Discussion: "Financial Variables as Predictors of Real Growth Vulnerability"

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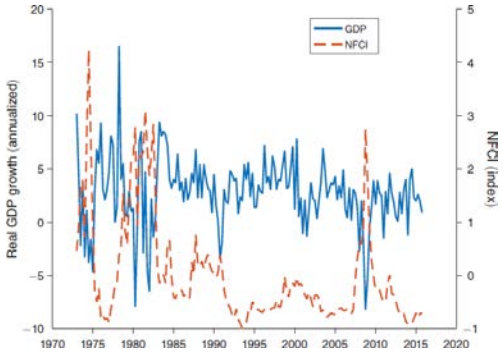
Outline

How does the nonlinear model help us forecast?

- ABG (*AER* 2019): Nonlinear link between financial cond's and GDP.
  - Bad fin cond's $\Rightarrow$ downside risk in GDP. Good fin cond's $\not\Rightarrow$ upside.
- RRH: Better density forecast performance of ABG's nonlinear model comes from higher precision in normal times, *not in bad times*.
  - This fact is actually reported by ABG (fig. 11), although not emphasized.

How to evaluate early warning indicators?

- RRH: NFCI does not provide early warning in 2008q2–q3. Non-fin leverage indicator does.
- Dangerous to evaluate models on single data point? Nonlinearities already identified off just 2 or 3 historical periods of stress.



Note:
ABG (2019)
Figure 2

- Cross-country data useful? Adrian, Liang, Grinberg & Malik (2018)

Outline

Letting the data speak about risk

- RRH break down distributional forecasts by NFCI sub-index.
  - ABG online appendix does the same, but omit *non-financial* leverage.
  - NFCI (and sub-indices) are constructed from ∼100 component series.
- RRH also control for real activity index, constructed from 18 component series.
- Neither the NFCI nor the real activity index have been constructed specifically with a view toward *risk* monotoring.
- Question: Taking sub-index approach to its logical conclusion, which *component series* are most important indicators of GDP risk?

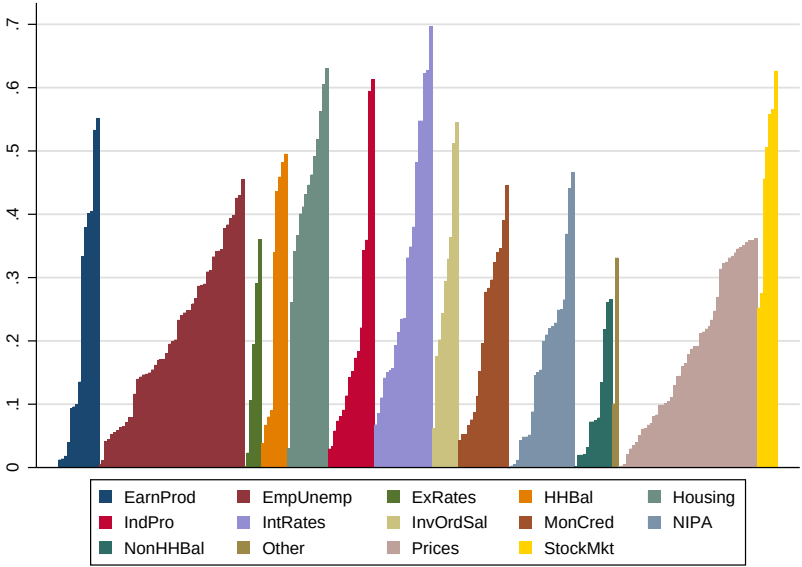
Conditional heteroskedasticity model

- ABG show that their one-quarter-ahead quant. reg. distributional forecasts are well approximated by a Gaussian conditional heteroskedasticity model:

$$y_{t+1} = \mu + \beta' x_t + \sigma_t \varepsilon_{t+1}, \quad \varepsilon_{t+1} \overset{i.i.d.}{\sim} N(0,1),$$
$$\sigma_t^2 = \exp(\nu + \gamma' z_t).$$

- ABG: z_t = NFCI & GDP.
- My approach: Let data speak flexibly.
  1. FRED-QD data set: 248 series, all categories of macro/finance data. Sample: 1973q1–2016q3. McCracken & Ng (2015); Stock & Watson (2016)
  2. Estimate 8 factors $\hat{F}_t$ by principal components (67% of variance). Bai & Ng (2002)
  3. Estimate cond het model with $x_t, z_t = \hat{F}_t$.
- Next: How does vol factor $\hat{\gamma}' \hat{F}_t$ relate to 248 underlying series? β

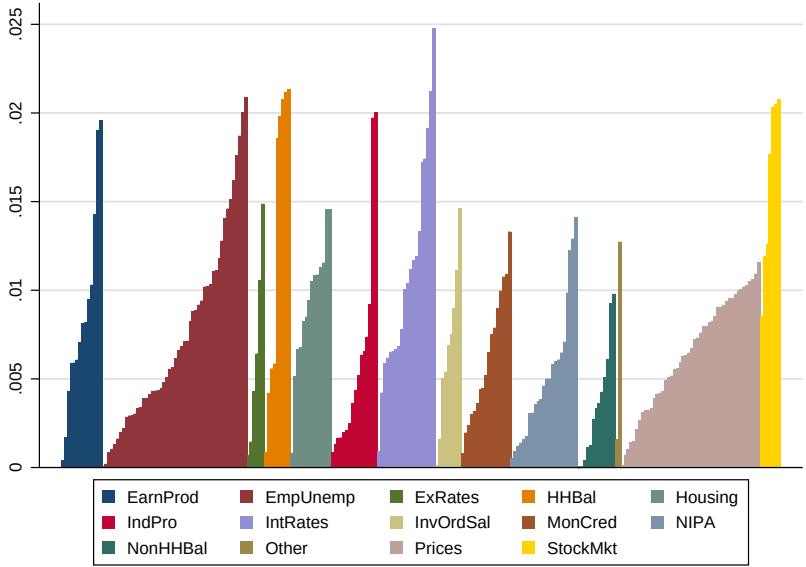
Correlation of underlying series with vol factor



Top-10 highest (abs.) correlates with vol factor

Series	Category	Corr.
3-mth CP/TBill spread	IntRates	.70
New housing build permits: total	Housing	-.63
AAA/FFR spread	IntRates	-.63
S&P 500: div yield	StockMkt	.63
3mTBill/FFR spread	IntRates	-.62
Capac util.: total	IndPro	.61
New housing build permits: South	Housing	-.60
Capac util: manuf	IndPro	.59
S&P 500	StockMkt	-.57
New housing starts	Housing	-.56

Weight of vol factor on underlying series



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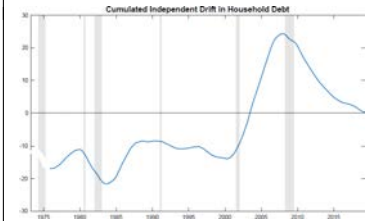
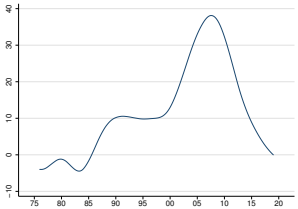
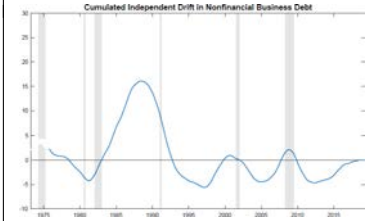
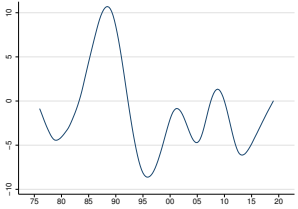
Outline

Excess leverage as macro-pru indicator

- Goal of last part of paper: "excess leverage" indicator for HHs and non-fin firms.
  - Rivals BIS's "credit gap" as macro-pru tool.
- RRH indicator = cumulated drift in HH/business debt *in excess of and independent of* drift in GDP growth.
- RRH emphasize need for trend-cycle model w. labor mkt var's to filter out business cycle.
- But I get similar indicators using simple approach:
  1. Obtain trend in debt+GDP using low-pass filter (retain cycles > 32 quarters).
  2. Subtract GDP trend from debt trend. Remove sample avg growth rate.

Excess leverage indicators

	RRH indicators	Low-pass indicators
Households		
Non-fin bus		

Taking stock: macro-pru indicators

- RRH indicators primarily differ from the simple-minded ones at end of the sample. Why?
  - Implicit prior on how much trend growth can fluctuate?
  - Do results depend on using labor market data?
- How to link excess leverage indicators with macro-pru goals?
  - According to RRH's model, the excess growth in debt *should not* help forecast GDP growth (due to independence assumption).
- How to reconcile with BIS's "credit gap", which is *difference from* debt-to-GDP trend?
  - Can theory guide us?

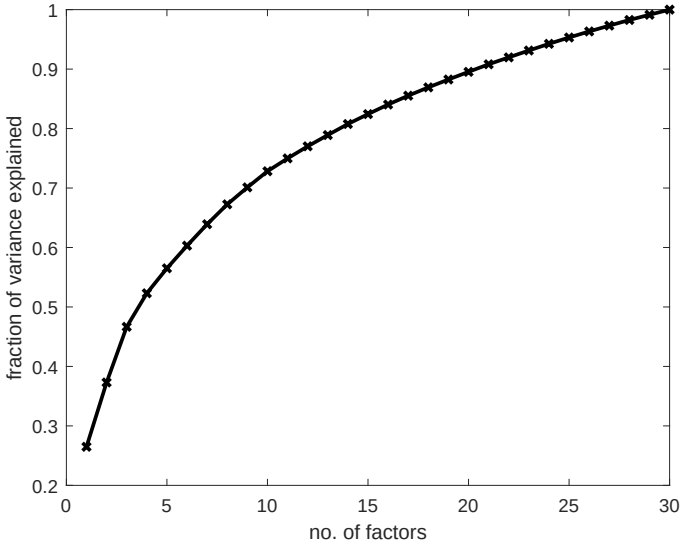
Outline

Summary

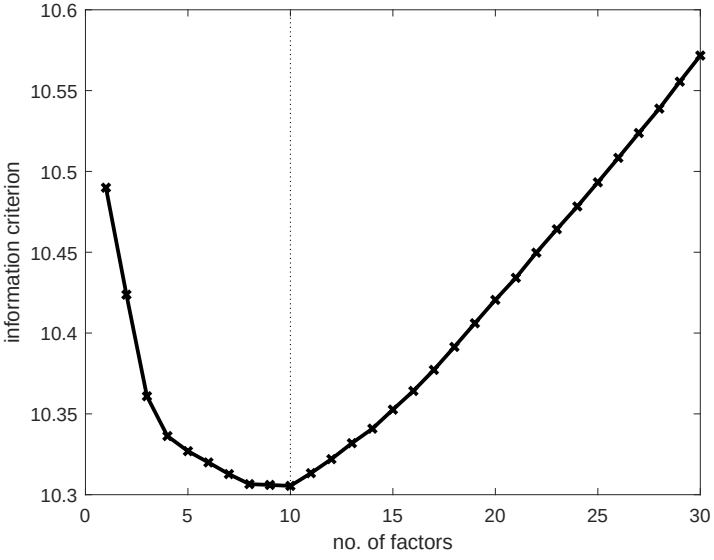
- Great paper that advances our understanding of GDP downside risk and of reduced-form macro-finance linkages.
- Humble suggestions:
  1. Cross-country data to avoid evaluating on a single Great Recession data point.
  2. Explore a wider set of variables for short-term risk prediction.
  3. Modify trend-cycle model so that excess leverage indicator may help forecast GDP growth. Explain differences from simple-minded low-pass filter and from BIS "credit gap".

Thank you!

Cumulative scree plot



Bai-Ng information criterion IC_{p2}



Conditional heteroskedasticity model estimates

	Mean	Var
L.factor1	-1.374***	0.0619
	(0.191)	(0.147)
L.factor2	1.148***	-0.530***
	(0.202)	(0.136)
L.factor3	-0.433**	-0.136
	(0.220)	(0.150)
L.factor4	0.402*	-0.0227
	(0.212)	(0.157)
L.factor5	0.440**	0.129
	(0.177)	(0.138)
L.factor6	-0.211	-0.153
	(0.184)	(0.142)
L.factor7	0.176	-0.0296
	(0.167)	(0.132)
L.factor8	0.356*	0.108
	(0.185)	(0.127)
Constant	2.722***	1.599***
	(0.203)	(0.126)
Observations	174	174

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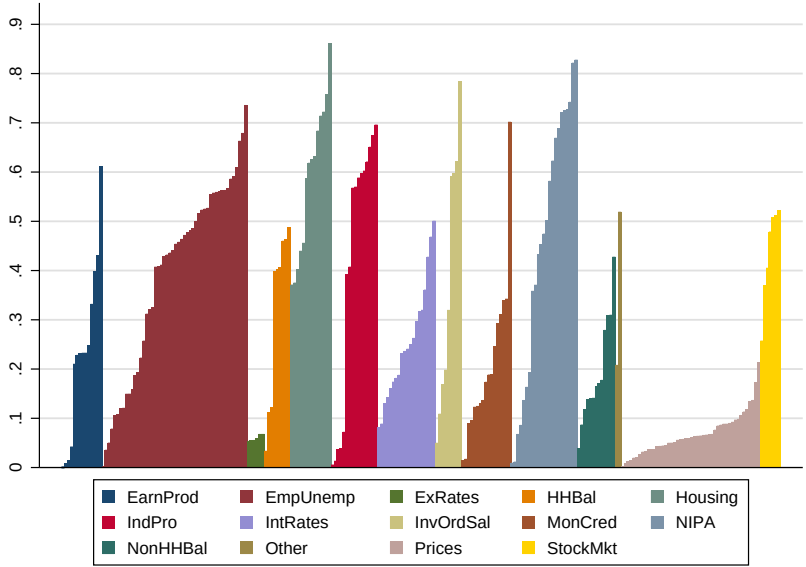
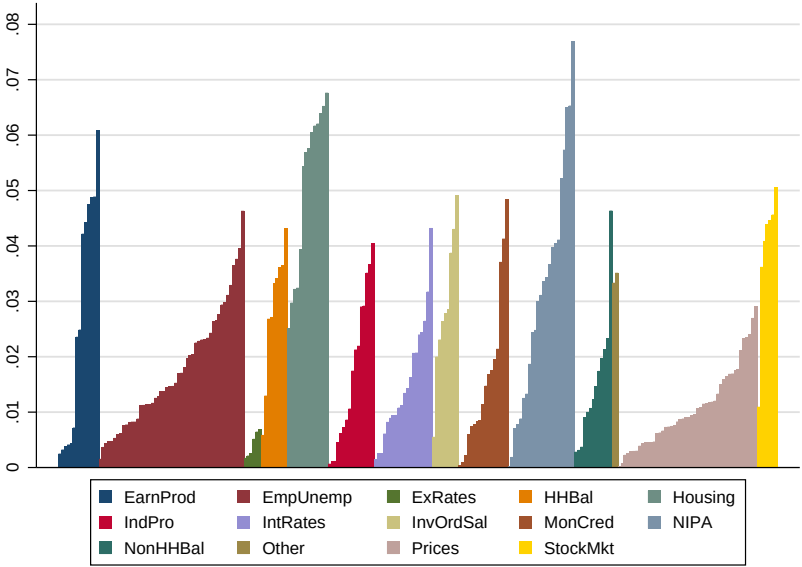
Correlation of underlying series with mean factor



Weight of mean factor on underlying series



Top-10 highest (abs.) weights in vol factor

Series	Category	Weight
3-mth CP/TBill spread	IntRates	.025
Fin assets, HH & non-prof	HHBal	-.021
3mTBill/FFR spread	IntRates	-.021
Net worth of HH & non-prof	HHBal	-.021
Employees: other services	EmpUnemp	.021
Real assets, HH & non-prof, excl. real estate	HHBal	-.021
S&P 500	StockMkt	-.021
S&P 500: div yield	StockMkt	.021
S&P 500: industrials	StockMkt	-.020
Employees: education & health	EmpUnemp	.020

Note: Series and factors are standardized to have variance 1.

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