
Production Networks and the Impact of the Financial Crisis in East Asia

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Objectives

- Indicate trade structure and production networks in East Asia
- Using the (updated) Asian input-output table for 2008, estimate the impact of a rapid decline in US import after the financial crisis on the industrial production of East Asian economies.
- Indicate the repercussion effects of the triangular trade with China.

Content

- 1. Real GDP growth rate
- 2. Background of the crisis: trade structure
- 3. Impact of the financial crisis (a sharp decline in US import demand)

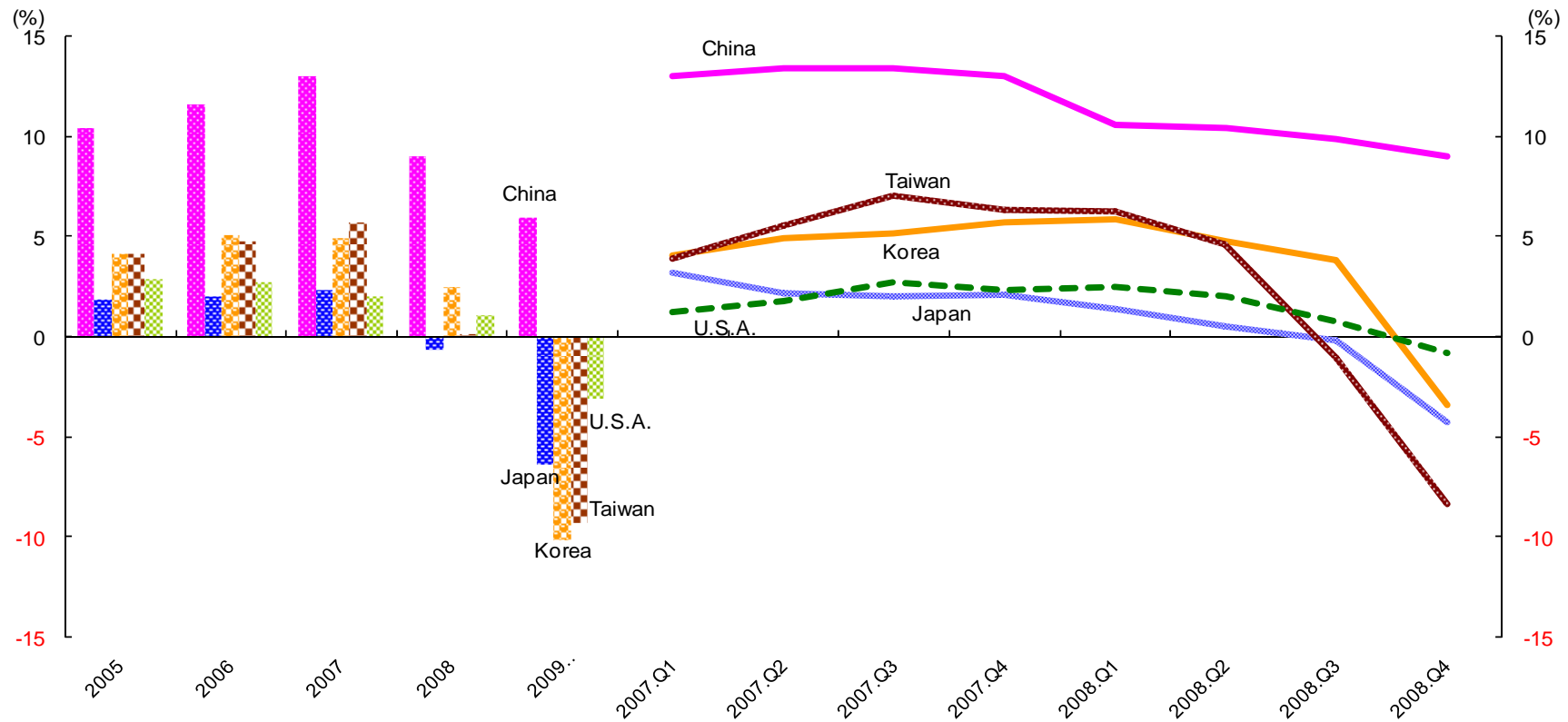
- Appendix 1: Average effective tariff rate of intra-regional trade in East Asia (2006)
- Appendix 2: Background of the triangular trade
- Appendix 3: Summary of the study on the production networks in East Asia (1990-2000)
- Appendix 4: Spatial linkages of the automotive and electronics sectors

1. Real GDP growth rate

- (1) Real GDP growth rate (2009 forecasting)
- (2) Growth rate (quarter)

Only China has positive growth rates

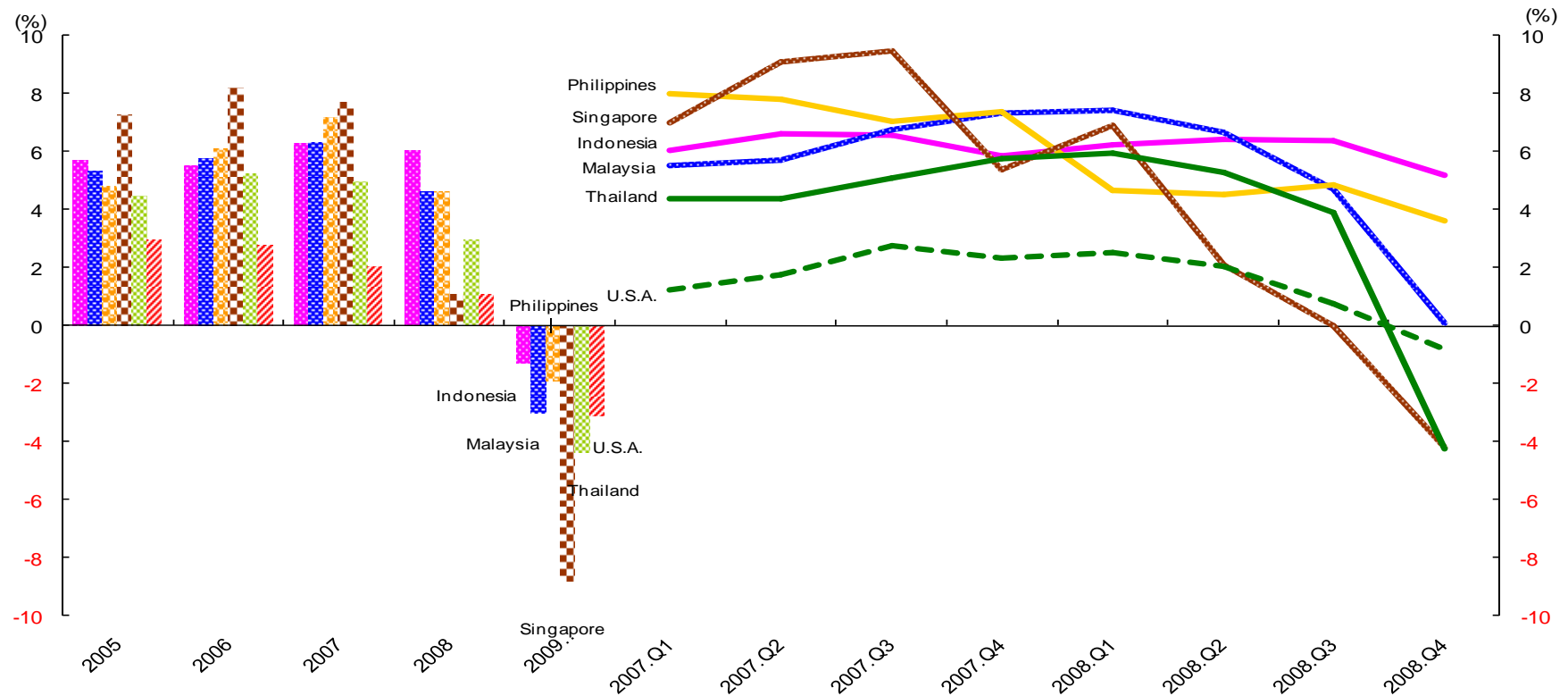
■ Real GDP growth rate (Northeast Asia)



Source: International Monetary Fund, *International Financial Statistics*, various volumes. Asian Development Bank, *Key Indicators*, various volumes (for Taiwan).
Economic Intelligence Unit (2009 Forecast)

Strong impacts on export-oriented Southeast Asian economies

■ Real GDP growth rate (Southeast Asia)



2. Background of the crisis

- Trade structure

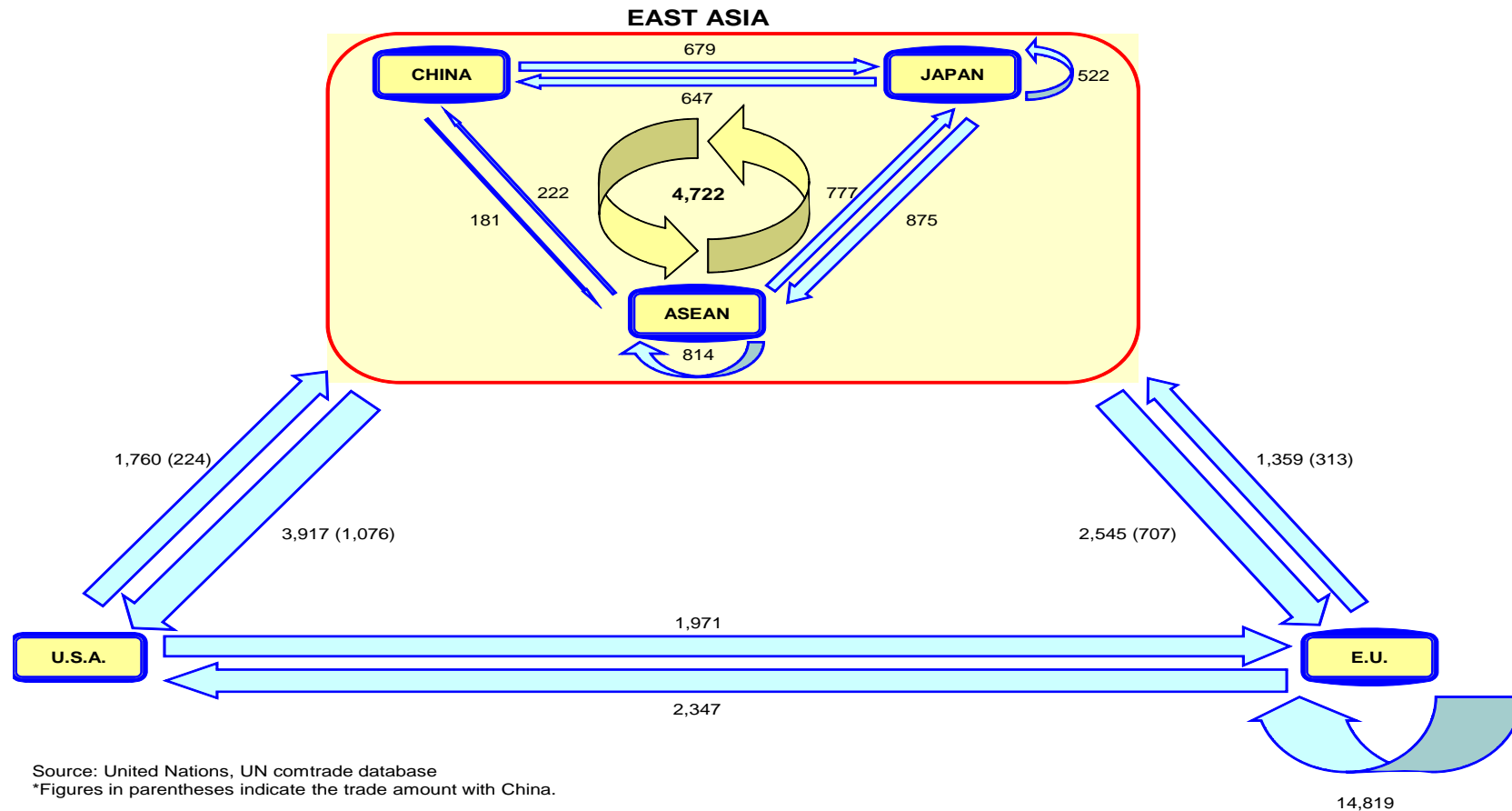
(1) Trade structure

(2) Export/GDP ratio

(3) Major destinations of exported goods

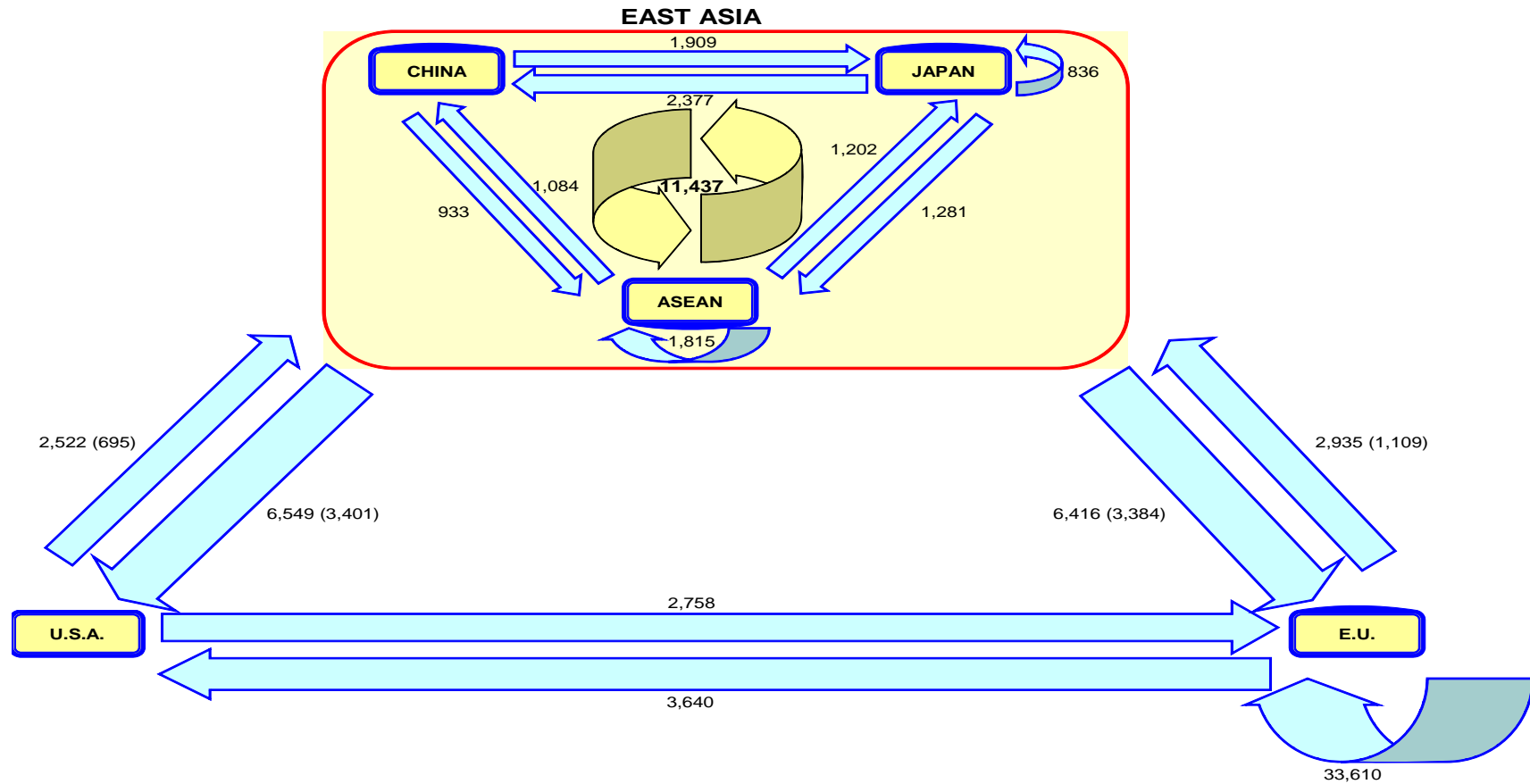
Large trade imbalances with the US and EU

- Trade structure (all commodities, 2000, in hundred million US\$)



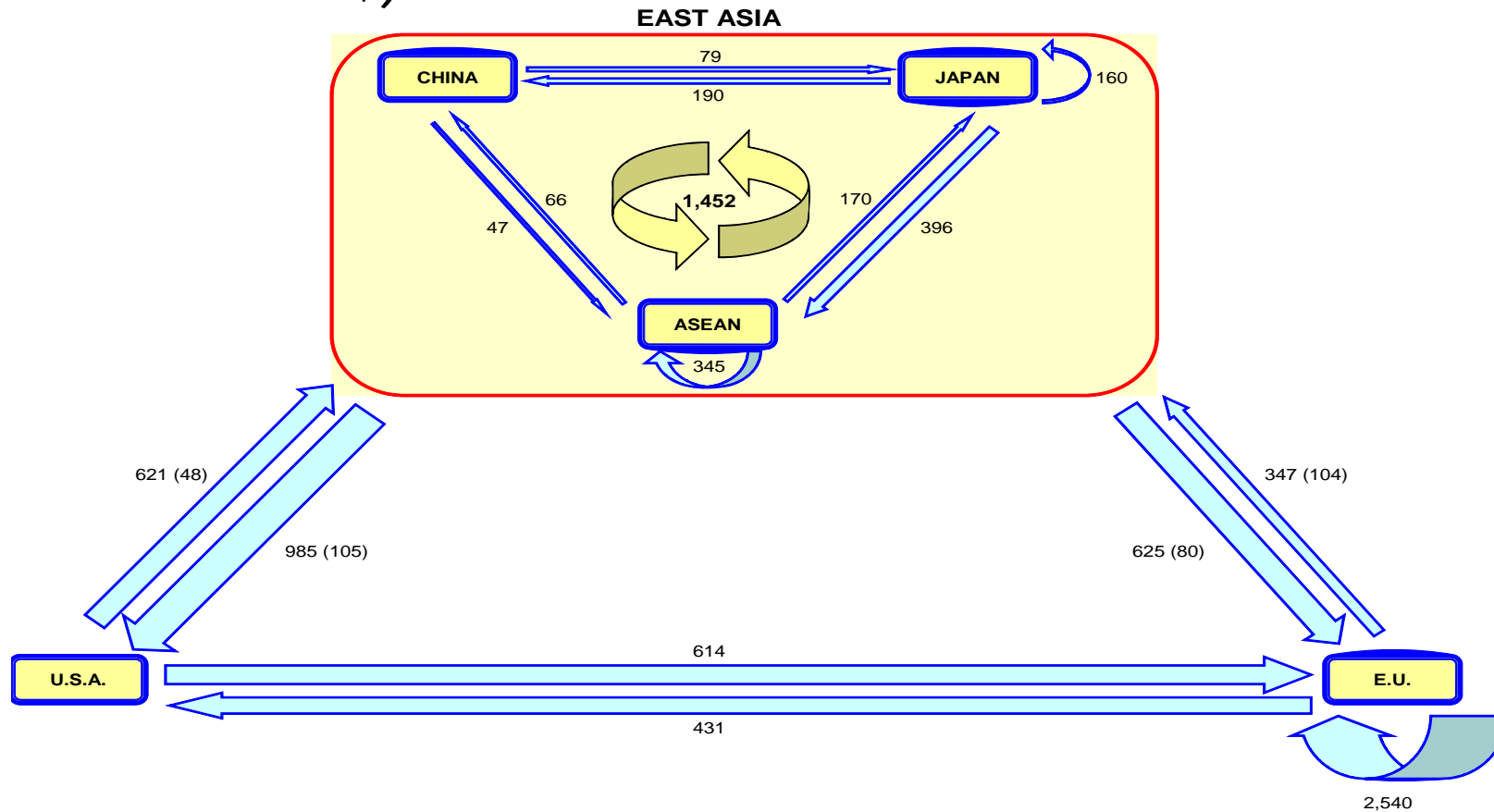
Rapid rise of China and growing trade imbalances

- Trade structure (all commodities, 2007, in hundred million US\$)



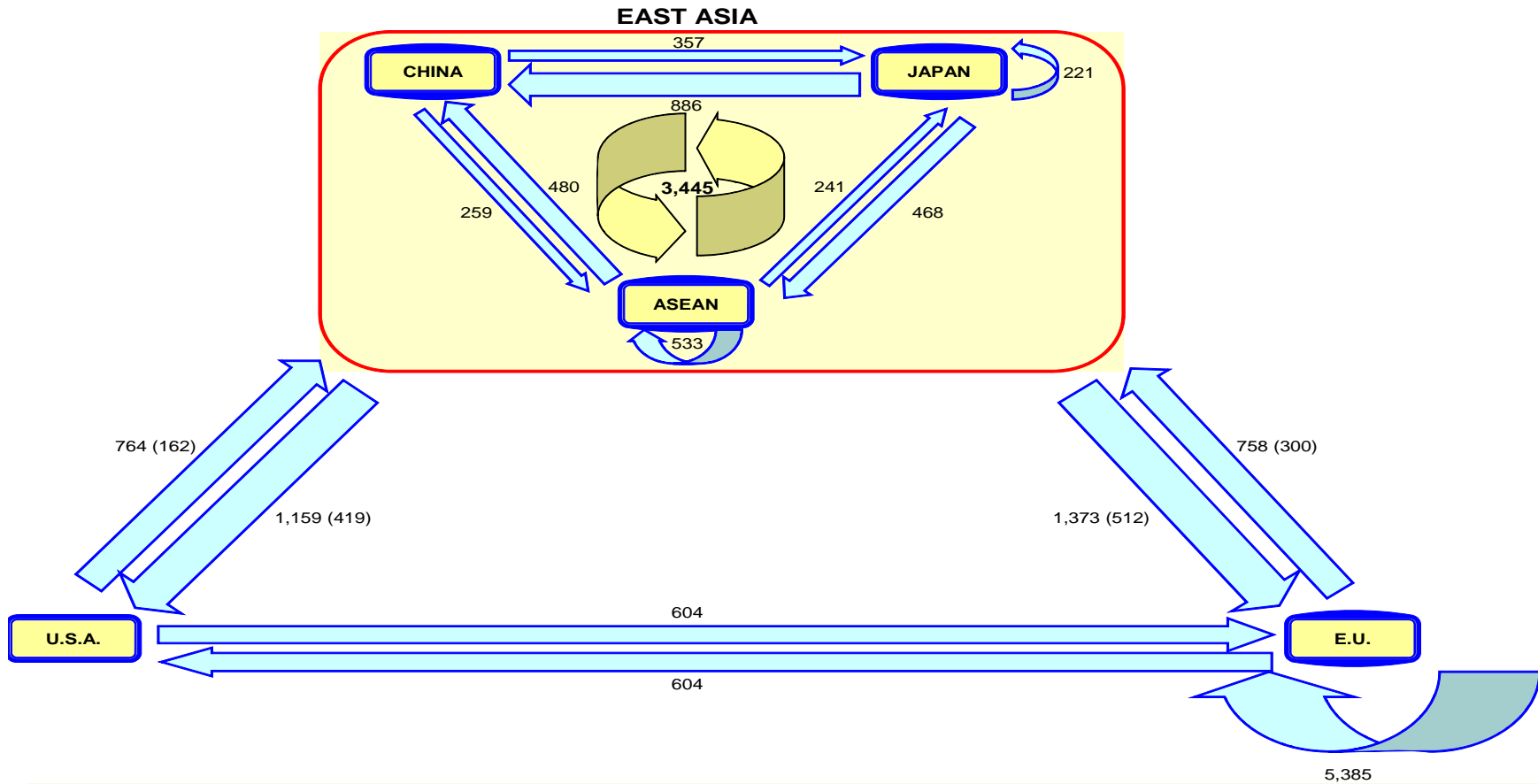
Establishment of production networks in East Asia

- Trade structure (parts & accessories, 2000, in hundred million US\$)



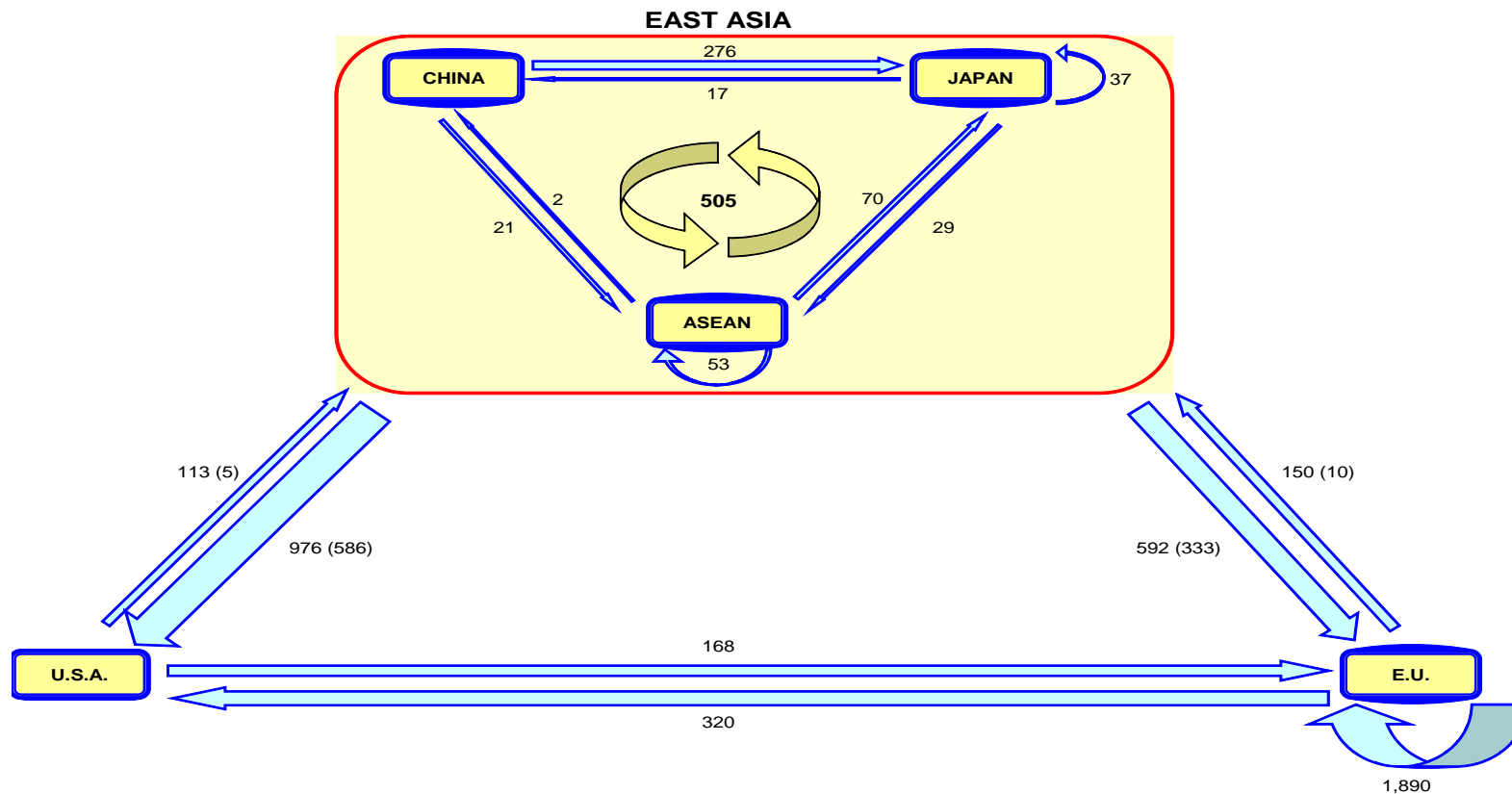
Expanding triangular trade with China

- Trade structure (parts & accessories, 2007, in hundred million US\$)



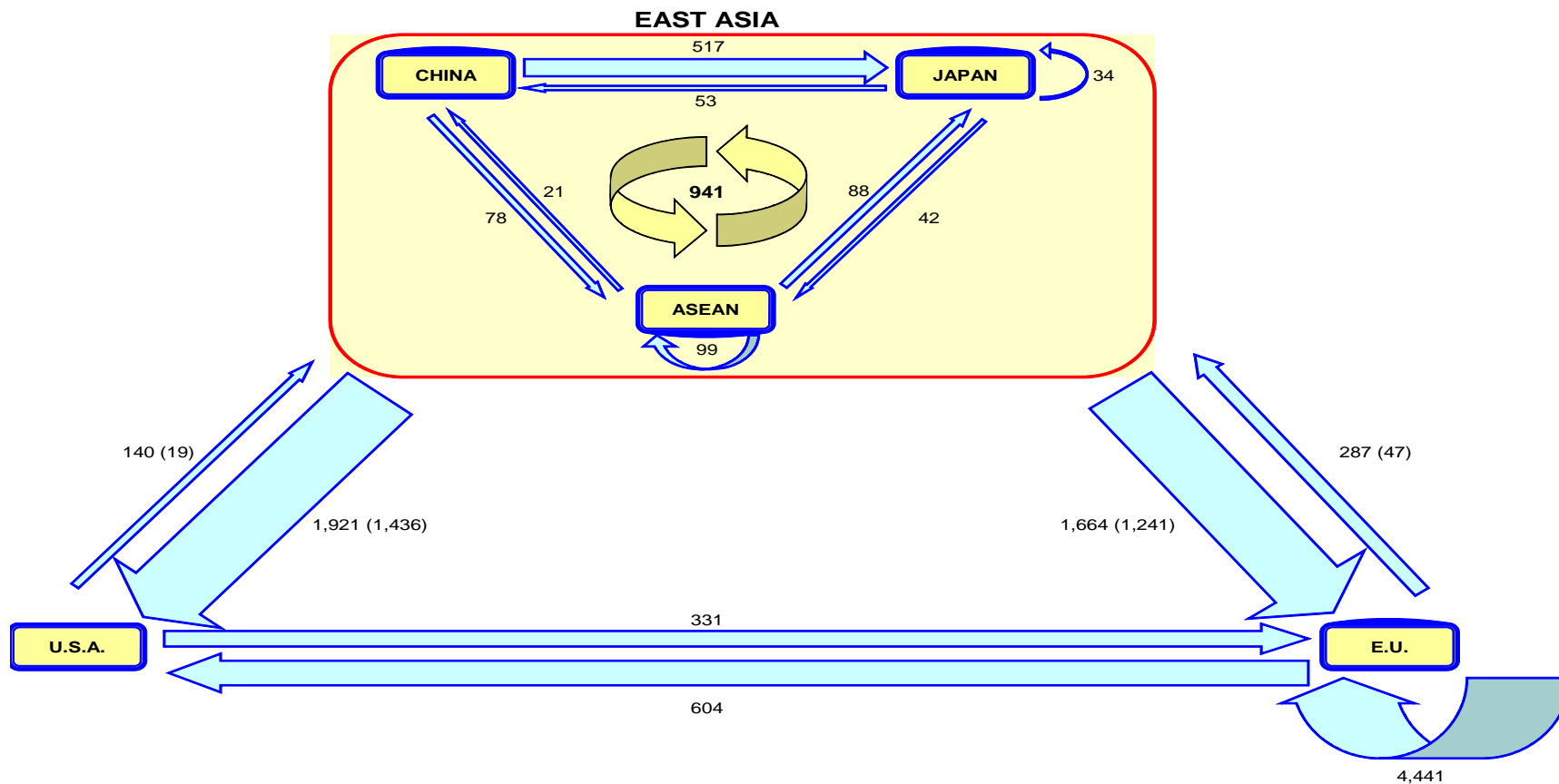
Weak intra-regional trade and high dependency on the US and EU markets

- Trade structure (consumption goods, 2000, in hundred million US\$)



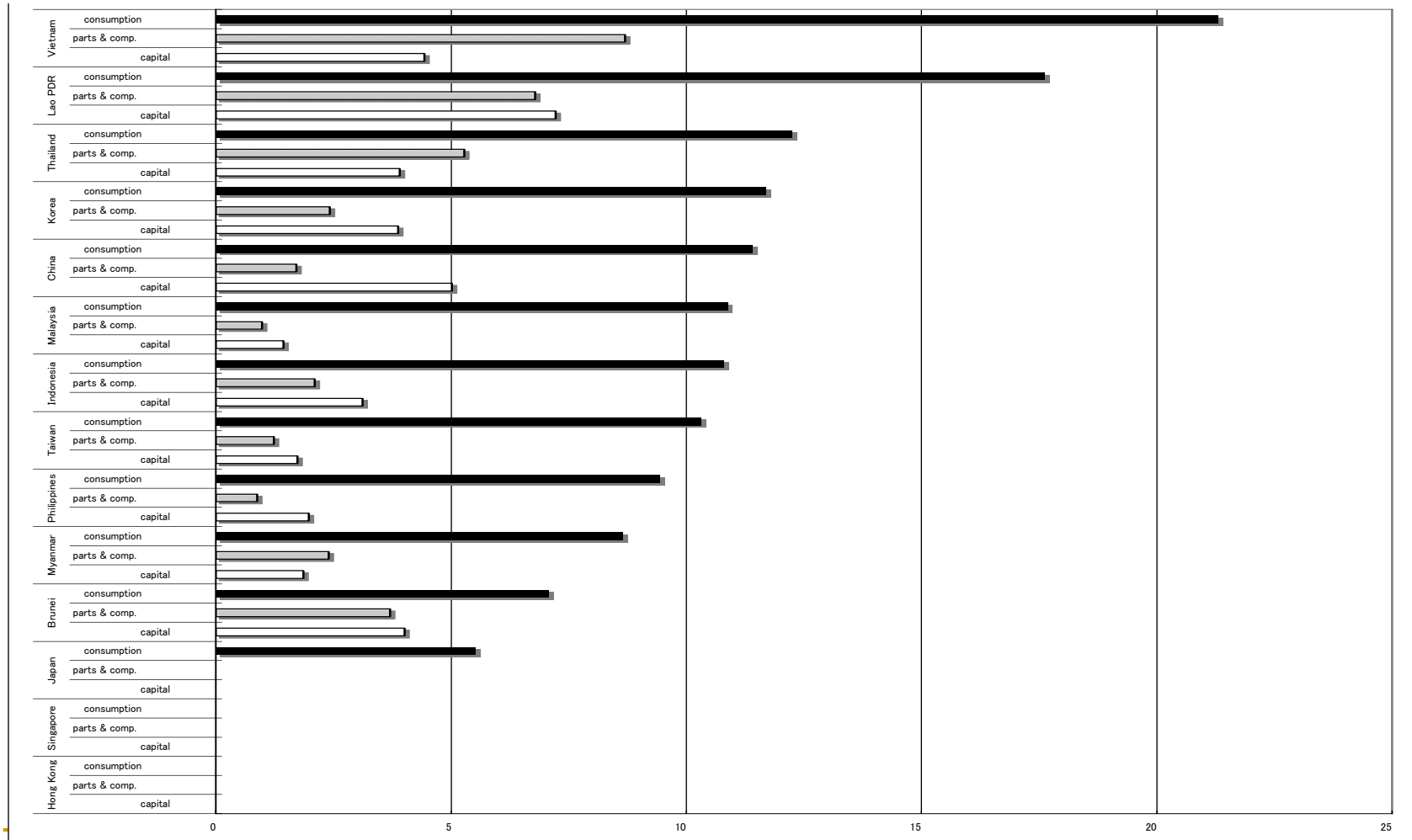
Expanding trade imbalances with advanced economies in East Asia, the US, and EU

- Trade structure (consumption goods, 2007, in hundred million US\$)



Appendix 1: Promoting export industry while restraining import of consumption goods

Average effective tariff rate of intra-regional trade in East Asia (2006)



Appendix 2: Background of the triangular trade

- During 1991 to 2002, 60 percent of FDI came from the advanced East Asian economies: Hong Kong (45%), Japan (8%), Taiwan (8%), Singapore (5%), and Korea (4%).
- Forty percent of China's imports for processing came from Korea, Taiwan, and Hong Kong, and one-fifth from Japan.
- The US accounts for one-fourth of China's processed exports.



Increasing export dependency (especially in Japan, China, and Thailand)

Export/GDP ratio

(%)

	1995	2000	2005	2007
China	20.4	20.8	34.0	37.1
Indonesia	22.5	37.6	29.8	26.4
Japan	8.4	10.3	13.1	16.3
Korea	24.2	33.7	35.9	38.3
Malaysia	83.1	108.8	103.3	97.5
Taiwan	48.0	53.8	64.2	73.8
Philippines	23.5	50.2	41.8	35.0
Singapore	140.3	148.6	191.7	185.5
Thailand	33.6	56.1	62.4	62.5
U.S.A.	7.9	8.0	7.3	8.4

Source: Calculated from WDI Online and UN comtrade.
ADB Key Indicators (for Taiwan).

High dependency on the US and neighboring Northeast Asian economies

Major destinations of exported goods (Northeast Asia 2000)

Commodity			1st		2nd		3rd	
(Rank)	(Commodity Name)	(Share)	(Country)	(Share)	(Country)	(Share)	(Country)	(Share)
CHINA								
1	Textile products	(19.8%)	Japan	(5.3%)	Hong Kong	(4.5%)	USA	(1.8%)
2	Electrical machinery	(18.5%)	Hong Kong	(4.2%)	USA	(3.8%)	Japan	(2.6%)
3	Machinery	(10.8%)	USA	(2.8%)	Hong Kong	(1.9%)	Japan	(1.0%)
TAIWAN								
1	Electrical machinery	(29.1%)	USA	(6.7%)	Hong Kong	(6.4%)	Japan	(3.1%)
2	Machinery	(26.6%)	USA	(7.7%)	Japan	(3.7%)	Hong Kong	(3.5%)
3	Textile products	(10.2%)	Hong Kong	(3.2%)	USA	(1.7%)	Indonesia	(0.4%)
KOREA								
1	Electrical machinery	(26.9%)	USA	(6.8%)	Japan	(2.7%)	Hong Kong	(2.2%)
2	Machinery	(17.3%)	USA	(5.4%)	Japan	(2.0%)	China	(1.2%)
3	Transport equipment	(14.2%)	USA	(3.8%)	Greece	(0.7%)	Germany	(0.7%)
JAPAN								
1	Electrical machinery	(25.1%)	USA	(6.5%)	Hong Kong	(2.2%)	Korea	(1.9%)
2	Machinery	(21.3%)	USA	(6.4%)	Korea	(1.3%)	China	(1.2%)
3	Transport equipment	(21.2%)	USA	(9.4%)	Panama	(1.3%)	Australia	(0.9%)

Source: United Nations, UN comtrade database. World trade Atlas (for Taiwan).

Note: "Share" indicates the percentage ratios to total exports.

Rapidly rising dependency on China

Major destinations of exported goods (Northeast Asia 2007)

Commodity			1st		2nd		3rd	
(Rank)	(Commodity Name)	(Share)	(Country)	(Share)	(Country)	(Share)	(Country)	(Share)
CHINA								
1	Electrical machinery	(24.7%)	Hong Kong	(6.3%)	USA	(4.6%)	Japan	(1.6%)
2	Machinery	(18.8%)	USA	(4.3%)	Hong Kong	(3.0%)	Japan	(1.4%)
3	Textile products	(13.6%)	USA	(1.9%)	Japan	(1.6%)	Hong Kong	(1.5%)
TAIWAN								
1	Electrical machinery	(35.0%)	Hong Kong	(7.7%)	China	(6.2%)	USA	(4.9%)
2	Machinery	(11.5%)	China	(2.3%)	USA	(2.2%)	Hong Kong	(0.9%)
3	Chemical products	(6.1%)	China	(3.2%)	Japan	(0.4%)	Hong Kong	(0.3%)
KOREA								
1	Electrical machinery	(26.2%)	China	(6.7%)	USA	(3.0%)	Hong Kong	(2.5%)
2	Transport equipment	(20.7%)	USA	(3.1%)	Russia	(1.2%)	Germany	(1.2%)
3	Machinery	(11.7%)	China	(2.7%)	USA	(2.0%)	Japan	(0.7%)
JAPAN								
1	Transport equipment	(25.1%)	USA	(8.4%)	Panama	(1.2%)	Russia	(1.2%)
2	Machinery	(19.5%)	USA	(4.1%)	China	(2.8%)	Korea	(1.4%)
3	Electrical machinery	(18.9%)	China	(4.0%)	USA	(2.9%)	Hong Kong	(2.0%)

High dependency on the US, Northeast Asia, and neighboring Southeast Asian economies

Major destinations of exported goods (Southeast Asia 2000)

Commodity			1st		2nd		3rd	
(Rank)	(Commodity Name)	(Share)	(Country)	(Share)	(Country)	(Share)	(Country)	(Share)
INDONESIA								
1	Minerals	(28.3%)	Japan	(12.9%)	Korea	(5.1%)	China	(1.7%)
2	Textile products	(13.2%)	USA	(3.5%)	U. Kingdom	(0.8%)	Japan	(0.8%)
3	Electrical machinery	(10.4%)	Singapore	(2.9%)	USA	(1.8%)	Japan	(1.7%)
MALAYSIA								
1	Electrical machinery	(38.3%)	USA	(9.2%)	Singapore	(8.9%)	Japan	(4.2%)
2	Machinery	(23.5%)	USA	(6.8%)	Singapore	(4.5%)	Japan	(2.6%)
3	Minerals	(9.7%)	Japan	(3.0%)	Korea	(1.2%)	Singapore	(1.1%)
PHILIPPINES								
1	Electrical machinery	(53.9%)	USA	(15.3%)	Singapore	(6.1%)	Japan	(5.9%)
2	Machinery	(20.2%)	USA	(4.5%)	Japan	(4.5%)	Thailand	(1.6%)
3	Textile products	(7.3%)	USA	(5.3%)	U. Kingdom	(0.3%)	Japan	(0.3%)
SINGAPORE								
1	Electrical machinery	(39.7%)	Malaysia	(9.6%)	USA	(6.3%)	Japan	(3.4%)
2	Machinery	(27.5%)	USA	(8.1%)	Malaysia	(3.0%)	Japan	(2.0%)
3	Minerals	(7.4%)	Malaysia	(1.6%)	Hong Kong	(1.6%)	Viet Nam	(0.7%)
THAILAND								
1	Electrical machinery	(22.5%)	USA	(5.3%)	Japan	(3.8%)	Singapore	(2.6%)
2	Machinery	(17.1%)	USA	(3.3%)	Singapore	(2.9%)	Japan	(2.2%)
3	Agricultural products	(7.9%)	Japan	(1.6%)	USA	(1.4%)	Hong Kong	(0.5%)

Rising dependency on Northeast Asia especially China

Major destinations of exported goods (Southeast Asia 2007)

Commodity			1st		2nd		3rd	
(Rank)	(Commodity Name)	(Share)	(Country)	(Share)	(Country)	(Share)	(Country)	(Share)
INDONESIA								
1	Minerals	(30.3%)	Japan	(11.8%)	Korea	(4.8%)	China	(3.6%)
2	Agricultural products	(12.1%)	India	(2.1%)	China	(1.4%)	USA	(1.0%)
3	Textile products	(8.6%)	USA	(3.3%)	Germany	(0.46%)	Japan	(0.44%)
MALAYSIA								
1	Electrical machinery	(29.3%)	Singapore	(5.6%)	USA	(5.3%)	China	(3.0%)
2	Machinery	(18.8%)	USA	(6.6%)	Singapore	(2.1%)	Netherlands	(1.5%)
3	Minerals	(14.5%)	Japan	(3.3%)	Singapore	(2.7%)	Korea	(2.0%)
PHILIPPINES								
1	Electrical machinery	(22.9%)	Netherlands	(6.5%)	Hong Kong	(3.7%)	USA	(2.9%)
2	Machinery	(12.3%)	USA	(4.8%)	Japan	(2.8%)	China	(1.3%)
3	Metal products	(4.5%)	China	(0.9%)	Korea	(0.7%)	Japan	(0.5%)
SINGAPORE								
1	Electrical machinery	(36.4%)	Malaysia	(5.7%)	Hong Kong	(5.6%)	China	(4.7%)
2	Machinery	(17.3%)	USA	(2.5%)	Indonesia	(2.1%)	Malaysia	(1.9%)
3	Minerals	(13.8%)	Hong Kong	(2.4%)	Indonesia	(2.3%)	Malaysia	(2.1%)
THAILAND								
1	Machinery	(18.7%)	China	(2.7%)	USA	(2.6%)	Japan	(1.9%)
2	Electrical machinery	(16.8%)	Japan	(2.9%)	USA	(2.4%)	Hong Kong	(1.6%)
3	Transport equipment	(9.6%)	Australia	(1.5%)	Indonesia	(0.7%)	Singapore	(0.6%)

4. Impact of the financial crisis (a sharp decline in US import demand)

- Impact on production

(1) Trend in US import demand

(2) Production induced by US import demand

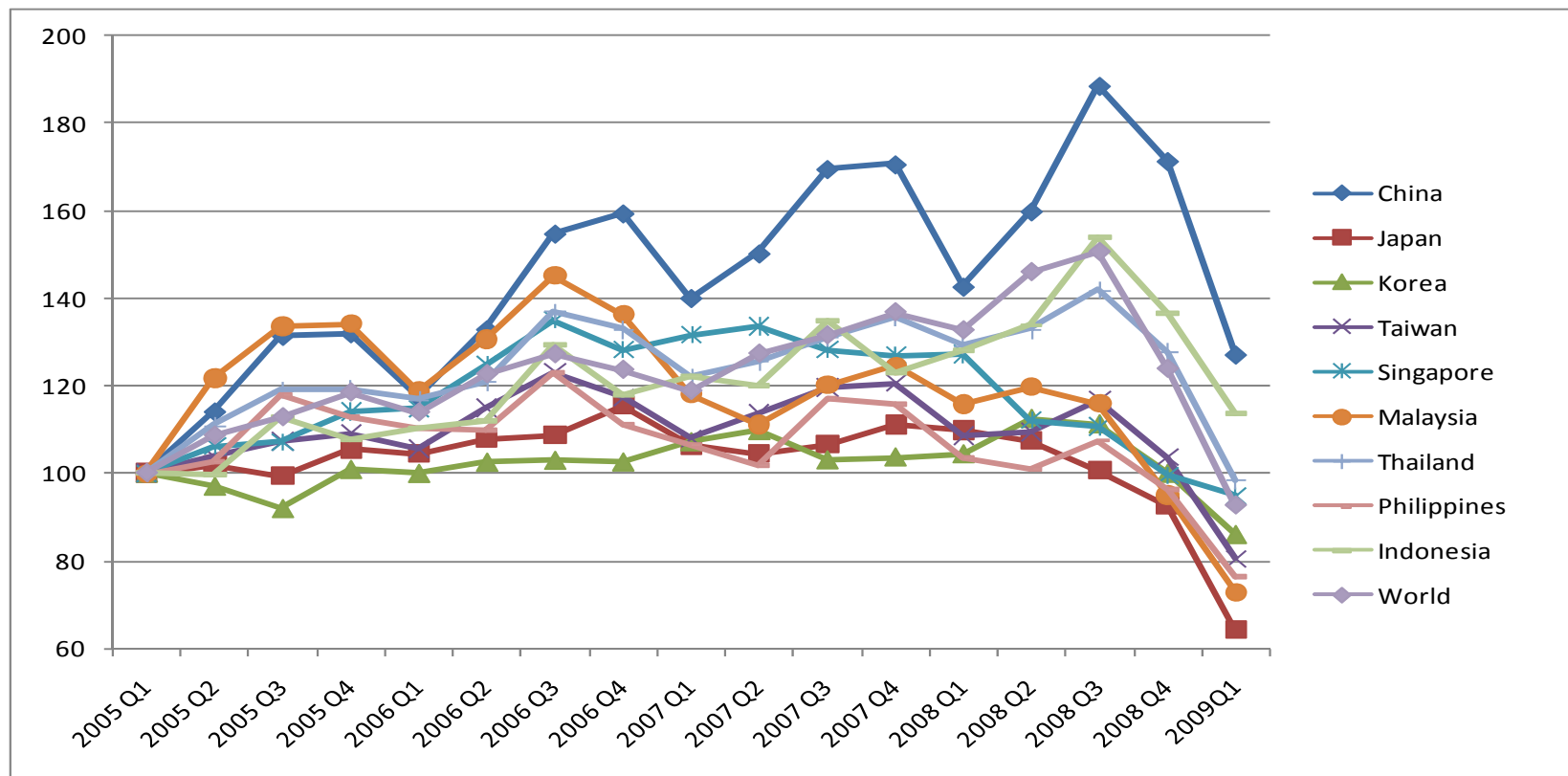
(3) Trend in production induced by US import demand

(4) Change in induced production after the financial crisis (08Q3-09Q1)

(5) Shares of spatial linkages

Rapid decline in US import demand after the 4th quarter, 2008 (the largest decline in Japan)

Trend in US import demand (2005Q1=100)



Source: U.S. Dept. of Commerce, Bureau of Census

- Largest impact on China
- Induced production is two to three times as large as US import demand.

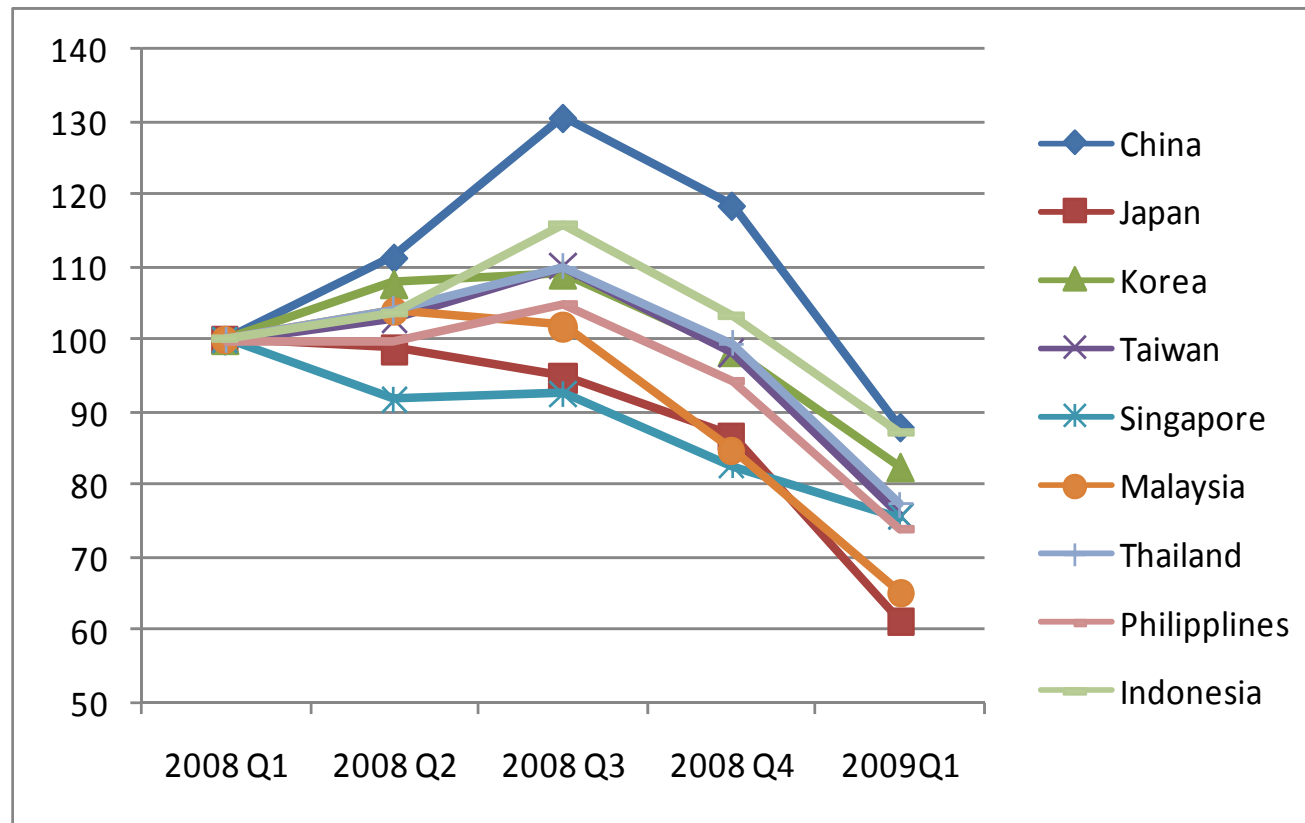
Production induced by US import demand(in billion US\$)

	2008 Q1	2008 Q2	2008 Q3	2008 Q4	2009Q1	(2009.04)
China	162.3	180.7	211.9	192.3	142.9	48.3
Japan	84.4	83.3	80.0	73.2	51.8	17.0
Korea	27.1	29.2	29.5	26.6	22.3	7.3
Taiwan	19.6	20.2	21.6	19.3	14.9	5.0
Singapore	11.9	10.9	11.0	9.8	9.0	3.2
Malaysia	16.7	17.4	17.0	14.2	10.9	3.5
Thailand	11.2	11.7	12.3	11.2	8.7	2.6
Philippines	9.6	9.6	10.1	9.1	7.1	2.2
Indonesia	9.1	9.5	10.6	9.4	8.0	2.4

Source: Calculated from Asian International Input-Output Table (2008) and U.S. Dept. of Commerce, Bureau of Census

Rapid decline in production induced by US import demand after the 4th quarter, 2008 (the largest decline in Japan)

Trend in production induced by US import demand(2008Q1=100)



Source: Calculated from Asian International Input-Output Table (2008) and U.S. Dept. of Commerce, Bureau of Census

- Textile, electronics, and material industries declined in China, while transport equipment, electronics, general machinery, and material industries were affected in Japan.
- Transport equipment had much lower spatial linkages than electronics.

Change in induced production after the financial crisis (08Q3-09Q1) in billion US\$

China					Japan				
	-69.0					-28.2			
	Share (%)	Elasticity	Spatial linkages (%)	China's export (%)		Share (%)	Elasticity	Spatial linkages (%)	China's export (%)
Textile and leather	14.4	1.00	0.17	0.02	Transport equipment	20.8	1.26	0.21	0.09
Computers and electronic equipment	13.8	0.94	1.29	0.22	Services	20.0	1.20	1.29	0.70
Other electrical equipment	12.7	1.08	0.40	0.04	Computers and electronic equipment	13.2	0.97	4.26	2.40
Other manufacturing products	10.4	1.11	0.19	0.02	Other electrical equipment	8.5	1.06	0.98	0.47
Metal products	9.3	1.04	0.62	0.08	General machinery	7.6	0.77	0.60	0.26
Chemical products	8.3	0.95	0.39	0.06	Metal products	7.5	0.86	2.14	1.01
Trade and transport	4.7	1.00	0.42	0.06	Trade and transport	6.8	0.96	1.67	0.90
Services	3.5	0.97	0.15	0.02	Chemical products	3.8	0.59	1.30	0.78
Electricity, gas and water supply	3.4	1.01	0.17	0.02	Other manufacturing products	3.2	0.88	0.46	0.27
Pulp, paper and printing	2.7	1.15	0.08	0.01	Pulp, paper and printing	1.8	0.93	0.33	0.19

Source: Calculated from Asian International Input-Output Table (2008) and U.S. Dept. of Commerce, Bureau of Census

- Electronics, material, and transport equipment declined in Korea, while electronics, material, and textile were affected in Taiwan.
- Both of these countries were strongly affected by a sharp decline in the triangular trade with China.

Change in induced production after the financial crisis (08Q3-09Q1) in billion US\$

Korea					Taiwan				
	-7.2					-6.7			
	Share (%)	Elasticity	Spatial linkages (%)	China's export (%)		Share (%)	Elasticity	Spatial linkages (%)	China's export (%)
Computers and electronic equipment	23.9	1.23	12.10	8.06	Computers and electronic equipment	25.9	1.03	11.40	7.79
Metal products	12.8	1.10	4.34	2.69	Metal products	13.0	1.10	2.87	2.14
Services	11.2	0.89	2.56	1.73	Services	12.4	1.14	2.27	1.63
Other electrical equipment	8.6	0.55	2.33	1.44	Other electrical equipment	6.7	0.60	1.03	0.66
Petroleum and petro products	8.1	1.84	1.41	1.07	Trade and transport	6.6	0.98	2.90	2.08
Chemical products	7.8	1.11	4.12	3.22	Other manufacturing products	5.5	0.97	0.81	0.60
Transport equipment	5.3	0.86	0.19	0.08	Textile and leather	5.5	1.21	0.67	0.58
Trade and transport	4.9	0.98	2.25	1.52	General machinery	5.2	1.12	0.32	0.17
Textile and leather	3.5	1.20	0.69	0.59	Chemical products	4.9	1.08	2.32	1.99
General machinery	3.5	0.75	0.53	0.25	Petroleum and petro products	3.5	0.95	1.27	0.99

- Rapid decline in electronics in Singapore and Malaysia
- Strong spatial linkages in electronics, especially through the triangular trade with China

Change in induced production after the financial crisis (08Q3-09Q1) in billion US\$

Singapore					Malaysia				
	-2.0					-6.1			
	Share (%)	Elasticity	Spatial linkages (%)	China's export (%)		Share (%)	Elasticity	Spatial linkages (%)	China's export (%)
Computers and electronic equipment	44.9	1.82	17.38	6.47	Computers and electronic equipment	54.1	1.10	8.49	5.16
Other electrical equipment	29.5	1.84	5.65	1.83	Other electrical equipment	15.6	1.12	1.56	0.62
Services	15.0	1.10	4.69	1.80	Trade and transport	8.0	1.01	1.64	0.87
General machinery	8.1	1.23	2.39	0.83	Services	3.1	0.84	0.77	0.29
Trade and transport	7.8	0.88	5.67	2.18	Metal products	2.9	0.99	0.62	0.24
Petroleum and petro products	6.6	0.99	7.68	2.87	Timber and wooden products	2.3	0.96	0.24	0.08
Metal products	4.8	1.26	2.54	0.80	Food, beverage and tobacco	2.2	0.65	0.10	0.05
Transport equipment	1.8	0.84	0.57	0.17	Textile and leather	1.9	0.93	0.10	0.03
Other manufacturing products	1.1	1.31	0.58	0.36	Other manufacturing products	1.5	0.88	0.20	0.09
Pulp, paper and printing	1.0	1.71	0.30	0.13	Forestry	1.3	1.22	0.18	0.10

- Rapid decline in electronics in Thailand and the Philippines
- Strong spatial linkages in electronics, especially through the triangular trade with China

Change in induced production after the financial crisis (08Q3-09Q1) in billion US\$

Thailand					Philippines				
	-3.6					-3.0			
	Share (%)	Elasticity	Spatial linkages (%)	China's export (%)		Share (%)	Elasticity	Spatial linkages (%)	China's export (%)
Computers and electronic equipment	22.24	1.00	8.71	5.98	Computers and electronic equipment	42.5	1.01	13.08	8.89
Other electrical equipment	16.85	1.32	1.52	0.68	Trade and transport	10.6	1.04	3.48	2.01
Trade and transport	7.62	1.01	2.26	1.25	Services	8.0	0.89	2.23	1.27
Other manufacturing products	6.54	1.32	0.23	0.10	Other electrical equipment	6.8	0.88	0.40	0.21
Services	5.41	1.11	0.73	0.38	Food, beverage and tobacco	6.2	1.31	0.33	0.17
Textile and leather	5.34	0.73	0.30	0.18	Textile and leather	5.4	0.67	0.11	0.06
General machinery	4.70	0.75	1.15	0.32	Transport equipment	3.3	1.89	0.24	0.02
Metal products	4.38	1.53	0.49	0.11	Metal products	2.5	1.33	0.60	0.18
Fishery	4.02	1.21	0.03	0.01	Electricity, gas and water supply	2.2	1.03	0.54	0.29
Forestry	3.84	1.40	0.62	0.28	Other agricultural products	1.9	1.14	0.11	0.05

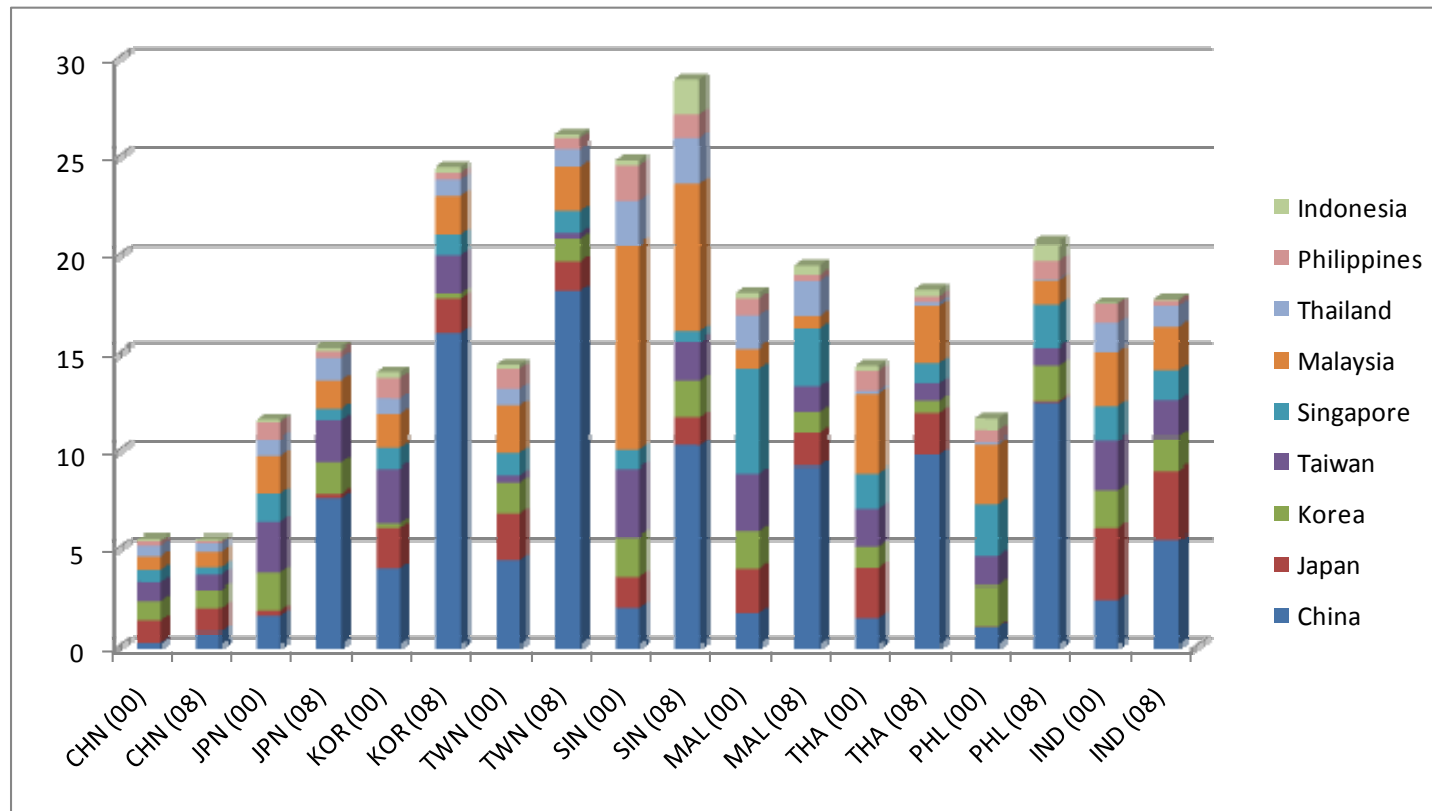
- Rapid decline in primary commodity production in Indonesia
- Strong spatial linkages in crude petroleum, natural gas, and other mining

Change in induced production after the financial crisis (08Q3-09Q1) in billion US\$

Indonesia	-2.6			
	Share (%)	Elasticity	Spatial linkages (%)	China's export (%)
Crude petroleum and natural gas	16.6	1.68	4.45	1.20
Forestry	10.6	1.96	0.20	0.13
Trade and transport	8.6	1.00	2.65	0.95
Chemical products	7.4	1.34	1.08	0.45
Services	6.5	1.12	1.32	0.49
Metal products	5.6	1.64	1.90	0.35
Other electrical equipment	5.1	0.98	0.64	0.17
Other mining	4.4	1.18	3.52	1.55
Food, beverage and tobacco	3.8	0.91	0.33	0.11
Computers and electronic equipment	3.8	1.38	1.02	0.48

Rapid increase in the repercussion effects induced by the triangular trade with China (especially in Japan, Korean and Taiwan)

Shares of spatial linkages (2000, 2008)



Source: Calculated from Asian International Input-Output Tables (2000, 2008)

Appendix 3: Summary of the study on the production networks in East Asia (1990-2000)

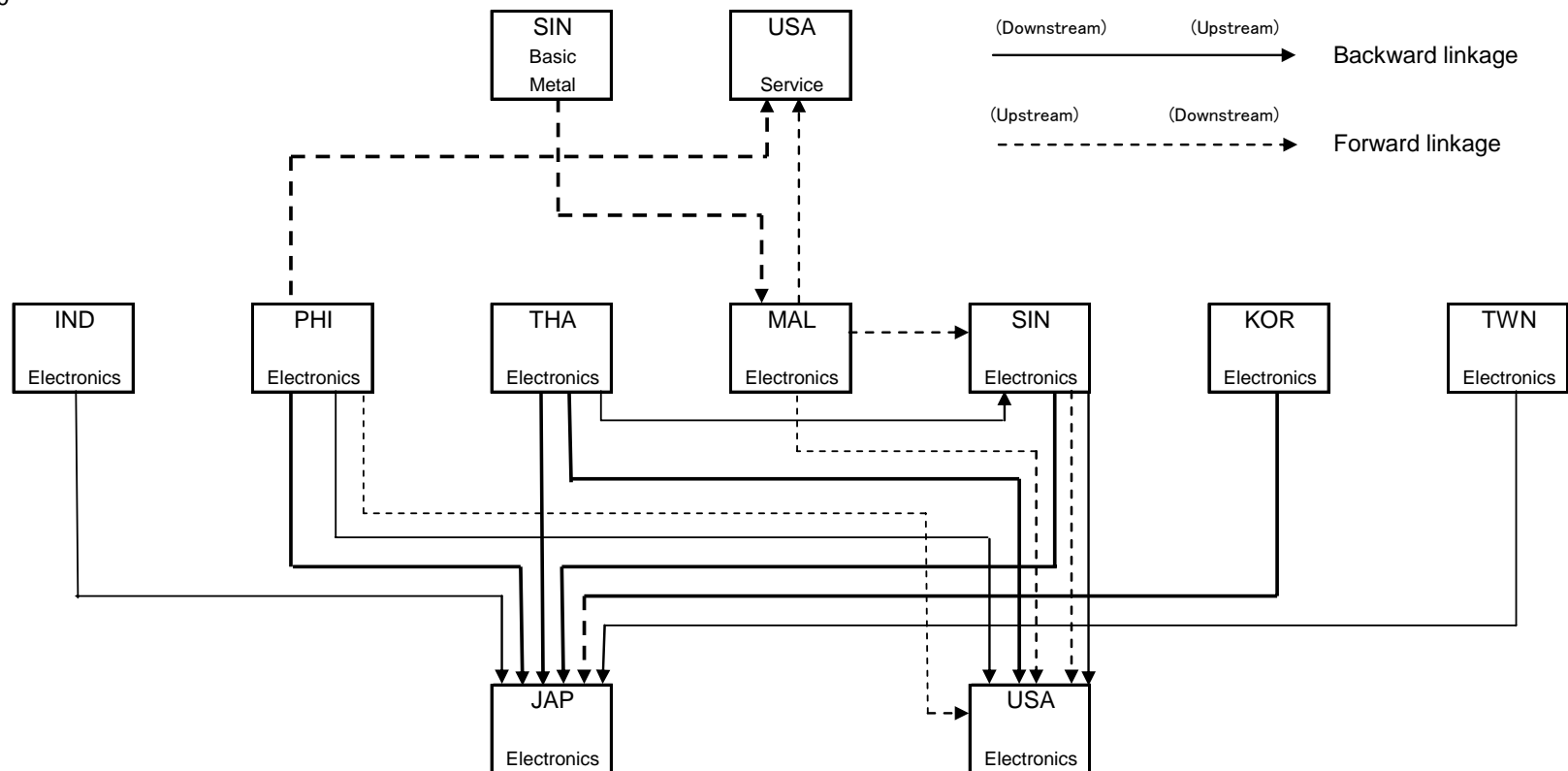
- Fact 1: Intermediate goods trade was a driving force of trade in East Asia
- Fact 2: Intermediate goods, especially material and machinery industry, increased their proportions of intra-industry trade.
- Fact 3: Many sectors decreased local content. Among them, the electronics sector decreased local content most sharply, whereas the automotive sector increased it most.

Appendix 3: Summary of the study on the production networks in East Asia (1990-2000) cont'd

- Fact 4: In the electronics sector, while local content, as well as import content from Japan, declined considerably, import content from East Asia increased sharply, so that the production networks had been shaped covering the entire region.
- Fact 5: The automotive sector increased local content, and a large portion of a decrease in import content from Japan was offset by an increase in local content. Therefore, the production networks of the automotive sector expanded only within the neighboring ASEAN countries.

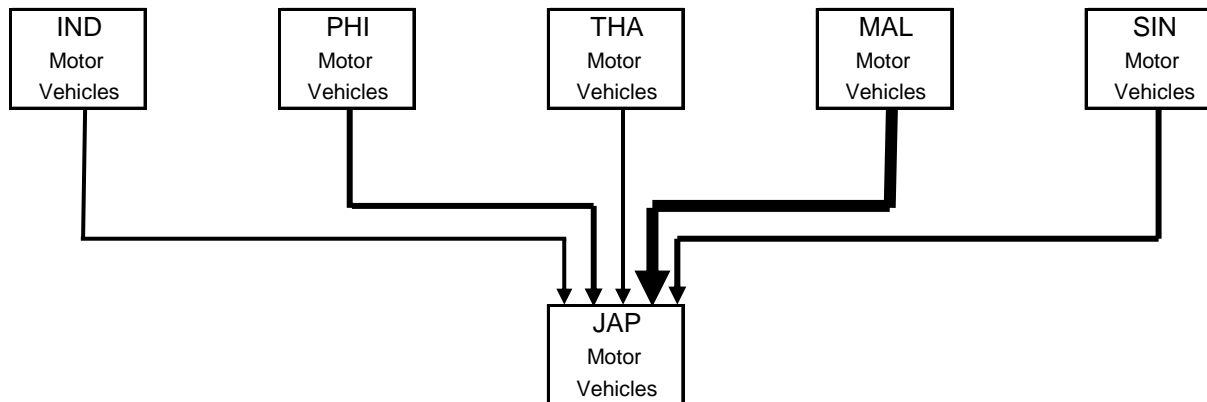
Spatial linkages (electronics, 1990)

Electronics Sector
1990



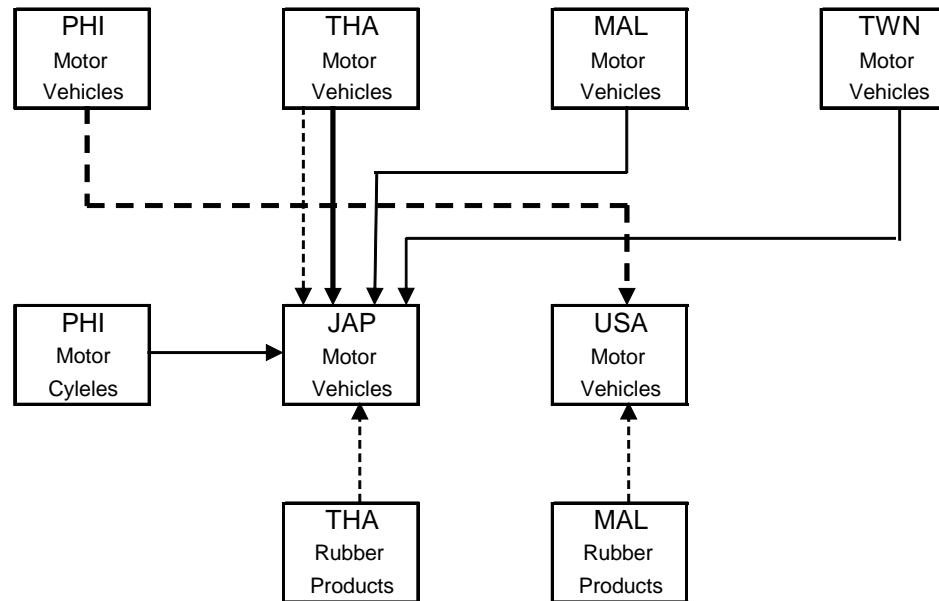
Spatial linkages (automotive, 1990)

Automotive Sector
1990



Spatial linkages (automotive, 2000)

Automotive Sector
2000



Source: Asian International Input-Output Tables (1990, 2000)

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- Thank you very much.