The impact of the increase of oil price

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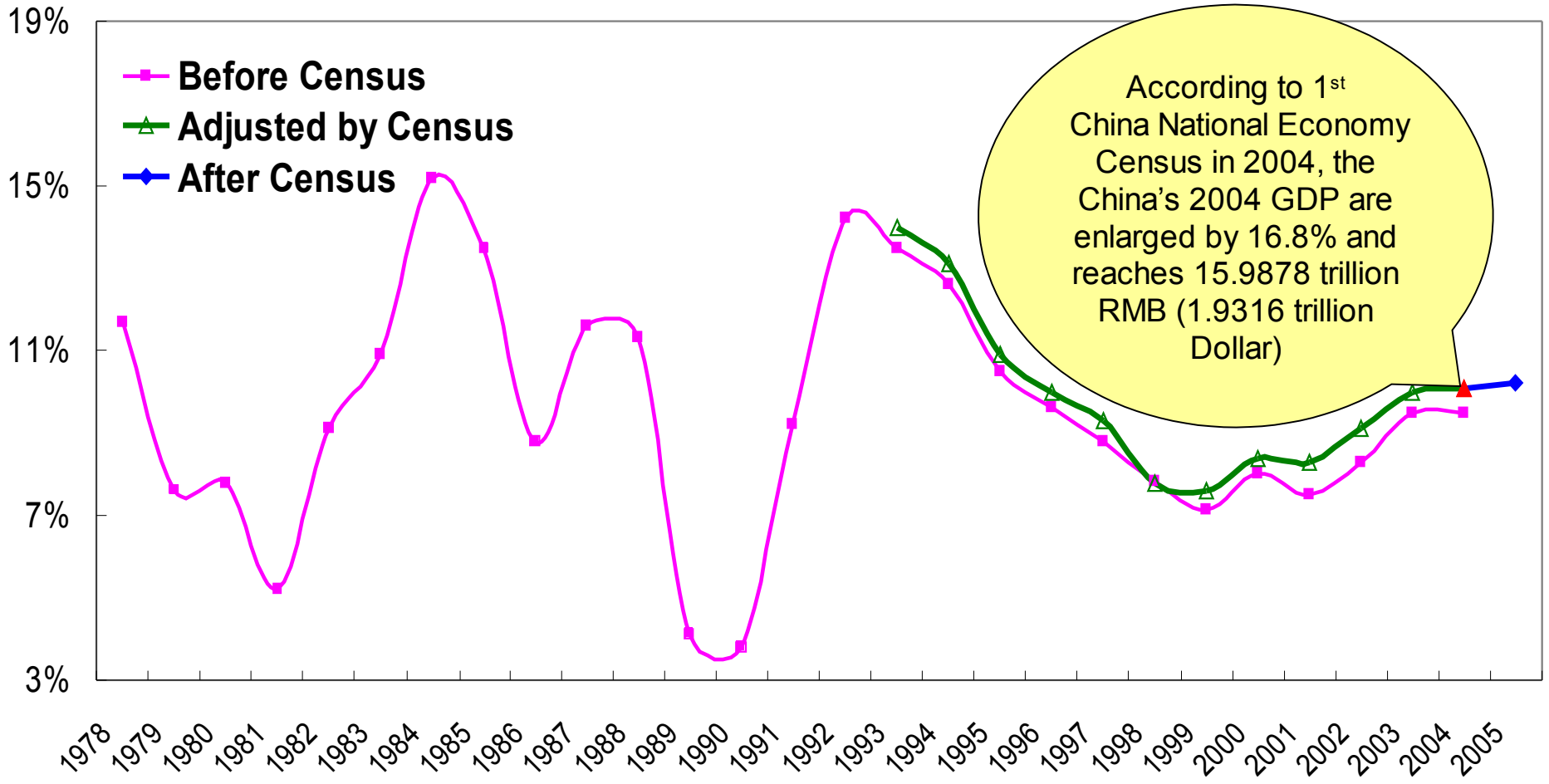
Note：The views expressed in the ppt are that of the author and should not be attributed to his affiliated institution.

Outline

- Data in China
- China's Social Accounting Matrix
- The Effect of the increase of Oil Price

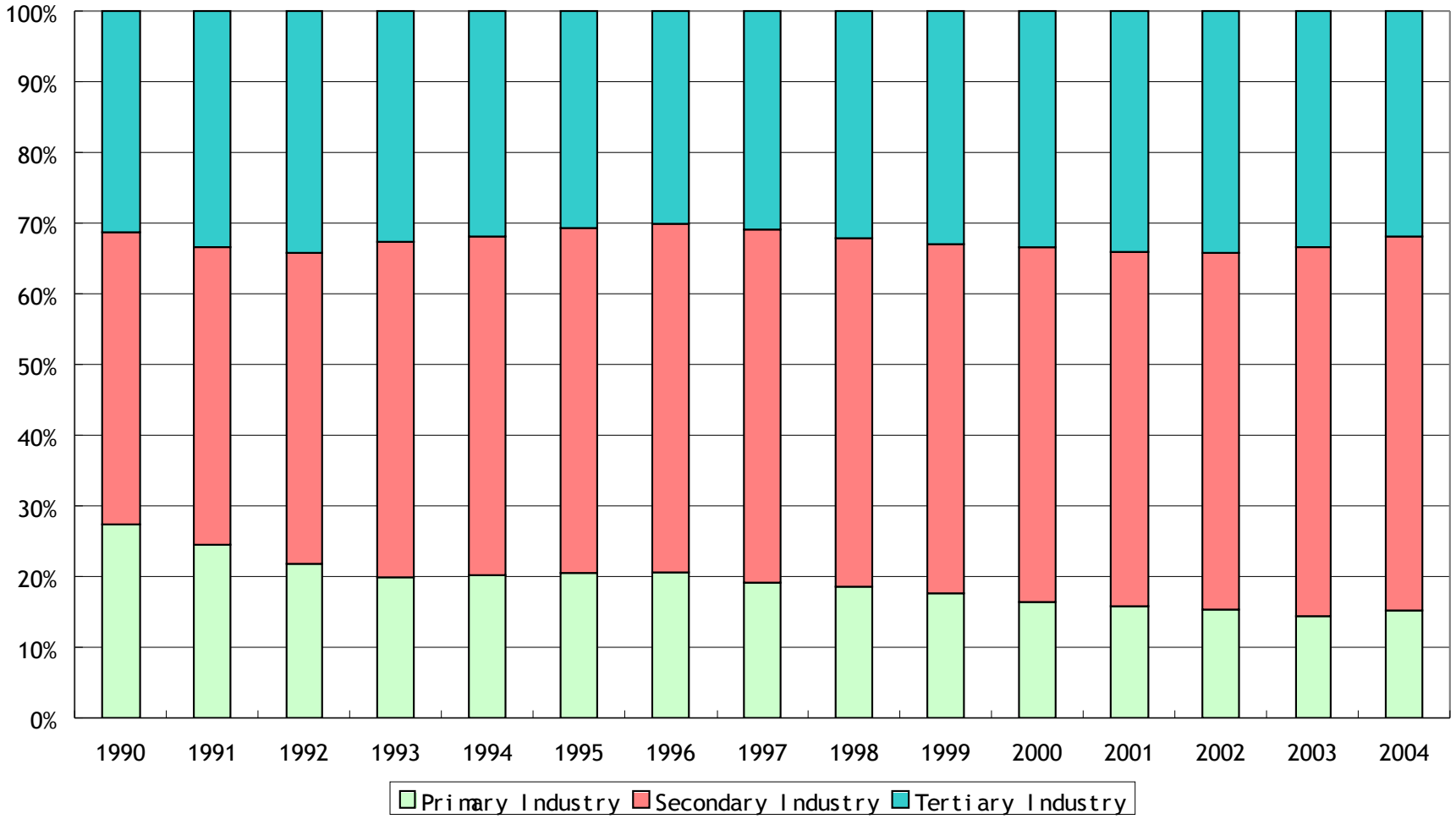
Economy Growth



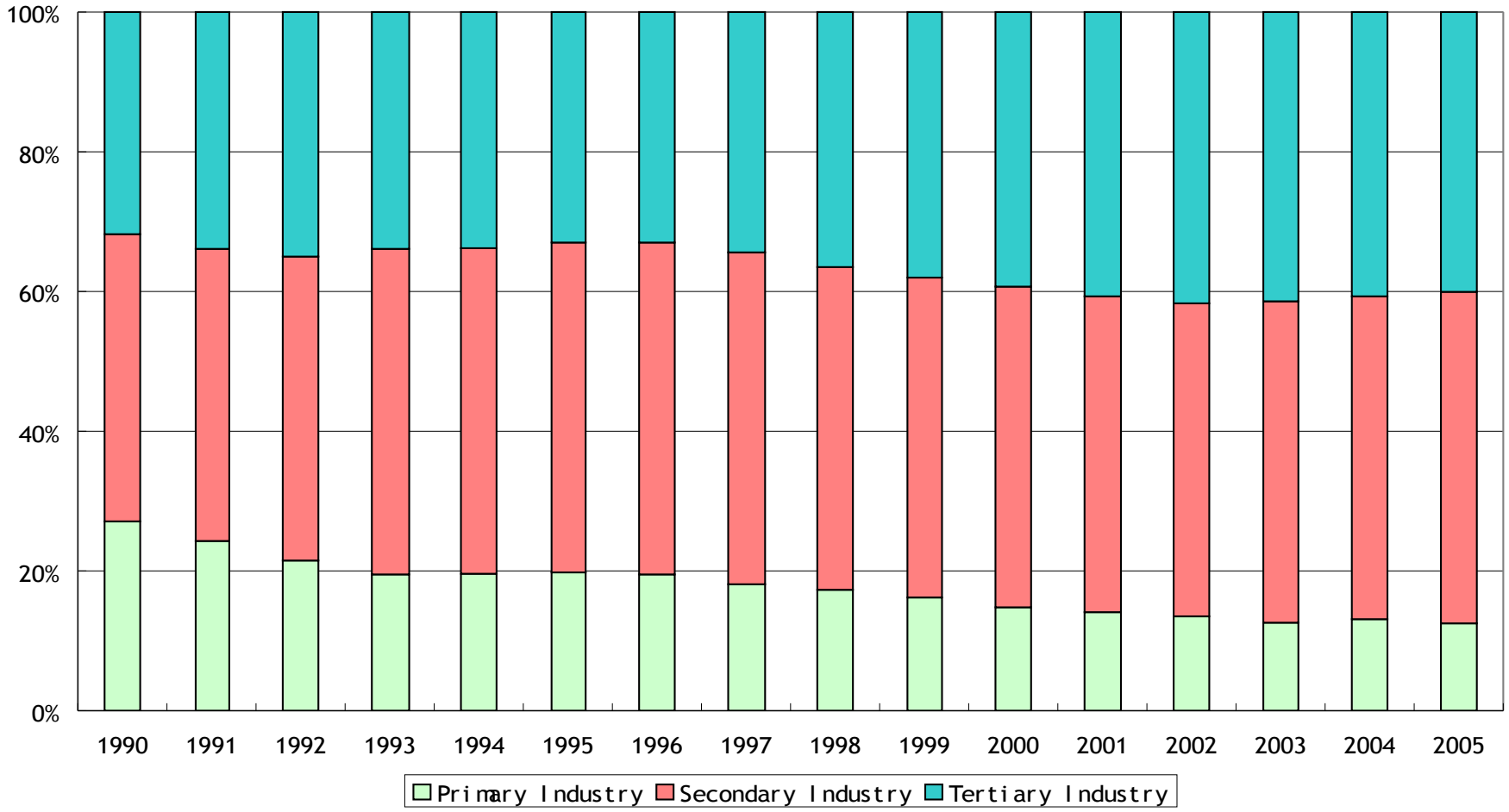
GDP ,1991-2005 (100 million Yuan)

	Old Data	New Data	Difference	%
1991	21617.8	21781. 5	163. 7	0. 76
1992	26638.1	26923. 5	285. 4	1. 07
1993	34634.4	35333. 9	699. 5	2. 02
1994	46759.4	48179. 9	1420. 5	3. 04
1995	58478.1	60793. 7	2315. 6	3. 96
1996	67884.6	71176. 6	3292. 0	4. 85
1997	74462.6	78973. 0	4510. 4	6. 06
1998	78345.2	84402. 3	6057. 1	7. 73
1999	82067.5	89677. 1	7609. 6	9. 27
2000	89468.1	99214. 6	9746. 5	10. 89
2001	97314.8	109655. 2	12340. 4	12. 68
2002	105172.3	120332. 7	15160. 4	14. 41
2003	117390.2	135822. 8	18432. 6	15. 70
2004	136875.9	159878. 3	23002. 4	16. 81
2005		182320. 6		

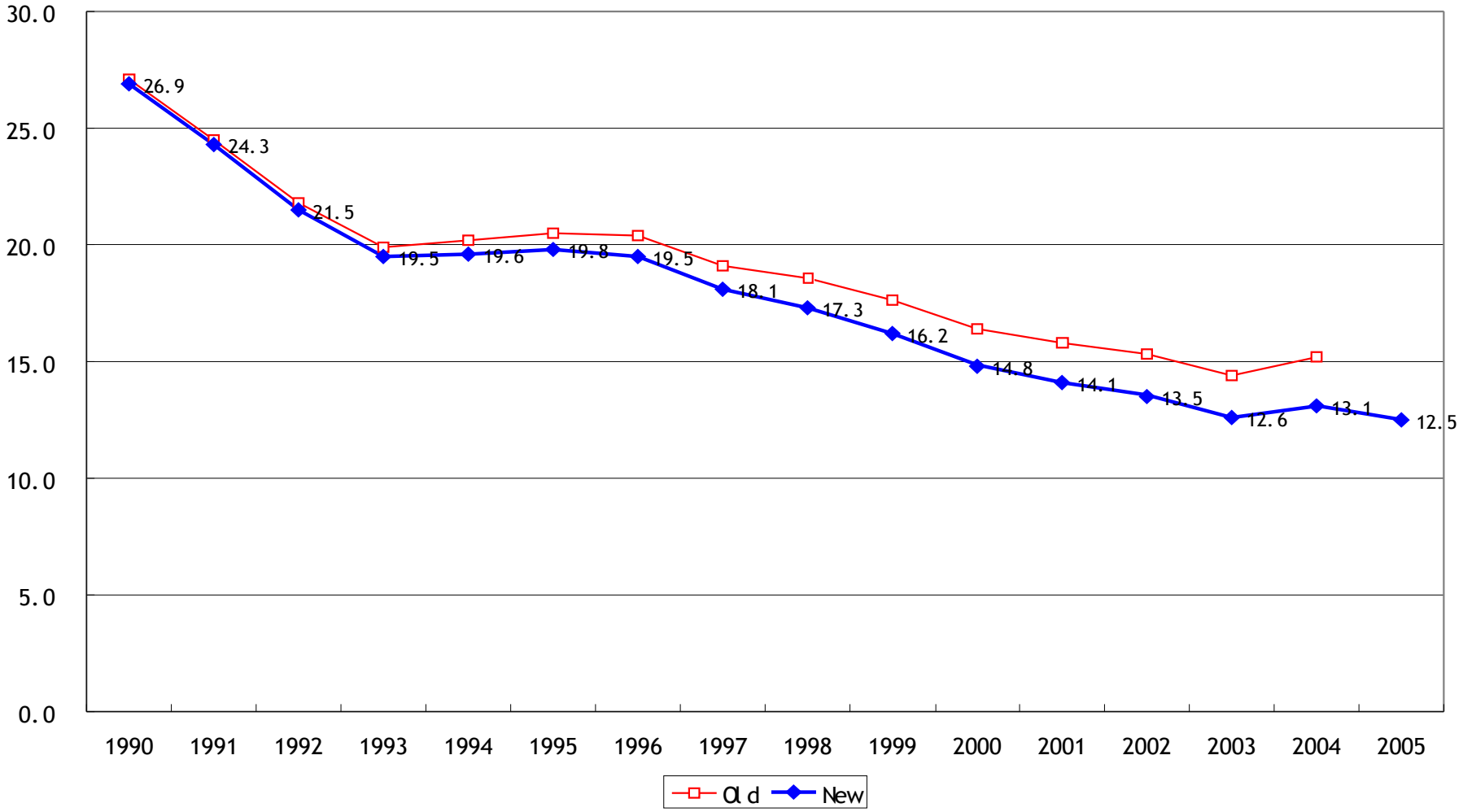
GDP Structure (old data)



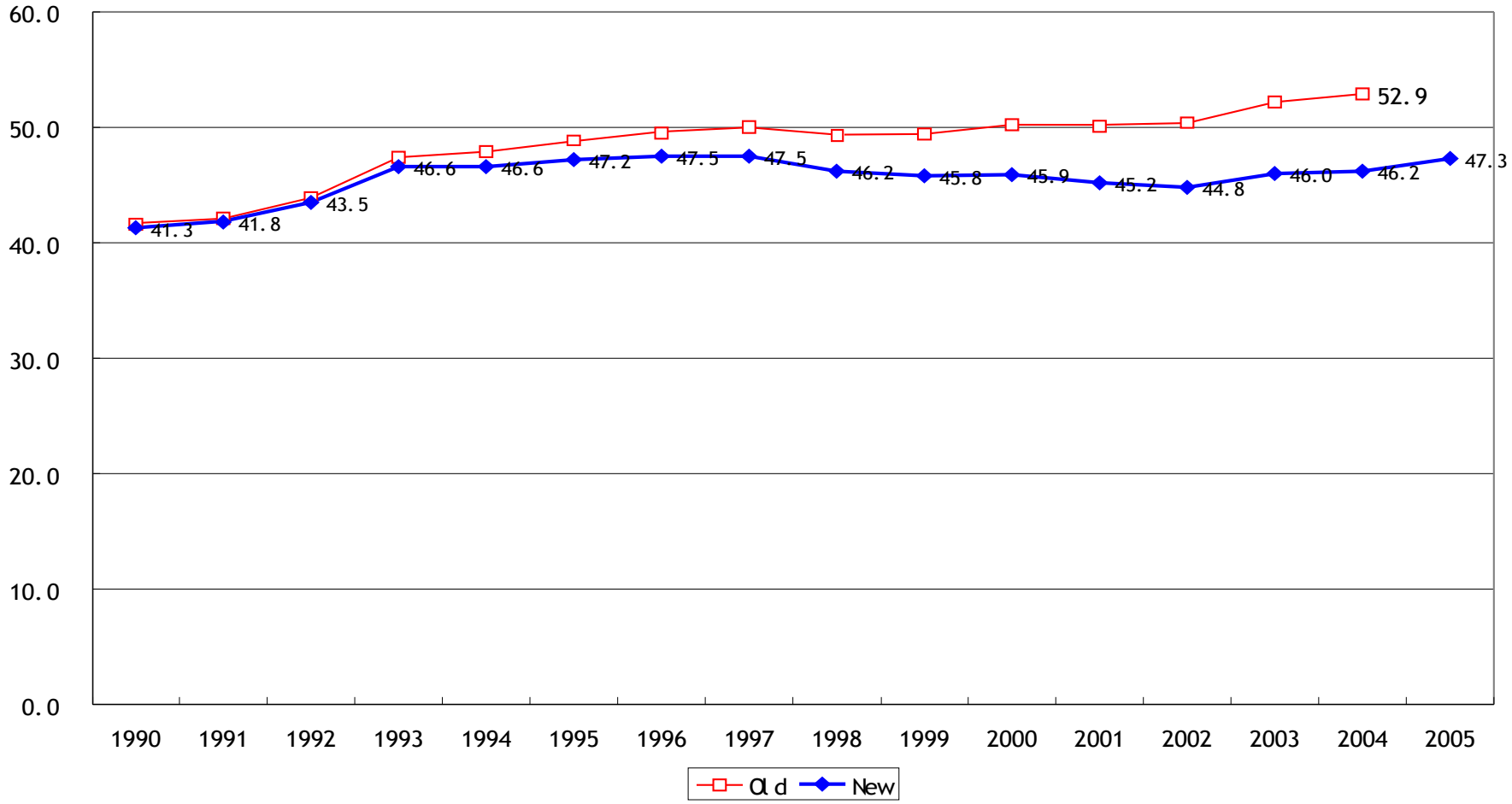
GDP Structure (new data)



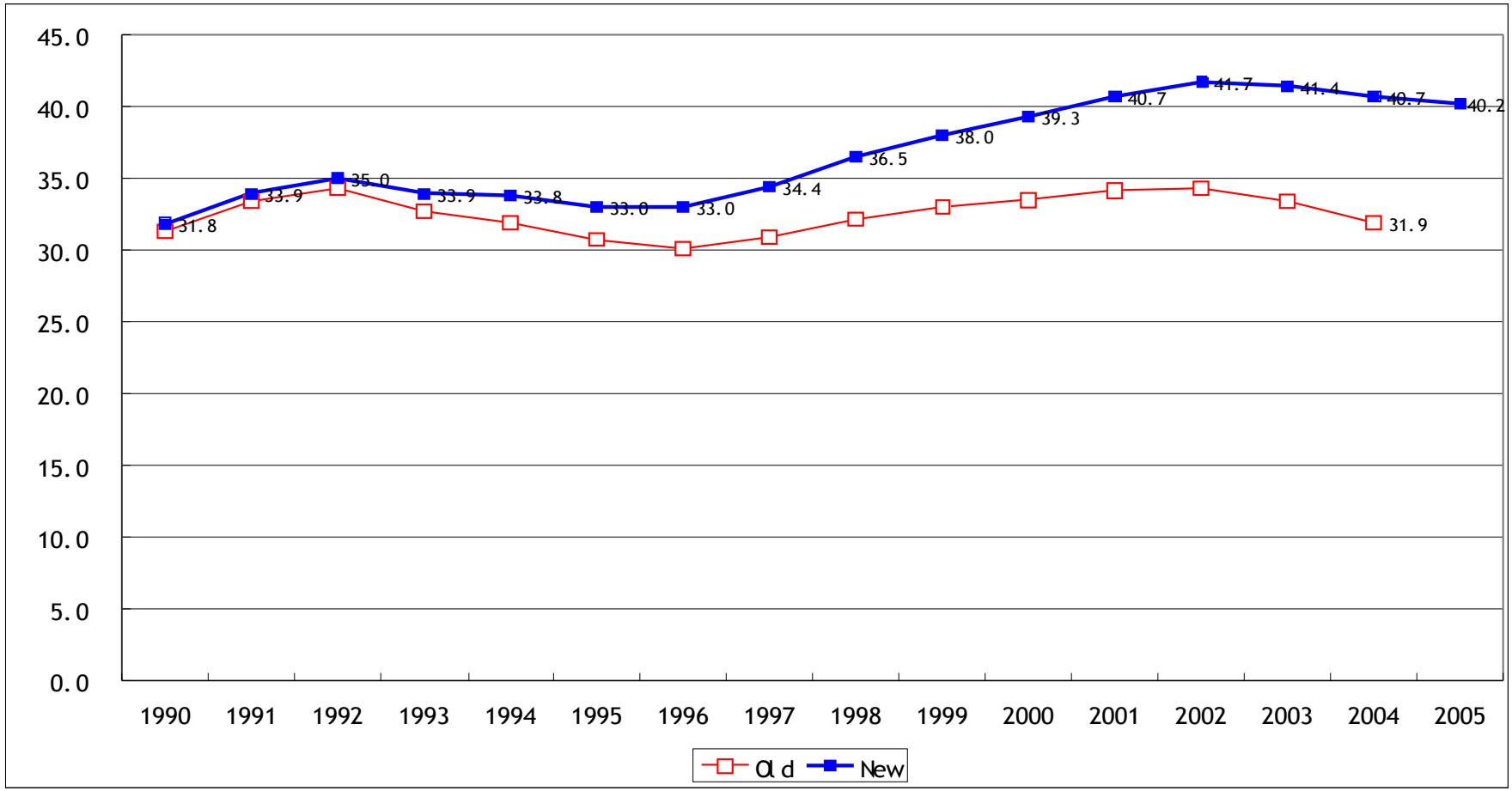
Share of Agriculture in GDP



Share of Secondary Industry in GDP



Share of Tertiary Industry in GDP



IO Tables in China

- The Input-Output tables for China's Economy
  - 1982, 1987, 1992, 1997 and 2002
    - Tables based on large-scale input-output survey across the country
  - 1990, 1995 and 2000
    - Extension tables

2002 Input-Output table

- The latest input-output table for China's economy
- This table is constructed based on large-scale input-output survey across the country and the 1st Economic Census of China in 2004

Cont.

- The basic structure of 2002 IO table is the same as 1997 table
  - Final demand: Household consumption, government consumption, capital formation, changes in stock and exports
  - Value added: Depreciation of fixed capital, Compensation of employees, Net taxes on production and Operation surplus
- The sectoral classification for the 2002 IO table
  - 122 sectors, of which there are 5 sectors for agriculture, 81 sectors for mining and manufacturing, and 36 sectors for services.
  - 42 sectors

Cont.

- Some new service sectors are introduced
  - e.g Information communication and Service, Computer service and software
- Some issues to be paid more attention
  - The errors term in 2002 table are relatively large,
    - There are16 of 122 sectors the error term is beyond 4 percent of sectoral gross output.
    - While the error terms are relatively small, most of them below 2 percent of sectoral gross output in 1997 IO table.
  - In some sector the export is larger than the gross output
    - As to the “Cultural and office equipment” sector in original 2002 China I-O table, the export is 103.8 billion RMB Yuan. But the gross output is only 75.0 billion RMB Yuan.
  - …

Social Accounting Matrix for China

- 2002 SAM for China's Economy
  - 2002 Input-Output Table
  - The data of China's 1st National Economy Census
  - Other data

The schematic macro SAM, 2002

Receipts	Expenditure												Total
	1. Commodity (42)	2. Activity (42)	3. VA- Labor (3)	4. VA- Capital	5. Households (2)	6. Enterprises	7. Gov. Subsidies	8. Extra-budget	9. Government	10. Rest of the World	11. Capital Account	12. Stock change	
1. Commodity (42)		Intermediate Consumption			Private Consumption			Extra-budget Consumption	Government Consumption	Export	Gross Fixed Capital Formation	Changes in Inventories	Total Commodity Demand
2. Activity (42)	Domestic Production												Total Domestic Production
3. VA- Labor (3)		Compensation of Employees											Labor Earning
4. VA- Capital		Depreciation; Operating Surplus											Capital Earning
5. Households (2)			Compensation of employees distr. to HH	Capital income distr. to HH		Transfers to households	Subsidy on households		Transfers to households	Earning from ROW			Household Income
6. Enterprises				Capital income distr. to Enterprise.									Enterprise income
7. Gov. Subsidies		Subsidy on Production (Negative)							Expenditure of Subsidy				Government Subsidy on Household
8. Extra-budget		extra-budget fee											Extra-budget Income
9. Government	Import tax (incl. Tariff)	Indirect Taxes			Income tax	Income tax				Earning from ROW	Government Deficits.		Government Revenue
10. Rest of the World	Imports		Compensation of employees paid to ROW	Capital income paid to ROW					Government income paid to ROW				Total Foreign Exchange Outlays
11. Capital Account					Households savings	Enterprise savings		Extra-budget savings	Government saving	Foreign Saving			Total savings
12. Stock change											Changes in Inventories		Total Changes in Inventories
Total	Total Commodity Supply	Total Cost of Production	Total Labor Payments	Total Capital Payments	Total Household Expenditure	Total Enterprise Expenditure	Total Government Subsidy on Household	Total Extra-budget Expenditure	Total Government Expenditure	Total Foreign Exchange Earnings	Total Investment Expenditure	Total Changes in Inventories	

Energy Consumption

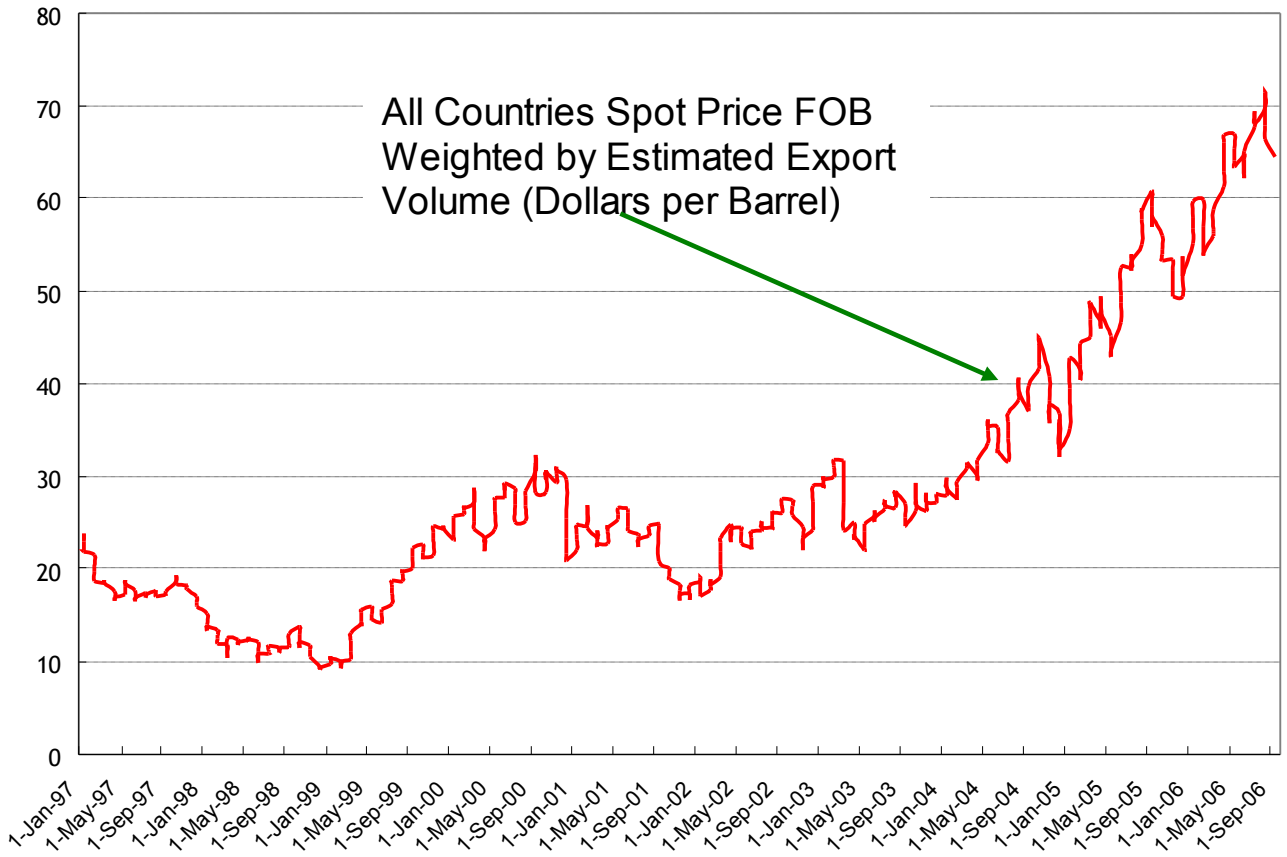
	1990	1995	2000	2002	2003
Total Energy Available for Consumption	**100%**	**100%**	**100%**	**100%**	**100%**
Primary Energy Output	108%	100%	93%	96%	95%
Recovery of Energy		2%	2%	1%	1%
Imports	1%	4%	12%	11%	12%
Exports (-)	6%	5%	8%	8%	8%
Stock Changes in the Year	-3%	0%	1%	0%	0%
Total Energy Consumption	**100%**	**100%**	**100%**	**100%**	**100%**
Consumption by Sector					
1.Farming,Forestry,Animal Husbandry, Fishery,	5%	4%	4%	4%	4%
2.Industry	68%	73%	69%	69%	70%
3.Construction	1%	1%	1%	1%	1%
4.Transport, Storage and Post	5%	4%	8%	7%	7%
5.Wholesale, Retail Trade and Hotel, Restaurants	1%	2%	2%	2%	2%
6.Others	4%	3%	4%	4%	4%
7.Residential Consumption	16%	12%	11%	11%	11%

Oil Consumption

	1990	1995	2000	2002	2003
Total Energy Available for Consumption	**100%**	**100%**	**100%**	**100%**	**100%**
Output	121%	93%	72%	67%	62%
Imports	7%	23%	43%	41%	48%
Exports (-)	27%	15%	10%	9%	9%
Stock Changes in the Year	0%	-1%	-5%	0%	0%
Total Energy Consumption	**100%**	**100%**	**100%**	**100%**	**100%**
Consumption by Sector					
1.Farming,Forestry,Animal Husbandry, Fishery and Water Conservancy	9%	7%	7%	7%	6%
2.Industry	64%	58%	51%	50%	50%
3.Construction	3%	2%	2%	2%	2%
4.Transport, Storage and Post	15%	18%	25%	25%	26%
5.Wholesale, Retail Trade and Hotel, Restaurants	1%	2%	2%	2%	3%
6.Others	7%	9%	8%	8%	7%
7.Residential Consumption	2%	4%	6%	6%	6%

The effect of increase of Oil Price

- With the increase of oil price, what are the price transmission effects on other sectors, on factors, and eventually, on the living standard of households



The adjustment of the price by NDRC

Date	Oil products	The increase of price (Yuan/Ton)	The price of 90# Gasoline (Yuan/Ton)	The increase (%) relative to the Beginning of the Year (90# Gasoline)
2005-3-23	Gasoline	+300	4050	
2005-5-10	Diesel Oil	+300		
2005-5-23	Gasoline	-150	3900	18.9%
2005-6-25	Gasoline □ Diesel Oil	+200 □ 150	4100	
2005-7-23	Gasoline □ Diesel Oil	+300 □ 250	4400	
2006-3-26	Gasoline □ Diesel Oil	+300 □ 200	4700	18.2%
2006-5-24	Gasoline □ Diesel Oil	+500 □ 500	5200	

Methodology

- SAM-based Price Multiplier Analysis
  - Extend the IO Multiplier, take the interaction between production and institution(especially, households) into account
- SAM-based Price Multiplier decomposition method is used to shed light on detailed linkages between economywide costs and the prices faced by households.

Overview of the 2002 SAM

□	I Production	II Factor	III Households	IV Others	V. Total
I. Production □ 42 Sectors □ n_1 □	T_{11}	O	T_{13}	T_{14}	Y_1
II. Factors □ Labor □ Capital □ n_2 □	T_{21}	O	O	O	Y_2
III. Households (Rural, Urban □ n_3)	O	T_{32}	O	T_{34}	Y_3
IV. Others (Enterprise □ Government, etc. □ n_4)	T_{41}	T_{42}	T_{43}	T_{44}	Y_4
V. Total	Y_1	Y_2	Y_3	Y_4	

Multiplier Decomposition Analysis

- In a market economy, a web of interactions delineate the path from initial expenditure to ultimate incomes.
- Multiplier decomposition methods can shed light on these complex linkages.

Path Decomposition

- To elucidate the complex chains of price interaction, we use path decomposition analysis.
- To summarize the methodology:
  - An ***arc*** is a pair ***<i,j>*** of indices in the SAM accounts
  - A ***path*** is a sequence s of indices ***s=<i,k,l,...,m,j>*** decomposable into consecutive arcs <*i,k*>, <*k,l*>,...,<*m,j*>.
  - The influence of *i* on *j* through path *s* is denoted ***(i->j)s***
  - To estimate the price influence of account i on account j along <*i,j*>, before economywide linkages are taken into account, we have:

$$\frac{\partial P_j}{\partial P_i} = a_{ij}$$

Path Decomposition

- For any given path *s*=<*i,k,…,m,j*> the ***Direct*** price influence the composite

$$D_{(i\rightarrow j)s} = a_{ki}\ldots a_{jm}$$

- In any given path *s* there may exist feedback effects among its indices, each of which can be represented by a multiplier μ_s (actually the ji entry in the multiplier matrix M.
- All of these feedback effects taking place along the path amplify the direct influence to produce ***Total*** influence:

$$T_{(i\rightarrow j)s} = D_{(i\rightarrow j)s}\mu_s$$

Path Decomposition

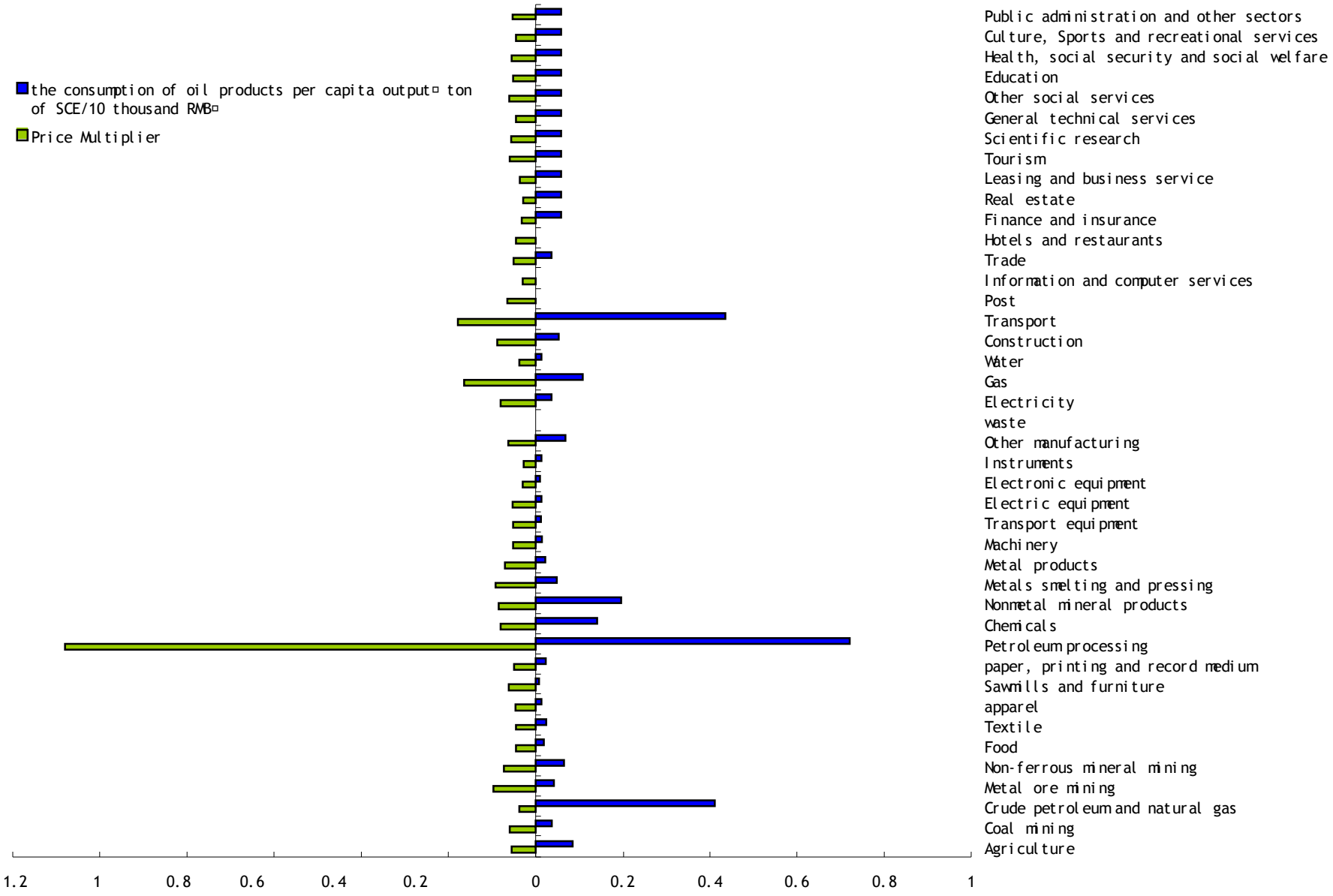
- Finally, note that more than one elementary path may span two indices *i,j*. Therefore the ***Global*** income effect must sum total effects over all paths:

$$G_{(i\to j)s} = \sum_{s\in S} T_{(i\to j)s} = \sum_{s\in S} D_{(i\to j)s}\mu_s$$

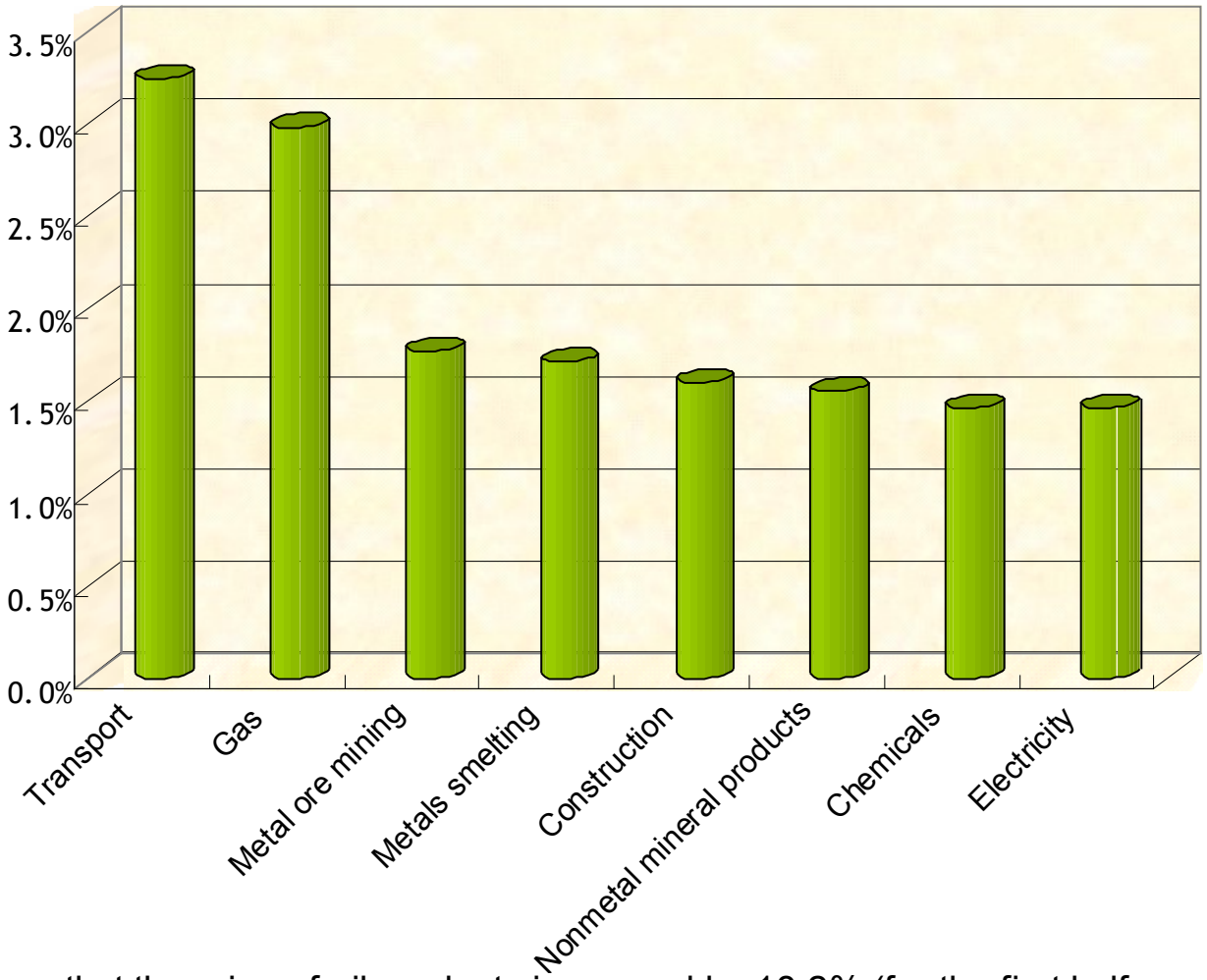
- ***Direct***, ***Total*** and ***Global*** influence are three distinct components that make up the transmission mechanism underlying income determination.

Price Transmission

Sector	Price Multiplier	Sector	Price Multiplier
Agriculture	0.055	waste	□
Coal mining	0.059	Electricity	0.08
Crude petroleum and natural gas	0.037	Gas	0.164
Metal ore mining	0.097	Water	0.037
Non-ferrous mineral mining	0.076	Construction	0.088
Food	0.045	Transport	0.178
Textile	0.045	Post	0.065
apparel	0.046	Information and computer services	0.03
Sawmills and furniture	0.061	Trade	0.05
paper, printing and record medium	0.049	Hotels and restaurants	0.045
Petroleum processing	1.082	Finance and insurance	0.032
Chemicals	0.08	Real estate	0.028
Nonmetal mineral products	0.085	Leasing and business service	0.036
Metals smelting and pressing	0.094	Tourism	0.059
Metal products	0.07	Scientific research	0.056
Machinery	0.051	General technical services	0.045
Transport equipment	0.051	Other social services	0.06
Electric equipment	0.053	Education	0.051
Electronic equipment	0.03	Health, social security and social welfare	0.055
Instruments	0.027	Culture, Sports and recreational services	0.048
Average	0.071	Households	0.04


the consumption of oil products per capita output□ ton of SCE/10 thousand RMB□
Price Multiplier
Public administration and other sectors
Culture, Sports and recreational services
Health, social security and social welfare
Education
Other social services
General technical services
Scientific research
Tourism
Leasing and business service
Real estate
Finance and insurance
Hotels and restaurants
Trade
Information and computer services
Post
Transport
Construction
Water
Gas
Electricity
waste
Other manufacturing
Instruments
Electronic equipment
Electric equipment
Transport equipment
Machinery
Metal products
Metals smelting and pressing
Nonmetal mineral products
Chemicals
Petroleum processing
paper, printing and record medium
Sawmills and furniture
apparel
Textile
Food
Non-ferrous mineral mining
Metal ore mining
Crude petroleum and natural gas
Coal mining
Agriculture
1.2
1
0.8
0.6
0.4
0.2
0
0.2
0.4
0.6
0.8
1

Top 8 sectors affected



Notes: Given that the price of oil products increased by 18.2% (for the first half year in 2006), the column in this figure indicates the change of the cost of these sectors.

Path Linkages from Oil products to Producers

Path	Global Effects	Total Effects	% of Global Effects	Accumulative total (%)
Transport <- Petroleum Processing	0.178	0.159	89.1	89.1
Transport <- Electricity <-Petroleum Processing		0.001	0.4	89.5
Gas <- Petroleum Processing	0.164	0.116	70.7	70.7
Gas <- Transport <-Petroleum Processing		0.01	6.1	76.8
Gas <- Coal Mining <-Petroleum Processing		0.003	1.9	78.7
Gas <- Electricity <-Petroleum Processing		0.002	1.5	80.2
Metal ore mining <- Petroleum Processing	0.097	0.062	64.1	64.1
Metal ore mining <- Transport <-Petroleum Processing		0.005	5.2	69.3
Metal ore mining <- Electricity <-Petroleum Processing		0.004	4.4	73.7
Metal ore mining <- Chemicals <-Petroleum Processing		0.002	2.1	75.8
Metals smelting <- Petroleum Processing	0.094	0.049	52.6	52.6
Metals smelting <- Transport <-Petroleum Processing		0.009	9.4	62
Metals smelting <- Metal ore mining <-Petroleum Processing		0.007	7.6	69.6
Metals smelting <- Electricity <-Petroleum Processing		0.003	3.4	73

Path Linkages from Oil products to Households

Path	Global Effects	Total Effects	% of Global Effects	Accumulative total (%)
Rural Households <- Petroleum Processing	0.041	0.003	6.5	6.5
Rural Households <- Agriculture <-Petroleum Processing		0.004	9.3	15.8
Rural Households <- Transports <-Petroleum Processing		0.004	8.9	24.7
Rural Households <- Chemicals <-Petroleum Processing		0.001	3.4	28.1
Rural Households <- Trade <-Petroleum Processing		0.001	1.9	30
Rural Households <- Agriculture <- Transports <-Petroleum Processing		0.001	2.9	32.9
Urban Households <- Petroleum Processing	0.04	0.003	6.4	6.4
Urban Households <- Transports <-Petroleum Processing		0.005	11.8	18.2
Urban Households <- Agriculture <-Petroleum Processing		0.002	5.4	23.6
Urban Households <- Chemicals <-Petroleum Processing		0.001	2.8	26.4
Urban Households <- Electricity <-Petroleum Processing		0.001	2.5	28.9
Urban Households <- Trade <-Petroleum Processing		0.001	2.1	31

Main Conclusion

- The increase of price of oil products has a significant effect on the cost of other producers. Given that the price of oil products increases by 10%, the average price will rise by 0.7%.
- The increase of price of oil products results in the increase of households' consumption cost. Given that the price of oil products increases by 10%, the consumption price will rise by 0.4%. In addition, the transportation, electricity, chemicals and agriculture are the main bridges for this effect.

Cont.

- As to the oil-intensive sectors, the effects of increase of price of oil products will larger than that on other sectors. These sectors include transportation, gas, non-metal mineral production and chemicals.
- Transportation and electricity become the two important bridges for the price transmission of oil products


Thanks for your attention!