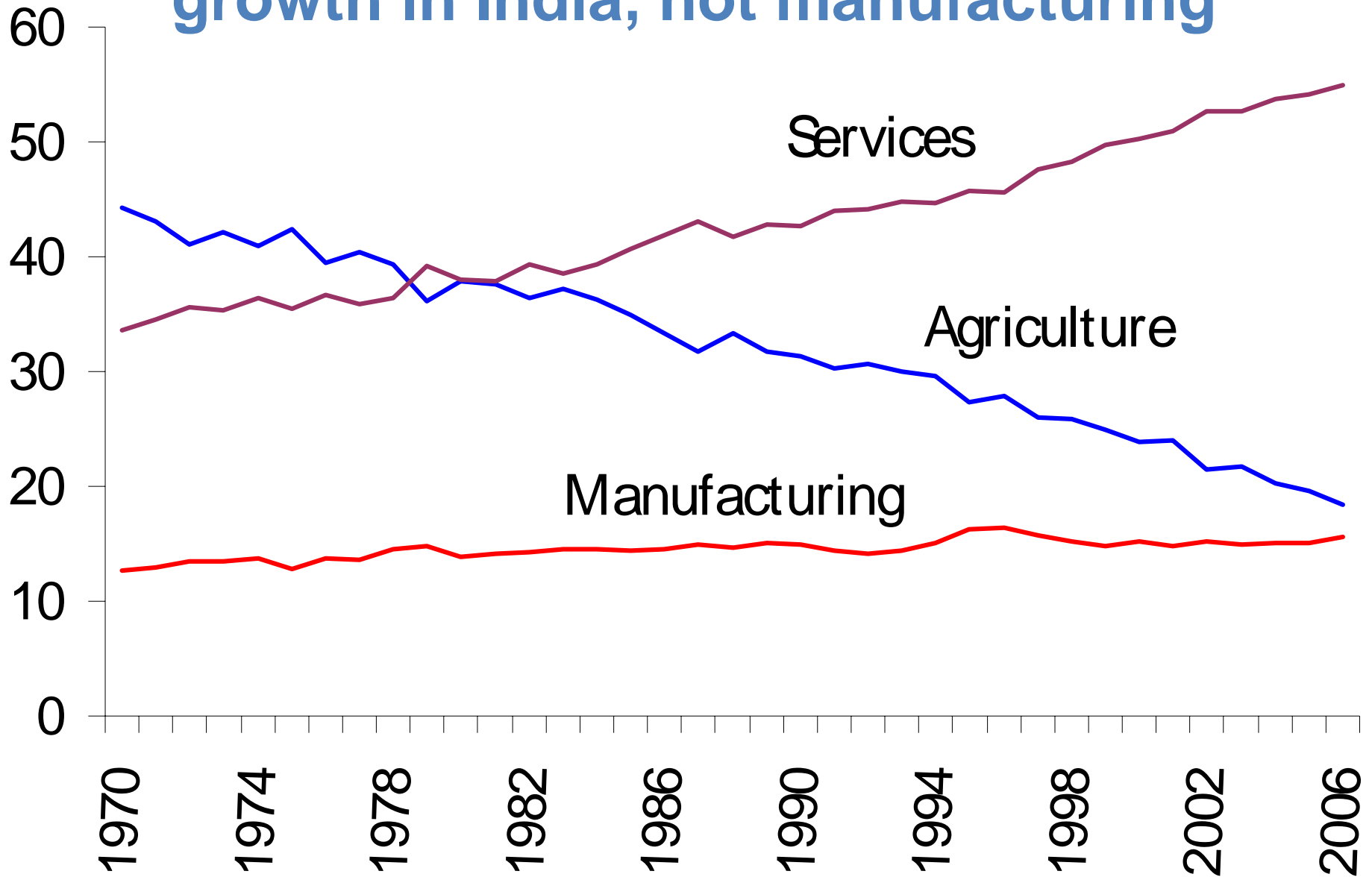


# **What Constrains Indian Manufacturing?**

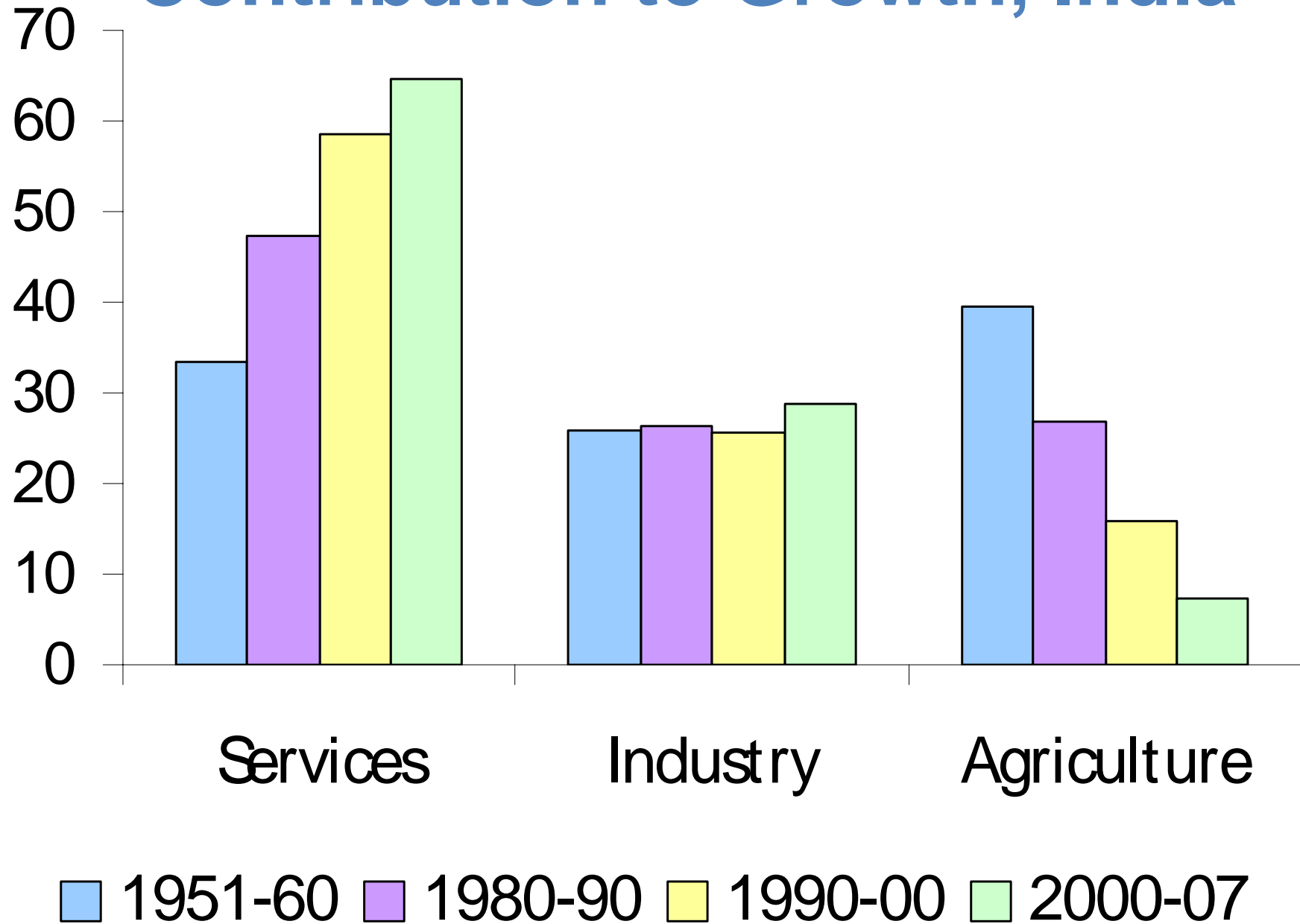
Poonam Gupta, Rana Hasan and Utsav Kumar

Conference on  
India and China's Role in International  
Trade and Finance and Global Economic  
Governance  
December 07, 2007

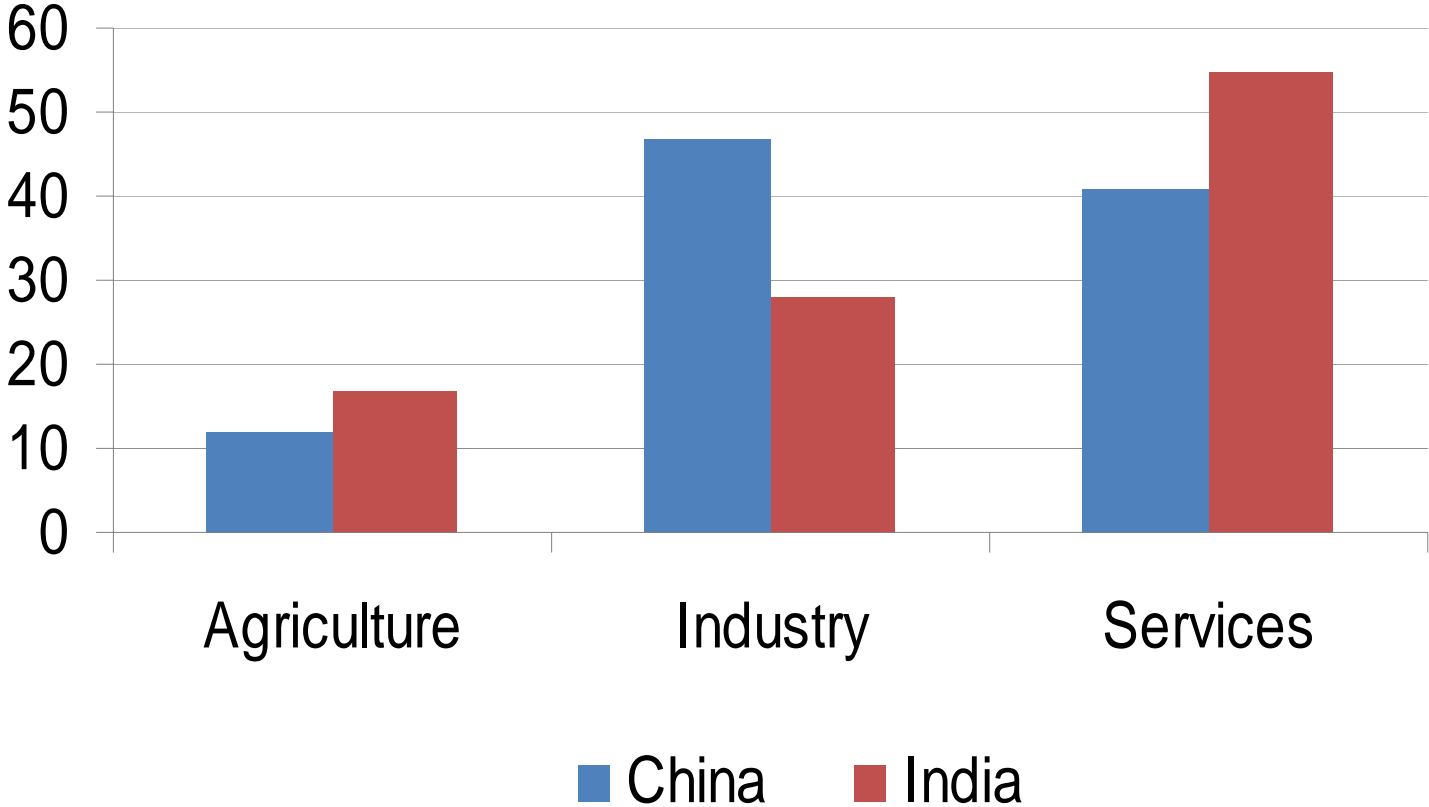
# Services has been the main engine of growth in India, not manufacturing



# Contribution to Growth, India

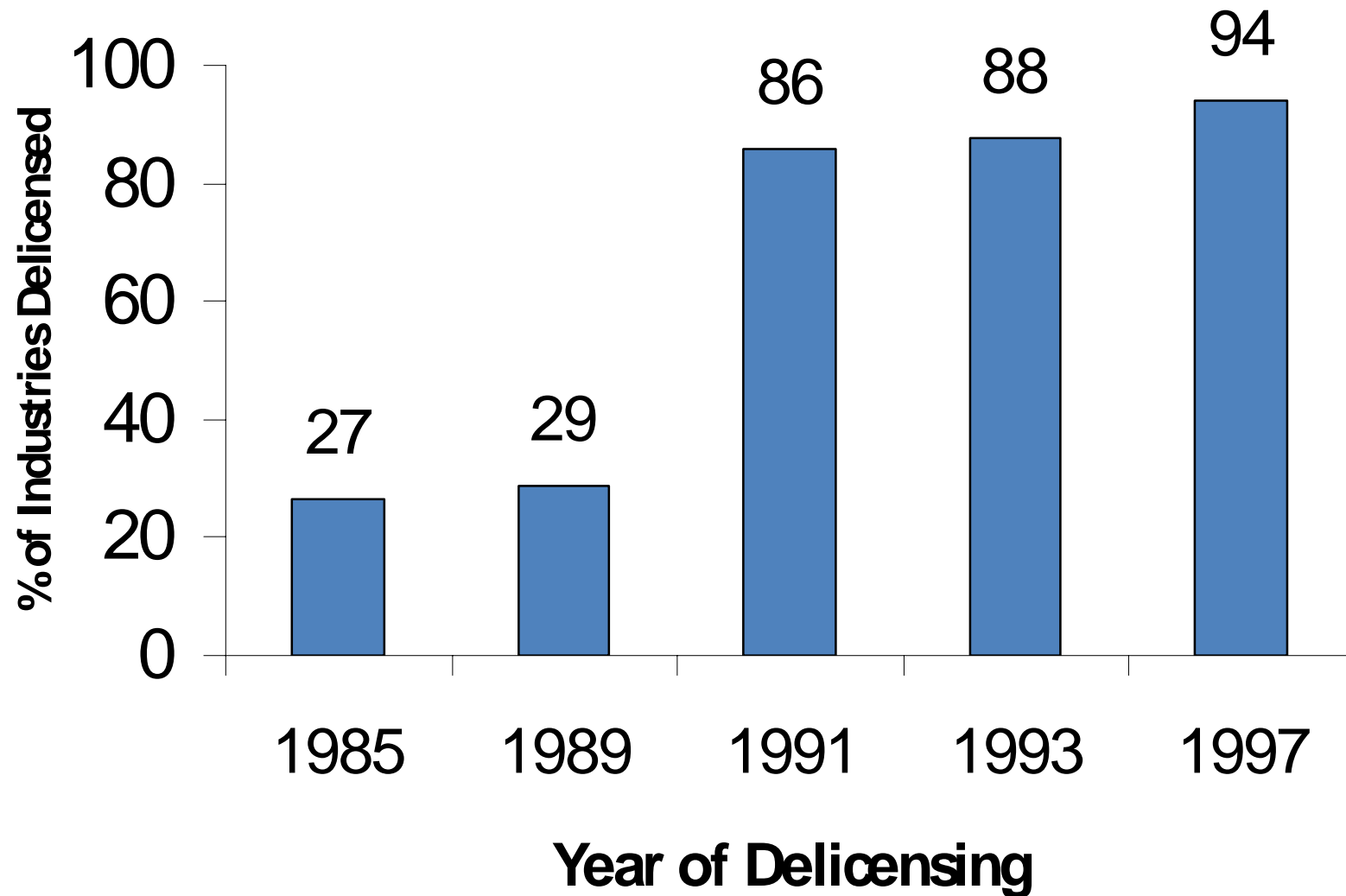


**Sectoral shares in GDP, 2006**

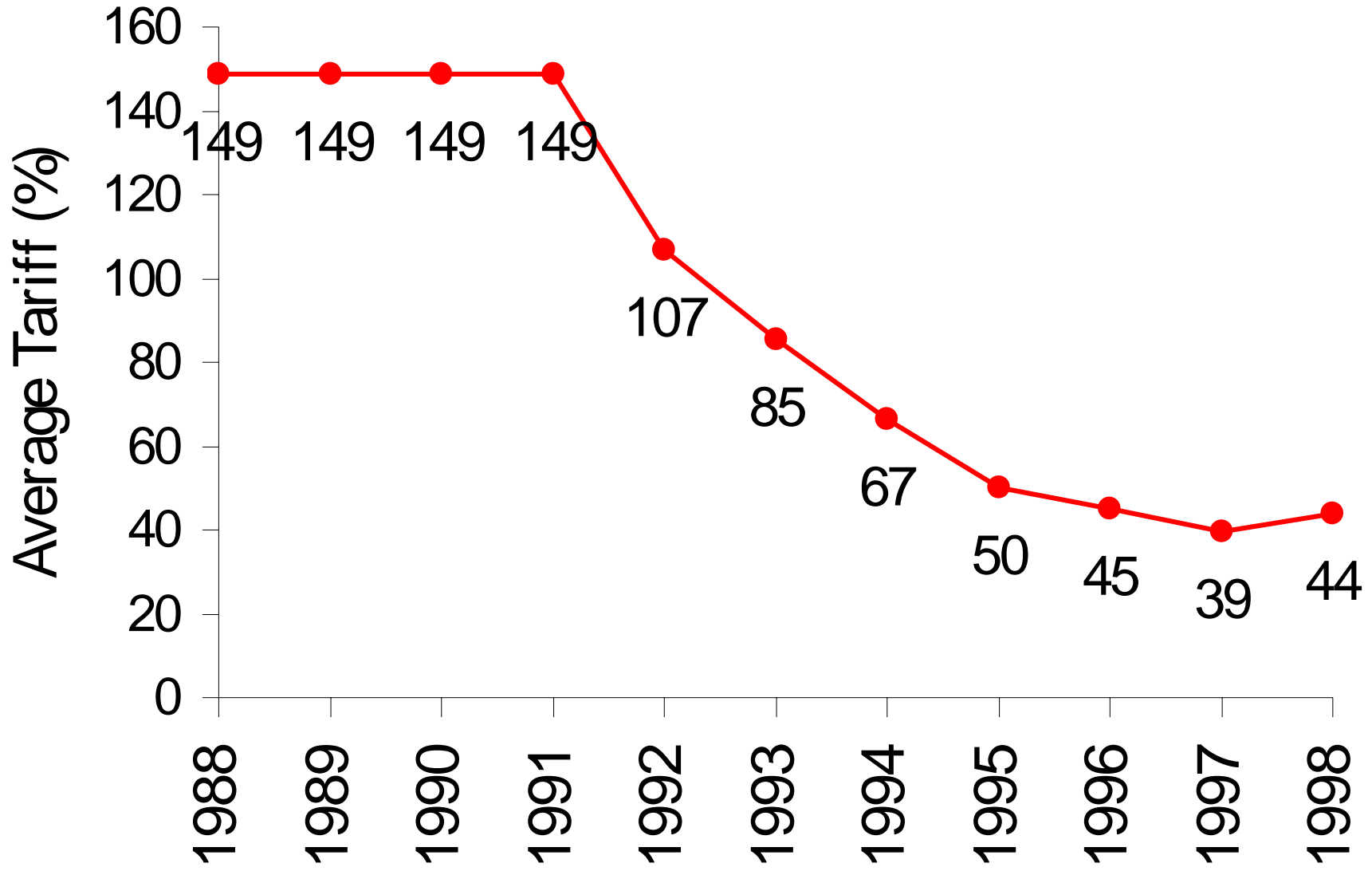


Surprising, because substantial Reforms in Indian Manufacturing.

E.g. Delicensing....



# .....and Trade Reforms



# Performance of Indian Manufacturing Post Reforms

**Table 1: Pre and Post Reforms Performance of Indian Manufacturing**

	(1)	(2)	(3)	(4)
	Real Value Added	Capital Stock	Number of Factories	Total Employment
trend	.0586***	.0628***	.0247***	.0113***
	[21.30]	[22.45]	[6.96]	[4.37]
Dummy for	0.15***	0.19***	-0.05	0.03
Post 1992	[3.03]	[3.72]	[1.09]	[0.89]
Observations	31	31	31	31
R-squared	0.98	0.99	0.87	0.77

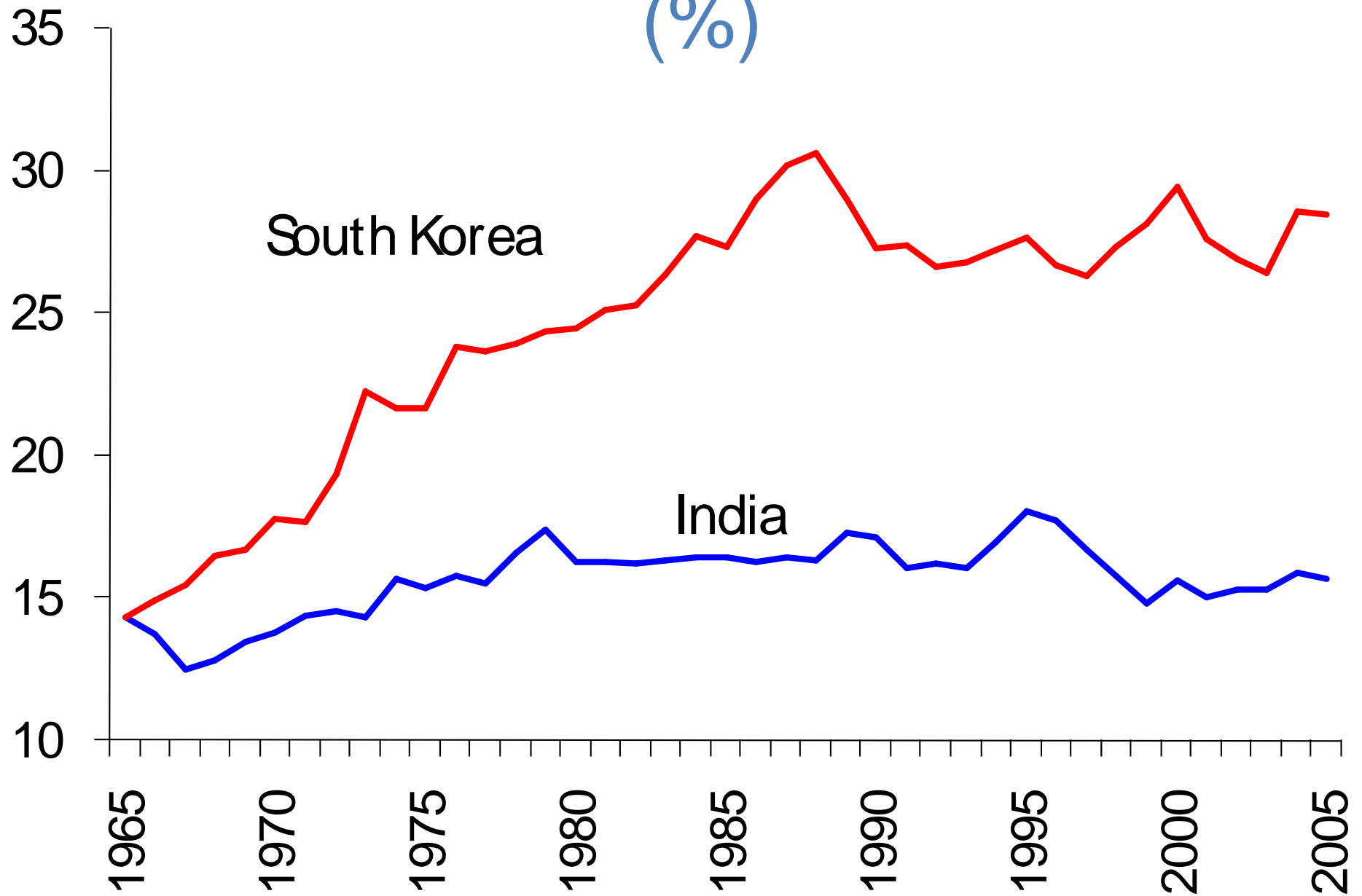
# Have these Payoffs been too Low?

Seem low when

- compared with Manufacturing growth in other countries—Korea, China
- Compared with the growth of services in India



# Share of Manufacturing in GDP (%)



# Major Factors Constraining Growth in Manufacturing—Survey Data

- Infrastructure
- Financing constraints
- Labor regulations (Surprisingly not found to be as important in the surveys!)
- Availability and quality of labor
- Business environment
- Corruption

# What do we do?

- We want to look at how important are these factors in constraining growth.
- To the extent that some of these factors are expected to affect industries differently we can use this variation to see whether industries dependent on
  - Infrastructure
  - Financial sector
  - Labor intensive industriesHave performed differently post delicensing, as compared to the control group.

# Defining Industry Characteristics

- ***Labor Intensity***: ratio of total employment to capital stock.
- ***Dependence on External Finance***: ratio of outstanding loans to invested capital.
- ***Infrastructure Dependence of Industries***: ratio of expenses on distribution (i.e., storage and transportation) and power and fuel to gross value added

# Preliminary Results

	Infrastructure dependent		Dependent on External Finance		Labor Intensive	
	Above Median	Below Median	Above Median	Below Median	Above Median	Below Median
Delicensing	-0.15*** [3.12]	0.33*** [4.46]	0.08 [1.31]	0.18*** [2.64]	-0.01 [0.22]	0.24*** [3.19]
Observations	682	679	682	679	682	679
Number of Industries	22	22	22	22	22	22
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.77	0.66	0.71	0.70	0.69	0.72

# Methodology

$$Y_{it} = \sum \alpha_i d_i + \sum \beta_t d_t + \gamma (\text{delicensing dummy}_{it}) + \delta (\text{characteristic of industry } i * \text{delicensing dummy}_{it}) + \varepsilon_{it}$$

We estimate these regressions for dependent variables log value added, and no of factories.

A slightly different specification for employment and capital stock.

# Interpretation of the Interaction Term

	Outcome Variable in Pre Reform period	Outcome variable in Post Reform period
For More Labor Intensive (treatment group)	$\Theta_{L,Pre}$	$\Theta_{L,Post}$
For Less Labor Intensive (control group)	$\Theta_{C,Pre}$	$\Theta_{C,Post}$

And test the hypothesis that:  $(\Theta_{L,Post} - \Theta_{L,Pre}) - (\Theta_{C,Post} - \Theta_{C,Pre})$  is significantly different from zero.

**Table 3: Value Added Post Delicensing**

	1	2	3	4	5	6
delicensing	0.12** [2.50]	0.18*** [3.10]	0.26*** [3.31]	0.53*** [4.65]	0.93*** [7.35]	0.36*** [5.61]
Infrastructure Dep* delicensing		-0.17** [2.42]			-0.18*** [2.59]	
Labor Intensity* delicensing			-0.30** [2.02]		-0.51*** [3.55]	
External Finance Dep* delicensing				-0.93*** [4.01]	-1.22*** [5.49]	
Infrastructure Dummy* delicensing						-0.10* [1.88]
Labor Intensity Dummy* delicensing						-0.19*** [4.07]
External Finance Dummy* delicensing						-0.18*** [3.40]



## Quantitatively:

In post delicensing period

- Industries at 75th percentile of infrastructure dependence grew 6 percent less than the industries at the 25th percentile.
- Industries at 75th percentile of financial dependence grew 13 percent less than the industries at the 25th percentile.
- Industries at 75th percentile of labor intensity grew 12 percent less than the industries at 25th percentile.

# Results....

- Post delicensing industries dependent on infrastructure, dependent on the financial sector and the labor intensive industries have grown less. Points to the fact that infrastructure, financial sector imperfections are emerging as bottlenecks on growth.
- Results on labor intensive industries also imply that they are facing bottlenecks: these could be due to labor market regulations; quality of labor or hysteresis (Kochhar et al).

# Results....

- Factories: Results are similar to value added for financial dependent and labor intensive industries. We see fewer new factories opening post delicensing in these industries.

# Results....

- Employment: employment elasticity of growth differs across industries.
- It is lower for infrastructure dependent and financial dependent industries and higher for labor intensive industries.
- No change post delicensing.

# Results....

- Investment elasticity of growth is higher than the employment elasticity.
- Thus the production techniques overtime are becoming more capital intensive!
- It is higher for infrastructure dependent and financial dependent industries and lower for labor intensive industries.
- Investment elasticity has increased in labor intensive industries!

# Robustness Tests

- Potential Outliers
- Autocorrelation in error terms
- Omitted industry characteristics
- Omitted Policy variables

# Caveats

- Causality—can we imply causality?
- Especially interpreting the results for labor intensive industries...

## What more can we do to establish causality?

If Indian states give adequate variation in

- Infrastructure quality
- Quality of financial sector
- Nature of labor regulations

Then we can address the causality issue even more strongly, by comparing the post delicensing performance of infrastructure dependent industries in states with better infrastructure with that of the control group.



Thank You!