Are Disagreements Agreeable? Evidence from Information Aggregation

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Overview

- ▶ Research questions
  - ▶ Whether different disagreement proxies are agreeable?
  - ▶ How do aggregate disagreement indexes forecast the market returns?

- ▶ What does this paper do?
  - ▶ Three aggregate disagreement indexes (from 20 measures), equal-weight (EW), principal component analysis (PCA), and partial least squares (PLS), significantly improve the forecast power for future market returns.
  - ▶ The PLS index has significant in- and out-of sample performance.
  - ▶ The forecasting power of the disagreement indexes is asymmetric and concentrates in high sentiment periods (Atmaz and Basak 2017).
  - ▶ The aggregate disagreement indexes negatively predict economic activities, and positively predict market volatilities, illiquidity, and trading volume.

Overview: Aggregating Individual Disagreement Measures

- ▶ Individual Disagreement Measures
  - ▶ The survey of professional forecasts on macroeconomics conditions(SPF)
    GDP, GDP growth, industrial production, industrial production growth, unemployment, investment, investment growth, consumer price index, and 3-month T-bill rate
  - ▶ Analyst forecast: value-weighted dispersion (Yu, 2011) and beta-weighted dispersion (Hong and Sraer, 2016)
  - ▶ Household forecasts (Michigan University Survey of Consumers)
    expected personal financial conditions, business conditions, unemployment condition, interest rate condition, and vehicle purchase condition
  - ▶ Unexplained stock trading volume (Garfinkel 2009)
  - ▶ Aggregated idiosyncratic volatility (Boehme, Danielsen and Sorescu(2006) and Ang, Hodrick, Xing and Zhang (2006))
  - ▶ Option open interest (Ge, Lin, and Pearson 2016): one minus the scaled difference between OEX call and put option interest

Overview: Aggregating Individual Disagreement Measures

- The PLS (Partial Least Square) approach takes three steps
  - Step 1 (a time-series regression for each individual disagreement measure)
    $D_{t-1}^k = \pi_{k,0} + \pi_k R_t + \mu_{k,t-1}, \quad k = GDP, ..., OID,$
    where π_k captures the sensitivity of each disagreement D_{t-1} to expected market return.
  - Step 2 (a cross-sectional regression of D_t^k on $\widehat{\pi}_k$ at month t
    $D_t^k = a_t + D_t^{PLS}\widehat{\pi}_k + v_{k,t}$, where D_t^{PLS} is the PLS disagreement index in month t.
  - Step 3 (predict R_{t+1}) $R_{t+1} = \alpha + \beta D_t^{PLS} + \epsilon_{t,t+h}$
- Out-of-sample test: repeat three steps by truncating the observation that are not known at month t
  - The forecast for R_{t+1} is $\hat{\alpha}_t + \hat{\beta}_t D_t^{PLS}$, where $\hat{\alpha}_t$ and $\hat{\beta}_t$ are the estimates using information up to month t.

Overview: Comparison Between Individual and Aggregate Disagreement

▶ Return Prediction: $R_{t,t+h} = \alpha + \beta D_t + \epsilon_{t,t+h}$

Disagreement	Panel A: $h = 1$				Panel B: $h = 3$			
	β	t-stat	R^2	R^2_{OS}	β	t-stat	R^2	R^2_{OS}
D^{GDP}	−0.15	−0.73	0.12	−1.69	−0.26*	−1.68	1.00	−5.24
D^{GDPg}	−0.29	−1.60	0.43	−3.01	−0.29*	−1.92	1.22	−7.58
D^{IP}	−0.11	−0.60	0.06	−2.33	−0.10	−0.67	0.15	−5.35
D^{IPg}	−0.01	−0.05	0.00	−2.13	−0.20	−1.48	0.57	−9.11
D^{UEP}	0.13	0.59	0.08	−0.35	0.12	0.72	0.22	−2.14
D^{INV}	−0.21	−1.16	0.24	−2.69	−0.26*	−1.66	1.03	−8.54
D^{INVg}	0.20	1.19	0.22	−0.68	0.04	0.32	0.03	−2.73
D^{CPI}	−0.36	−1.62	0.71	−5.44	−0.31**	−2.11	1.45	−27.02
D^{TBL}	−0.66***	−2.57	2.37	−3.60	−0.55**	−2.55	4.63	−6.31
D^{Yu}	−0.32	−1.71	0.66	−3.08	−0.33**	−1.98	2.10	−4.99
D^{PL}	−0.14	−0.67	0.14	−2.80	−0.18	−0.89	0.62	−5.02
D^{RPF}	−0.20	−1.01	0.22	−2.57	−0.06	−0.35	0.06	−4.54
D^{EPF}	−0.22	−1.01	0.25	−3.05	−0.13	−0.95	0.25	−6.95
D^{BC}	−0.24	−1.25	0.31	−4.26	−0.12	−0.67	0.21	−7.75
D^{UC}	−0.05	−0.23	0.01	−2.02	0.02	0.11	0.00	−3.41
D^{IRC}	−0.23	−0.99	0.28	−1.74	−0.43**	−2.54	2.89	−8.69
D^{XRC}	−0.14	−0.69	0.11	−1.89	0.08	0.48	0.09	−2.92
D^{SUV}	−0.27	−1.61	0.40	−2.44	−0.20	−1.58	0.62	−6.52
D^{IVOL}	−0.20	−1.02	0.21	−3.36	−0.19	−1.01	0.52	−9.54
D^{OID}	−0.20	−0.56	0.08	−2.12	−0.08	−0.26	0.04	−4.80

Overview: Comparison Between Individual and Aggregate Disagreement

Disagreement	β	t-stat	R^2	R^2_{OS}
Panel A: $h = 1$				
D^{EW}	-0.62^{***}	-3.09	1.53	0.13
D^{PCA}	-0.35^{**}	-2.02	0.56	-0.24
D^{PLS}	-0.83^{***}	-3.69	2.59	1.94^{**}
Panel B: $h = 3$				
D^{EW}	-0.61^{***}	-3.30	4.31	1.41^{**}
D^{PCA}	-0.35^{**}	-2.15	1.57	0.00
D^{PLS}	-0.80^{***}	-3.72	6.93	5.29^{***}
Panel C: $h = 12$				
D^{EW}	-0.56^{***}	-3.24	6.97	6.89^{***}
D^{PCA}	-0.24^{*}	-1.77	2.77	-0.38
D^{PLS}	-0.67^{***}	-4.81	18.53	14.32^{***}

▶ PLS measures negatively forecast economic activities: industrial production, unemployment, business inventory.

▶ Aggregate indexes (particularly PLS) asymmetrically forecast the market with greater power in high sentiment period.

▶ Aggregate indexes positively forecast market volatilities, illiquidity and trading volume.

Comment I: How to Improve Aggregate Measures

- Direct measures of investors' beliefs?
    - A growing literature tries to use mutual funds' holding to infer their beliefs?
    Jiang and Sun (2014), Cohen, Polk,and Silli (2010), Shumway, Szefler and Yuan (2010)
    - Implementation (Jiang and Sun, 2014)
    $Dispersion_{i,t} = \{\frac{1}{N_i-1}\sum_{j=1}^{N_i}[(w_{i,t}^j - w_{i,t}^{j,b}) - \overline{(w_{i,t}^j - w_{i,t}^{j,b})}]^2\}$
    - Why use mutual funds' holding data?
        - The U.S. market has been increasingly dominated by institutional investors.
        - The actively managed mutual funds have well-specified performance benchmarks,which allow us to use the insights of portfolio theory to infer their beliefs about future stock returns.

Comment I: How to Improve Aggregate Measures?

▶ Time-varying weights on individual disagreement measures?
  ▶ For example, this paper could use 5-year rolling window in PLS
  ▶ Step 1: using month $t-60$ to t to forecast $\widehat{\pi}_k$
  ▶ Step 2: run cross-sectional regressions from month $t-60$ to t
  ▶ The forecast for R_{t+1} is $\hat{\alpha}_t + \hat{\beta}_t D_t^{PLS}$, where $\hat{\alpha}_t$ and $\hat{\beta}_t$ are the estimates using information from month $t-60$ to month t.
▶ Why consider time-varying PLS estimations?
  ▶ The rolling-window approach could capture the time-varying information of individual disagreement measures
  ▶ A further justification of PLS approach: holding-based disagreement may play a more important role than that based on household survey

Comment II: Predictability asymmetry of disagreement

▶ Test theory of Atmaz and Basak (2017) that disagreement has an asymmetry forecasting pattern in different market states

▶ Intuitions

  ▶ Dispersion represents additional risk for investors, and therefore investors demand a higher return to hold the stock when dispersion is higher

  ▶ However, dispersion also amplifies the average bias in beliefs, which in turn leads to a lower mean return when the view on the stock is optimistic and to a higher mean return when pessimistic.

  ▶ When there is sufficiently optimistic view on the stock (good market states), the latter effect dominates and produces the negative relation between belief dispersion and mean return.

▶ How to capture the average bias? Probably not sentiment index?

# Comment II: Predictability asymmetry of disagreement
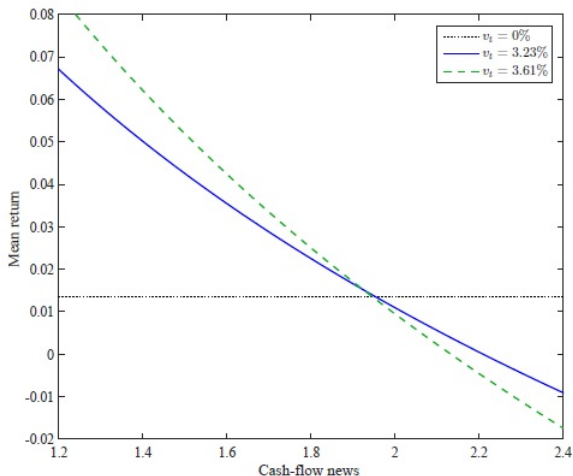
- ▶ Use business cycle variables rather than sentiment
- ▶ Other sub-sample period tests: Ted spread?

Comment III: Forecasting Cross-Sectional Portfolios

▶ How disagreement predicts cross-sectional portfolio returns?
  ▶ The portfolio with firms that are subject to more constrained should be more sensitive to disagreement (Duffie, Garleanu, and Pedersen 2002)
    ▶ This paper uses institutional ownership, but why not consider more direct measures of short costs(lending fee)?
  ▶ High beta portfolios are more likely to overpriced in high disagreement periods (Hong and Stein 2007)
    ▶ But Hong and Sraer (2016) predicts a inverted-U shape of Security Market Line during the high disagreement periods, particular for those speculative stocks (high β_i/σ_i)

# Comment III: Forecasting Cross-Sectional Portfolios
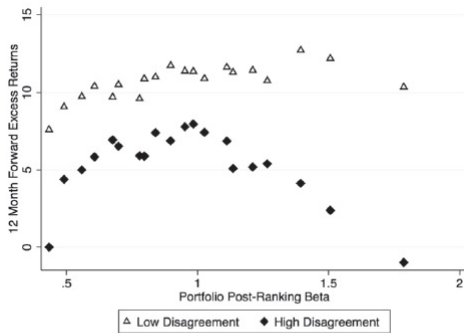
Panel C. 12-Month Value-Weighted Return

▶ An inverted-U shape of Security Market Line during the high
  disagreement periods?

Comment III: Forecasting Cross-Sectional Portfolios

Figure 2: **Bond Excess Returns for High versus Low Inflation Disagreement Months**

Source: Michigan Survey and Fed Bond Sample. Sample Period: 1978-2012.
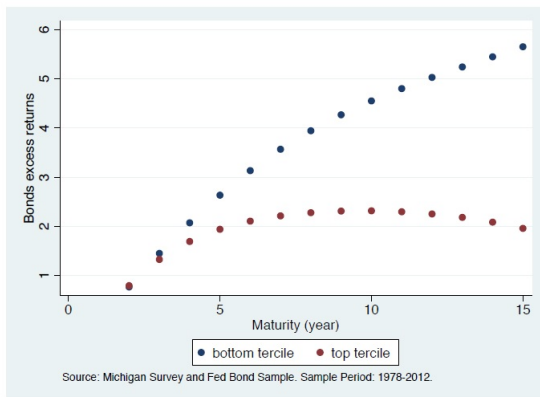
▶ An inverted-U shape of excess return vs. maturity during the high disagreement periods?

  ▶ Aggregate disagreement about CPI, 3-month T-bill rate, consumers' expectation on interest rate condition

Other Comments

- ▶ Horse race regressions: consider aggregate short interest and aggregate corporate activities
  - ▶ Table 11 only consider multivariate regressions with aggregate disagreement indexes and one of 14 economic predictors each time
  - ▶ Short interest strongly negatively forecast market returns(out-of-sample R^2 is 13.24%, Rapach, Ringgenberg, and Zhou (2016))
  - ▶ Corporate activities (out-of-sample R^2 is 12.28%, Lie, Meng, Qian, and Zhou (2017))
- ▶ Predicting market volatility: why forecast VIX (a forward-looking measure)
- ▶ The correlation between Business-Condition-Based measure and other measure are negative (puzzling)

Conclusion

▶ Overall very nice paper

▶ Well written and solid analysis

▶ Would improve the PLS approach

▶ Better link the empirical study and theory

▶ More horse race regressions