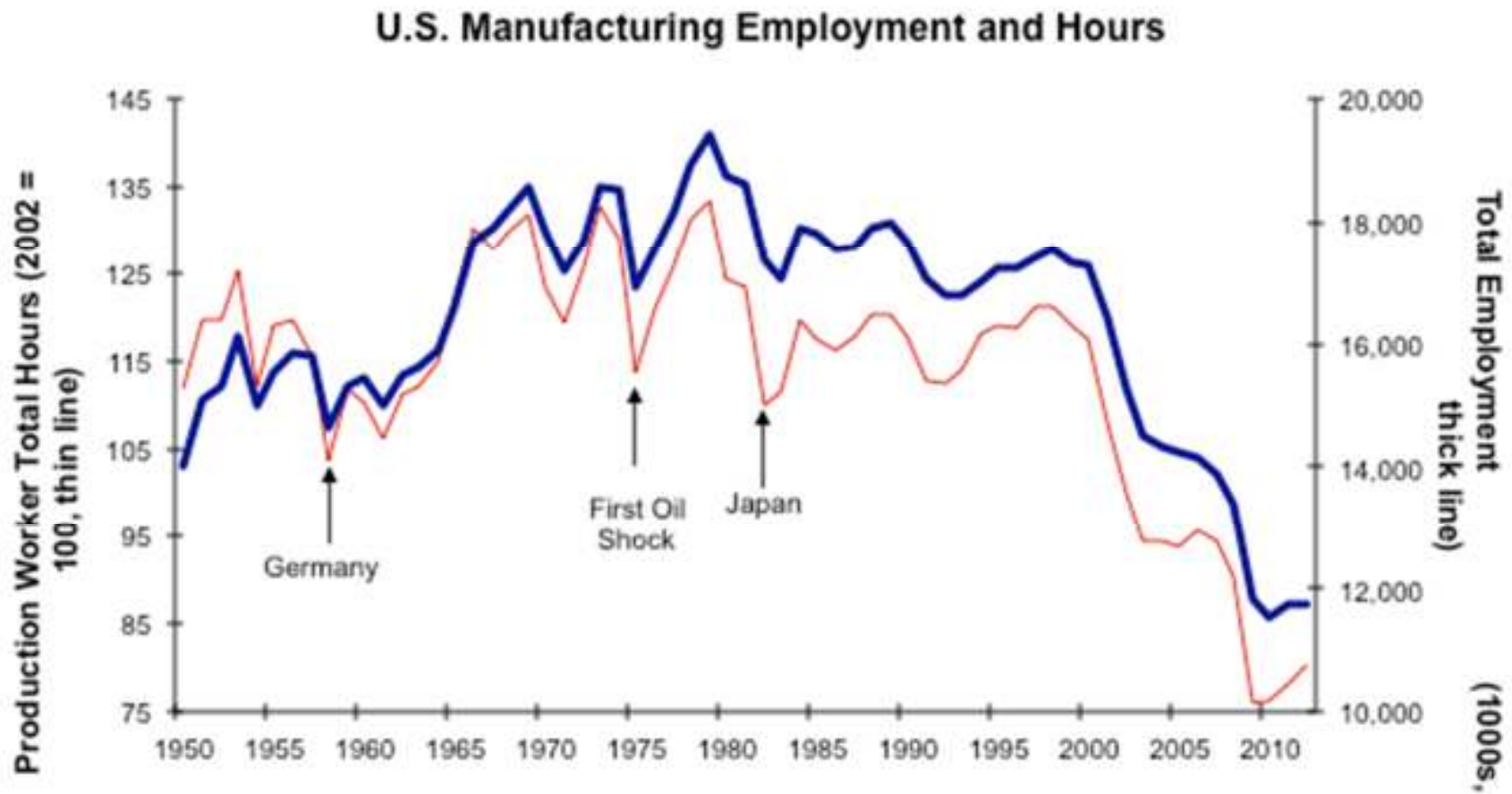


# Roundtable on Education and Human Capital Requirements – McGraw-Hill Research Foundation



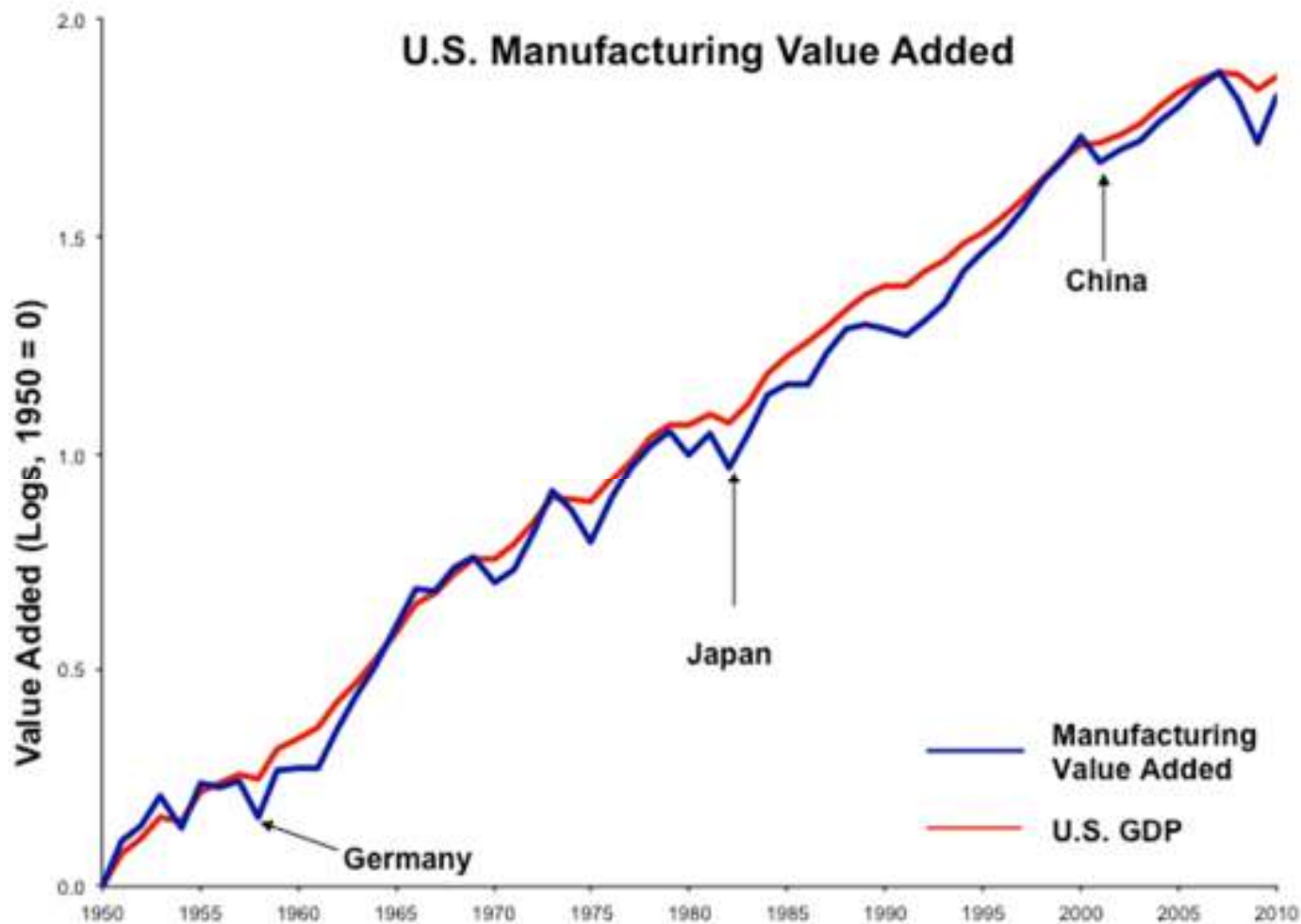
**Daniel Trefler**  
Rotman School of Management and CIFAR  
February 24, 2012

# *The Decline of Manufacturing*



### 3. The Decline of Manufacturing

$$(\text{Real VA}^{\text{Manuf}})/(\text{Real GDP}) = (\text{VA}^{\text{Manuf}}/\text{GDP}) \times (\text{P}/\text{P}^{\text{manuf}})$$



# *The Resilience of Manufacturing*



## Growing Industries had More Value Added and Creativity-oriented Jobs

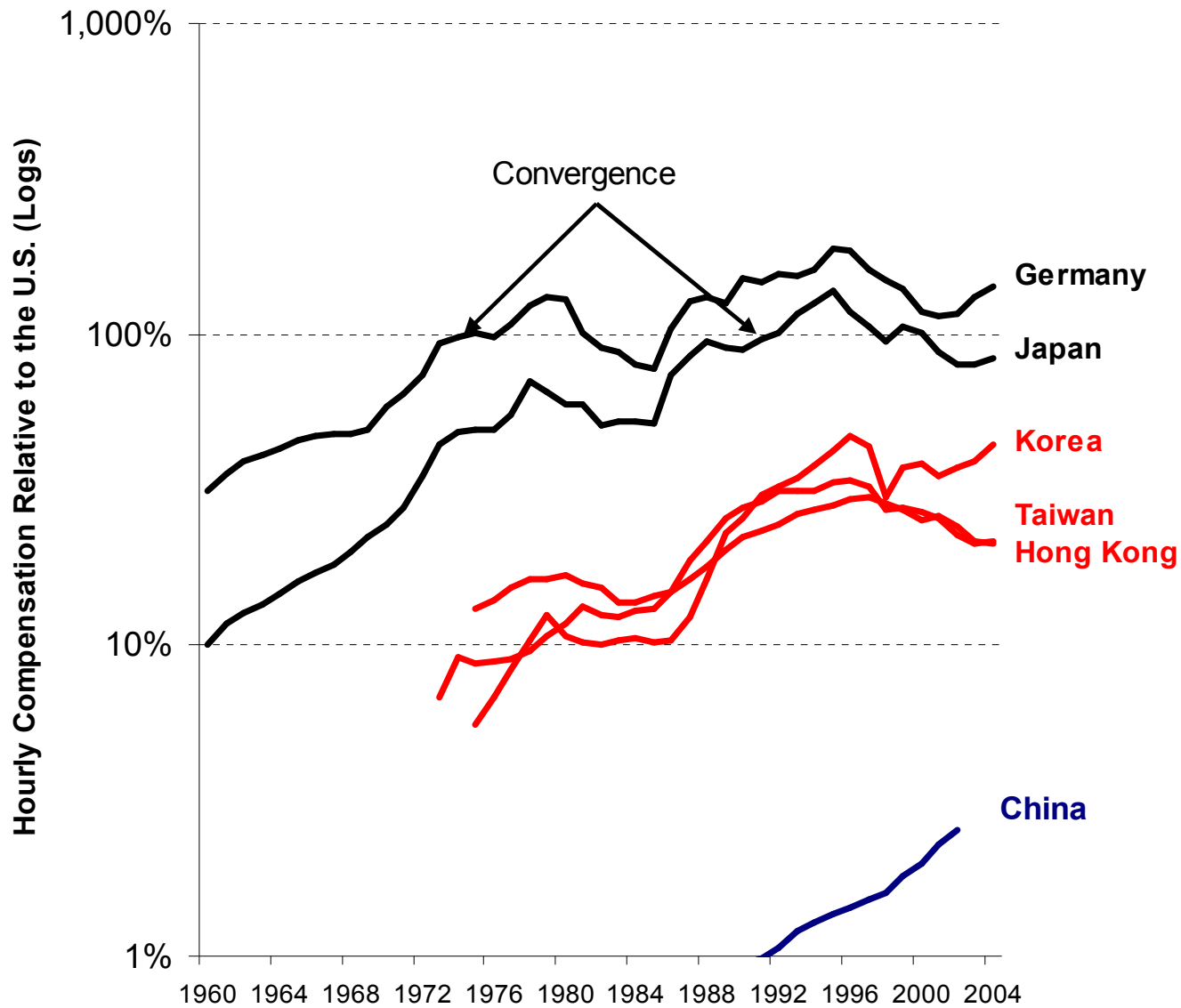
NAICS4	Share of net change in jobs (2002-2008)	Value added per employee, weighted by employment change	Occupational mix, 2002
<b>Manufacturing industries losing jobs</b>			<b>Mix of jobs</b>
Cut and Sew Clothing	-13%	<b>\$88,400</b>	<b>Creativity-oriented</b> 16%  <b>Routine-oriented, physical</b> 68%  <b>Routine-oriented, service</b> 16%
Sawmills and Wood Preservation	-8		
Motor Vehicle Parts	-7		
Pulp, Paper and Paperboard Mills	-6		
Household and Institutional Furniture and Kitchen Cabinets	-5		
Rubber Products	-4		
Motor Vehicles	-4		
Semiconductor and Other Electronic Components	-4		
Printing and Related Support Activities	-4		
Clothing Knitting Mills	-3		
Foundries	-3		
Iron and Steel Mills and Ferro-Alloys	-3		
Other 56 industries	-50		
<b>Manufacturing industries gaining jobs</b>			<b>Mix of jobs</b>
Agricultural, Construction and Mining Machinery	2	<b>\$110,000</b>	<b>Creativity-oriented</b> 25%  <b>Routine-oriented, physical</b> 53%  <b>Routine-oriented, service</b> 22%
Other Foods	2		
Architectural and Structural Metals	2		
Pharmaceuticals and Medicines	1		
Cement and Concrete Products	1		
Other General-Purpose Machinery	1		
Petroleum and Coal Products	1		
Medical Equipment and Supplies	1		
Other 10 industries	3		
<b>Total manufacturing jobs lost</b>			

# The Dragon Myth

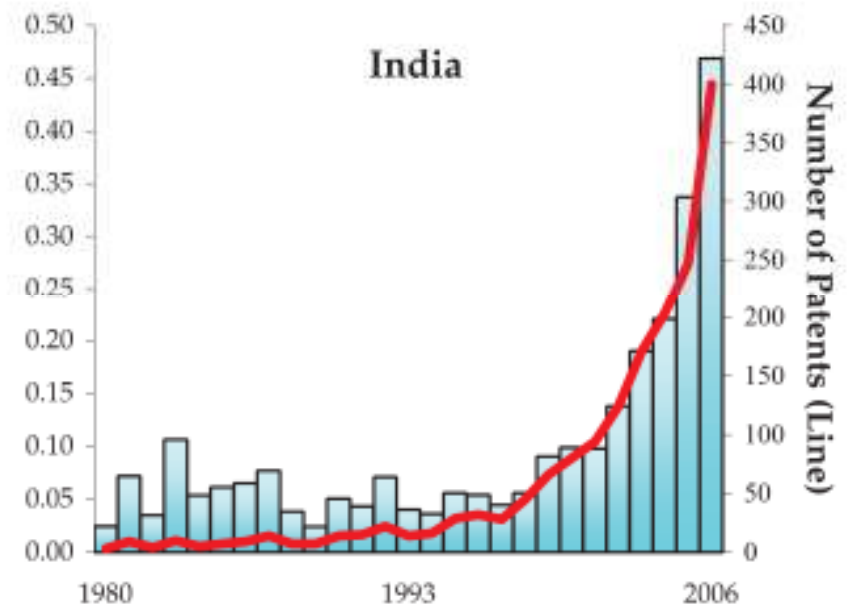
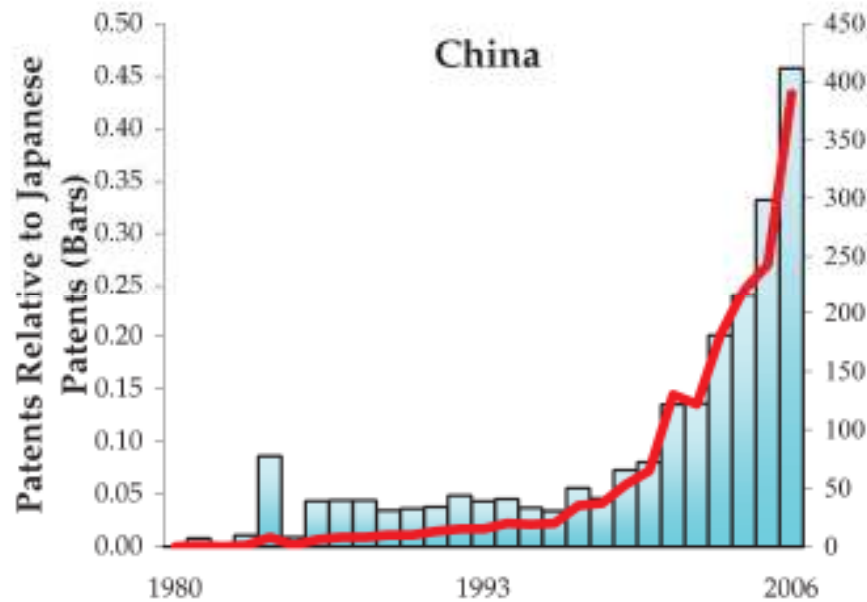
## Each Sector's Contribution to Real GDP

<b>Service</b>	<b>70.4%</b>
Real Estate and Rental and Leasing	12.9%
Finance and Insurance	6.5%
Retail Trade	6.1%
Wholesale Trade	5.7%
Public Administration	5.7%
<b>Goods Producing: Non-Manufacturing</b>	<b>15.3%</b>
Construction	6.1%
Mining and Oil and Gas Extraction	4.5%
Utilities	2.5%
Agriculture, Forestry, Fishing and Hunting	2.1%
<b>Goods Producing: Manufacturing</b>	<b>14.3%</b>
Transportation Equipment Manufacturing	2.5%
Food Manufacturing	1.6%
Chemical Manufacturing	1.3%
Machinery Manufacturing	1.1%
Paper Manufacturing	0.8%
<b>Top 5 Imports From China (61% of Total China Imports to Canada)</b>	<b>2.5% of Canada's GDP</b>
Computer and Electronic Product Manufacturing	0.6%
Miscellaneous Manufacturing	0.4%
Clothing Manufacturing	0.1%
Electrical Equipment, Appliance and Component Manufacturing	0.3%
Machinery Manufacturing	1.1%

# The Comparative Advantage Police?



# The Innovation Tipping Point

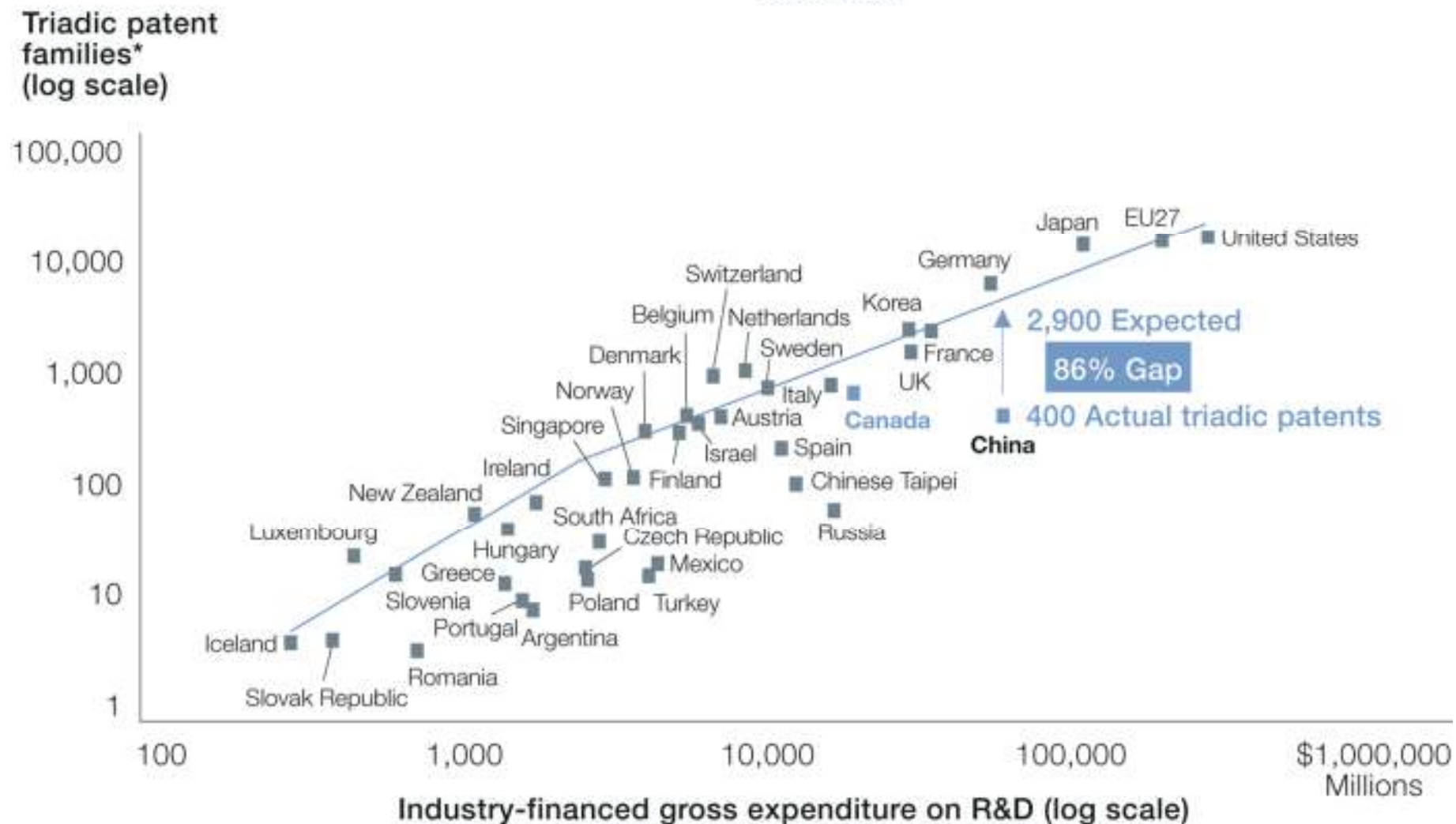


Source: Puga and Trefler, JDE, 2010



# With China's R&D Expenditures, Patents are Below Expectations

Industry-financed R&D and patent output, 2003-2007



# *China is not yet at the Innovation Tipping Point*

## Low-cost competition

- Gains advantage from low cost resources and labour
- Focuses on achieving greater volumes and low prices
- Imports or copies technology
- Follows trends

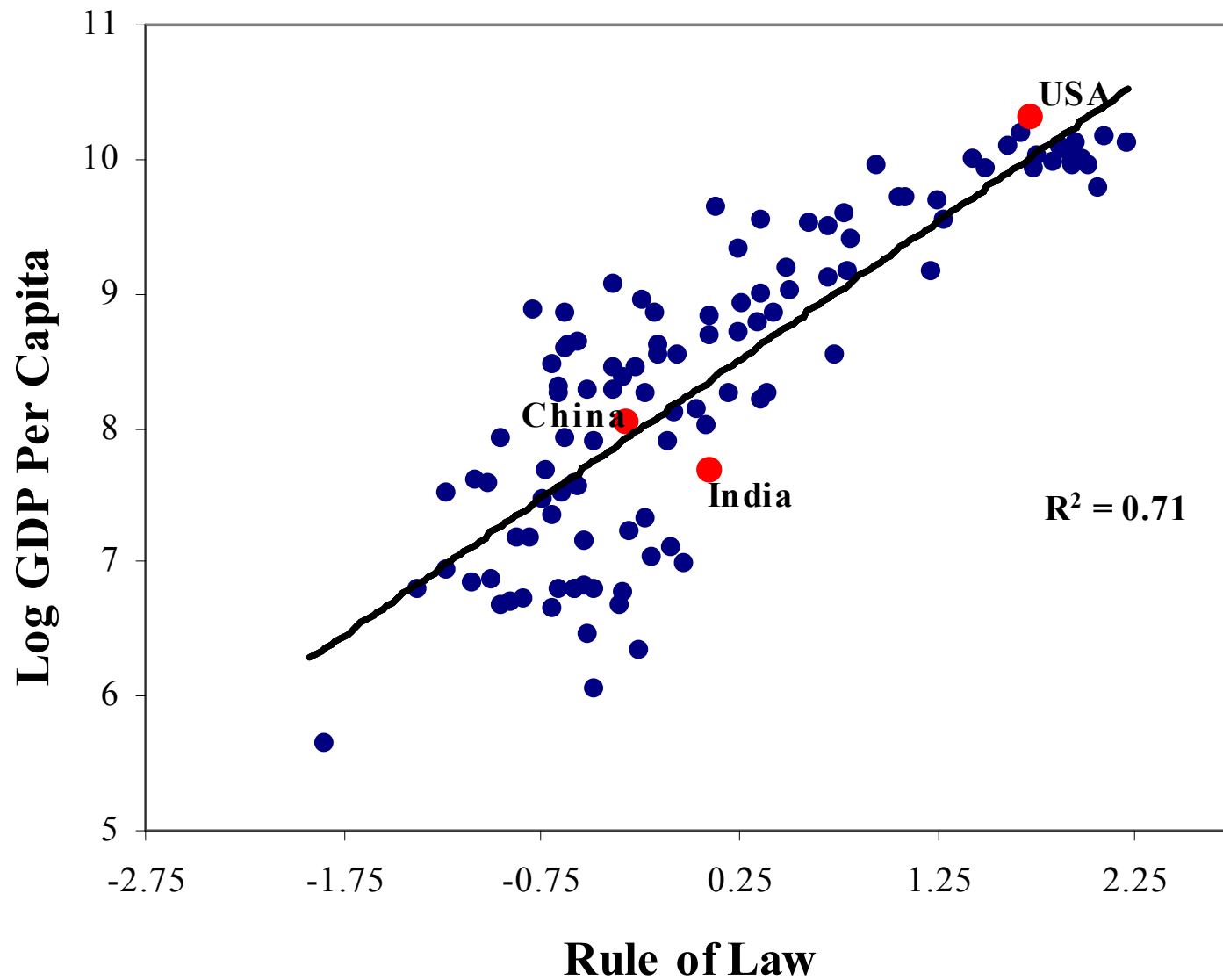
## Innovation-based competition

- Gains advantage from creating a unique market position
- Focuses on new products and processes
- Develops world-class technology
- Sets trends



**TIPPING POINT**

# *Institutions Matter*



# Outsource your personal life



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## *Offshore Outsourcing in Services*

- Services trade revolution driven by ICT and China/India.**
- Educated U.S. workers are competing with workers from low-wage countries.**
- Blinder and many others have found ways of linking occupation data with service trade data: about 20% of workers are in occupations associated with tradeable services.**
- What has this done to wages, employment and occupational switching?**
- Is services different from manufacturing? Yes: educated workers are less likely to become and stay unemployed, and less likely to be earning 'good-job' rents.**

- ❑ **Liu and Trefler, “A Sorted Tale of Globalization: White Collar Jobs and the Rise of Service Offshoring”.**
  
- ❑ **Look at U.S. imports of services from China and India during 1996-2007.**
  
- ❑ **Relate these to occupations:**
  - **financial analyst -> financial service imports**
  - **computer support specialist -> computer and information service imports.**
  
- ❑ **Link to matched CPS data in order to track workers for a year.**

- Rank occupations by average wage after controlling for worker characteristics such as education e.g., doctors earn more than plumbers because of education.
- For each worker who switches occupations, did the worker move to a lower- or high-paying occupation.

## 1997-2007 growth of service imports from China and India:

### 1. Occupational switching:

- Downward switching **rose by 17%.**
- Upward switching **rose by 4%.**
- David's cohorts: same if you track individuals

### 2. Transitions to unemployment: **Up 0.9 percentage points.**

### 3. Earnings changes:

- Occupational stayers: **Down 2.3%**
- Downward switchers: **Down 13.9% or 0%**
- Upward switchers: **Up 12.1% or 0%.**



- ❑ Is more STEM the answer to prosperity?
  
- ❑ Emphasize *process* of thinking.
  - Bernard's WATSON
  - Mihnea Moldevano
  
- ❑ Integrative thinking:
  - Cox: All models are wrong.
  - Leamer: Models are not right or wrong, they are useful.
  - **Roger Martin**: Conflicting models are an opportunity for a rethink, for finding a third possibility.
  
- ❑ Example for Bernard: Lenovo (hardware, costs) vs. IBM (software, margins).

# *In addition to STEM --- Integrative Thinking*

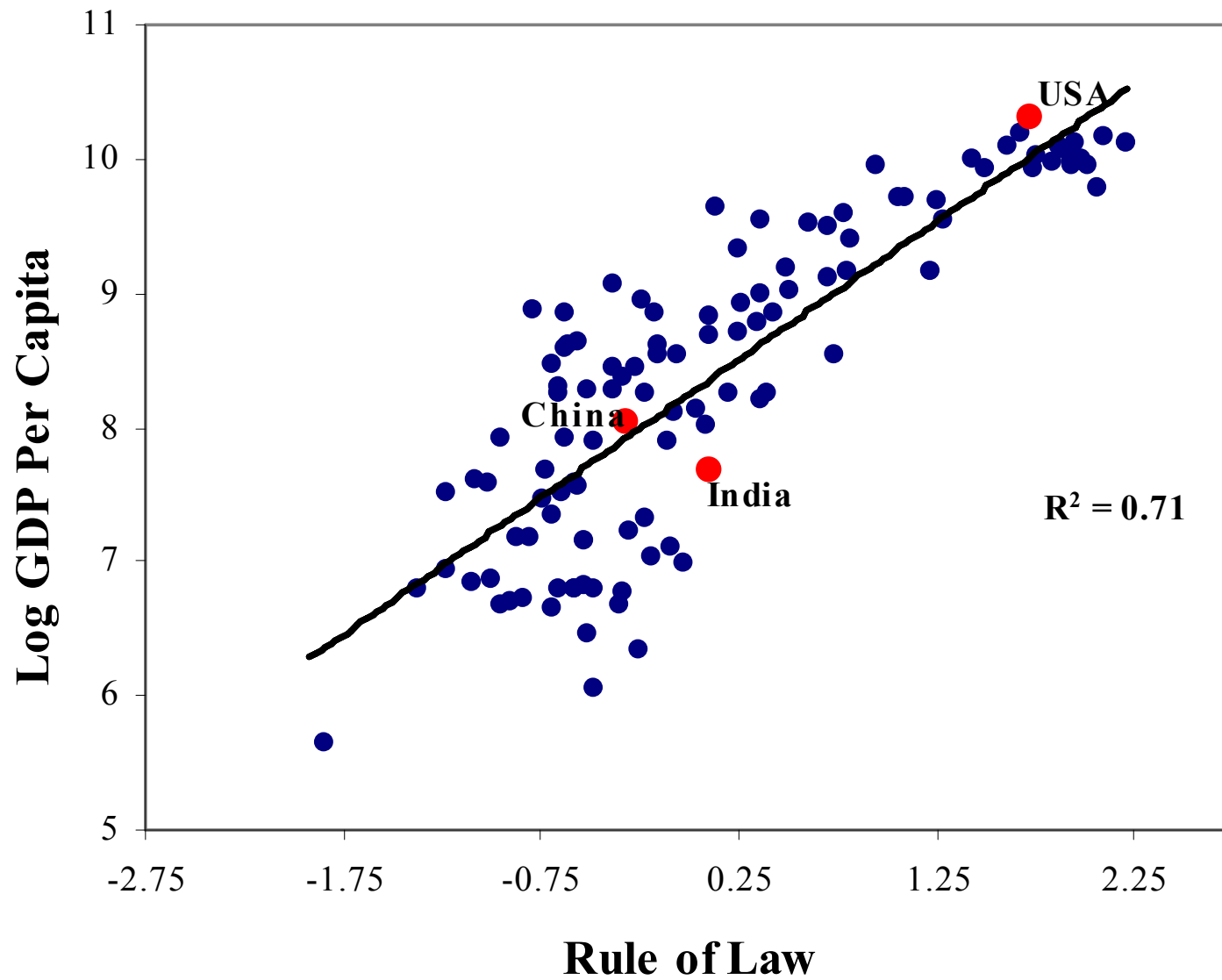
## **Four Components:**

### **1. Saliency:**

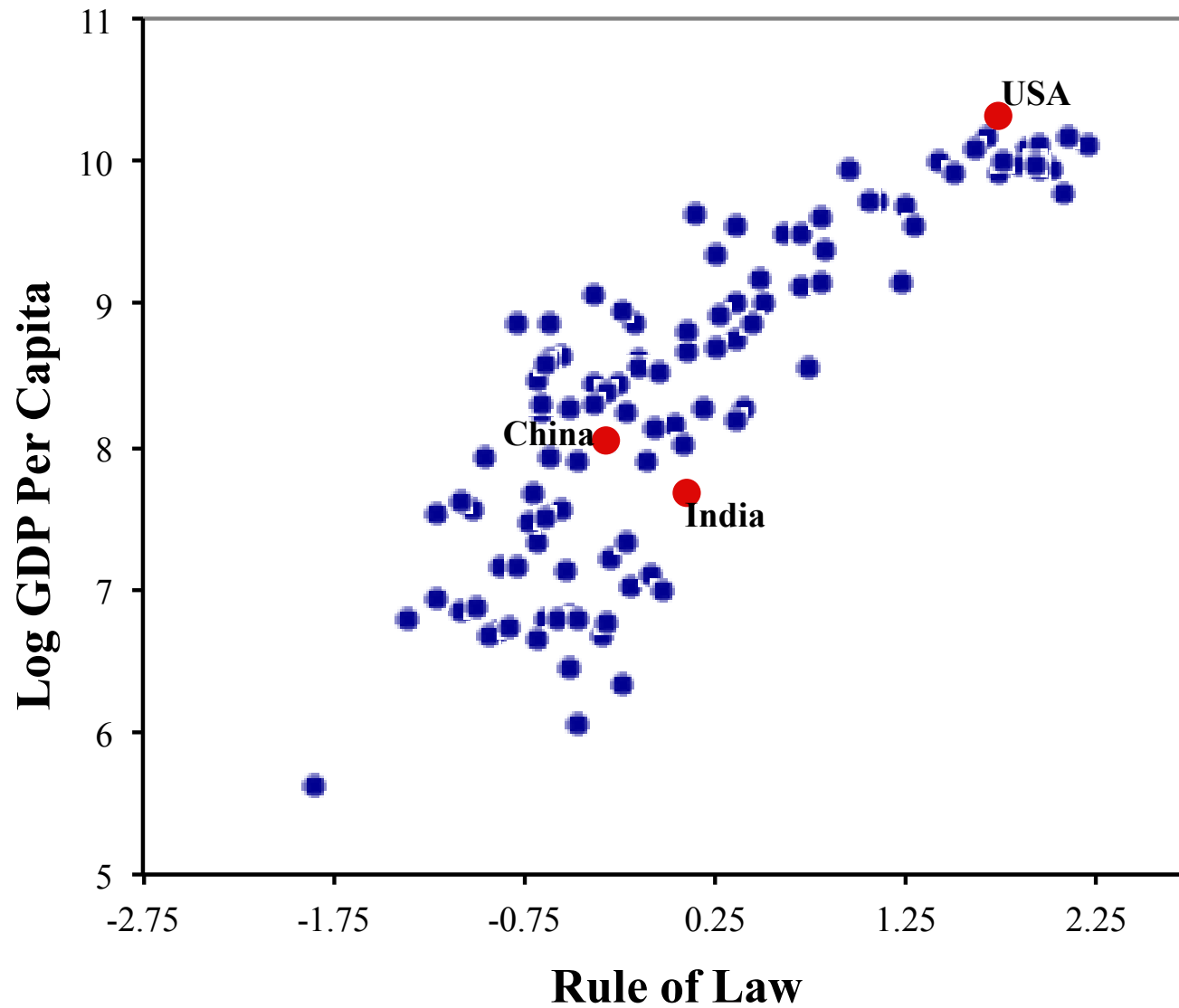
### **2. Causality:**

- **Models are wrong and the real world is complex – that's OK.**
- **In STEM: work toward a correct answer, saliency is pre-defined, there are no trade-offs.**

# *Institutions Matter*



# *Institutions Matter*



- Near frontier in some tasks: need advanced incentives OR women.
- Far from frontier in some tasks, need coercive institutions there

# *In addition to STEM --- Integrative Thinking*

## **Four Components:**

### **1. Saliency:**

### **2. Causality:**

- Models are wrong and the real world is complex – that’s OK.
- In STEM: work toward a correct answer, saliency is pre-defined, there are no trade-offs.

### **3. Decision Making:**

- All the pieces must be considered at once.
- E.g., STEM + Entrepreneurship + Innovation + Polarization + (Can everyone learn – ECE) + Government Deficit + Outsourcing.
- Good decisions are not the hard ones, they are the ones that create a new option.

### **1. Achieving a resolution:**

- Put new ideas on the table, choices are not either-or.
- E.g., “Pick a big problem in your life”

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