Financial Conditions Indexes(FCI): A fresh look after the financial crises

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Outline

1. Introduction

- Global financial crisis of 2007- 09 has brought to the fore the importance of Financial Conditions to macroeconomic outcomes.
- To examine:
    1. Why FCI might prove to be useful tool for both forecasters and policy makers.
    2. Analyze how they are constructed.
    3. Provide new econometric research to see how useful tool they can be.

Why FCI?

- Financial conditions is defined as the current state of financial variables that influence economic behaviour and future state of economy.
- FCI should measure financial shocks [exogenous shifts]

Understanding the potential utility of FCI

- ▶ To simplify, imagine that the link between a particular FCI and the future growth rate of the economy is one-for-one.
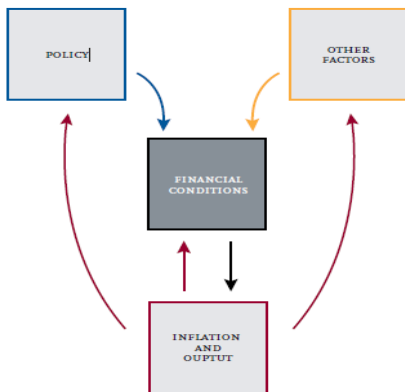
How FCI have been calculated in practice

2. Methodologies to calculate an FCI

- A variety of methodologies for constructing FCI have been developed
  1. Weighted-sum approach
  2. Principal components approach

Weighted-sum approach

- The weights reflect the relative importance of each of the financial variable in affecting the output variable.
- where X: endogenous variable(GDP, equity prices,interest rates), A and B: vectors of coefficient's, Y: vector of exogenous variables
- Thus, FCI can be constructed as:

$$FCI_t = \sum_{i=1}^{n} w_j(x_{jt} - \bar{x}_j)$$

- where w_j is the weight attached to financial variable x_j, which is obtained by the cumulative responses of GDP growth to one unit shock to the variable x_j and $\bar{x}_j$ is an average of x_j

Principal component approach (PCA)

- Extracts a common factor from a group of several financial variables. This common factor captures the greatest common variation in the variables
- FCI can be constructed in two steps:
    1. Estimating the unobserved common component
    2. Regressing the common factor by the economic activity variables.

Testing the predictive power of FCI

3. Variables for Prediction

Frequency: Quarterly, Period: 1961-2009

- ▶ Term spread.
- ▶ Real M2.
- ▶ S&P 500.
- ▶ Federal funds rate.
- ▶ Short-term credit spread.

In-Sample Testing

Results for forecast horizon h = 4:

Frequency, Quarterly: 1961-2006

Y (Outcome/Dependent variable) = IIP

Financial indicator (x/Independent variable)	R2	F stats	QLR
Federal fund	0.27	0.00	0.02
Term spread	0.10	0.03	0.00
Credit spread	0.21	0.00	0.00
Real M2	0.23	0.00	0.00
S&P500	0.16	0.00	0.12

Conclusion:

1. Financial variables are useful in explaining the variance.
2. Greater stability for 4 quarter horizon.

Out-of-Sample Testing

Results for forecast h=4 (Data :1970-2009) :

Root MSE	2000 I - 2004 IV	2005 I - 2009 IV
Federal fund	1.12	1.15
Term spread	1.09	1.05
Credit spread	1.40	0.89
Real M2	1.43	1.14
S&P500	0.87	0.89

- ▶ Prediction errors dropped substantially after mid-1985 and remained low for the next 20 years.
- ▶ The financial indicators generally did not enhance indeed they tended to worsen the accuracy of post-sample prediction.
- ▶ The stock market variable and the credit spread did relatively well.

Out-of-Sample Testing with FCI Models

Results:

FCI Forecasting models :

BLOOMBERG, CITI, DB (PC), DB (FCI), GS, KCFSI, MA, OECD

2005 I - 2009 IV		
FCI	h=2	h=4
Average all FCIs	0.95	0.83
Average from Out-Of-Sample Table	1.02	1.02

- ▶ Pooling of information appears to improve the predictive ability of financial indicators.
- ▶ During the 1990s, some of the available FCIs did not do as well as the AR model (relative RMSE>1).

Constructing a new FCI

4. Why bother?

- Three limitations of earlier financial conditions indexes:
    1. Previous FCIs cover only a limited span of history.
    2. Narrowness of the underlying history.
    3. Previous FCI do not purge their measures of endogenous movements related to business cycle fluctuations or of monetary policy influences and so are less representative of the shocks to the financial system.
- Paper aims to develop a new, broader index of financial conditions and to improve the predictive performance compared to the existing FCIs.

Selection of financial variables

- In all 45 variables were included in the financial indicator list.
- The selection of these variables was the coverage of existing FCIs,interest rate levels or spread variables, asset price variables, 15 financial stock and flow variables, seven survey indicators of financial conditions.

Historical Coverage

- One-fourth of the 45 series go back to the beginning of the 1970s, but the two-thirds go back to the early 1980s, and about 90% to the mid 1990s.
- Half of the variables in the new areas we have chosen to stress-stocks outstanding, flows and surveys go back to 1970s.

Econometric approach

- Unbalanced panels (data series)
- Eliminate variability in the financial variables that can be explained by current and past real activity and inflation.(PCA)
- Summarize financial variables using more than a single principal component.

Principal components computation of the 45 financial series

- Let X_{it} denote i'th financial indicator at time t, Y_t denote a vector of macroeconomic indicators and consider the regression equation

$$X_{it} = A_i(L)Y_t + v_{it}$$

- where v_{it} is uncorrelated with current and lagged values of Y_t, and thus represents the financial variable purged of its relation with current and lagged Y. Suppose that v_{it} can be decomposed as

$$v_{it} = \lambda i' F_t + u_{it}$$

unrelated to F_t and Y_t.

- Under the assumption that the u_{it} are uncorrelated (or "weakly" correlated) across the financial variables, the vector F_t captures the covariation or co-movement in the financial indicators.

- Thus, the goal of the econometric analysis is to estimate F_t.

How well does the new FCI do?

5. Evaluation of the new financial conditions indexes

- Evaluate new FCI
- Asses the extent to which the wider coverage of our index and econometric enhancements
- Review for the period ahead in 2010

Relative RMSE for Forecasting Models Using Financial Indicator Factors

FCI	1970.I - 1974.IV	1975.I - 1979.IV	1980.I - 1984.IV	1985.I - 1989.IV	1990.I - 1994.IV	1995.I - 1999.IV	2000.I - 2004.IV	2005.I - EOS
1 PC			0.87	1.55	0.88	1.60	0.93	0.66
2 PCs			0.82	1.89	1.04	1.87	1.01	0.69
3 PCs			0.90	1.64	1.02	2.03	0.89	0.73
AR Model RMSE	3.86	2.77	3.38	1.03	1.69	1.02	1.64	3.05
New FCI			1.08	1.40	0.81	1.93	0.77	0.60

Prediction tests with new FCI

- ▶ The one-factor variant generally performed at least as well as two- and three-versions.
- ▶ The one-factor FCI generally tracked future GDP growth better than the AR models.
- ▶ The new FCI did better than the average single financial indicator on most sub-periods,including both the period of
- ▶ The new FCI did better than the average single financial indicator in most sub-periods, including both the period of the early 1990s and the past decade. It also outperformed the best of the single-factor indicators, the stock market index, over the past five years, but under-performed significantly in a couple of the earlier sub-periods.
- ▶ Like the other FCIs, new FCIs performed noticeably better after 2000, especially over the most recent five-year period, than it did earlier.

Testing the new FCIs enhancements of the existing technology

Tests

- ▶ Balanced panel
- ▶ Decomposition tests
- ▶ Purging macro influences
- ▶ Purging the funds rate

Possible sources of instability

- ▶ Tests indicate that the new FCI is a more reliable predictor of activity during recent period
- ▶ Financial conditions indexes do better in predicting activity during periods dominated by exogenous financial disturbances.

What our FCI tells about the period ahead

- Unpurged and purged version of FCI
- Two main reasons for the difference between the new FCI and other measures.

Concluding remarks

- ▶ Among single-variable indicators, a broad stock market index outperforms as a predictor over the next two to four quarters.
- ▶ In forecasting tests, our new FCI outperformed a variety of alternative measures in recent years.

Proposing an FCI for India

Earlier work on FCI for India

- Jeevan Kumar Khundrakpam,(2017), Estimating Financial Conditions Index for India, Journal of Emerging Market Finance, Institute for Financial Management and Research,16(1) 1-29

- Shankar A., (2014), A financial conditions index for India. DEPR Working Paper WPS 08-2014, Reserve Bank of India, Mumbai.

- R Charleroy and Michael A. Stemmerz, (2014), An Emerging Market Financial Conditions Index: A VAR Approach.

- Pradhan, R.P, (2009), The nexus between financial development index and economic growth in India: Evidence from multivariate VAR model. International Journal of Research and Review in Applied Sciences,1(2), 141-151.

What variables do we propose to use

- Term Spread (10-year G-sec yield rate, 1990-2019, Monthly)
- Money Supply (M3, 2001-2019, Quarterly)
- Nifty-50 closing Price (Nifty-50, Aug 2007- April 2019, Monthly)
- Call Money Rate (Call Money Rate, 2000-2016, Yearly)
- Index of Industrial Production, base year: 2011-12 (IIP, April 2012-Feb 2019, Monthly)
- Frequency of the output FCI based on the data series available is monthly frequency.

What methodology we will use

- Weighted-sum approach
- Principal component analysis
- Vector auto-regression

How we will test the FCI for India

- Description statistics
- Univariate time series analysis on stationary time series
- Balanced panel
- Decomposition tests
- Purging macro-economic influences
- Forecasting

Thank you
Questions?