Financial Statements and Macroeconomic Dynamics

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Introduction

- On most days, dozens of companies file quarterly financial statements (8-Ks, 10-Qs) containing detailed information from their income statements and balance sheets.
- Firm-specific news from this rich data source tend to dominate the headlines, e.g., JP Morgan beats earning forecasts.
- Common themes related to the **state of the underlying economy** often emerge, e.g. credit to firms is booming $\rightarrow$ the economy is solid.

Motivation

- Company financial statements offer a unique perspective on the state of the economy, different from
  - *Market-based indicators*, e.g., inverted yield curve
  - *Labor market indicators*, e.g., unemployment rate
  - *Aggregate macro indicators*, e..g, retail sales
  - *Household-based indicators*, e.g., credit card balances
- Accounting data contains both contemporaneous and forward-looking information.
- Corporate accounts are audited and rarely revised, ensuring consistency.

Research Questions

1. Do specific accounting variables lead, lag, or move contemporaneously with the economy?

2. Can we construct real-time, daily **aggregate** indicators from company filings to track and predict economic activity?

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Challenges in constructing daily, aggregate indicators using individual, firm-level filings:

- Time-varying set of reporting companies
- Firm- or industry-specific components may dominate
- Simple weighting schemes result in volatile time series

Contributions

1. New methodology for aggregating daily firm-level news that controls for firm- and quarter-specific fixed effects.
2. Construct **daily** time series of 21 key firm variables and aggregate categories
   - Leverage, Valuation, Liquidity, Operations, Profitability
3. Systematic analysis of the dynamic relationship between a broad array of high-frequency accounting variables and measures of macroeconomic activity.

Main Results

1. Complex lead-lag relationships between corporate filings and the aggregate state of the economy. Examples:
   - **Liquidity** becomes significantly lower several months prior to recessions (leading, pro-cyclical indicator)
   - **Debt** increases before recessions
   - **Leverage** remains elevated for months after the end of recessions
   - **Operating activity and profitability** measures are lower after recessions (lagging, pro-cyclical indicators)
2. Most of financial variables significantly correlated with the Atlanta GDP Nowcast errors
   - This is consistent with the corporate variables containing information beyond that incorporated in the Fed model.
3. PLS-based (CABA) indexes closely track economic activity

Website

https://corporateactivitytracker.com

- Interactive plots
- Downloadable series

Website – Revenues

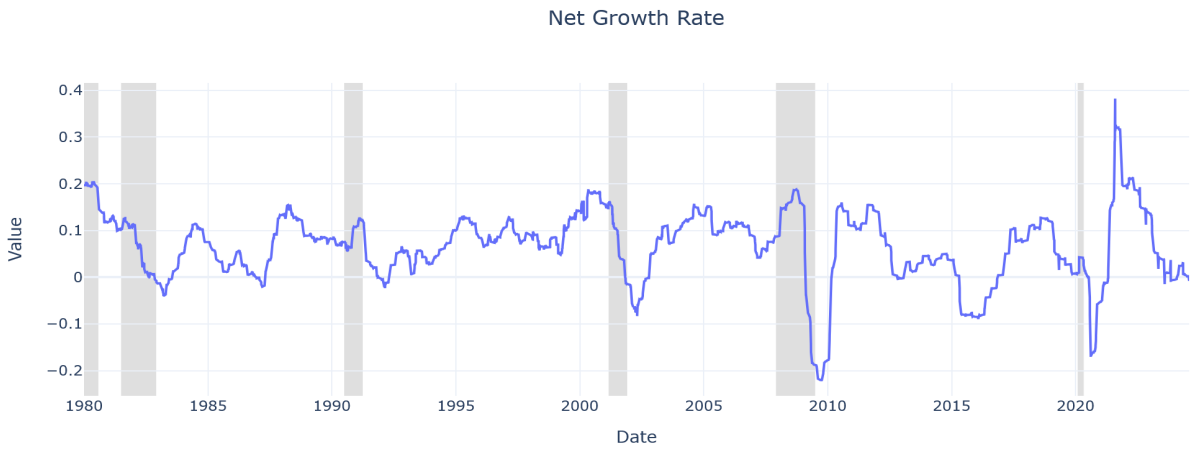
Fundamentals

- Revenues
- Cost of Goods Sold
- Cash
- Cash and Short Term Investments
- Depreciation and Amortization
- Total Debt
- Working Capital
- EBIT
- Net Income

Financial Ratios

- Book-to-Market Ratio
- Cash Ratio
- Current Ratio
- Debt-to-Equity Ratio
- Debt Ratio
- Gross Margin Ratio
- Investment-to-Capital Ratio
- Interest Coverage Ratio
- Price-to-Earnings Ratio

Revenues



Shaded areas indicate U.S. recessions

Download Data

Outline

Data Source and Approach

- *Source*: CRSP/COMPUSTAT merged, 1975-2022 (website: April 2025).
- *Data*: Firm-level accounting data from quarterly 8-Ks/10-Q filings, on announcement dates.
- Focus on both fundamentals' growth rates and ratios:
  - *Growth* rates: insight into how variables change over time
  - *Ratios*: track firms' financial health metrics
- Financial firms are excluded from the analysis.

Variables and Categories

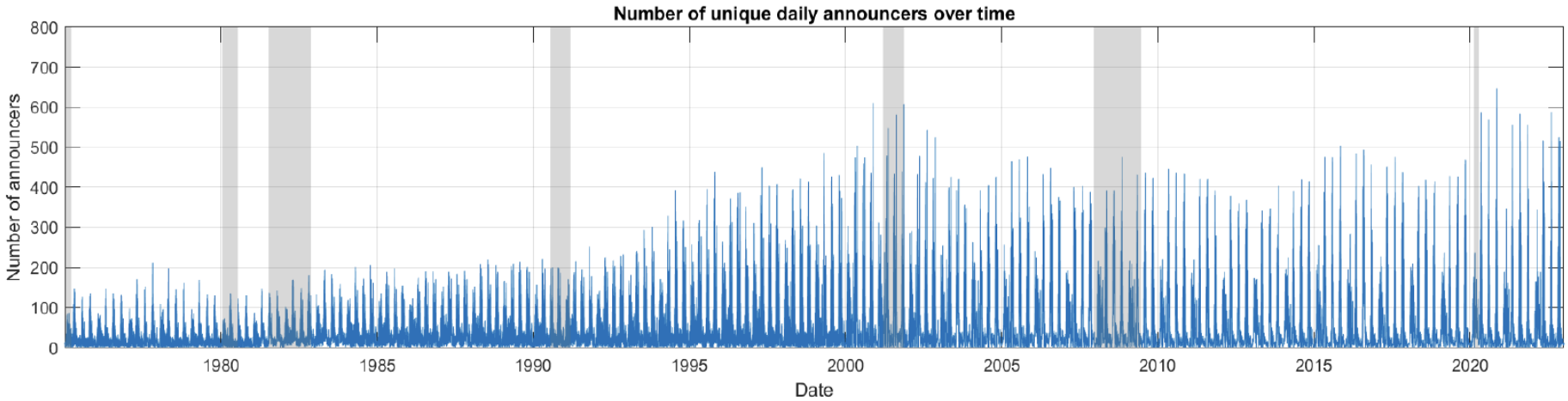
21 variables (9+12) categorized into five groups:

- **Leverage**
  - Total debt
  - Working capital
  - Debt-equity ratio
  - Debt ratio
- **Valuation**
  - Price-earnings ratio
  - Book-to-market ratio
- **Liquidity**
  - Cash
  - Cash and short-term investments
  - Cash ratio
  - Current ratio
  - Interest coverage ratio
- **Operating activities**
  - Revenues
  - Cost of goods sold
  - Depreciation and amortization
  - Investment-to-capital ratio
- **Profitability**
  - Gross margin ratio
  - Return on equity (ROE)
  - Return on assets (ROA)
  - Return on net operating assets (RNOA)
  - EBIT
  - Net income growth

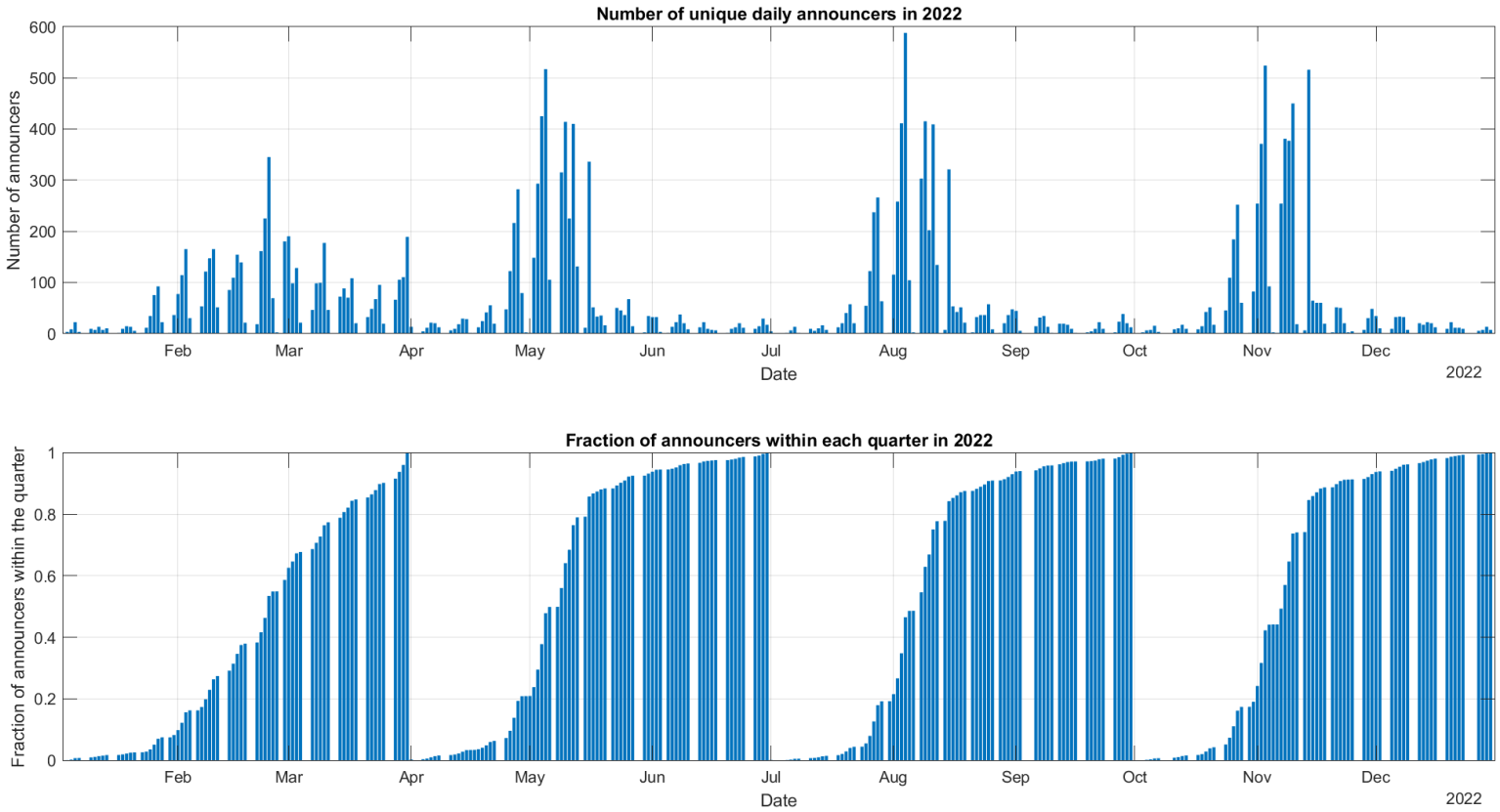
Data Cleaning

- Firm announcement dates from Compustat (variable *rdq*).
- Drop entries with missing or negative values.
- Replace missing announcement dates if available from past year to avoid losing valuable information.
- Winsorize data at the 1% level.

Number of Daily Announcers



Announcement Cycle During The Year



Growth Rates

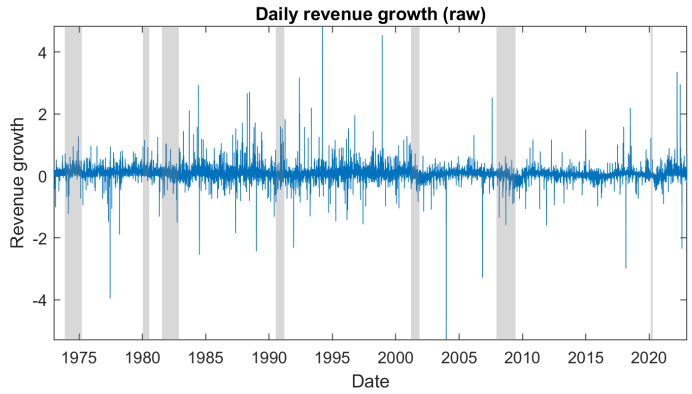
- Aggregate, real-time, daily growth rates

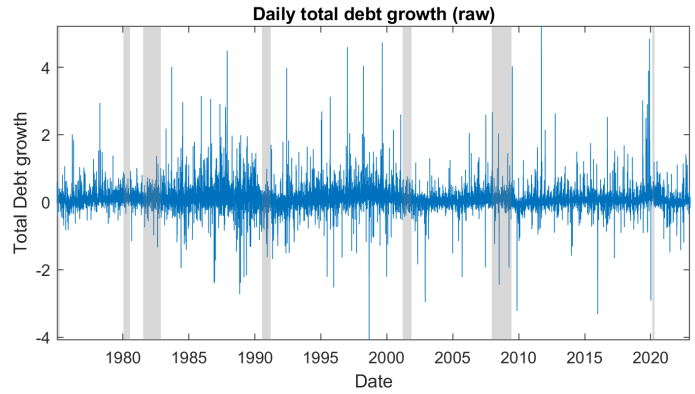
$$X_{i,t} = \frac{\sum_{\tau=0}^{89} \sum_{f \in Q(t-\tau) \cap Q(t_{-1yr}-\tau)} x_{i,f,t-\tau}}{\sum_{\tau=0}^{89} \sum_{f \in Q(t-\tau) \cap Q(t_{-1yr}-\tau)} x_{i,f,t_{-1yr}-\tau}} - 1$$

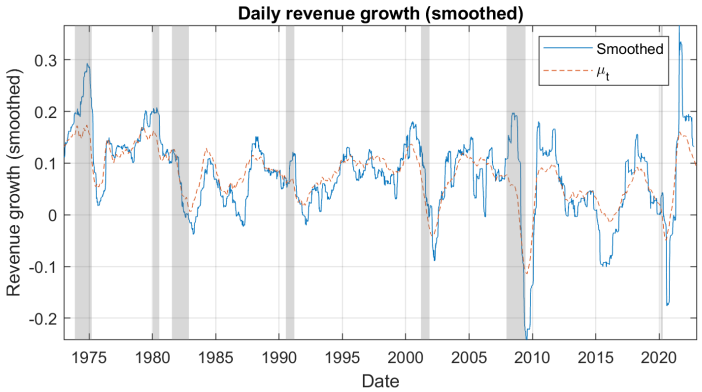
i indexes variables
f indexes firms
t indexes time (days)

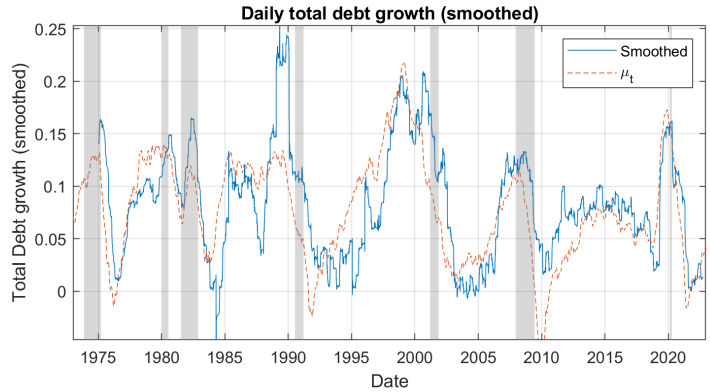
$Q(t-\tau) \cap Q(t_{-1yr}-\tau)$ denotes the set of firms filing both on day $t-\tau$, and on the same (or close-by) day one year before.

Examples: Revenues and Total Debt









Note: μ_t is the filtered mean extracted using the approach in Pettenuzzo et al. (2020)

Desirable Properties of Our Approach

- *Firm-matched*: identical set of firms in numerator and denominator.
- Controls for firm-level heterogeneity and minimize composition effects.
- Accounts for seasonality by comparing same fiscal quarters.
- Simple and intuitive method, no need for a formal econometric model.

Financial Ratios

- Similar to growth rates, but numerator and denominator from *same* fiscal quarter

$$R_{i,t} = \frac{\sum_{\tau=0}^{89} \sum_{f \in Q(t-\tau) \cap Q(t_{-1yr}-\tau)} x_{i,f,t-\tau}}{\sum_{\tau=0}^{89} \sum_{f \in Q(t-\tau) \cap Q(t_{-1yr}-\tau)} y_{i,f,t-\tau}}$$

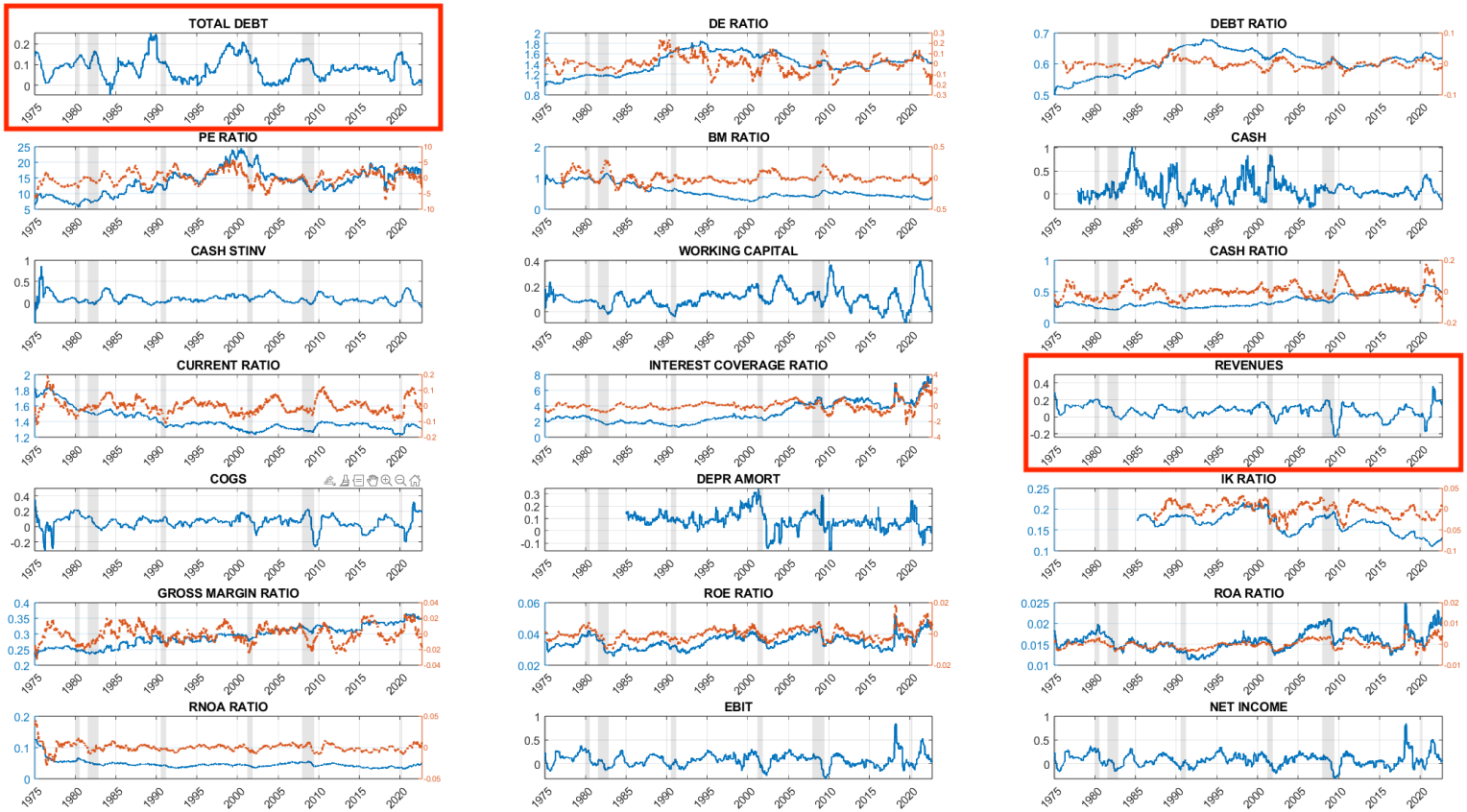
- We remove the trend using Hamilton (2018) method:

$$R_{i,t+h} = \beta_{i,0} + \sum_{j=1}^{p} \beta_{i,j} R_{i,t-j+1} + X_{i,t+h}$$

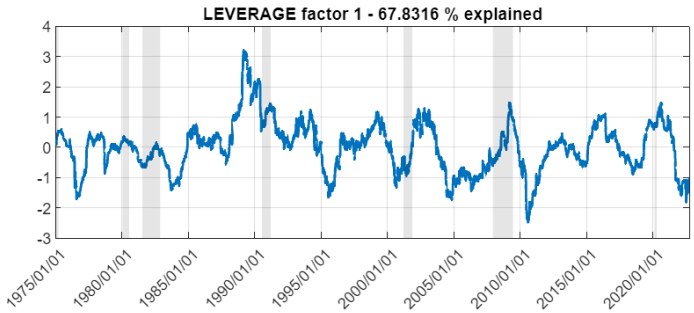
where:

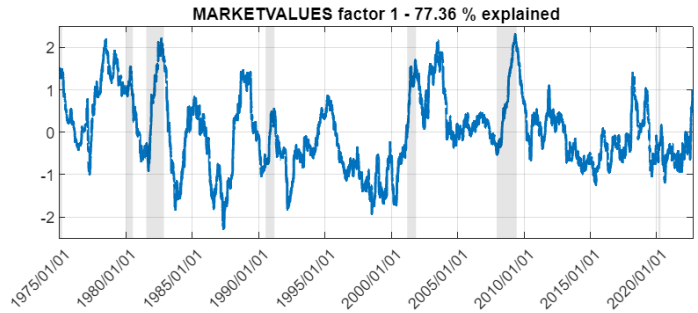
- $h = 500$ (2-year-ahead residual)
- $p = 250$ (number of lags)
- $X_{i,t+h}$ is the cyclical component

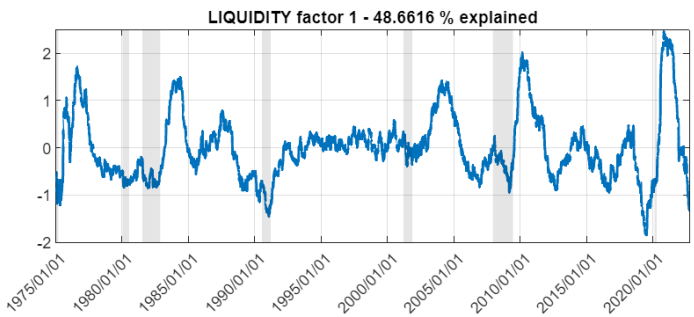
All Variables

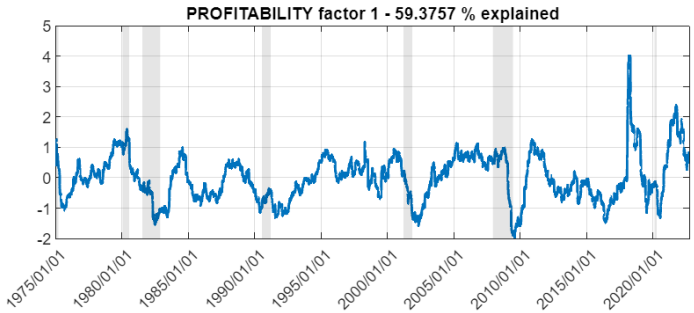


Principal Components by Categories









Corporate Variables and Macro Quantities

- We look at lead-lag regressions using GDP growth (quarterly) and Industrial Production growth (monthly)

$$\Delta y_t = \beta_{0,i} + \beta_{1,i} X_{i,t+j} + \varepsilon_t$$

  where Δy_t is either quarterly GDP or monthly IP growth

- Leads: $j < 0$, lags: $j > 0$, keeping the same frequency of the dependent variable.

Corporate Variables and GDP Growth

Series	4Q before	3Q before	2Q before	1Q before	Concurrent	1Q after	2Q after	3Q after	4Q after
Leverage and valuation									
Total debt	-0.044	-0.089	-0.109	-0.149	-0.114	-0.108	-0.074	-0.026	0.096
DE ratio	0.060	0.025	-0.019	-0.001	-0.153	−0.255***	−0.197**	−0.182**	−0.186**
Debt ratio	0.096	0.024	-0.021	-0.034	−0.178*	−0.228**	−0.174*	-0.145	−0.178*
Leverage factor	0.061	0.000	-0.047	-0.054	−0.181*	−0.249**	−0.189**	-0.157	-0.143
Liquidity									
Cash and short term investments	0.289***	0.223**	0.279***	0.347***	0.280***	0.177*	−0.026	−0.200**	−0.252**
Working capital	0.091	0.103	0.169*	0.203**	0.218**	0.095	-0.072	−0.239**	−0.348***
Cash ratio	0.132	0.118	0.104	0.127	0.132	-0.134	−0.200**	−0.318***	−0.427***
Current ratio	0.216**	0.249**	0.291***	0.342***	0.389***	0.234**	0.107	0.011	-0.080
Liquidity factor	0.212**	0.207**	0.236**	0.305***	0.306***	0.125	-0.033	−0.196**	−0.293***

Corporate Variables and GDP Growth

Series	4Q before	3Q before	2Q before	1Q before	Concurrent	1Q after	2Q after	3Q after	4Q after
Operating activities									
Revenues	0.073	0.058	0.146	0.154	0.199**	0.532***	0.548***	0.562***	0.458***
COGS	-0.071	-0.096	-0.048	0.001	0.030	0.314***	0.376***	0.390***	0.397***
IK ratio	-0.164	-0.055	-0.053	-0.004	0.024	0.013	0.042	0.223*	0.274**
Operating activity factor	-0.046	-0.050	0.037	0.030	0.102	0.367***	0.441***	0.518***	0.472***
Profitability									
Gross margin ratio	0.060	0.087	0.107	0.163*	0.178*	0.088	0.023	-0.110	-0.066
ROE ratio	-0.090	-0.106	-0.078	-0.090	0.067	0.261***	0.222**	0.183**	0.182**
ROA ratio	-0.104	-0.002	-0.045	0.005	0.132	0.286***	0.272***	0.194**	0.206**
RNOA ratio	0.053	0.145	0.176*	0.224**	0.251**	0.349***	0.290***	0.228**	0.279**
EBIT	0.068	0.047	0.118	0.096	0.213**	0.392***	0.404***	0.391***	0.197**
Net Income	0.091	0.074	0.120	0.094	0.221**	0.416***	0.418***	0.392***	0.214**
Profitability factor	0.005	0.027	0.057	0.061	0.199**	0.385***	0.365***	0.316***	0.229**

GDP Nowcast Errors and Financial Statements

- Can information from corporate announcements be used to augment macroeconomic estimates, or is this type of information already subsumed by other macroeconomic variables used to track the state of the economy?
- **Target**: GDPNow model by the Atlanta Fed
- **Test:** Regress the daily nowcast errors, constructed as the actual GDP growth minus the daily GDPNow forecast, on the individual corporate variables / principal components.
- **Finding:** 19 of our 21 variables are significantly correlated with the nowcast errors.

GDPNow Nowcast Errors

Variable	Coefficient	p-value	PCA	Coefficient	p-value
Total debt	0.056	0.435	Income statement 1	0.561	0.000
DE ratio	0.259	0.000	Income statement 2	-0.841	0.000
Debt ratio	0.309	0.000	Balance sheet 1	-0.594	0.000
PE ratio	0.141	0.050	Balance sheet 2	0.295	0.052
BM ratio	0.371	0.000	Profitability factor	-0.578	0.000
Cash	0.279	0.000	Operating activity factor	-0.465	0.000
Cash and short term investments	0.070	0.331	Market values factor	0.059	0.662
Working capital	-0.231	0.001	Liquidity factor	-0.239	0.002
Cash ratio	-0.155	0.031	Leverage factor	0.383	0.000
Current ratio	-0.317	0.000			
Interest coverage ratio	-0.435	0.000			
Revenues	-0.493	0.000			
COGS	-0.315	0.000			
Depreciation and amortization	0.086	0.233			
IK ratio	0.265	0.000			
Gross margin ratio	-0.260	0.000			
ROE ratio	-0.579	0.000			
ROA ratio	-0.465	0.000			
RNOA ratio	-0.475	0.000			
EBIT	-0.547	0.000			
Net income	-0.625	0.000			

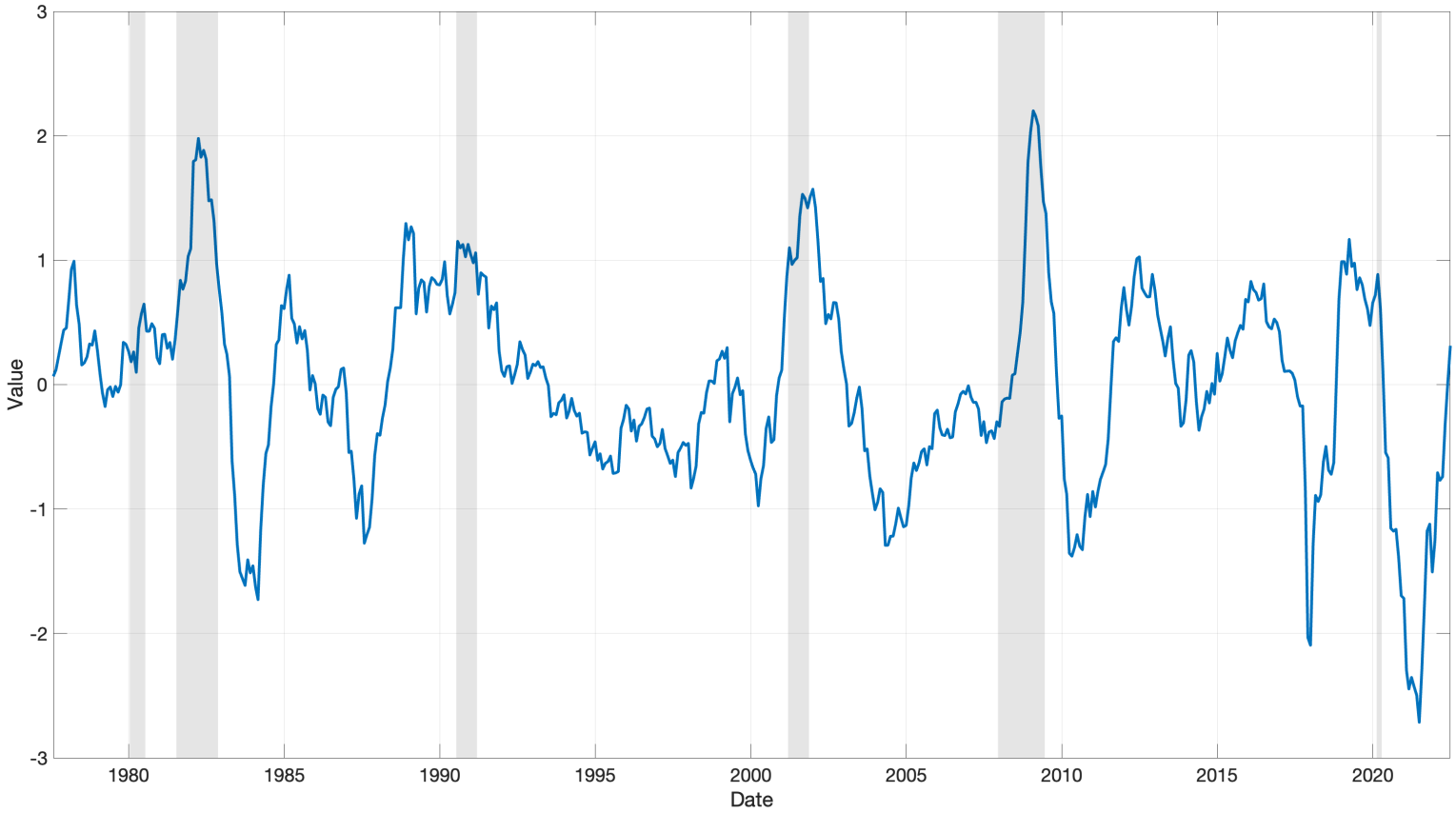
Corporate Accounts Business Activity (CABA) Indexes

- Rich patterns displayed by corporate variables over the business cycle, e.g., some leading, some lagging.
- These asynchronous movements make it challenging to create a *single* index of economic activity.
- **Solution:** PLS methodology that forms combination of firm-level variables that are maximally correlated with economic outcome variables (Recession, GDP Growth, IP, etc.), at different leads and lags.

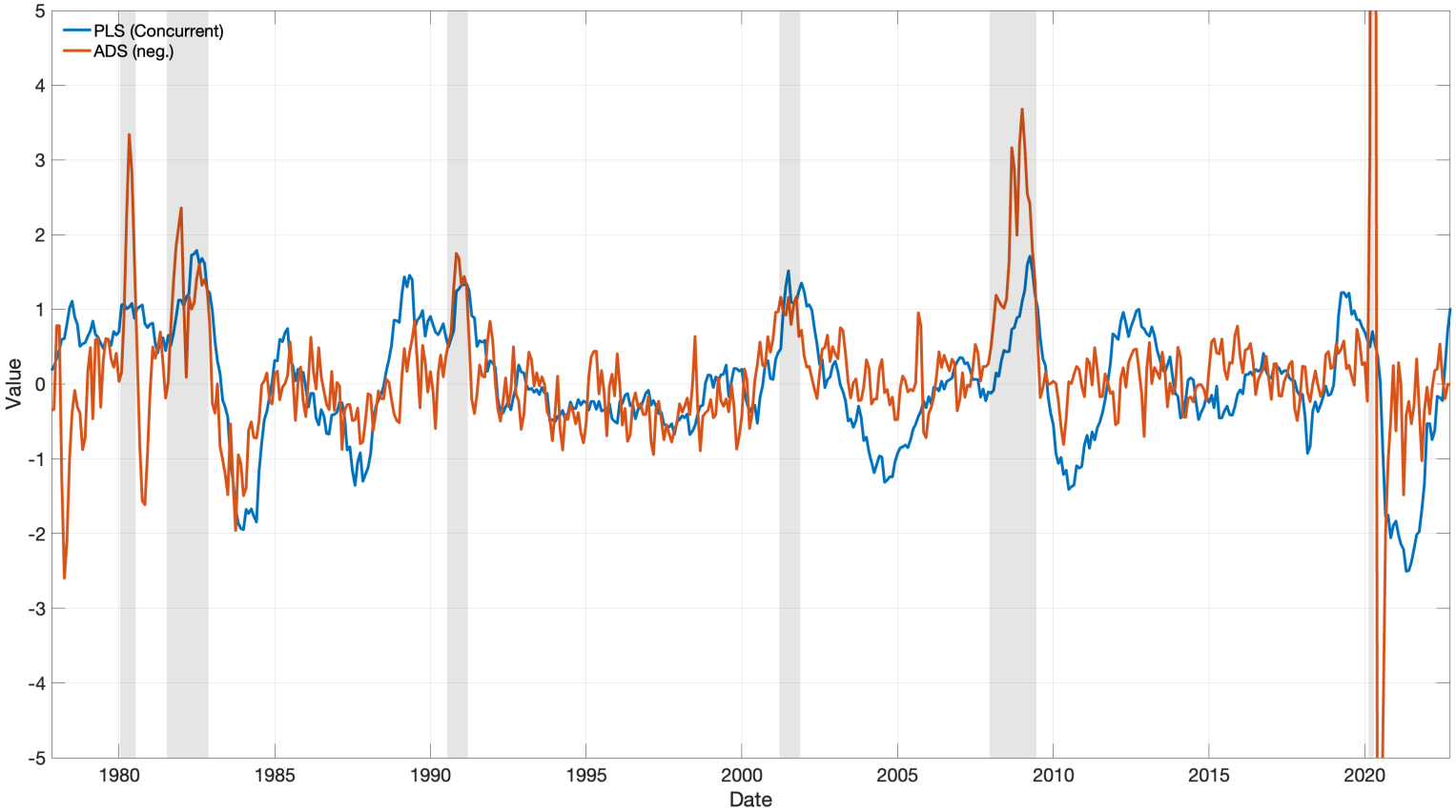
PLS Weights

	6m before (1)	3m before (2)	Concurrent (3)	3m after (4)	6m after (5)
Recession indicator					
Leverage	0.209	0.160	0.098	0.075	0.055
Market values	0.004	0.093	0.237	0.284	0.203
Liquidity	0.391	0.418	0.385	0.233	0.079
Operations	0.235	0.132	0.027	0.024	0.154
Profitability	0.162	0.198	0.254	0.383	0.509
Industrial production					
Leverage	0.150	0.120	0.102	0.127	0.088
Market values	0.023	0.118	0.216	0.118	0.096
Liquidity	0.503	0.565	0.553	0.210	0.085
Operations	0.183	0.072	0.001	0.157	0.282
Profitability	0.142	0.126	0.128	0.389	0.448
GDP growth					
Leverage	0.072	0.059	0.069	0.063	0.027
Market values	0.017	0.018	0.040	0.027	0.028
Liquidity	0.426	0.478	0.304	0.082	0.133
Operations	0.041	0.091	0.114	0.337	0.392
Profitability	0.444	0.354	0.474	0.491	0.419

Recession Index (3m before)



Recession Index (Concurrent) vs. ADS index



Conclusions

- We develop real-time, high frequency measures of corporate activity.
- Liquidity and debt growth are leading indicators of economic activity.
- Operating and profitability variables instead tend to be pro-cyclical, lagging indicators.
- Corporate account business activity (CABA) indexes tracking recessions, GDP growth, and industrial production, both full sample and in real time.
- **Takeaway:** Company filings contain timely and unique information that is not subsumed by traditional macroeconomic data sources.
- **Future steps:** European/International data, industry split.

Hamilton, J. D. (2018): "Why you should never use the Hodrick-Prescott filter," *Review of Economics and Statistics*, 100, 831–843.

Pettenuzzo, D., R. Sabbatucci, and A. Timmermann (2020): "Cash Flow News and Stock Price Dynamics," *The Journal of Finance*, 75, 2221–2270.