

Deep Learning Mutual Fund Disclosure:  
Risk Sentiment, Risk Taking, and Performance  
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# Why do we care?

- ▶ Mutual funds are an important financial intermediary
- ▶ Risk attitudes of financial intermediaries are central to the intermediary asset pricing literature
  - ▶ Theory (Brunnermeier-Pedersen 2009 RFS, He-Krishnamurthy 2013 AER; Brunnermeier-Sannikov, 2014 AER)
  - ▶ Evidence (Adrian-Etula-Muir, 2014 JF; He-Kelly-Manela, 2017 JFE; Haddad-Muir, 2020 JF)
- ▶ Text is a relatively new source of data
  - ▶ Better methods for textual analysis have broad applicability

# What the paper does?

- ▶ Uses deep learning to measure “risk sentiment” in mutual fund managers’ discussions

**Billionaire investor Ray Dalio warns the US is in a period of 'great risk' - and says the most important thing investors can do is diversify**

Emily Graffeo

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## What the paper does?

- ▶ Starts with a generic model for dependency parsing (Chen-Manning, 2014)
- ▶ Identifies that 'great' modifies 'risk' in this *risk sentiment pair*
  - ▶ Because 'great' is a positive word according to the LM word lists, this would count as a positive risk pair
  - ▶ Use it to rank all manager letters each year on a  $[0,1]$  scale of NegRisk and of PosRisk
    - ▶ Q: why not one combined scale  $[-1,1]$ ?
- ▶ Use risk sentiment to explain changes in risk taking and performance

# Main findings

Managers with a more negative risk sentiment

1. reduce their future portfolio risk
2. generate superior risk-adjusted return and higher Sharpe ratio

# Contribution

- ▶ Shows that a ground-up model of language can help measure textual context in an interesting finance application
  - ▶ Improves over dictionary-based sentiment measures based on a unigrams (Loughran-McDonald, 2011) or simpler attempts to capture context (Hassan et al 2019)

## Suggestion 1: Sharpen contribution

- ▶ “bag-of-words” does not preclude using higher order n-grams to capture context (e.g. Manela-Moreira, 2017 JFE; Kelly-Manela-Moreira, 2018)
- ▶ Deep learning, word embeddings have been used before (Cong-Liang-Zhang, 2018; Hanley-Hoberg, 2019 RFS; Ke-Kelly-Xiu, 2019)
- ▶ “state-of-the-art” is quite far from the LM word lists ...
- ▶ State-of-the-art NLP uses Transformers
  - ▶ Jha-Liu-Manela (2020, 2021) use BERT to measure public attitudes toward finance based on books



## Suggestion 2: Portfolio returns

- ▶ Asset pricers worry about cross-correlation in errors
- ▶ Standard errors that cluster by firm do not help
  - ▶ Could be off by an order of magnitude
  - ▶ Maybe firm and time clustering
- ▶ Fama (1998) recommends calendar portfolio sorts



## Suggestion 3: Face validity

### Appendix C. Examples of Shareholder Reports with Risk Sentiment Statements

This appendix provides excerpts of shareholder reports in which risk sentiment statements, i.e., dependency pairs of risk and positive/negative words, appear. The fund name, filing date, and subsequent change in fund risk are reported.

Excerpts	Fund and filing information
<p>My team and I have continually worked, tirelessly, to improve the strategy while <b>reducing risk</b> each and every day. JFK once said, “Great accomplishments are not achieved by extraordinary men doing extraordinary things extraordinarily well, but by ordinary men doing ordinary things extraordinarily well.” I believe the team at IPS Strategic Capital is a group of very hard-working professionals that look to achieve extraordinary things.</p>	<p>IPS Strategic Capital Absolute Return Fund, May 07, 2018 <math>\Delta Risk = -0.63\%</math></p>
<p>Although diversification doesn't eliminate the risk of loss or guarantee a profit, a careful selection of complementary asset classes may cushion your portfolio against <b>excessive volatility</b>.</p>	<p>AIM Funds Group, March 06, 2009, <math>\Delta Risk = -1.08\%</math></p>
<p>As bottom-up, fundamental stock pickers, we maintain our focus on identifying businesses with idiosyncratic growth drivers that should power through a variety of economic or market scenarios and whose stocks present <b>attractive risk</b>/reward opportunities. We believe that if we can identify and invest in high-quality companies with more durable growth opportunities than the market expects, investors in the stocks of those companies should be rewarded.</p>	<p>Vanguard U.S. Growth Fund, October 25, 2017, <math>\Delta Risk = 7.88\%</math></p>

## My take

- ▶ Really nice contribution to our understanding of mutual fund managers who are important financial intermediaries
- ▶ Potential improvement over existing textual analysis methods

## Other suggestions / minor points

- ▶ Could the result about NegRisk funds performing better be period specific? For example, if they are negative on risk just before a market crash (say 2008), then they would perform better, but maybe not in general
- ▶ Page 1: “Is mutual fund managers’ subsequent”