A UK financial conditions index using targeted data reduction forecasting and structural identification

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Concept

- Financial condition indices (FCI) summary measure of 'financial conditions' but not a well-defined concept.
- Might be useful for improving forecasting.
- Might also help to bring more relevant information into structural models.

Existing approaches

- FCIs constructed as linear combinations of a set of relevant financial variables.
  1. How to choose weights?
  2. How to choose the relevant variables?
- Typically small ($\ll 10$) sets of variables used, *eg* yields (bonds, stocks), exchange rates and house prices.
- Weights arbitrary, or determined by calibrating the effect of the variables on other macro variables such as GDP *via* some model, or *via* principal components.
- Recently larger sets used.

Targeted data reduction - MPLS

- Univariate PLS obtains a linear combination of x_t that 'best' describes y_t, maximising the covariance of x and y.
- PLS weights the covariances of x_t and each element of y_t.
- With multivariate y_t, construct a linear combination of the y_t and then performs PLS on it.
- May construct linear combination with the first eigenvector of the 'squared' covariance of y_t and x_t.

Data

- We select 28 financial y_t variables similar to those in Hatzius *et al*.

1	10yr gilt
2	3m Tbill - Bank Rate spread
3	2yr gilt - 3m Tbill spread
4	10yr gilt - / 3m Tbill spread
5	TED Spread (3m LIBOR - 3m Tbill)
6	3-month LIBOR/OIS spread
7	£ Baa corporate - gilts spread (NB: Not just UK issuers)
8	£ high yield corporate - Baa corporate spread
9	75% LTV variable rate mortage - Bank Rate spread
10	£ 10k personal loan rate - 2-year swap rate spread
11	PNFC variable rate lending rate - 3m LIBOR spread
12	Major UK lenders' CDS premia
13	£ real effective exchange rate
14	FTSE 100
15	Financials market cap (percent of FTSE 100)
16	Composite UK house price indices
17	£ price of gold
18	£ price of crude oil relative to 2yr MA
19	Stock of bank lending (M4L)
20	£ commercial paper Issuance (Relative to 24 Month MA)
21	£ bond Issuance (Relative to 24 Month MA)
22	Stock of M0 (notes and coins and reserves)
23	Stock of broad money (M4-IOFC)
24	Government bonds outstanding
25	PNFC Debt (SA)
26	Factors likely to limit output: Credit/finance
27	Factors likely to limit capital expenditure: External finance
28	Factors likely to limit capital expenditure: Cost of finance
All variables transformed to stationarity	

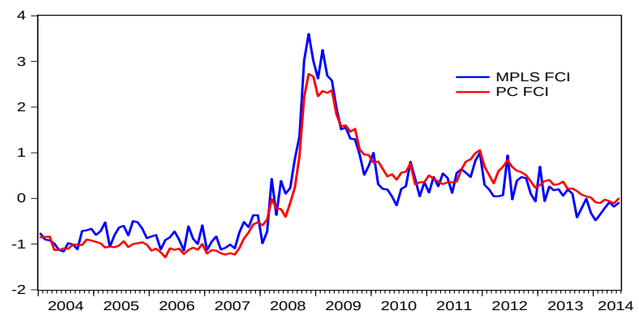
- Focus on all 28 for the PC FCI.
- Unlike Hatzius *et al*, do not 'purge' data by filtering with a regression on GDP growth
- Also construct a large macro ('factor') dataset, x_t containing *eg* real activity variables, prices, surveys.
- Construct linear combination of x_t that 'best' explains y_t using MPLS.
- Focus on a subset of six spreads (7-12) for MPLS FCI.
- For forecast exercise, use NIESR Monthly GDP growth.

x - macro data set

A large monthly macroeconomic data set 2004m1 - 2014m6 (N=135), transformed to stationarity.

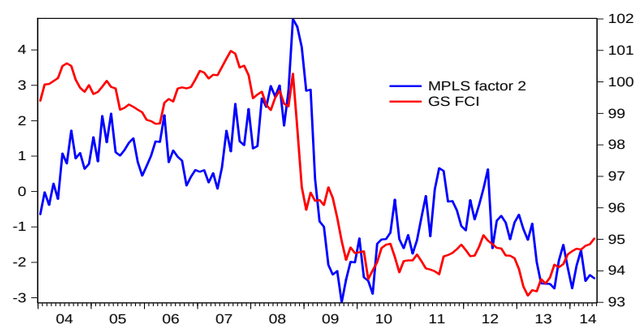
- Short rate; CPI indices; Surveys of activity and expectations; Labour market activity; Surveys of confidence; House prices; Indices of production; Retail sales.

MPLS FCI vs vanilla PC FCI



- FCI-PC28 first principal component of full data set y, as Hatzius *et al*.
- MPLS weights on y_i 0.31, 0.30, 0.15, 0.15, -0.10 and 0.18.

2nd factor from MPLS FCI and GS FCI



- GS FCI average of 3-month LIBOR rates, 10-year corporate bond rates, the effective exchange rate and UK equity prices with weights of 0.46, 0.34, 0.17 and 0.03 respectively.

RRMSE of one-factor models versus $AR(2)$

Horizon	FCI-M6	FCI-PC28	FCI-M28	FCI-PC6
1	**0.861***	0.864*	0.985	0.939
2	**0.987**	1.015	0.995	1.030
3	0.996	**0.969**	1.016	1.020
4	**0.957**	0.982	0.979*	1.003
5	**0.968**	0.991	1.001	1.052
6	0.977	**0.976**	1.003	0.995
7	**0.961***	0.993	0.994	1.028
8	0.997	0.999	**0.994**	1.045
9	**0.961***	1.006	0.989*	1.058+
10	1.051	**1.019**	1.024	1.026
11	**0.956***	0.985	0.980	1.042
12	1.002	1.033	**0.998**	1.057
Average	**0.973**	0.986	0.997	1.025

*Best performer in any row; * model sig. better than AR at 5%; + AR sig. better than model at 5%.*

Robustness

- Adding a second or third factor improves the MPLS FCI-M6 results.
- MPLS FCI-M6 generally remains dominant.
- Estimating the models over rolling windows (36, 48 and 60 months), in most cases FCI-M6 preferred to FCI-PC28.
- If y_y is augmented with lagged values (allowing the factor to lead macro variables) little change to the results.

RRMSE of three-factor models versus $AR(2)$

Horizon	FCI-M6	FCI-PC28	FCI-M28	FCI-PC6
1	**0.750***	0.847*	0.836*	0.963
2	**0.974**	1.015	0.989	1.016
3	**0.949**	0.972	0.961	1.026
4	0.930	0.985	**0.917**	0.982
5	0.953	0.998	**0.940**	1.051
6	0.951	0.980	**0.940**	0.978
7	0.957	0.995	**0.947**	0.997
8	0.970	1.019	**0.933**	1.009
9	1.003	1.022	**0.983***	1.017
10	1.066	1.027	1.023	**0.964**
11	**0.958***	0.984	0.969	0.978
12	1.043+	1.053+	**0.997**	1.002
Average	0.959	0.991	**0.953**	0.999

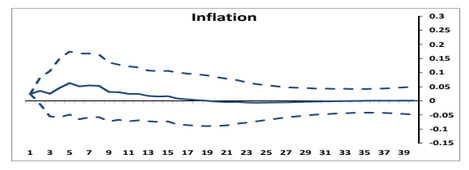
Helping to identify a credit shock

- Estimate two SVARs - one including inflation, growth, loans, bank lending spreads on loans to NFCs and LIBOR; another these and the FCI.
- Identify a monetary and credit supply shock using these commonly used sign restrictions.

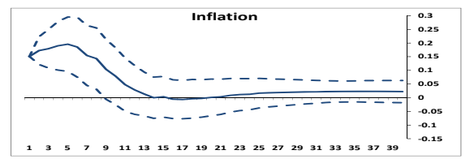
Variable	Adverse credit shock (rise in FCI)		Adverse monetary shock (rise in policy rate)	
	sign	timing	sign	timing
Inflation	unrestricted	n/a	-	after one month
Growth	-	after one month	-	after one month
Lending growth	-	after one month	-	after one month
Spread level	+	immediate	unrestricted	n/a
LIBOR level	-	immediate	+	immediate
FCI	+	immediate	unrestricted	n/a

- Relative to an SVAR excluding FCI, main changes are to increase the positive impact of a credit shock on inflation, make lending more negative and spreads much higher.

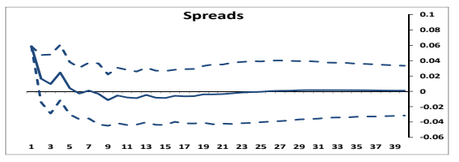
Impulse responses - credit shock



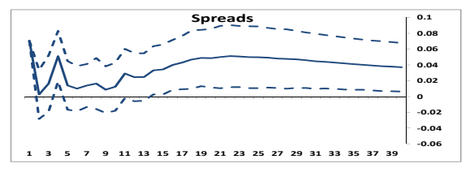
without FCI



with FCI



without FCI



with FCI

Conclusions

- New type of FCI that rotates a large macro data set onto financial variables (most usefully, spreads).
- Results are intuitively sensible and arguably helps identify a credit supply shock.
- Good forecasting performance for monthly growth.
- MPC appear to find it helpful.