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Lead indicators of the Indian business cycle

NIPFP Macroeconomics Symposium, 2010

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14 September 2010

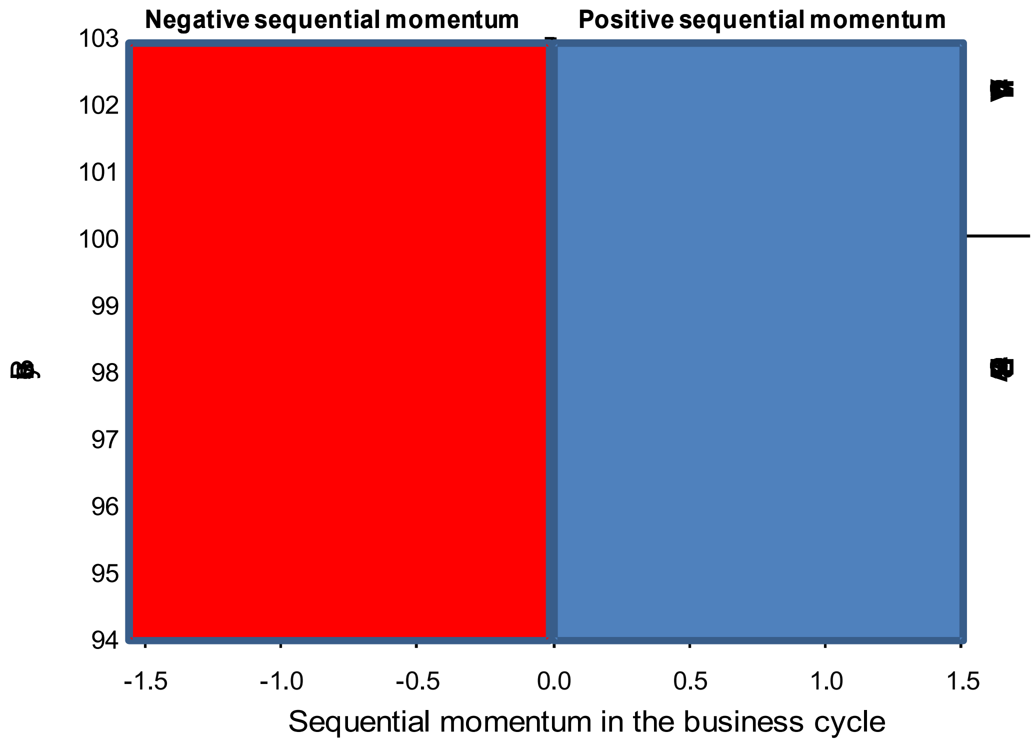
Structure

- The objective
- Constructing a leading indicator
- Results: Nomura's CLI for India
- Historical performance of the CLI
- Issues and the way forward

What are business cycles?

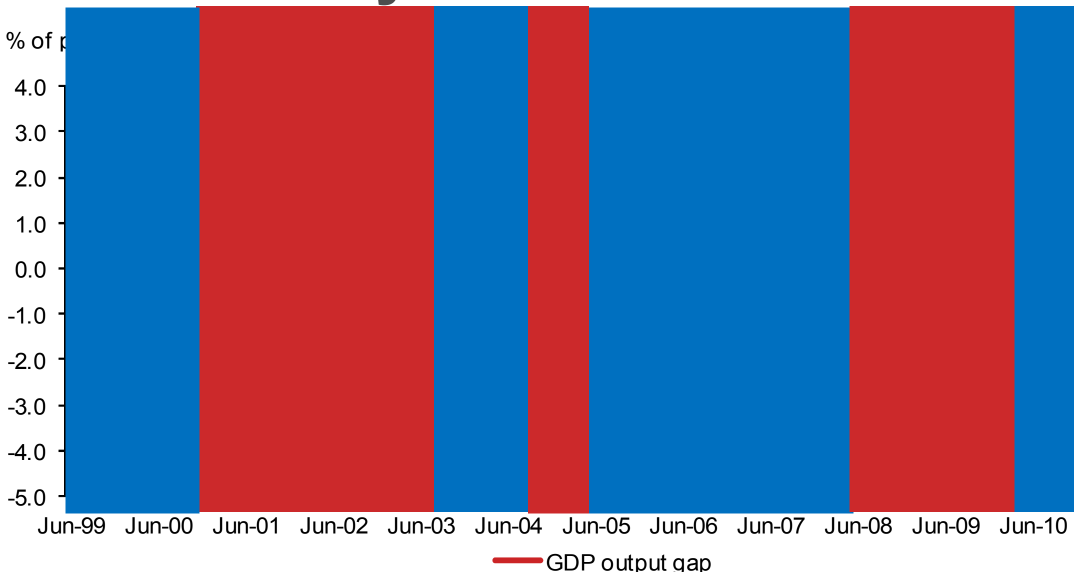
- OECD: Business cycles are *defined as fluctuations in the level of economic activity around its underlying trend*.

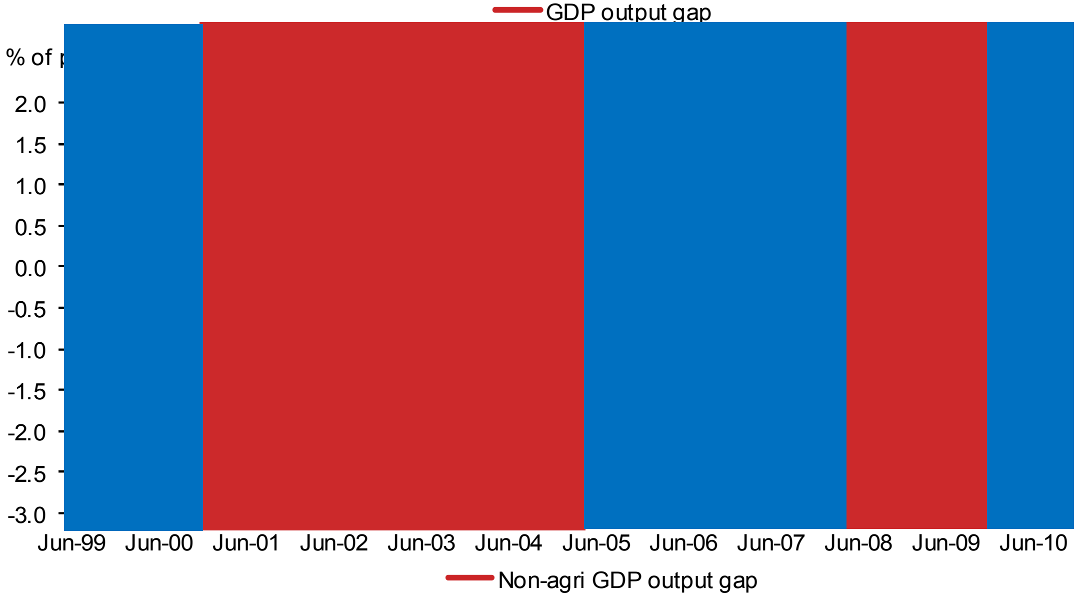
- A cycle consists of expansions occurring at the same time in many economic activities, followed by downturn, slowdown and recovery, followed by expansion, and so on.



Source: Nomura Global Economics.

Business cycles in India: GDP and non-agri GDP





- Trend estimated using the HP filter.
- In recent years, GDP and non-agriculture GDP business cycles have moved in tandem. However, there was a divergence during the 2002-2004 period because of the agriculture shock.
- Objective: Construct a composite leading indicator (CLI) for India that can help predict turning points in the business cycle.

Source: CEIC and Nomura Global Economics.

Steps in constructing the leading indicator - 1

- **Identify what are we predicting: select a reference series**

Candidates for reference series	Comment
Industrial production	Monthly, but does not capture services
Manufacturing production	Monthly, but does not capture services
GDP growth	Very volatile because of agriculture
Non-agriculture GDP growth	**Quarterly, but less volatile and captures services**

Steps in constructing the leading indicator - 2

- Identify the component series for the CLI
- Characteristics of the component series
  - Timeliness (monthly/quarterly) of the component series and the frequency with which the data are released. There is a trade-off between timely versus how comprehensive the indicator is.
  - Smoothness of the component series. This can be measured by the months/quarters of cyclical (MCD/QCD) dominance. This is defined as the shortest span of quarters that smoothes the series without eliminating the cycles.

Steps in constructing the leading indicator - 3

- Potential candidates for the component series ~ 100

Real sector	External	Price	Financial	Monetary	Others
Sales: CV, car, motor cycle	Exports	CPI IW: All, food, housing	Bank Rate, lending rate, deposit rates, repo rate, real repo rate	Currency in circulation	Govt revenue
Cellular subscribers	Imports, non-oil imports	CPI: UNME, CPI RL	Yield spread	Nominal: M0, M1, M2, M3	Govt expenditure
Railway: Goods Carried, passengers carried	Exports to: US, Saudi Arabia, UAE, UK, US, Euro area, China	CPI AL, CPI AL Food	3-month t-bill, 1-yr t-bill	Real: M0 M1, M2, M3	Employment exchange: new registrations
Production: coal, power, natural gas, petroleum products, cement, steel, non-ferrous metals, textiles, diesel engine, auto ancillary, commercial vehicles, motor cycle, car, yarn	Imports from: US, Saudi Arabia, UAE, UK, US, euro area, China	Crude oil, real crude oil price	1 yr G-Sec, 5yr Gsec, 10yr Gsec	Aggregate deposits, demand deposits, time deposits	Leading economic indicators: US, EU
IIP: Overall, mining, chemicals, basic metals, machinery & equipment, basic goods, capital goods, intermediate goods, consumer durables, consumer non-durables	Exports: gems & jewellery	WPI: All, fuel, manufacturing, non-metallic minerals, basic metals, machinery, non-electrical machinery, transport equipment	USD/INR, REER, NEER	Non-food credit, real bank credit	
Port traffic	Exports: transport equipment		BSE Sensex, BSE 200, Nifty, BSE Dollex	Cheque clearance volume	
	Imports: electronic machinery		BSE turnover		
	Imports: machine tools		BSE: new listed companies		
	Visitor arrivals		BSE Sensex - PE ratio		
	Tourism revenue		FII investment		
			New capital raised		

Steps in constructing the leading indicator - 4

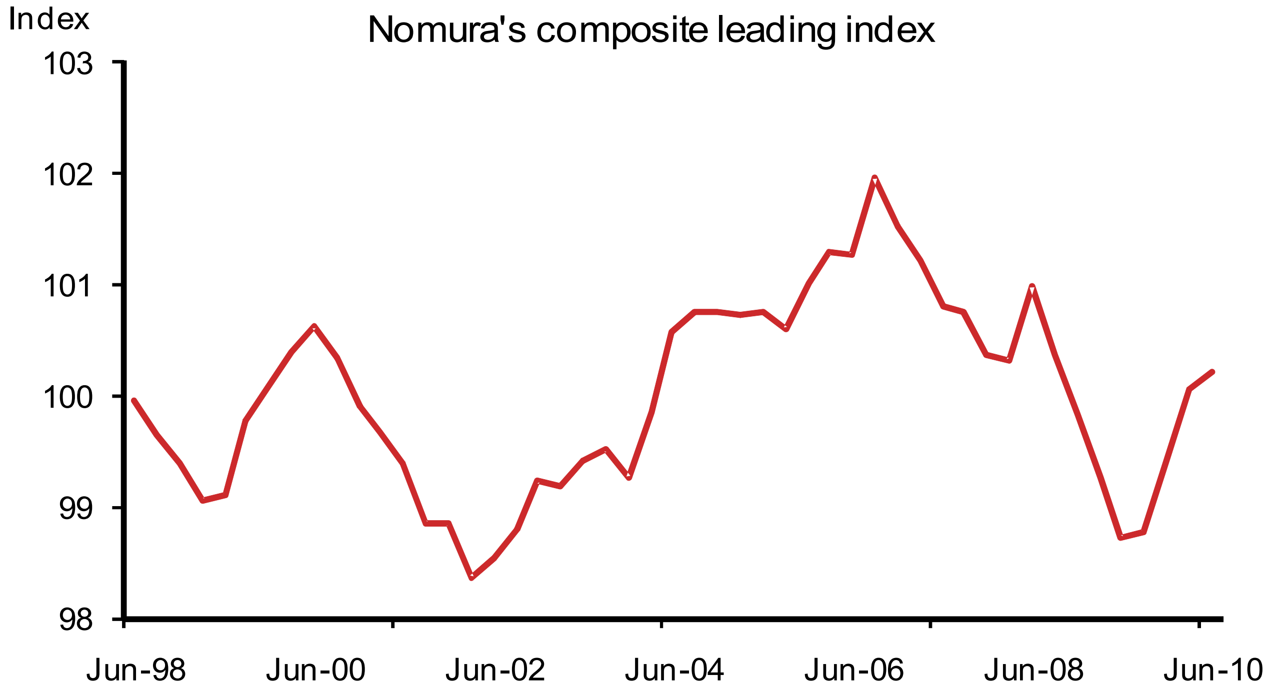
- Estimate point-to-point growth rate cycles for each of the component series.
- Use the months/quarters of cyclical dominance to smooth the growth rate cycles.
- Selection criteria for leading indicator
  - **Turning point analysis**: Check performance of each component series during peak/trough of non-agriculture GDP. Estimate median/mean leads and the number of extra/missing cycles compared to non-agri GDP to select.
  - **Dynamic cross correlation** of each component series with non-agriculture GDP to assess lead of the each component series.
  - **PROBIT analysis** to check the robustness of the CLI in forecasting turning points.

Result: Key components of the CLI

	Lead time (quarters)	Cross correlation coefficient with non-agriculture GDP
Real money supply (M2)	2	0.78
Industrial output	2	0.65
BSE Sensex	2	0.65
Non-oil imports	4	0.63
Real bank credit	2	0.52
Visitor arrivals	2	0.52
Repo rate	4	-0.69

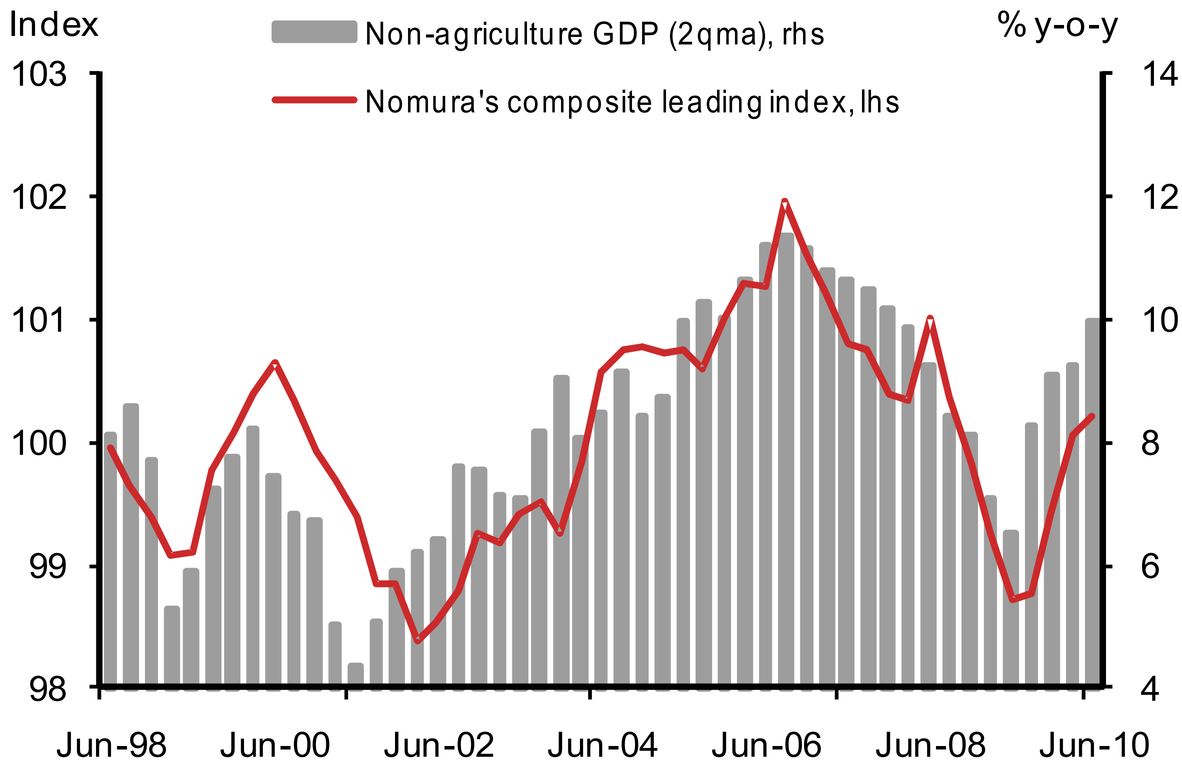
Source: CEIC, RBI and Nomura Global Economics.

Nomura's composite leading index for India



Source: Nomura Global Economics.

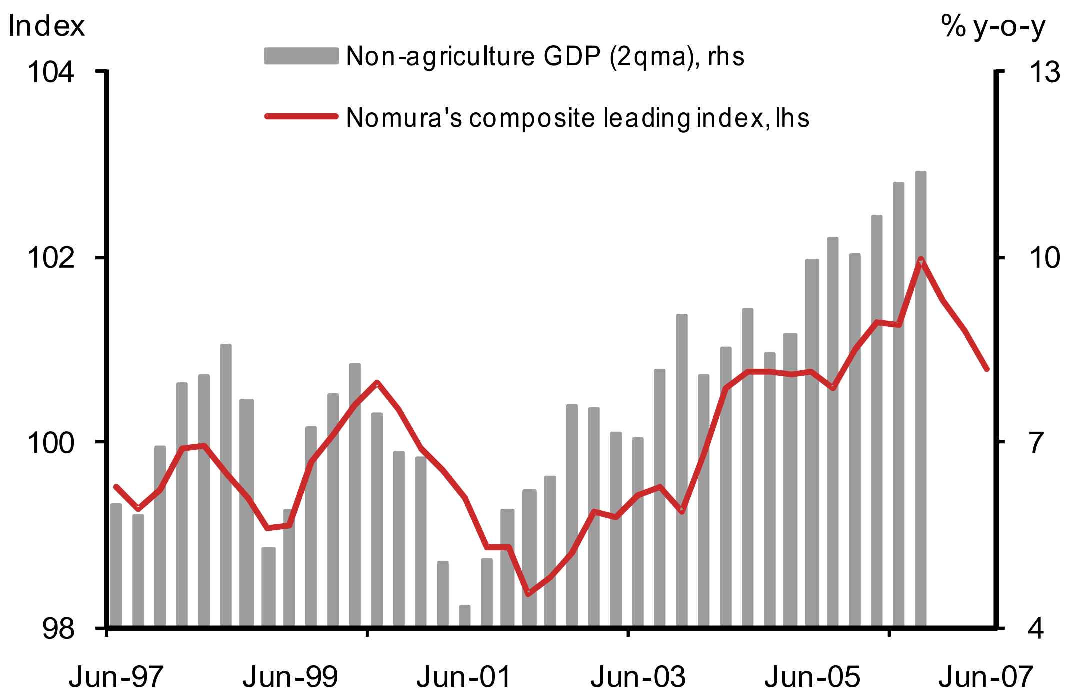
Nomura's CLI for India and non-agriculture GDP



Source: CEIC and Nomura Global Economics.

Performance of the CLI in 2006-07

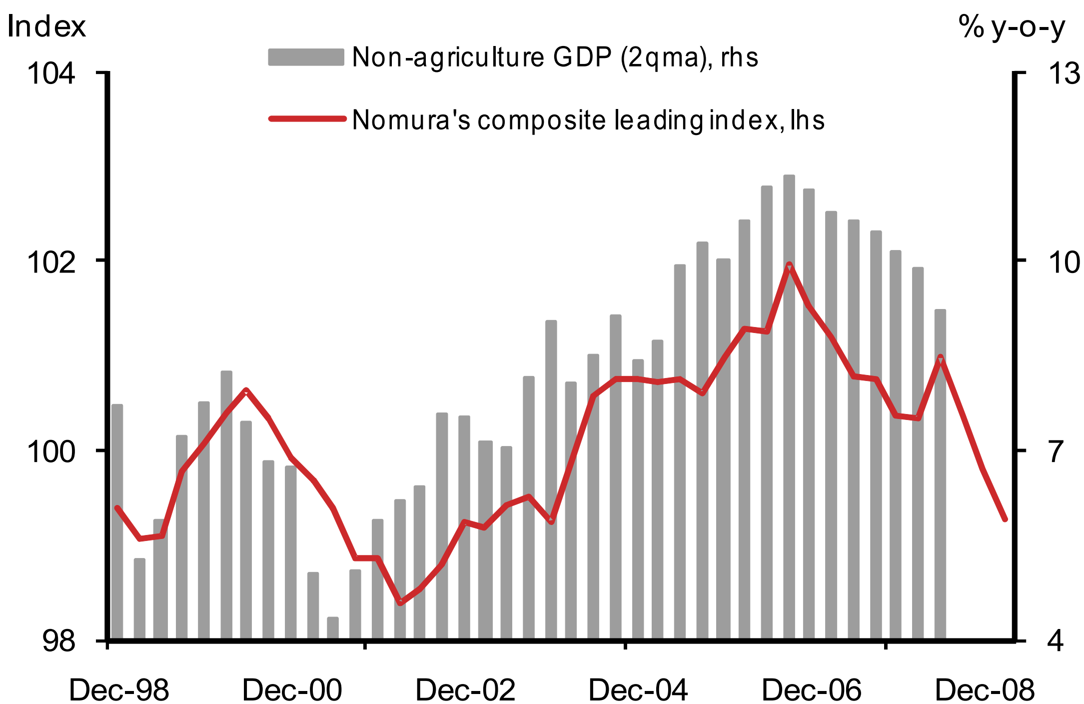
- **In Q4 2006, Nomura's CLI suggested that the business cycle had peaked, but was still above long-run trend, i.e. it was moving from an expansion to a downturn.**



Source: CEIC and Nomura Global Economics.

Performance of the CLI during the financial crisis

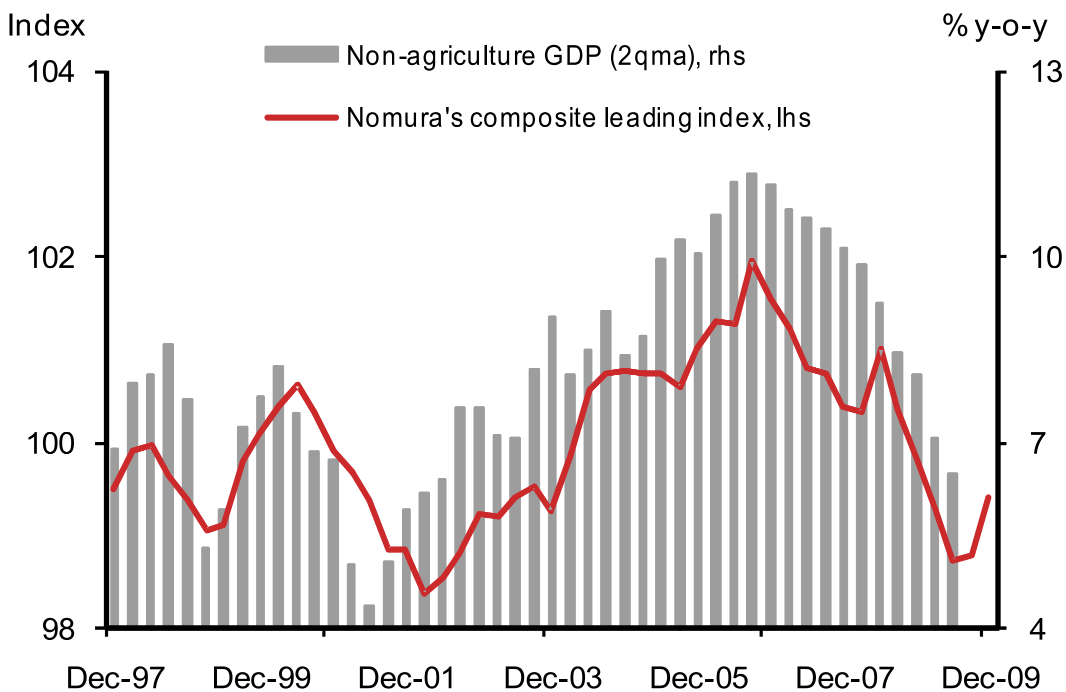
- **By mid-2008, it was clear that the economy had moved from a downturn to a slowdown phase with no bottom yet in sight.**



Source: CEIC and Nomura Global Economics.

Green-shoots starting to sprout

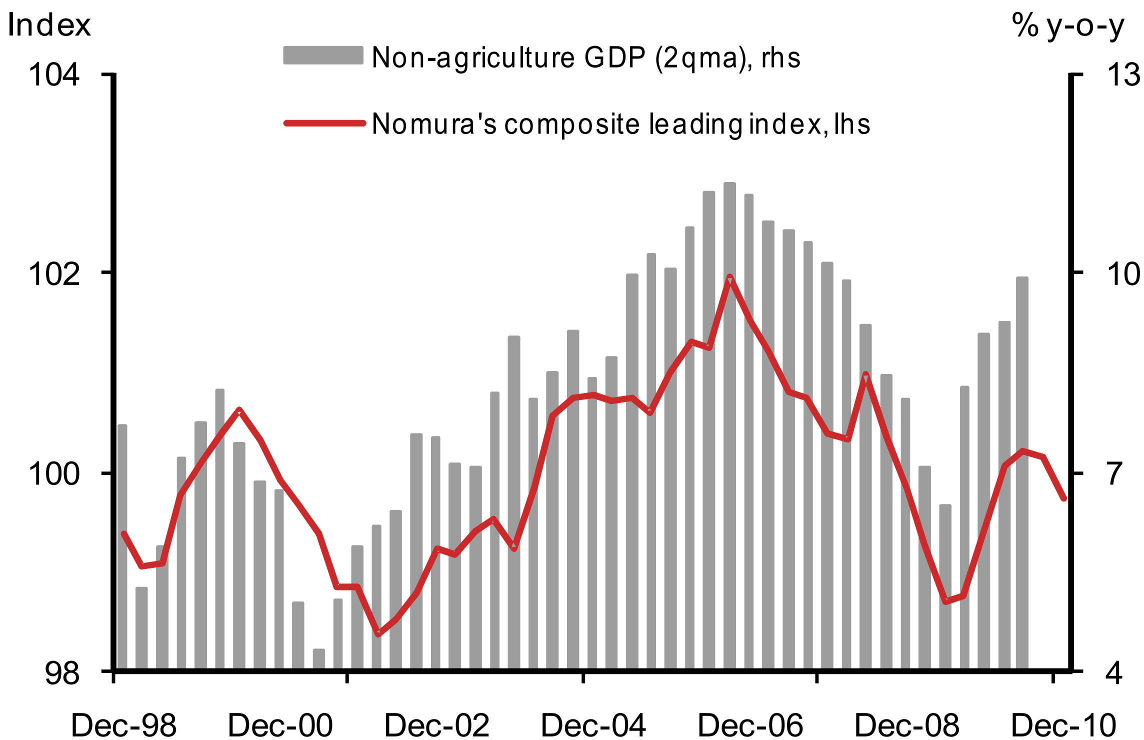
- **Around May 2009 (when GDP growth of 5.8% was announced for Q1 2009), the CLI was, in fact, suggesting that the economy had bottomed out and was recovering.**



Source: CEIC and Nomura Global Economics.

What is the CLI suggesting now?

- After the 8.8% real GDP growth in Q2 2010, Nomura's CLI is pointing to a slowdown in H2 2010. The business cycle has moved from an expansion to a downturn phase



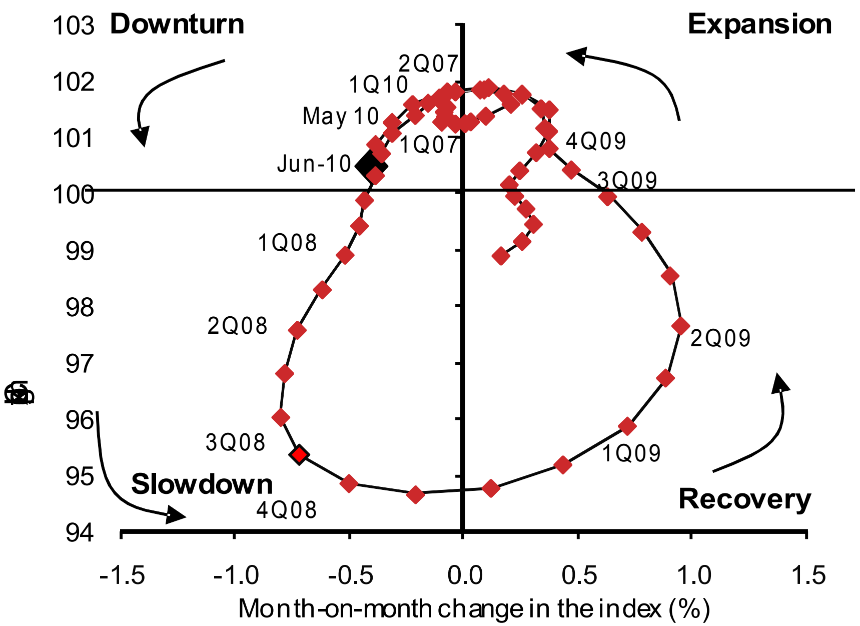
Source: CEIC and Nomura Global Economics.

An alternative measure: the OECD's leading index

Details of the OECD index

- IIP as a reference series
- Components
  - Basic goods IIP
  - Intermediate goods IIP
  - Industrial confidence indicator (% balance)
  - Monetary aggregate M1
  - Share prices: BSE Dollex (2000=100)
  - Average INR/US, inverted
  - Deposit interest rate (lower bound) (% per annum) Inverted
  - Total imports (INR)

Business cycle as per the OECD leading index for India



Source: OECD and Nomura Global Economics.

Issues and future course of action

- Issues
  - While the CLI correctly predicts the turning points, it is difficult to use its current value to estimate the exact point forecast for non-agriculture GDP growth due to the large smoothing involved. Therefore, while the CLI can correctly predict turning points, it can be harder to predict the magnitude of an upturn or downturn
  - It will be beneficial to have a longer lead using the CLI. However, that may mean sacrificing some amount of accuracy.
  - Need to constantly test CLI to make sure components are the right ones
- Future course of action
  - Update to check the most relevant components for the CLI
  - Use GDP as a reference series, instead of non-agriculture GDP
  - Construct separate lead indicators for the industry and the services sectors
  - Shift from quarterly to monthly lead indicators
  - Use non-market variables only in the CLI

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