Impact of China's Industrial Relocation on Energy Consumption

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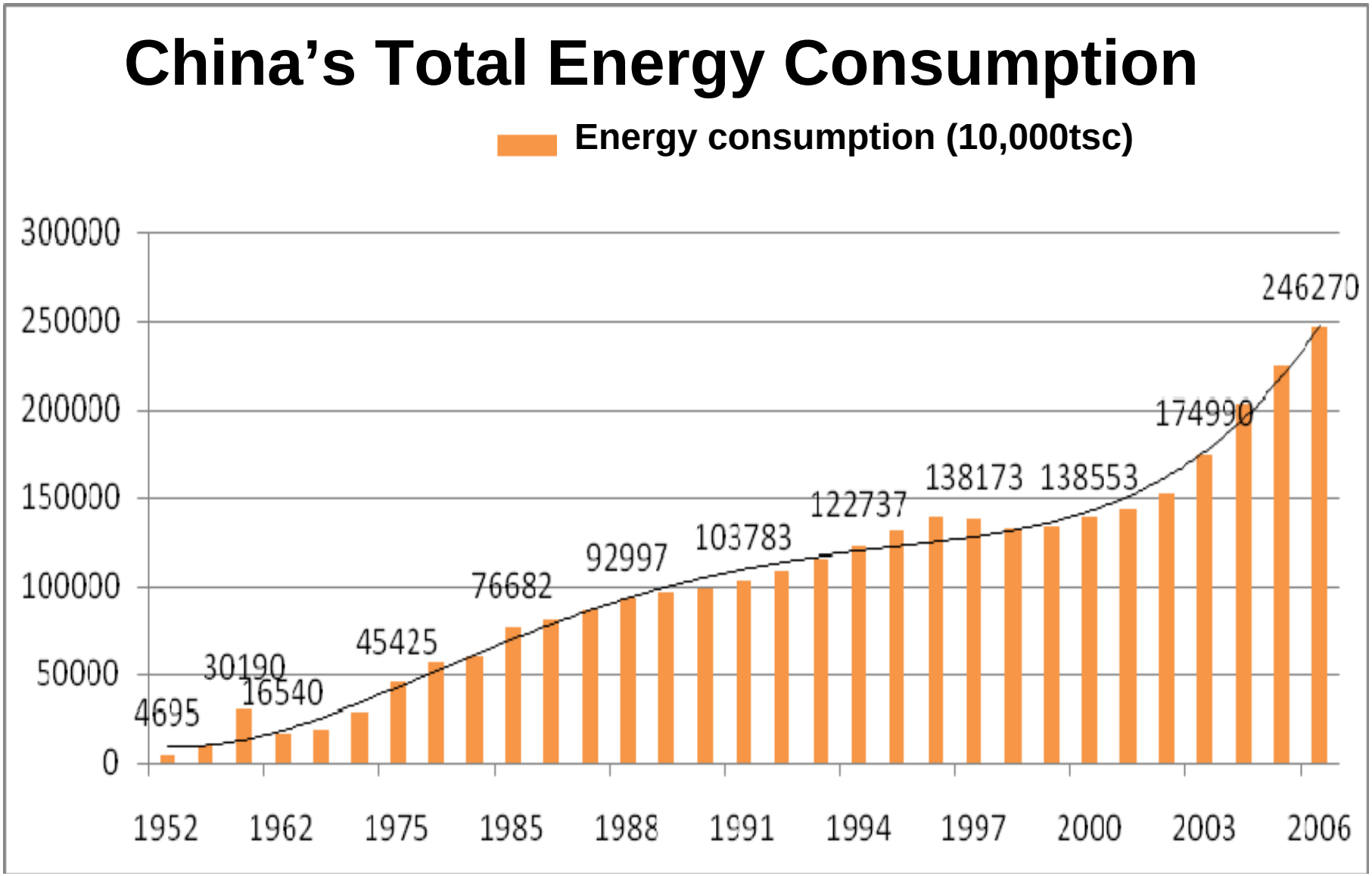
China's Total Energy Consumption



Sources: China Statistical Yearbook

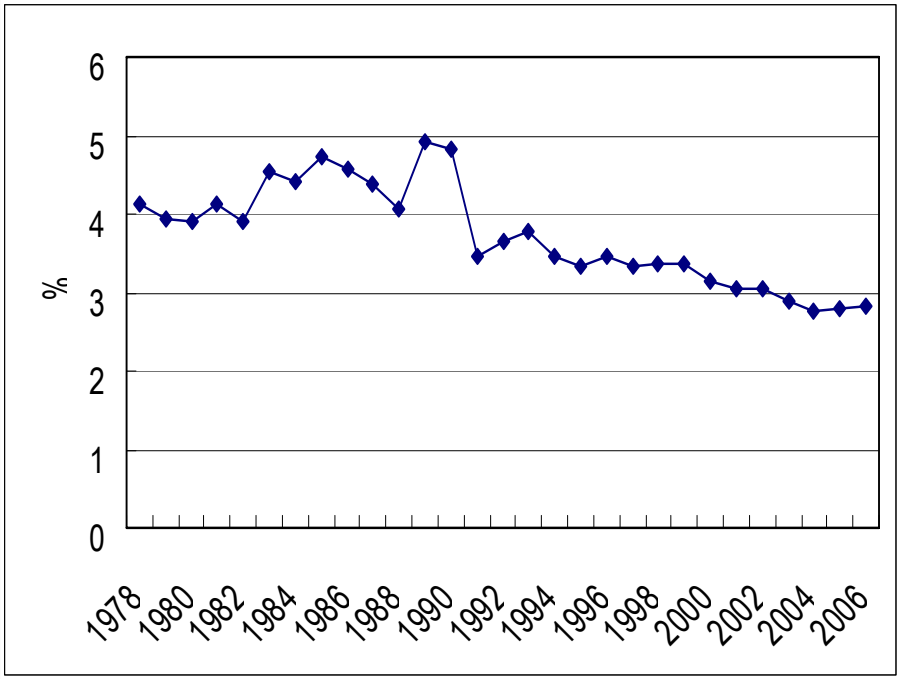
Our Planet's Energy and Environmental Future Is Now Being Written in China (Steinfeld,2008)

- The second largest energy consumer in the world
- The largest CO2 and SO2 emitter
- China is in a stage of high energy consumption (per capita GDP $3200 in 2008)
- Oil, natural gas and coal deposit per capita : 6.1, 6.5, and 79 percent of the world average

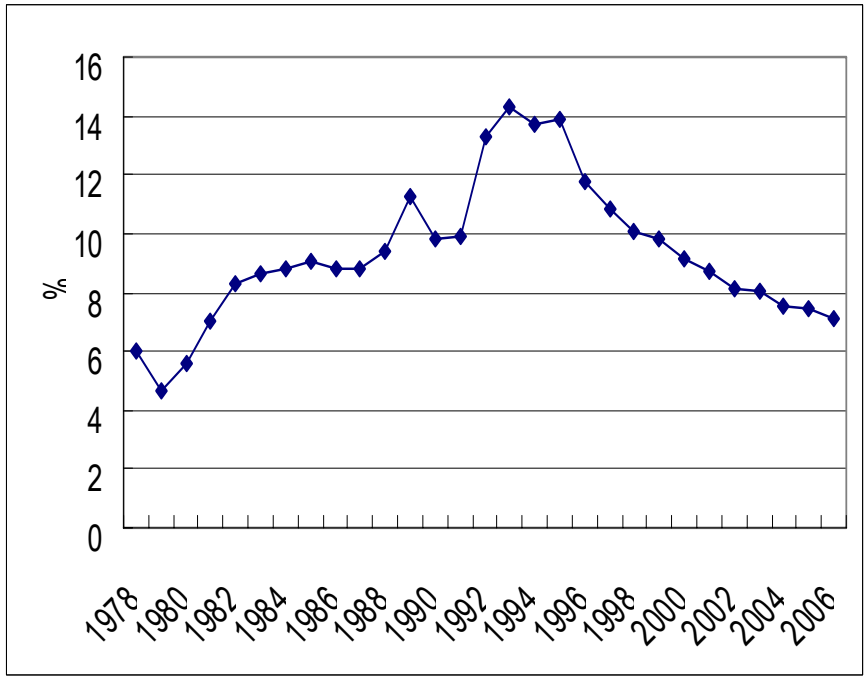
Goal of the research

- Has China's industrial relocation had an impact on energy consumption?
- Why is there such an impact?
- Policy implication.

Trend of China's Industrial Relocation in Early 1990s

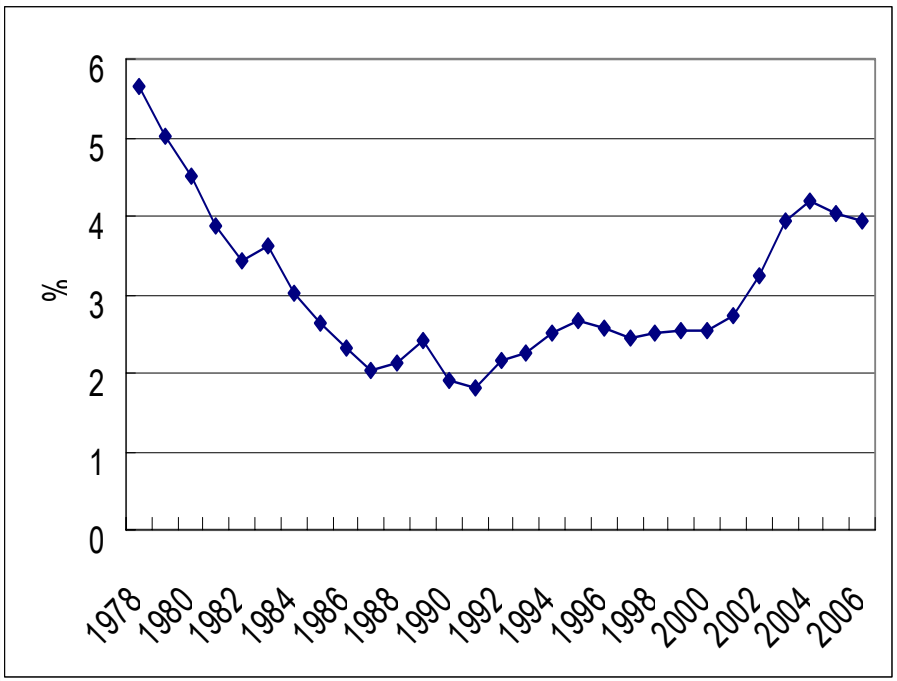


Change of Beijing's Industrial Structure

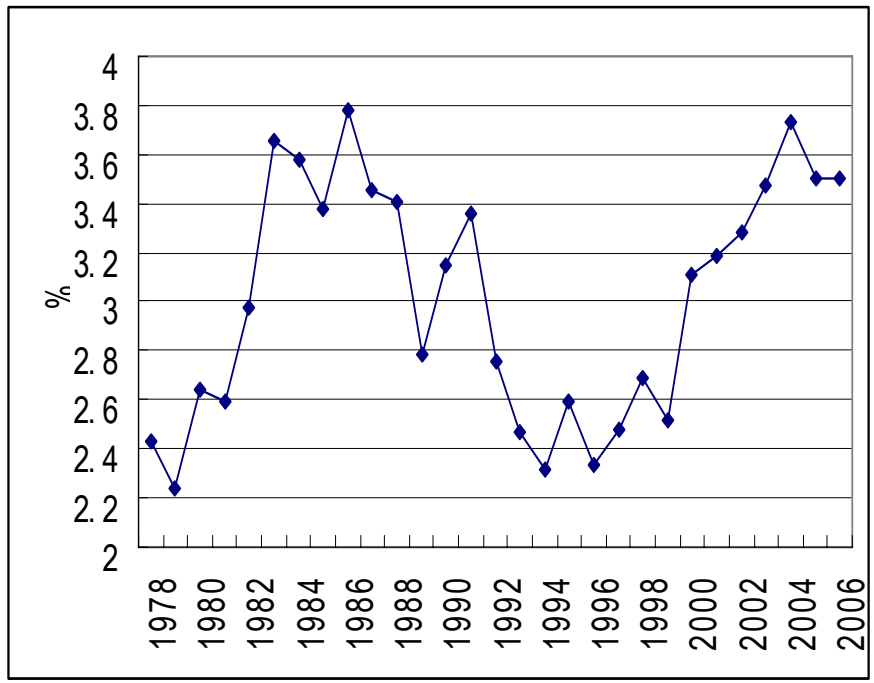


Change of Guangdong's Industrial Structure

Trend of China's Industrial Relocation in Early 1990s

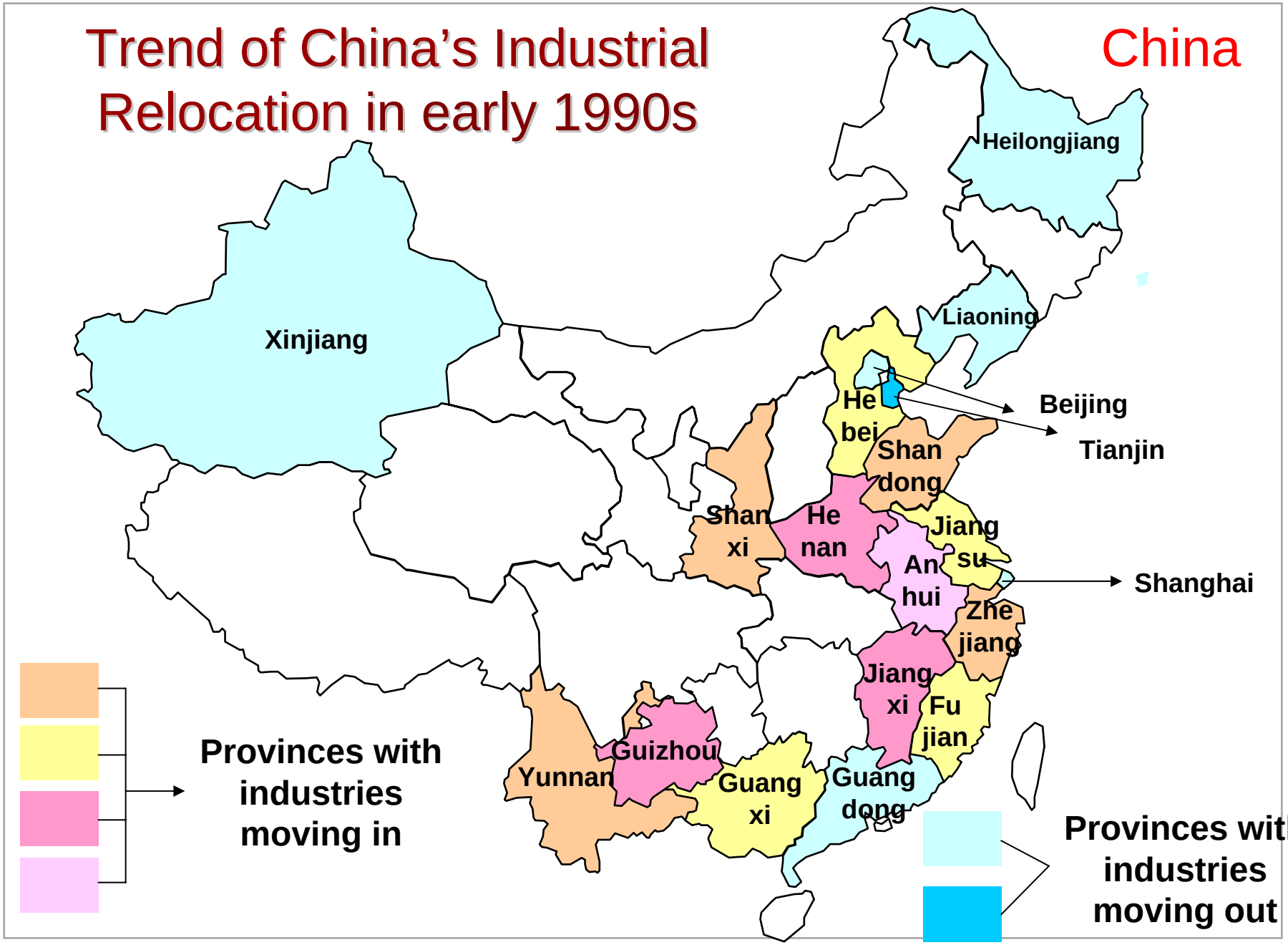


Change of Jiangxi's Industrial Structure



Change of Anhui's Industrial Structure

Trend of China's Industrial Relocation in early 1990s

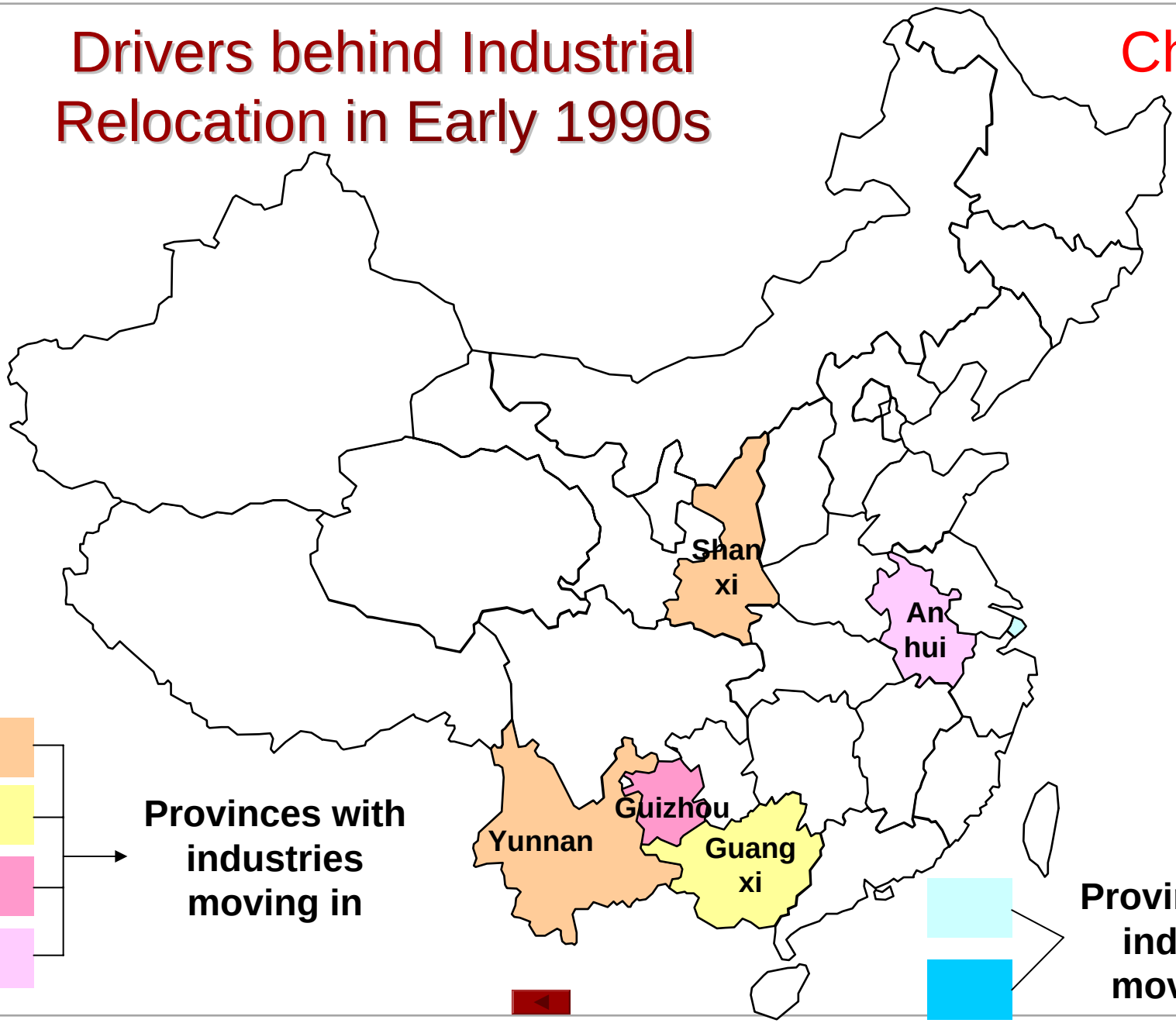


What are the drivers behind industrial relocation

- Industrial strategy adjustment and competition advantages
- Endowment of natural resources
- Requirement of industrial structure adjustment in the relatively developed areas
- Environmental protection

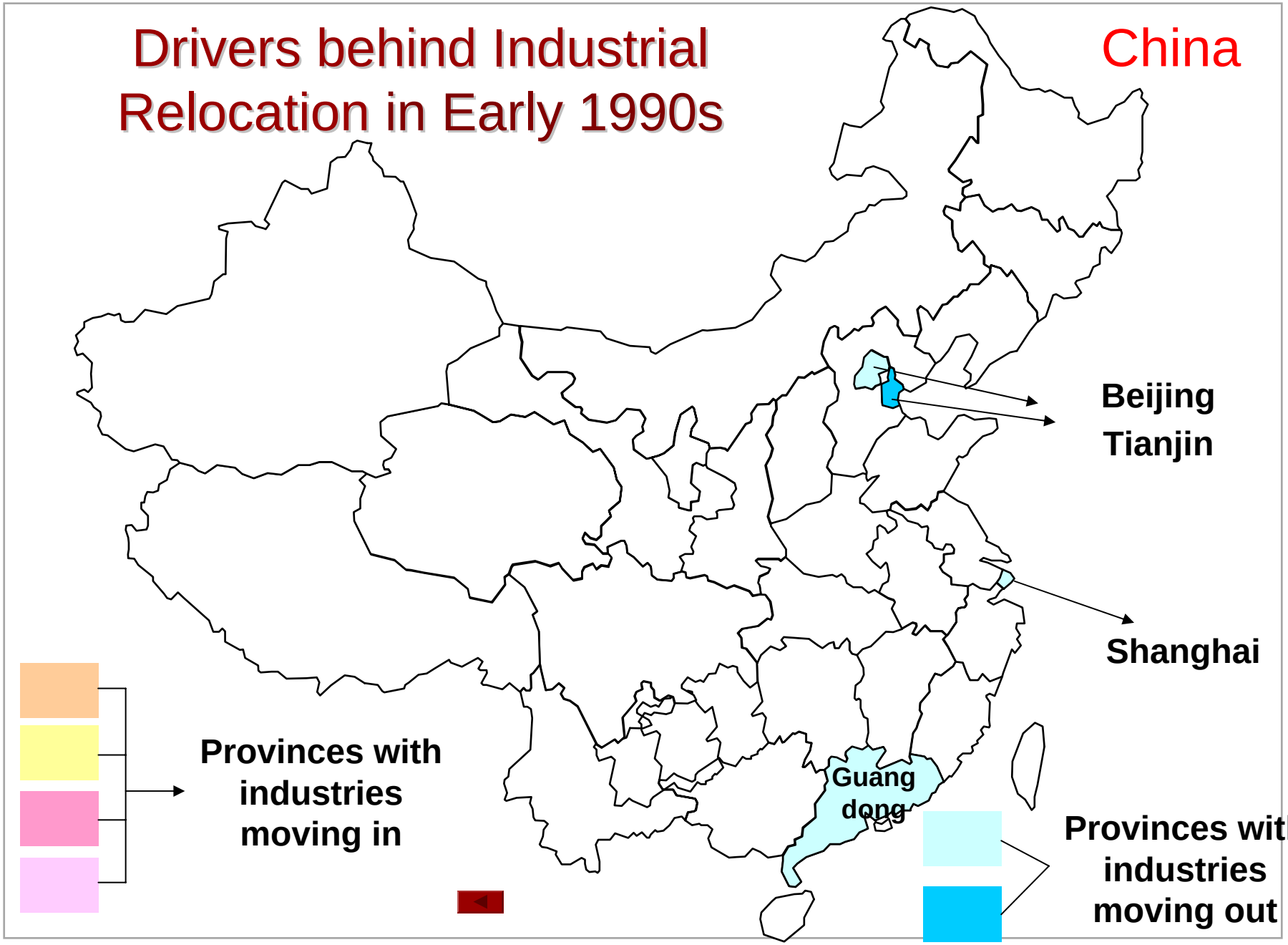
Drivers behind Industrial Relocation in Early 1990s

China



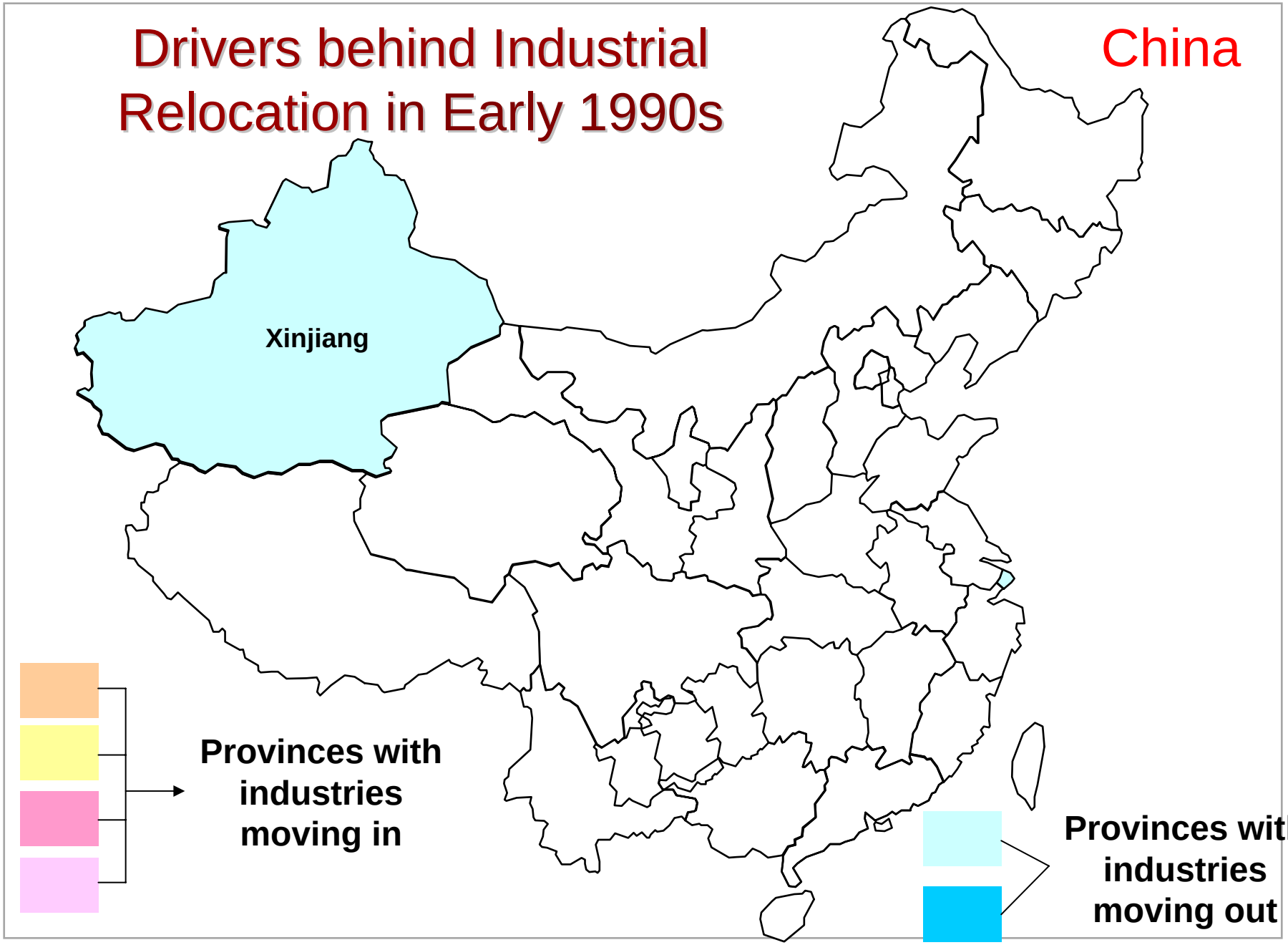
Drivers behind Industrial Relocation in Early 1990s

China

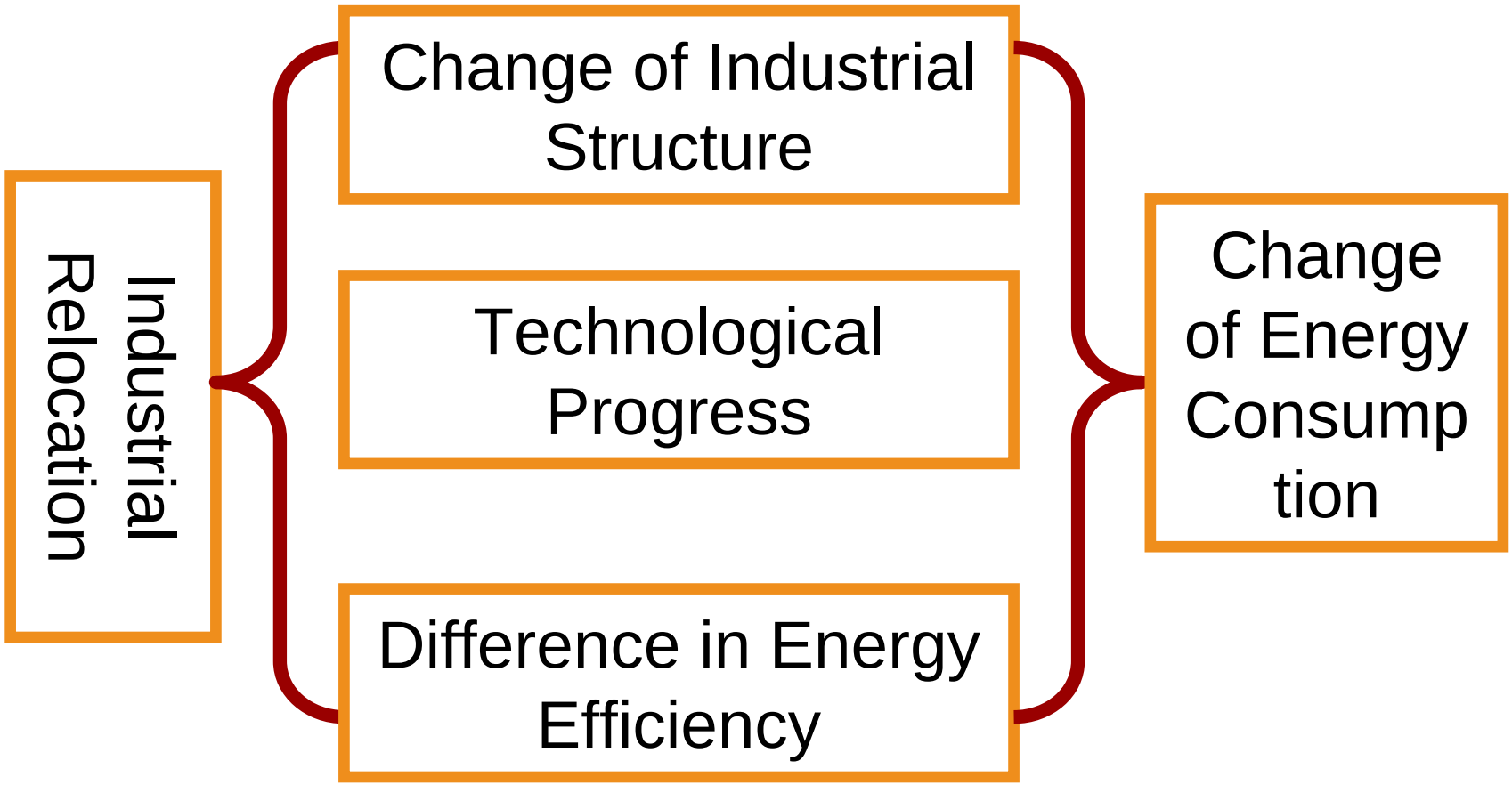


Drivers behind Industrial Relocation in Early 1990s

China



Mechanisms through which industrial relocation affect energy consumption



Method and Data Collection

Based on regression results → Construct a counterfactual estimation →

What the energy consumption would be if industrial location had not been changed

Counterfactual estimation of energy consumption

Estimation under current industrial structure

→ Compared → Result

Method and Data Collection

$$E_{it} = a + b_1 Ip_{it} + b_2 z + b_3 Ip_{it} \cdot z + \varepsilon_{it}$$

E_{it} is the energy consumption in area i and year t;

Ip_{it} is industrial production of each area;

z is a vector for area dummies;

ε_{it} is error term.

Method and Data Collection

- China Statistic Yearbook (CSY).
- China Energy Statistic Yearbook (CESY).
- CESY began to publish in year 1986, Hence, our data ranges from the year of 1985 to 2006.
- 28 provinces (municipalities) are studied (Chongqing, Xizang and Hainan are excluded)

Regression Result

EC	Coef.(P Value)	EC	Coef.(P Value)
AVindAdj:	0.882184 (0.000)	Area2	-359.8196 (0.092)
AVindAdj2:	-0.0124816 (0.900)	Area3	-1807.621 (0.000)
AVindAdj3:	0.3556901 (0.000)	Area4	-1016.281 (0.000)
AVindAdj4:	0.3719009 (0.003)	Area5	469.9487 (0.086)
AVindAdj5:	0.7715278 (0.000)	Area6	-1744.769 (0.000)
AVindAdj6:	0.5235941 (0.000)	...	...
AVindAdj7:	2.770796 (0.000)	Area28	-166.2967 (0.597)
...	...		
AVindAdj28:	0.3345875 (0.016)	Cons	3218.801(0.000)

Number of obs = 616 ; F(55, 560) = 836.21 ; Prob > F = 0.0000 ; R-squared = 0.9775

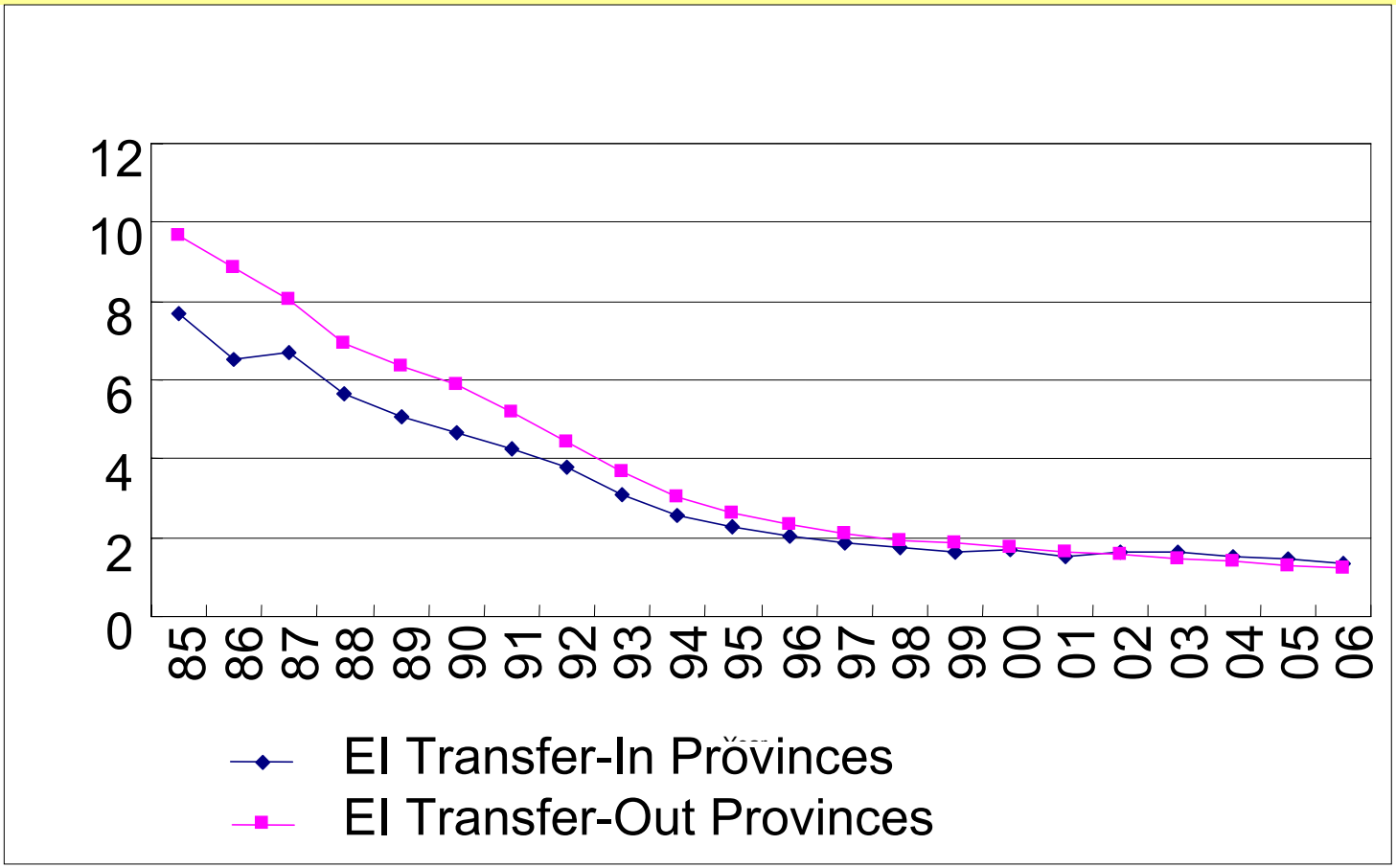
Simulation Result

Year	DCI	DCO	DCN	TD
1995	-579.91	-211.88	730.19	-61.6
1996	-679.5	714.96	248.97	284.43
1997	-1651.65	1027.85	699.69	75.89
1998	-2113.02	1665.29	633.64	185.91
1999	-2712.72	2345.37	598.16	230.81
2000	-3274.73	3457.62	293.76	476.65
2001	-3791.18	4526.79	-34.81	700.8
2002	-4827.97	6565.3	-684.05	1053.28
2003	-7107.36	9874.09	-1644.97	1121.76
2004	-10688.1	14218.46	-1686.06	1844.3
2005	-13925.9	15965.85	-186.75	1853.2
2006	-17391	21008.86	-869.92	2747.94
SUM	-68743	81158.56	-1902.15	10513.37

Impact of industrial relocation on energy consumption (10,000 tce)

Analysis of energy efficiency

Difference of energy efficiency between provinces with industries moving in and moving out



Discussion

(Why is there an positive impact)

- Industries moved to provinces with rich coal.
- Provinces with industries moving in have advantages in energy efficiency.
- Market-driven industrial relocation

Conclusions

1) Industrial relocation in China after early 1990s has reduced about 105 mtce in energy consumption.

2) Energy saving from industrial relocation was expedited from 1995 to 2006.

3) The difference in energy efficiency between provinces with industries moving in and out is reduced.

Policy Implications

It’s possible for China to promote energy saving through industrial relocation.

How to integrate industrial relocation into policies that encourage energy saving should be considered in the future.

Future Research

It should be considered in the future how to deal with technological progress in the regression model, especially in the context of limited data.

Thanks for Your Time !

华北电力大学

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