

Exchange Rate Narratives

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Introduction

- Text analysis is not new (eg Friedman & Schwartz 63. Romer & Romer 04)
- Text algorithms are, especially to economists
- Offer a procedure to explain macro indicators info from news media
- Target dollar exchange rate

Why the exchange rate?

- Analyses from standard time series are inconclusive:
 - Low R^2 (Fama 84), “wrong” correlations (Backus and Smith 93), poor forecasts (Meese and Rogoff 84)
- Some recent progress: Stavrakeva and Tang 23, Chahrour et al 24, Engel and Wu 24

⇒ News might help!

- Reflect innovations/updates in the mkt info set
- Are salient/relevant to mkt participants

Preview of the findings

1. News contains useful info about the exchange rate
 - Outperform predictions of standard macro indicators
2. Topic model favors an epidemic-like decomposition of the exch. rate
 - Distinct diseases (topics) explain the dollar exchange rate
 - Nonlinear relation between exchange rate and fundamentals
3. Informative for exchange rate theories
 - Scapegoat theory (Bacchetta & van Wincoop 13, Fratzscher et al 15)

Related Literature

1. Text Algorithms: (LDA) Blei Ng and Jordan 2003, (sLDA) Mcauliffe and Blei 2007, (summary) Gentzkow Kelly and Taddy 2019, Ash and Hansen 2022
 - Business Cycles: Bybee Kelly Manela Xiu 2021
 - Finance: (stock prices) Bybee Kelly Su 2023 (emerging risk) Hanley Hoberg 2019 (climate risk management) Engle Giglio Lee StroebeL 2020
 - Monetary Policy: (and transparency) Hansen McMahon Prat 2018, (and its decision rule) Shapiro, (forecasting) Handlen (news release) Hansen McMahon 2016, (text shocks) Handlan 2022, (Inflation expectations) Angelico Marcucci Miccoli Quarta 2022
 - Narratives: Shiller 2017, 2020, (Macro implications) Flynn and Sastry 2022, (on inflation) Andre Haaland Roth and Wohlfart 2022, (financial crashes) Goetzmann Kim and Shiller 2022, (and social media) Macaulay and Song 2022
2. Exchange rate: (monetary policy) Dornbusch 1976,(Disconnect) Meese and Rogoff 1983, (Scapegoat theory) Bacchetta and van Wincoop 2013, (Fiscal cycle) Jiang 2022, (TFP expectations) Chahrour Cormun De Leo Guerron and Valchev 2024

Intro to sLDA

Latent Dirichlet Allocation (LDA) is a dimension-reduction technique

- Convert V words into K topics where $K \ll V$
- Let \mathbf{x}_a include the number of occurrences of each word in article a

$$\min(\mathbf{x}_a - \sum_k \theta_{a,k} \beta_k)^2$$

topic $\beta_k \in \Delta^{V-1}$ is a distribution over $V - 1$ words

$\theta_{a,k}$ is the loading of article a on topic k

Supervised LDA (sLDA)

- Pair each (meta) article with a response variable
- Max predictive power

Estimation Procedure

- Input text data: 564 monthly pooled article titles from Jan 1975 to Jan 2022 (707,984 individual WSJ articles).
- Response variable: monthly real exchange rate q_t of the U.S. vs G6
- Hyperparameter selection via grid search by semantic coherence and exclusivity.
 - Number of topics and parameters \rightarrow 180 topics
- Estimate word assignments via Gibbs Sampling

Estimation Output

- sLDA produces 180 topics time series. Next:
 - Select a subset of topics with highest predictive power
 - Use topic word distributions β to cluster topics in a few metatopics
 - Examine the relation between metatopics and macro indicators

Random Forest results

1. Estimate each tree on a random subsample.
2. Compute prediction and R^2 on the remaining sample.

Dep. variable	Out-Of-Bag R^2				
	(i) All topics	(ii) FRED	(iii) FRED + topics	(iv) Selected topics	(v) Metatopics
q_t	0.88	0.79	0.90	0.88	0.85
$q_{t+12} - q_t$	0.61	0.58	0.65	0.58	0.53
$q_{t+24} - q_t$	0.80	0.72	0.82	0.78	0.71
$q_{t+36} - q_t$	0.80	0.80	0.86	0.80	0.73
$q_{t+60} - q_t$	0.87	0.78	0.89	0.87	0.84

- Topics are highly informative and preferred to time series [▶ Results](#)
- Focusing on six metatopics reduces R^2 only slightly

Metatopics: dendrogram

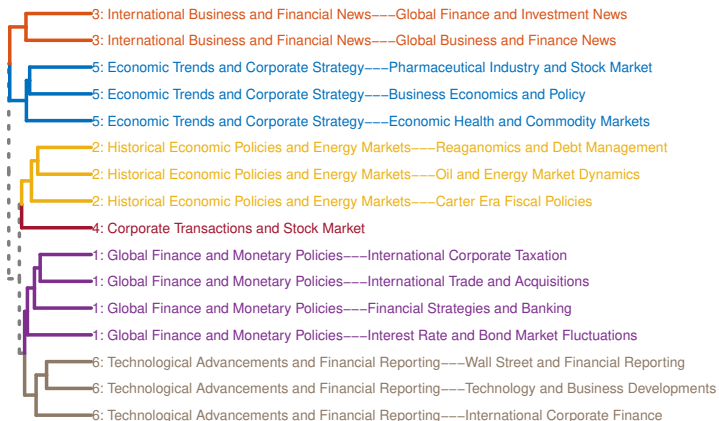
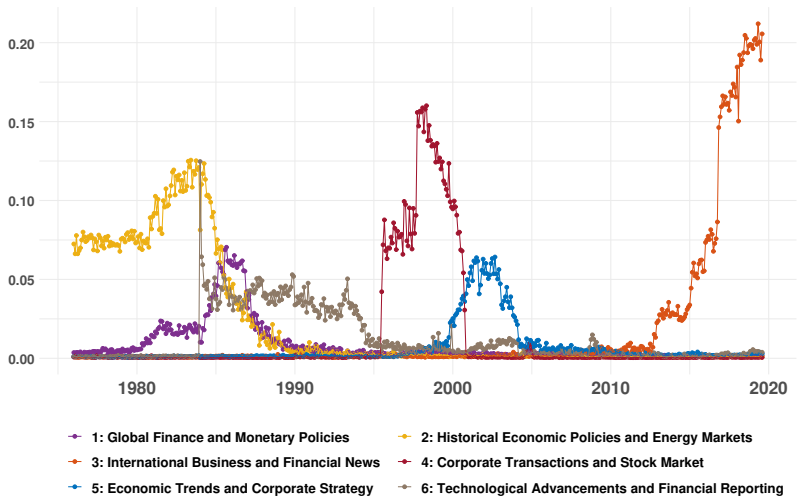


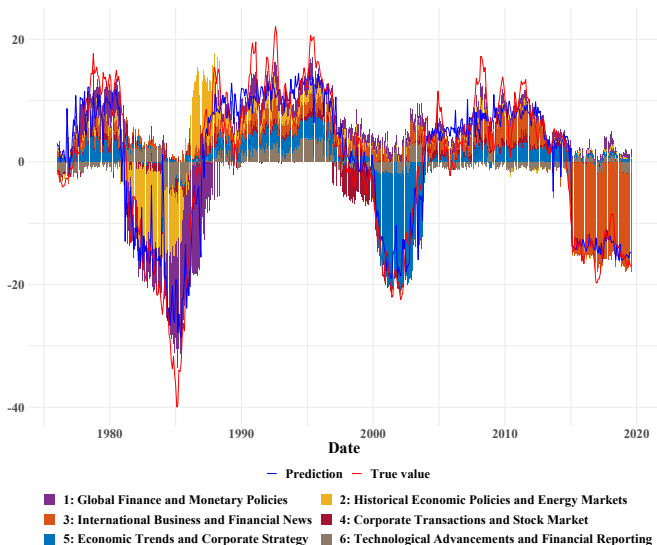
Figure: Dendrogram

Note: Titles are constructed using ChatGPT4.

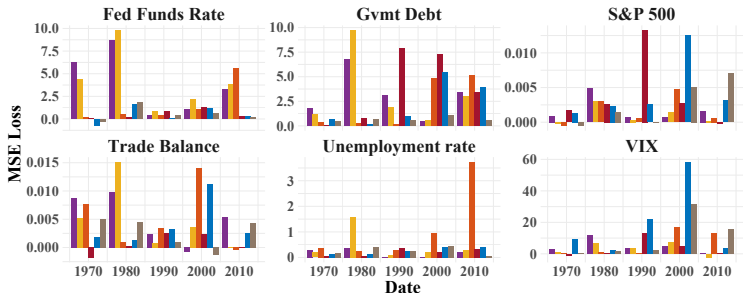
Metatopic Prevalence



Exchange rate and metatopics



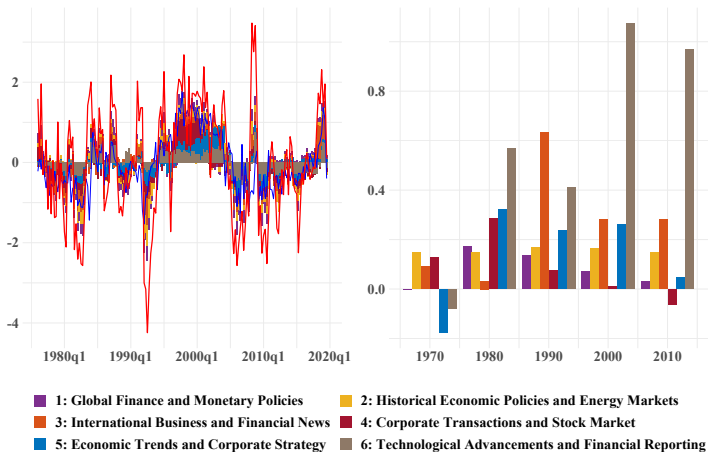
Metatopic contributions by decade



- 1: Global Finance and Monetary Policies**
- 2: Historical Economic Policies and Energy Markets**
- 3: International Business and Financial News**
- 4: Corporate Transactions and Stock Market**
- 5: Economic Trends and Corporate Strategy**
- 6: Technological Advancements and Financial Reporting**

Quarterly Fernald TFP and metatopics

($R^2 = 28\%$)

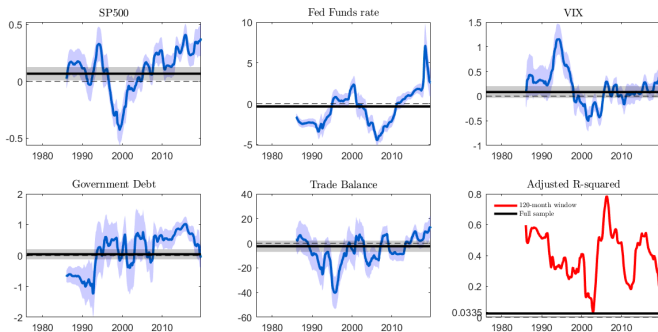


In Sum

- Exchange rate changes can be explained by metatopics or narratives
- Narratives are differently related to fundamentals
 - Each validates theories of exchange rate fluctuations
 - If so, we should observe *something* in standard macro regressions

Rolling Window Regressions

Dep. var: $q_t - q_{t-12}$



► Wider Windows ► Level ► Metatopic Contributions to $q_t - q_{t-12}$

- Large subsample R-squared
- Coefficients consistent with metatopic analysis

Conclusion

- Novel procedure to extract news media info on a time series of interest
- Anatomy of the exchange rate sheds light on long-standing puzzles
 1. Sources of exchange rate fluctuations varied over time
 2. Consistent with scapegoat theory

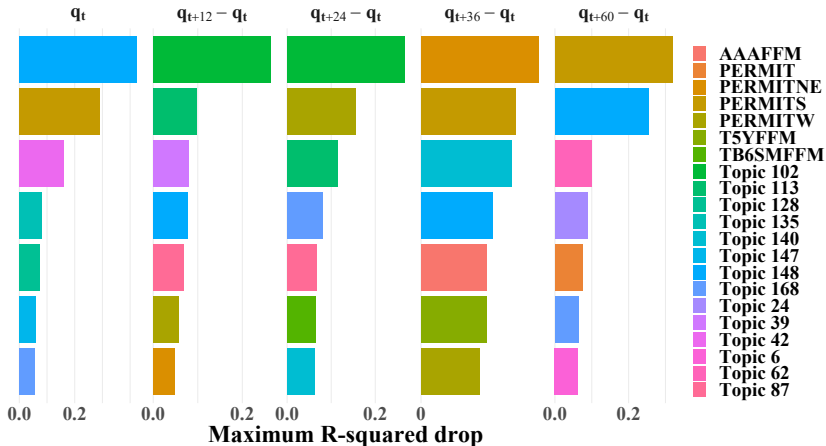
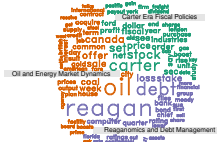


Figure: Importance ranking computed in a model with FRED and all topics. AAAFFM is the spread between Moody’s Aaa Corporate Bond Minus Federal Funds Rate; PERMIT is the number of new housing permits in the U.S., and PERMITNE, PERMITS, and PERMITW are the number of new housing permits in the northeast, in the south, and in the west of the U.S.; T5YFFM is the spread between the 5-year Treasury and the Federal Funds Rate, TB6SMFFM is the spread between 6-month Treasury and the Federal Funds Rate

Wordclouds



(a) MT1: Global Finance and Monetary Policies



(b) MT2: Historical Economic Policies and Energy Markets



(c) MT3: International Business and Financial News



(d) MT4: Corporate Transactions and Stock Market



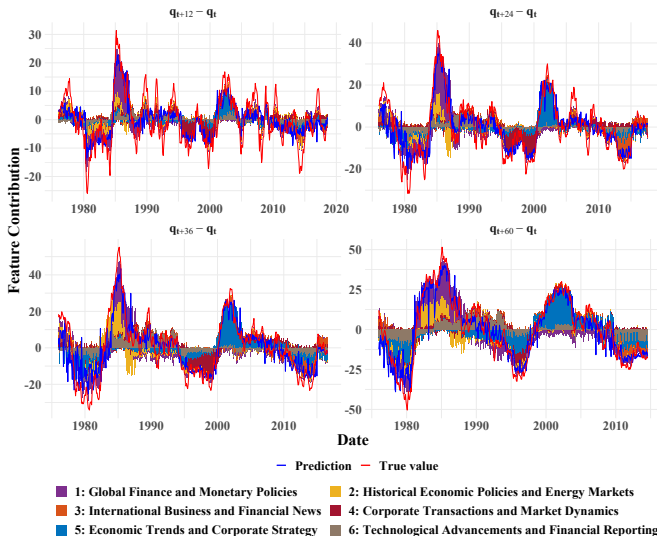
(e) MT5: Economic Trends and Corporate Strategy



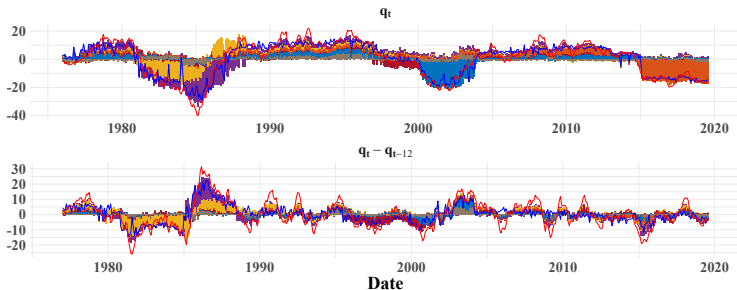
(f) MT6: Technological Advancements and Financial Reporting

▶ Return

Exchange rate and metatopic



Exchange rate and metatopic



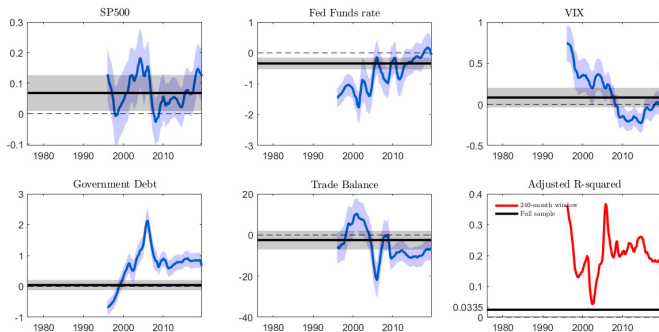
— Prediction — True value

- 1: Global Finance and Monetary Policies
- 2: Historical Economic Policies and Energy Markets
- 3: International Business and Financial News
- 4: Corporate Transactions and Stock Market
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- 6: Technological Advancements and Financial Reporting

▶ Return

Rolling Window Regressions

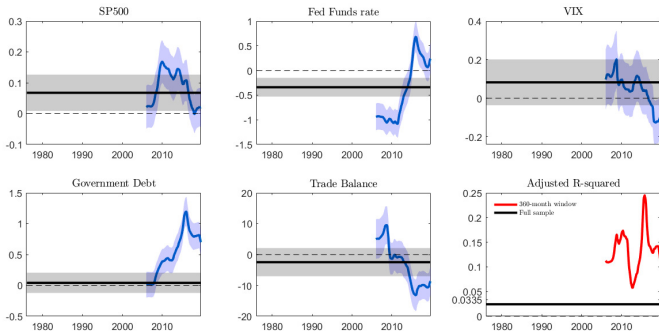
Dep. Var: $q_t - q_{t-12}$



► Return

Rolling Window Regressions

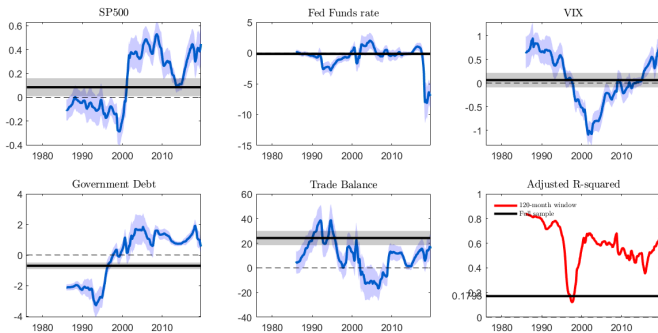
Dep. Var: $q_t - q_{t-12}$



► Return

Rolling Window Regressions

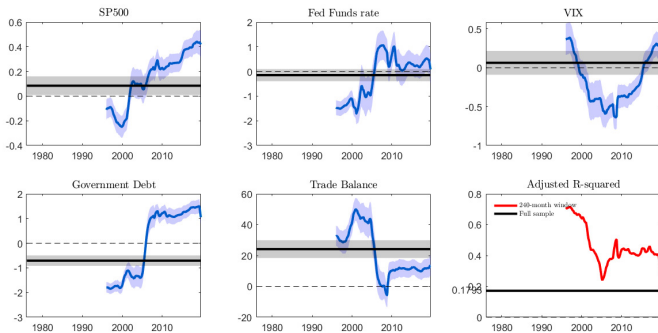
Dep. var: q_t



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Rolling Window Regressions

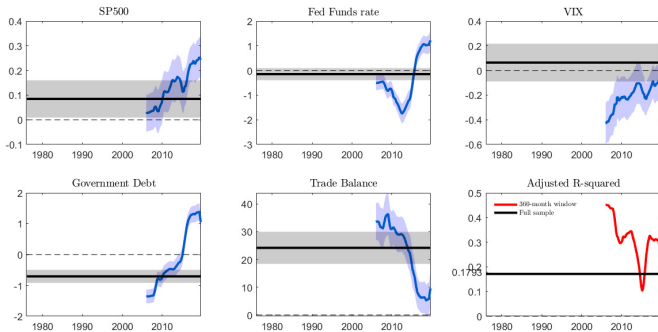
Dep. var: q_t



► Return

Rolling Window Regressions

Dep. var: q_t



► Return

Rolling Window Regressions

Dep. var: $q_t - q_{t-1}$

