggests aggregate accounting is particularly useful at predicting macro declines due to conservatism
  - GDP forecasters underreact to negative news in aggregate earnings. Usefulness seems to be due to conservatism (Gaertner, Kauser, and Steele 2020)
  - Aggregate special items (which are usually bad news) are a leading indicator of job destruction (Hann, Li, and Ogneva 2021)
  - Accounting conservatism seems to be the channel that mediates the association between accounting earnings and future inflation and money supply (Crawley 2014)

How might aggregate earnings growth improve revenue forecasts?

- Two channels for improvement
  - **Indirect:** Improve the quality of tax revenue forecast inputs
  - **Direct:** Public-company earnings growth could a leading indicator of various tax bases


Forecast inputs:
GDP
Population
Income
Unemployment
Interest rates
Fin. mkt. performance
Foreign trade
Consumer confidence
Inflation
Housing starts
Historical tax revenue
Revenue forecast
Actual revenues
Direct
Indirect
Aggregate Earnings Growth

Nice idea in theory so far…

- But there is still a big problem.

How do you allocate activity from a globally-consolidated firm to specific state?

- Discuss design and data assumptions first.

General Research Strategy

1. Establish a baseline level of explanatory power in forecasts.

$$Actual\ Revenue\ Growth_{st} = \beta_0 + \beta_1 Forecasted\ Revenue\ Growth_{st} + \varepsilon_{st}$$

2. Supplement that model with aggregate earnings growth.

$$Actual\ Revenue\ Growth_{st} = \beta_0 + \beta_1 Forecasted\ Revenue\ Growth_{st} + \beta_2 Aggregate\ Earnings\ Growth_{st-2} + \varepsilon_{st}$$

3. Compare R2.

Variable definitions

Dependent Variable (Actual Revenue Growth):

$(REVENUE_{st} – REVENUE_{s,t-1}) / REVENUE_{s,t-1.}$

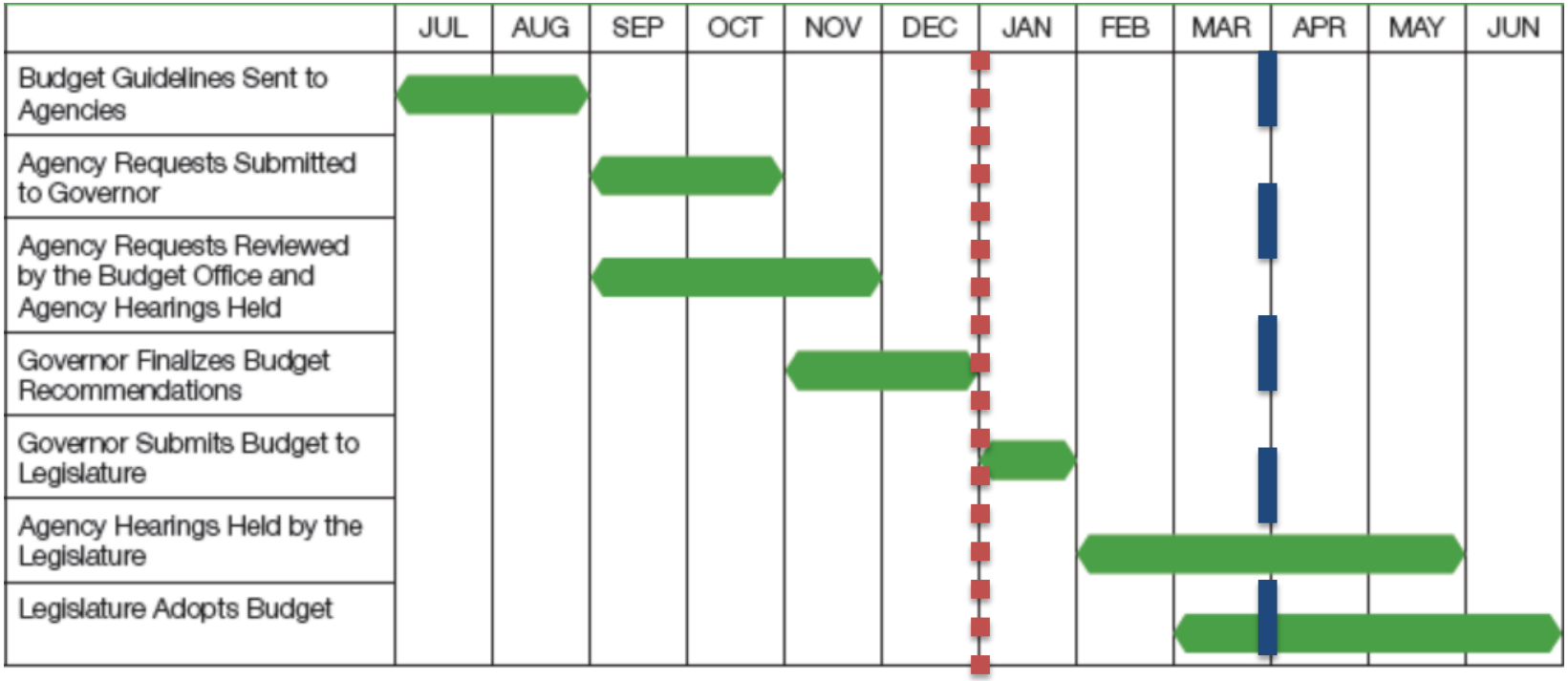
Baseline model independent variable (Forecast Growth):

$(FORECASTED\ REVENUE_{st} – REVENUE_{s,t-1}) / REVENUE_{s,t-1.}$

Panel Data

- NASBO: actual and forecasted state tax revenues for 1999-2018:
- WRDS Compustat quarterly: estimate earnings for 1997-2016 using calendar-year quarter data.
- BEA for industry weightings (state GDP by industry).

Design - State Budget Cycle



Source: NASBO's *Budget Processes in the States* (Spring 2015). The figure reflects a typical budget cycle for states with June 30th fiscal year-ends.

Aggregate Earnings Growth

- By firm, calculate growth in firm's PI pseudo-calendar year:
  (pre-tax income$_t$ – pre-tax income$_{t-1}$) / sales$_{t-1}$.

- Value-weight by MVE and aggregate:
  1. National level.
  2. Headquarter-state level.
  3. Industry-level (state-specific):
     - ∑ PI Growth* Industry Weight

State-specific industry-weighted aggregate earnings growth example

	Aggregate Earnings Growth		Industry contribution to State GDP	
			State A	State B
Mining	4%		30%	40%
Retail	6%		30%	40%
Technology	13%		40%	20%
			100%	100%
	Weighted Average Earnings Growth Rate		8.200%	6.600%

Validation Tests – General Fund

Actual Rev. Growth = β_0 + β_1 Forecast Rev Growth + ε

- β_1 = 0.7113***; R^2 = 0.176

Actual Rev. Growth = β_0 + β_1 Agg. Earn Growth$_{t-1}$ + ε

- β_1 = 0.8691***; R^2 = 0.119

Forecast Rev Growth = β_0 + β_1 Agg. Earn Growth$_{t-1}$ + ε

- β_1 = -0.0346; R^2 = 0.000429

Inferences: Forecasted growth predicts actual revenue growth. Earnings growth also predicts actual revenue growth, but forecast growth and earnings growth are not related.

Main Test – General Fund

Actual Rev. Growth = β_0 + β_1 Forecast Rev Growth + ε

- β_1 = 0.7113***; R^2 = 0.176

Actual Rev. Growth = β_0 + β_1 Forecast Rev Growth +
β_2 Agg. Earn $Growth_{t-1}$ + ε

- β_1 = 0.7480*** & β_2 = 0.8950***; R^2 = 0.302

Inference: R2 increases from 0.176 to 0.302 is statistically significant and suggests that aggregate earnings adds explanatory power to forecasts.

Repeat PIT, Sales Tax, and CIT

	Model 1 Baseline R_2	Model 2 Supplemented R_2
Personal Income Tax	0.141	0.420
Sales Tax	0.305	0.362
Corp Income Tax	0.234	0.344

Inference: Aggregate accounting earnings increases explanatory forecast of all major tax types—especially PIT and CIT.

Testing direct or indirect channel

- Essentially a de facto mediation analysis
- Simplify by using forecasts error as DV.

$$\textit{Forecast Error}_t = \beta_0 + \beta_1 \textit{ Agg. Earn Growth}_{t-1} + \varepsilon$$

- Add controls for *year t* realizations of GDP, unemployment, inflation, and other macro outcomes.

Result: β_1 still loads with a kitchen sink of controls.

Inference: Aggregate earnings can directly improve tax forecasts. Improvement aren't just due to improving forecasts of tax revenue input forecasts.

Results are robust to:

- Using forecast error as DV
- Use domestic pretax income (PIDOM) or income before extraordinary items (IB).
- Drop the interim year for states with biennial budgets.
- Only use June 30 year-end states.
- Remove influential observations.
- Two different hold-out samples (random and pre/post-2015).

Additional analysis:

- We repeated analysis using:
  - Analysts' earnings forecasts
  - Managers' earnings guidance
  - Changes in stock returns.
- All added explanatory power to the modes, but none to the degree of earnings.

Conclusion

- Documents **usefulness of accounting earnings to state tax revenue forecasts**.
- **Earnings outperforms** stock returns and analysts' forecasts.
- States can improve forecasts of **all major tax types** by incorporating accounting earnings growth.
- **Industry-weighted model** has greatest ability to improve forecasts.
  - Method innovation for researchers.

If you're curious…

- We're willing to share our historical measures for your state.
- We're curious how they would perform in a your state-specific models.
- Send an email if you're curious, and I'll send you our sample data.

Email: brady.williams@mccombs.utexas.edu

Thank you!