Has India Emerged? Business Cycle Stylised Facts from a Transitioning Economy

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March 14, 2011

Motivation

- A great deal of modern macroeconomics is rooted in DSGE-style models. A critical building block for this is the stylised empirical facts about the macroeconomy.
- We focus on the fundamental changes in empirical regularities; as an economy transitions from an agricultural, planned and closed set up to one that is industrial, market based and increasingly globalised.

Developed vs emerging economies stylised facts

- A substantial literature exists on stylised facts for developed economies.
- Recently a number of papers have focussed on stylised facts for developing economies.

Developed vs emerging economies stylised facts: Are they different?

	Developed economies			Emerging economies		
	Std dev.	Rel std. dev.	Cont. cor.	Std dev.	Rel. std. dev.	Cont. cor.
Real GDP	1.34	1.00	1.00	2.74	1.00	1.00
Private Consumption		0.94	0.66		1.45	0.72
Investment		3.41	0.67		3.91	0.77
Trade balance		1.02	-0.17		3.22	-0.51

Source: Aguiar and Gopinath, 2007.

Developed vs emerging/LDC business cycles: Main features

Developed economies	Developing economies
Output is less volatile	Output is more volatile.
Consumption is less volatile than output	Consumption is more volatile than output
Investment is volatile	Investment is volatile
Government expenditure is counter-cyclical	No consistent relation
Consumer prices are counter-cyclical	No consistent relation
Investment is procyclical	Investment correlation is weak
Imports are procyclical	Imports correlation is weak
Weakly counter-cyclical net exports	Strongly counter-cyclical net exports

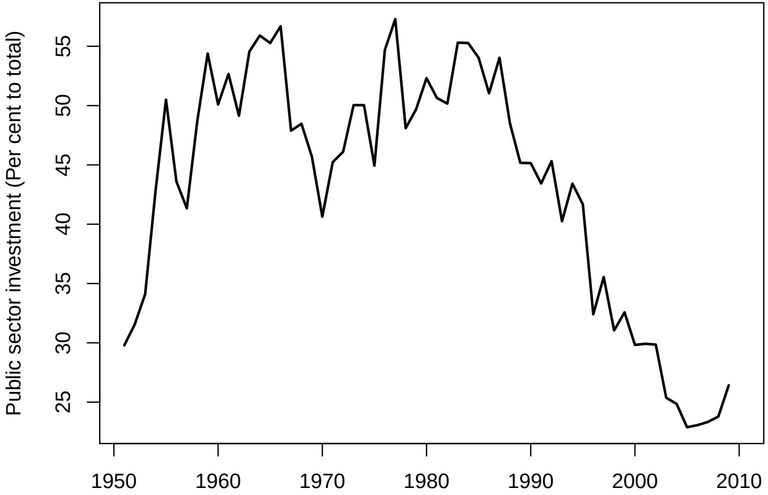
Part I

India's transition

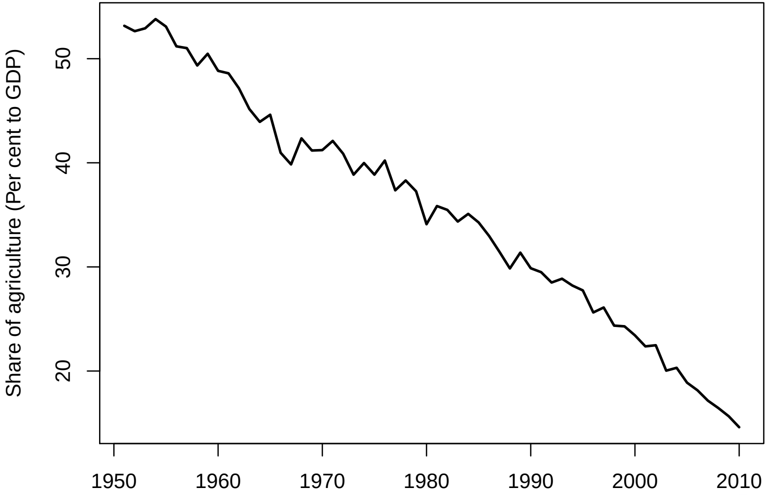
Setting

- India provides an interesting to example to study the changing nature of stylised facts.
- The Indian policy environment changed in 1991.
- The economy changed from a largely planned, agricultural, closed economy to a market determined, industrial and increasingly globalised economy.
- India has gone through three transitions: away from socialism, away from autarky, and away from agriculture.
- So did this generate structural change in the stylised facts?

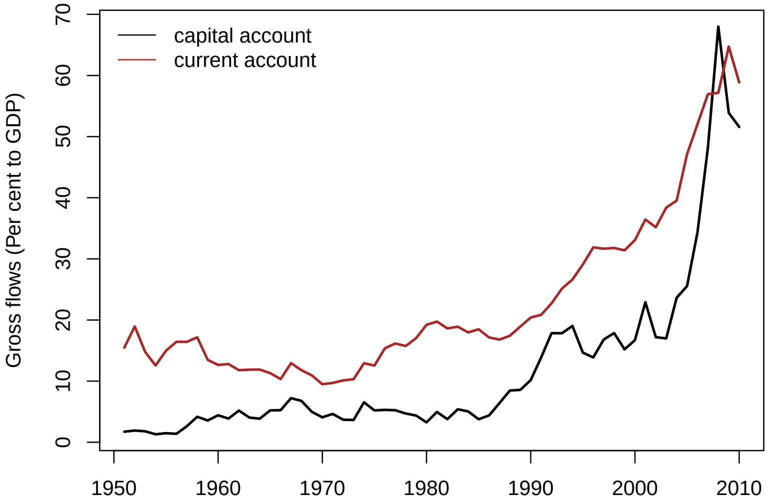
Transition out of socialism



Transition away from agriculture



Transition away from autarky



Part II

Data

The dataset

- The analysis of stylised facts relies on long time series of quarterly data.
- To understand the changing nature of Indian business cycles, we examine annual data.
- We choose real GDP, private consumption and total investment.
- In addition, we examine exports, imports, consumer prices (CPI-IW), government expenditure, net exports and nominal exchange rate.

Part III

Methodology

Growth cycle approach

- The log transformed series is filtered through a filter to extract the cyclical (stationary) and trend (non-stationary) component.
- The cyclical component of the series is used to derive the business cycle characteristics of volatility, persistence and cross-correlation.
- We use the Hodrick-Prescott filter to extract the cyclical component of the series

Part IV

Changes in stylised facts

Annual data analysis

	Pre-reform period 1951-91			Post-reform period 1992-09		
	Std. dev.	Rel. std. dev.	Cont. cor.	Std. dev.	Rel. std. dev.	Cont. cor.
Real GDP	2.13	1.00	1.00	1.78	1.00	1.00
Pvt. Cons.	1.82	0.85	0.69	1.87	1.05	0.89
Investment	5.26	2.46	0.22	5.10	2.85	0.77
CPI	5.69	2.66	0.07	3.49	1.95	0.29
Exports	7.14	3.34	0.07	7.71	4.31	0.33
Imports	11.23	5.26	-0.19	9.61	5.38	0.70
Govt expenditure	6.88	3.22	-0.35	4.60	2.58	-0.26
Net exports	0.9	0.4	0.24	1.1	0.65	-0.69
Nominal exchange rate	6.74	3.15	0.10	5.35	3.00	-0.48

Testing the statistical significance of difference in correlation

Variables (X&Y)	Difference in correlation (z)	P-value
Investment and ouput	-2.61	0.0089
Imports and output	-3.49	0.0004
Nominal exchange rate	2.08	0.037
Net exports	3.63	0.000278

The story of India's transition

Pre-reform period

Output is more volatile
Investment is weakly correlated with output
Imports are acyclical
Net exports are acyclical
Nominal exchange rate is acyclical

Post-reform period

Output becomes less volatile
Investment is strongly correlated with output
Imports become pro-cyclical
Net exports become counter-cyclical
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The story of India's transition

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But still retains some features of an emerging economy

- Consumption is more volatile than output.
- Government expenditure is not strongly counter-cyclical.

Is this result mere statistical noise?

	First period 1951-1991			Second period 1992-2009		
	Std. dev.	Rel. std. dev.	Cont. cor.	Std. dev.	Rel. std. dev.	Cont. cor.
Real GDP	2.16	1.00	1.00	2.05	1.00	1.00
Private Consumption	1.83	0.84	0.87	1.84	0.89	0.89
Investment	8.07	3.72	0.85	8.37	4.07	0.84
Imports	6.14	2.83	0.69	6.19	3.01	0.76

Table: Business cycle statistics for US

The difference in correlation is insignificant at -0.70 for investment and 0.20 for imports.

Sensitivity tests

- Quarterly data analysis
- Choice of de-trending procedure

Conclusion

- The business cycle stylised facts have moved closer to those of advanced economies.
- In some key aspects, we resemble developing economies business cycle features.

Implications

- First step towards construction and validation of modern business cycle models.
- While the features of the Indian business cycle are moving closer to those of advanced economies, it still retains some features of developing economies.
- The business cycle modelling framework should take into account these features of an economy in transition.
- Has implication not just for India, but for any economy that undergoes transitions.
- To effectively incorporate the features of the economy, recent data should be taken.
- Some existing research has used the longest available span of data. This is inappropriate.

Thank you