Investor Sentiment and Global Economic Conditions

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Motivation

- Asset prices are correlated with business cycles.
- Stock markets tend to rise in good times and are occasionally subject to spectacular reversals, which tend to happen near business cycle turning points and in sync across countries.
- Such events are difficult to reconcile with standard finance models in which investors force prices to equal the present value of cash flows.
- Kroencke (2022) looks at 42 recessions in 14 countries and finds that stock prices decline on average 30 %; twice as much as dividends.
- Author also finds that cash-flow news do not anticipate recessions.

Motivation

We ask two related questions:

- Does the component of stock price movements, which is unrelated to fundamentals, (ie. **investor sentiment**) drive macroeconomic fluctuations?
- should investor sentiment be regarded as a global variable and therefore exogenous to domestic economies or is it best thought of as being domestically determined?
- Define investor sentiment in a way which is consistent with Asset Pricing Theory and easily measurable across countries.

Literature

- **Investor sentiment**, refers to beliefs about future cash flows and investment risks that are not fully justified by fundamentals (cf. Baker and Wurgler (2007), Huang et al. (2015)).
- Baker and Wurgler (2007) propose to measure investor sentiment as the common component of 6 proxies.
- proxies: the closed-end fund discount, NYSE share turnover, the number and average first-day returns on IPOs, the equity share in new issues, and the dividend premium.
- Existing sentiment indices are mainly driven by business-cycle components (see Sibley et al. (2016))
- Baker et al. (2012) extend the BW index to 6 major stock markets by using only 4 of the 6 original proxies of investor sentiment due to lack of data.

Contribution

- A different way to think about investor sentiment that seeks to address common critiques to existing investor sentiment indices.
- We propose one global and six local investor sentiment indices.
- Document the link between investor sentiment and the macroeconomy.

Measuring Investor Sentiment

Start by writing log returns

$$r_{t+1} = ln(P_{t+1} + D_{t+1}) - ln(P_t) \tag{1}$$

and follow Campbell and Shiller (1988) log-linearization based on the 1st order Taylor Approx. around the historical average value of $d - p$.

$$r_{t+1} \approx \kappa + \Delta d_{t+1} + \rho dy_{t+1} - dy_t \tag{2}$$

Measuring Investor Sentiment

Iterating forward the CS identity, applying expectations, and imposing the transversality condition $lim_{T\to\infty}\rho^T\mathbb{E}_t dy_{t+T} = 0$,
Campbell and Ammer (1993) derive a decomposition of unexpected returns

$$\underbrace{r_{t+1} - \mathbb{E}_t r_{t+1}}_{\text{News}} = \underbrace{(\mathbb{E}_{t+1} - \mathbb{E}_t)\sum_{j=0}^{\infty}\rho^j \Delta d_{t+j+1}}_{\text{Fundamental News}} - \underbrace{(\mathbb{E}_{t+1} - \mathbb{E}_t)\sum_{j=1}^{\infty}\rho^j r_{t+j+1}}_{\text{Non-Fundamental News}}, \quad (3)$$

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We describe the joint behavior of the unobserved macroeconomic factors and the country specific investor sentiment factors using a hierarchical dynamic factor model.

$$y_t = \Gamma_{t,yy} F_t^y + v_t^y, \tag{4}$$

Firm-specific investor sentiment is described by a factor model that involves both macroeconomic as well as investor sentiment factors.

$$\eta_t = \Gamma_{t,\eta y} F_t^y + \Gamma_{t,\eta\eta} F_t^\eta + v_t^\eta, \tag{5}$$

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The macroeconomic and sentiment factors are then jointly determined by

$$\begin{pmatrix} y_t \\ \eta_t \end{pmatrix} = \begin{bmatrix} \Gamma_{t,yy} & \Gamma_{t,y\eta} \\ \Gamma_{t,\eta y} & \Gamma_{t,\eta\eta} \end{bmatrix} \begin{pmatrix} F_t^y \\ F_t^\eta \end{pmatrix} + \begin{pmatrix} v_t^y \\ v_t^\eta \end{pmatrix}, \quad \begin{pmatrix} v_t^y \\ v_t^\eta \end{pmatrix} \sim N(0, V_t) \tag{6}$$

with $\Gamma_{t,y\eta} = 0$. Here $\Gamma_t = (\Gamma_{t,ij})_{i,j\in\{\eta,y\}}$ are matrices of factor loadings. The dynamics of the parameters are described by

$$\gamma_t = \gamma_{t-1} + \varepsilon_t \quad \varepsilon_t \sim N(0, W_t) \tag{7}$$

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In addition, the joint dynamics of the investor sentiment factors and the macroeconomic factors follow a VAR process of the form

$$\begin{pmatrix} F_t^y \\ F_t^\eta \end{pmatrix} = \begin{bmatrix} \Phi_{t,yy} & \Phi_{t,y\eta} \\ \Phi_{t,\eta y} & \Phi_{t,\eta\eta} \end{bmatrix} \begin{pmatrix} F_{t-1}^y \\ F_{t-1}^\eta \end{pmatrix} + \begin{pmatrix} u_t^y \\ u_t^x \end{pmatrix}, \quad \begin{pmatrix} u_t^y \\ u_t^\eta \end{pmatrix} \sim N\left(0, \begin{bmatrix} \Sigma_{t,yy} & \Sigma_{t,y\eta} \\ \Sigma_{t,\eta y} & \Sigma_{t,xx} \end{bmatrix}\right), \tag{8}$$

with time-varying covariance matrix $\Sigma_t = (\Sigma_{t,ij})_{i,j\in\{\eta,y\}}$ and VAR coefficients $\Phi_t = (\Phi_{t,ij})_{i,j\in\{\eta,y\}}$.
The dynamics of the parameters are described by

$$\phi_t = \phi_{t-1} + h_t \quad h_t \sim N(0, Q_t) \tag{9}$$

All covariance matrices in the model which include V_t, Σ_t, W_t and Q_t are time dependent. Their dynamics are described by EWMA equations.

Factor Hierarchy

Each factor is identified according to which individual series are allowed to load onto it which is prescribed by a hierarchical structure that applies to the loadings matrix. The key idea in achieving this is to impose restriction on the state space.

$$R = \left(\begin{array}{ccc:cccc} \mathbf{1}_k & \mathbf{0} & \mathbf{0} & \mathbf{0} & \cdots & \cdots & \mathbf{0} \\ \mathbf{0} & \mathbf{1}_k & \mathbf{0} & \mathbf{0} & \cdots & \cdots & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \mathbf{1}_k & \mathbf{0} & \cdots & \cdots & \mathbf{0} \\ \hdashline \mathbf{1} & \mathbf{1} & \mathbf{1} & \mathbf{1}_{N_\eta^1} & \mathbf{1}_{N_\eta^1} & \cdots & \mathbf{0} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ \mathbf{1} & \mathbf{1} & \mathbf{1} & \mathbf{1}_{N_\eta^k} & \mathbf{0} & \cdots & \mathbf{1}_{N_\eta^k} \end{array}\right) \tag{10}$$

Estimation

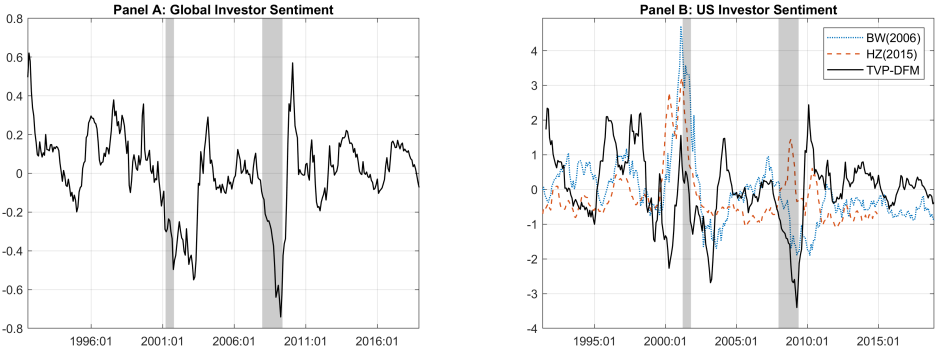
i) **Step 1:** Estimate investor sentiment at a firm level by estimating the residuals of a DDM model;

ii) **Step 2:** Initialize the factors $\{F_t^y, F_t^\eta\}$ with a PCA;

iii) **Step 3:** Estimate the Dynamic Factor Model with a Kalman filter and smoother based on Koop and Korobilis (2014) with constraints placed on the state space.

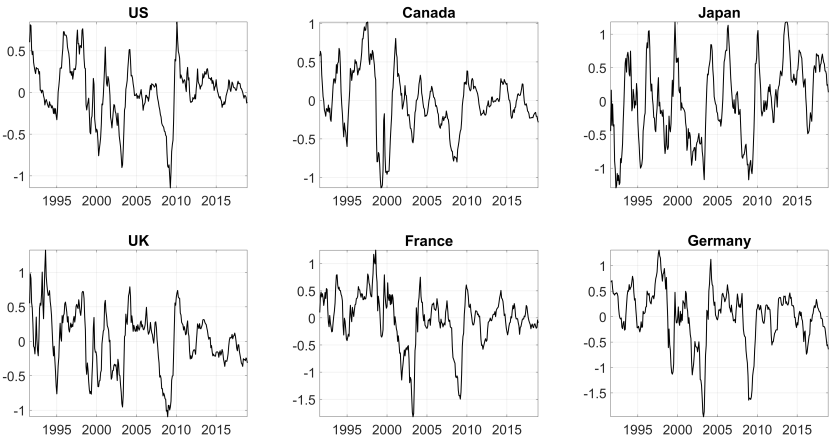
Results

Figure 1: Investor Sentiment Index



Results

Figure 2: Domestic Sentiment Indices



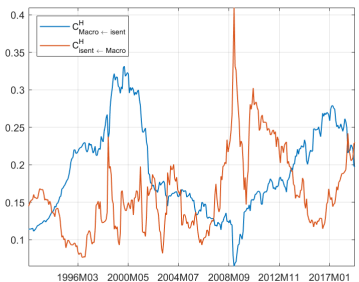
Results

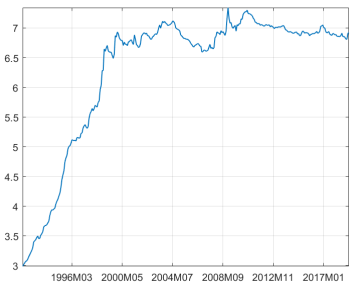
Table 1: Macro-Sentiment Static Connectedness Table.

		Macro			Sentiment						
		Ind Prod	Inflation	Unemp	Global iSent.	US iSent.	CAN iSent.	JP iSent.	UK iSent.	DE iSent.	FR iSent.	From others
Macro	Ind Prod	50.22	15.59	10.67	9.73	1.72	1.93	0.75	1.91	2.06	0.51	44.87
	Inflation	6.04	75.20	1.04	0.50	0.38	2.68	1.49	1.40	1.07	2.33	16.94
	Unemp	32.19	14.15	28.40	8.18	0.64	1.62	3.76	1.03	1.27	0.33	63.16
Sentiment	Global Sent	6.44	4.06	2.23	68.90	1.91	5.07	0.53	1.10	0.57	1.81	23.73
	US Sent	6.68	5.20	2.47	54.93	13.87	5.32	0.74	1.34	0.42	2.10	79.20
	CAD Sent	4.65	3.55	2.71	34.08	5.37	36.23	0.66	1.92	0.76	1.09	54.78
	JP Sent	3.61	5.08	3.06	38.37	12.30	1.59	23.58	4.17	1.20	0.64	70.02
	UK Sent	5.32	2.54	3.48	56.42	5.43	4.04	1.73	11.71	0.98	2.10	82.03
	DE Sent	6.42	3.40	3.06	52.78	3.29	7.08	2.51	2.44	8.35	0.97	81.96
	FR Sent	4.97	5.30	4.22	58.57	3.20	5.69	2.01	2.19	1.50	4.66	87.66
	To others	76.33	58.87	32.94	313.57	34.25	35.01	14.18	17.50	9.82	11.88	**604.36**
	NET	31.46	41.93	-30.23	289.84	-44.95	-19.76	-55.84	-64.53	-72.14	-75.78	

Results

Figure 3: Connectedness Macro-Investor Sentiment





Final Remarks

- The key contributions are:
  - i) A novel measure investor sentiment at global and local levels that addresses the main critiques to existing indicators.
- The most interesting findings:
  - i) Investor sentiment moves business cycles.
  - ii) Global investor sentiment drives domestic sentiment but local sentiment has an important idiosyncratic component.
  - iii) There is a complex two-way cause and effect link between investor sentiment and economic activity.