

Energy Outlook and Impact of Energy Price Hike on the Food System in Chinese Taipei

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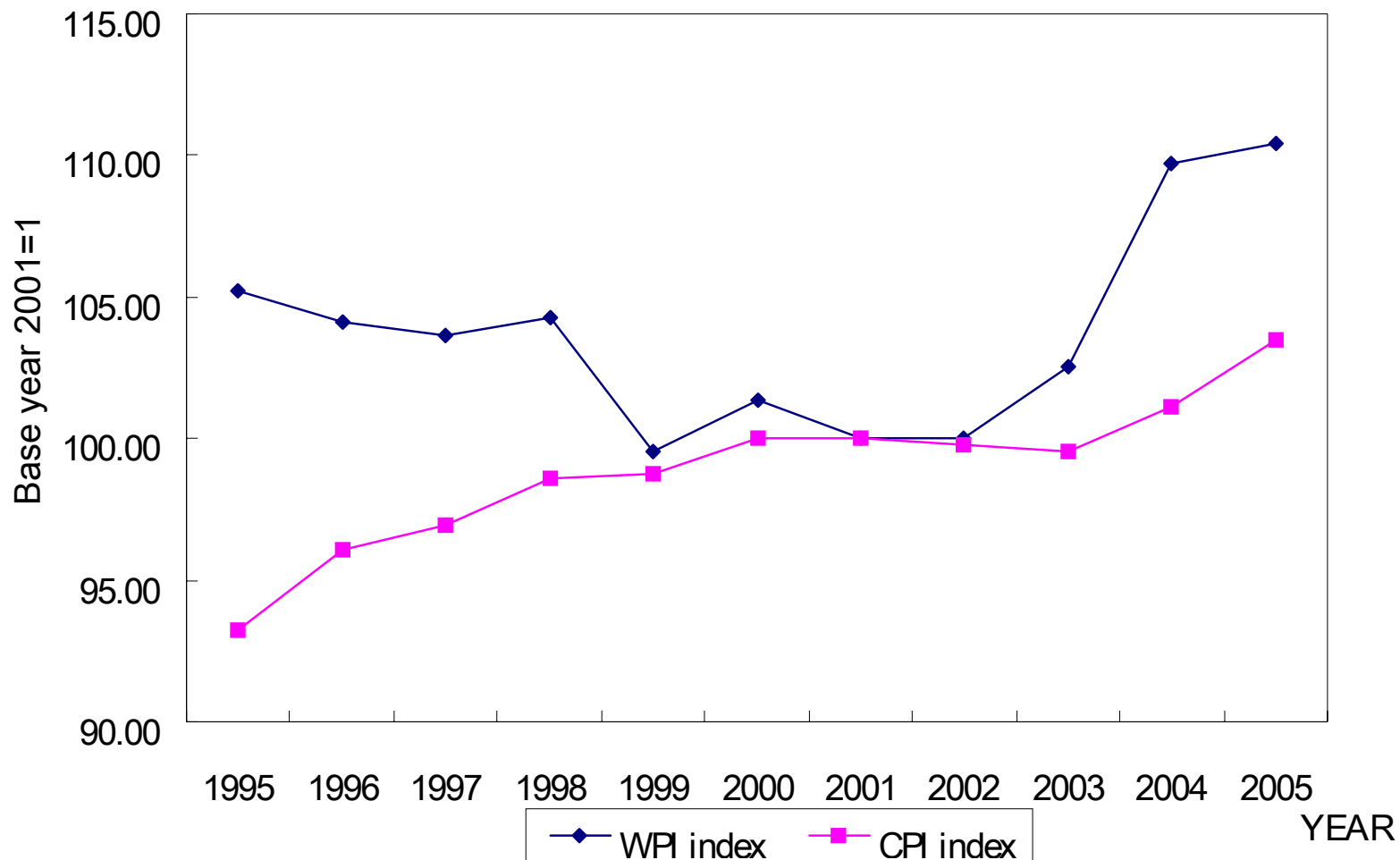
Pacific Food System Outlook 2006-07

Outline

- # Energy Outlook
 - # Impact Assessment
 - Energy consumption
 - Partial Equilibrium Analysis
 - General Equilibrium Analysis
 - # Conclusion & Policy Recommendations
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Outlook-1

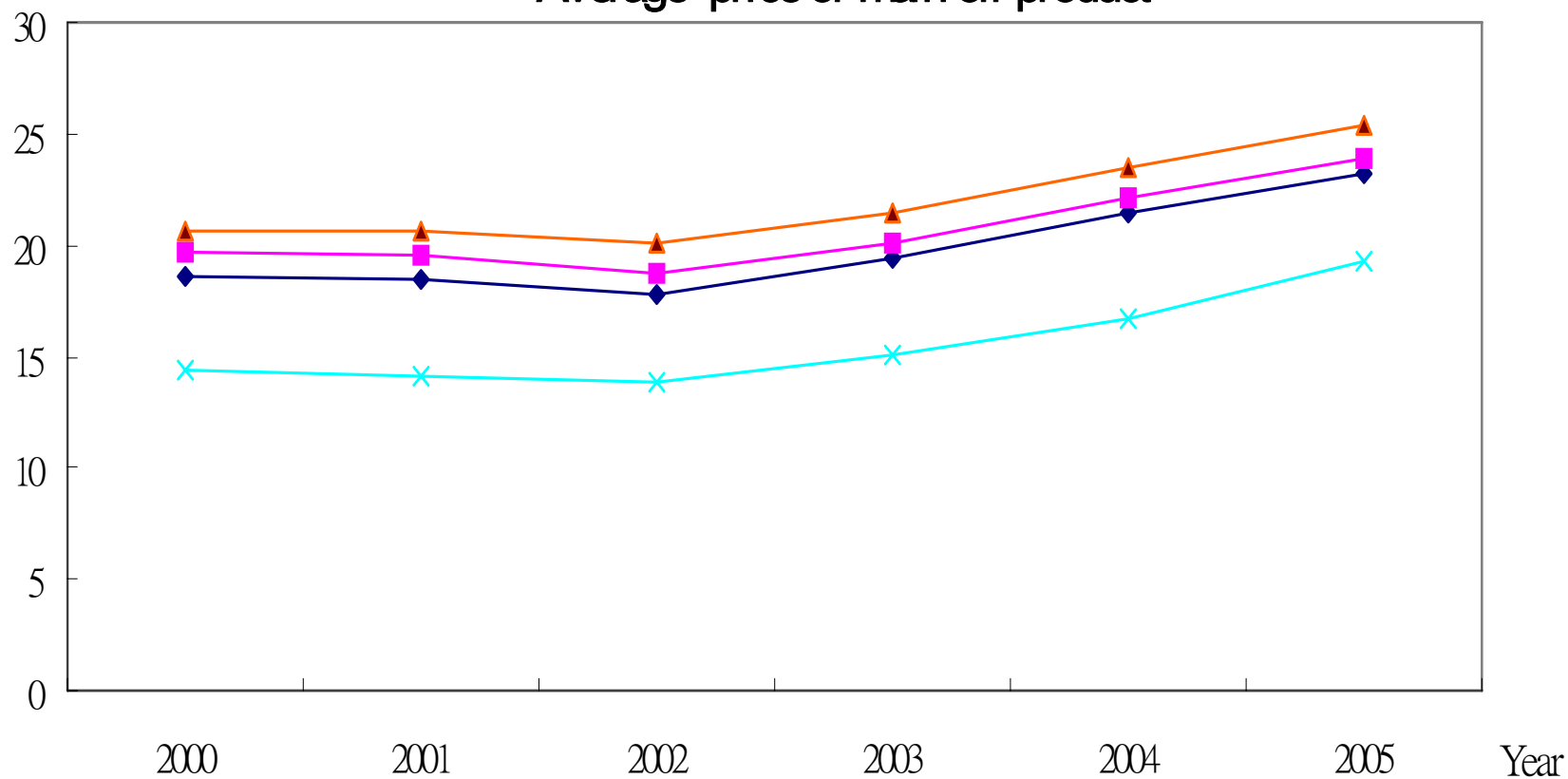
CPI & WPI TREND OF TAIWAN



Outlook-2

NT\$/liter

Average price of main oil product



◆ 92 Unleaded Gasoline ■ 95 Unleaded Gasoline ▲ 98 Unleaded Gasoline × Premium Diesel Oil

Energy Policy

Goal—

- Stabilize domestic energy **price**
 - Reduction in fuel tax
 - State-owned (Taipower, CPC) absorb the cost
 - CPI rose 1.35% in 1st quarter of 2006
 - Stabilize energy **sources** (98% imported)
 - Diversify types and sources
 - Reduce consumption
 - Decouple GDP growth from energy consumption
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Domestic Energy Price

Low compared to other countries

■ Gasoline (per liter):

- Taiwan: US\$0.80
- Germany: US\$1.45
- UK: US\$2.25

■ Electricity (per kw-hour)

- Taiwan: US\$0.0614
 - Japan: US\$0.1440
 - Korea: US\$0.0627
 - H.K.: US\$0.13
 - Singapore: US\$0.0882
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Energy Sources

92% fossil

- **Petroleum** (Middle East, Africa)-51%
- **Coal** (China, Indonesia, Australia)-33%
- **LNG** (Indonesia, Malaysia)-8%
- **Nuclear power**-7%

9% Renewable

- **Hydro**
 - **Wind**
 - **Biomass**
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Renewable energy policy

Goal—

- 10% by 2020 from current 6%
 - 5,00 megawatts generating capacity
 - 40 % hydro
 - 40% wind
 - 20% biomass
 - Municipal waste
 - Vegetable oil
 - Sugarcane
 - Ag waste
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Wind Power

Offshore windmill

- Lack of open land
- Noise from the turbine

Problem:

- Unreliable wind
- High construction cost

Price subsidy

- Regular price NT\$1.8 from Taipower
 - Subsidized price (Private)
 - NT\$2.2 for onshore
 - NT\$2.9 for offshore
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Biomass-Ethanol from Sugarcane

High Cost of Production (per liter)

- Brazil: NT\$6.1
- US (corn): NT\$10.6
- US(Hawaii): NT\$11.9
- China: NT\$11.0
- EU: NT\$17.6
- Thailand: NT\$10.2
- **Taiwan: NT\$15.6**

Biomass-Waste

Cost of Production (NT\$/kWh)

- Incinerator burning — 0.6~1.0
 - New technology — 3.2~4.8
 - Electricity price—
 - Household: 2.5
 - Private purchase: 0.45~2.91
 - Has potential, but need subsidy to start with
 - Small-scale operation
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Energy Use in Ag & Fishery Sectors



Petroleum and Electricity Costs in Crop and Livestock Production

Unit: Million NT\$, %

	1999		2001	
	Crop	Livestock	Crop	Livestock
Petroleum Product (19)*	3,804	25	3,697	124
Electricity (34)	900	995	861	1,039
Natural Gas (35)	4	2	3	2
Total	4,708	1,022	4,561	1,165
Percentage in Intermediate Input	5.16%	0.85%	5.45%	1.08%
Percentage in Total Input	2.04%	0.64%	2.11%	0.96%


Shares of Energy Cost in Total Output Values

	Share of energy cost in total cost	Share of fuel cost in total energy cost
Crop	2.17	81.45
Rice	3.68	83.93
Other cereal crops	3.10	82.15
Specialty crops	2.97	83.92
Vegetables	1.36	76.72
Fruits	1.68	76.57
Floral Crops	1.80	82.52
Livestock	1.28	32.56
Hogs	1.11	48.32
Other livestock	2.68	48.89

Major Components of Input Costs in Fishery

Ranking	Sector	Input Costs (NT\$ Million)	Percentage in total cost (%)
1	065 Petroleum products	9,439	22.63
2	022 Feed	5,569	13.35
3	012 Fish	4,493	10.77
4	106 Vessel	3,124	7.49
5	136 Financing	2,905	6.96
6	037 Other Fabrics	1,701	4.08
7	114 Electricity	1,395	3.34
8	121 Wholesale	1,045	2.51
9	124 Misc. Services	995	2.39
10	010 Agricultural services	949	2.28
	001-162 Total	41,713	

Partial Equilibrium Analysis

- Math-programming
 - Price endogenous
 - Activity-based
 - Sectoral & regional
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Impact of Oil Price Increase on Price, Production Cost, Value-added, Acreage in Crop and Livestock

	30% increase	40% increase	50% increase
Prices			
Crop	0.27	0.34	0.40
Rice	1.45	1.84	2.20
Other cereals	0.61	0.61	0.73
Specialty	0.00	0.00	0.00
Fruits	0.04	0.04	0.05
Vegetables	0.16	0.20	0.23
Floral	-0.02	-0.02	-0.02
Livestock	0.65	0.95	1.07
Hogs	0.12	0.15	0.17
Other	1.32	2.13	2.96
Total Output Values	0.17	0.22	0.26
Crop	0.25	0.32	0.37
Livestock	0.06	0.06	0.10
Production costs	1.14	1.54	1.88
Crop	0.88	1.20	1.38
Livestock	1.38	1.84	2.30
Value Added	-0.39	-0.48	-0.54
Crop	-0.11	-0.18	-0.19
Livestock	-0.98	-1.12	-1.26
Planting Acreages	-0.15	-0.15	-0.41
North	0.00	0.00	0.00
Central	0.17	0.17	0.60
South	-0.03	-0.03	-0.06
East	-2.66	-2.70	-8.09

Impact of Oil Price Increase on Price, Production Cost, Value-added, Acreage in the Fishery

		Coastal 30% Distance 73%	Coastal 40% Distance 98%	Coastal 50% Distance 122%
Distance water	Production	-2.95	-4.02	-5.10
	Output Value	-1.57	-2.23	-2.90
	Production Cost	7.63	10.09	12.49
	Value-added	-14.08	-18.98	-23.81
Coastal	Production	-2.30	-2.75	-3.16
	Output Value	-1.50	-1.71	-1.96
	Production Cost	8.42	11.09	13.89
	Value-added	-4.77	-5.92	-7.18
Aquaculture	Production	0.00	0.00	0.00
	Output Value	0.54	0.55	0.59
	Production Cost	0.00	0.00	0.00
	Value-added	2.07	2.11	2.25
Total	Production	-2.05	-2.72	-3.39
	Output Value	-0.95	-1.32	-1.69
	Production Cost	4.76	6.28	7.79
	Value-added	-7.96	-10.66	-13.35

General Equilibrium Analysis

CGE model Simulation



Macroeconomic Impact

	30% increase	40% increase	50% increase
Real GDP	-0.64	-0.85	-1.06
Employment	-1.02	-1.36	-1.70
GDP deflator	0.58	0.77	0.96
CPI	1.17	1.56	1.95
Terms of Trade	-1.01	-1.34	-1.68
Export volume	-2.82	-3.76	-4.70
Import volume	-1.72	-2.30	-2.87
Import Price	1.62	2.16	2.70
Export Price	0.61	0.81	1.01

Sectoral Impact- Ag & Fishery

	Real GDP			Employment			Prices		
	30%	40%	50%	30%	40%	50%	30%	40%	50%
All	-0.50	-0.66	-0.83	-0.82	-1.09	-1.36	0.80	1.06	1.33
Paddy rice	-0.35	-0.47	-0.58	-0.56	-0.74	-0.93	1.16	1.54	1.93
Other cereal	-0.78	-1.05	-1.31	-1.31	-1.75	-2.19	0.70	0.94	1.17
Sugarcane	-0.48	-0.63	-0.79	-0.61	-0.82	-1.02	1.50	2.00	2.50
Specialty	-1.12	-1.49	-1.86	-1.40	-1.87	-2.34	1.01	1.35	1.68
Fruits	-0.50	-0.67	-0.83	-0.61	-0.82	-1.02	0.99	1.32	1.65
Vegetables	-0.43	-0.57	-0.71	-0.60	-0.80	-1.01	0.88	1.18	1.47
Floral	-0.52	-0.70	-0.87	-0.67	-0.89	-1.12	1.09	1.46	1.82
Hog	-0.35	-0.46	-0.58	-0.20	-0.26	-0.33	0.61	0.81	1.02
Other Livestock	-0.21	-0.28	-0.36	-0.38	-0.50	-0.63	0.74	0.98	1.23
Ag Services	-0.42	-0.56	-0.71	-0.88	-1.17	-1.46	1.77	2.35	2.94
Fishery	-0.97	-1.29	-1.62	-1.17	-1.56	-1.96	1.04	1.38	1.73
Forestry	-0.65	-0.87	-1.08	-1.18	-1.57	-1.96	0.29	0.39	0.49

Sectoral Impact- Food Processing

	Real GDP			Employment			Prices		
	30%	40%	50%	30%	40%	50%	30%	40%	50%
All	-0.50	-0.66	-0.83	-0.82	-1.09	-1.36	0.80	1.06	1.33
Slaughtering	-0.24	-0.33	-0.41	-0.36	-0.48	-0.60	0.86	1.15	1.43
Edible oil & fat	-0.38	-0.51	-0.63	-0.80	-1.07	-1.33	0.62	0.83	1.04
Flour	-0.61	-0.81	-1.01	-1.00	-1.33	-1.66	0.43	0.58	0.72
Rice	-0.29	-0.39	-0.49	-0.48	-0.63	-0.79	1.21	1.62	2.02
Sugar	-0.51	-0.69	-0.86	-0.41	-0.55	-0.68	0.80	1.07	1.34
Feed	-0.41	-0.54	-0.68	-0.78	-1.04	-1.30	0.45	0.59	0.74
Canned goods	-1.38	-1.83	-2.29	-1.87	-2.49	-3.11	1.22	1.62	2.03
Frozen goods	-1.15	-1.54	-1.92	-1.63	-2.17	-2.71	0.58	0.77	0.97
Monosodium	-1.56	-2.07	-2.59	-2.17	-2.89	-3.62	0.53	0.71	0.88
Other seasonings	-1.22	-1.62	-2.03	-1.90	-2.54	-3.17	0.80	1.07	1.34
Dairy product	-0.54	-0.73	-0.91	-0.82	-1.10	-1.37	0.73	0.97	1.21
Confectionery	-0.40	-0.53	-0.67	-0.59	-0.79	-0.99	0.74	0.98	1.23
Other foods	-0.63	-0.85	-1.06	-0.90	-1.20	-1.50	0.76	1.01	1.26
Non alcoholic	-0.31	-0.42	-0.52	-0.70	-0.93	-1.16	0.83	1.10	1.38
Alcoholic	-0.48	-0.64	-0.80	-1.05	-1.40	-1.75	0.82	1.10	1.37
Tobacco	-0.64	-0.85	-1.07	-1.41	-1.87	-2.34	0.70	0.93	1.16

Conclusions

- # Both the partial and general equilibrium models show that the impact of oil price hike is lower than expected except the offshore fishery and food processing sectors.
 - # The increase in oil prices has created a timely environment and made ready for a structural reform of the domestic petroleum pricing policies.
 - # The effects of these policy reforms should be carefully examined and cannot be viewed in isolation from other complementary measures and general economic conditions
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