

# The Estimation of Domestic Value-Added and Employment Induced by Exports: An Application to Chinese Exports to the United States

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June, 2001

# Objectives

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- ◆ Develop a methodological framework for the estimation of the increases in domestic value-added and employment in a country in response to increases in its exports, in the aggregate as well as disaggregated by commodity and by destination
- ◆ Apply this methodology empirically to the estimation of the increases in Chinese domestic value-added, or equivalently, Chinese GDP, and employment, as a consequence of increases of US\$1,000 in aggregate Chinese exports to the United States and, say, US\$1,000 in the exports of Chinese textiles to the United States, and to the World
- ◆ The methodology is applicable to the analysis of the effects of exports to any specific country, or groups of countries, or to the World as a whole

# Motivation: How to Measure the Relative Gains from Trade between Trading Partner Countries?

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- ◆ Is the bilateral trade balance a good or useful measure of the relative gains from trade between two trading partner countries?
  - ◆ The theory of comparative advantage of Ricardo tells us that both trading partner countries will gain from trade but does not specify the distribution of the gains from trade
  - ◆ Efficiency gains from exports (and imports) are difficult to measure—e.g., gains from specialization and division of labor, from the realization of economies of scale, and from competitive pressure
- ◆ Focus on value-added (GDP) and employment, which are what the politicians and the public really care about (based on the assumption of existence of slacks in the economy, e.g., surplus labor and other resources)
  - ◆ How much value-added is generated per unit of exports?
  - ◆ How much employment is generated per unit of exports?
- ◆ Perhaps one may also focus on the effects on the levels and rates of growth of prices (in both the exporting and the importing countries)

# Practical Motivation: Large Imbalance in China-U.S. Trade in Favor of China

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- ◆ Large trade imbalances between China and the United States, e.g., for 1999, estimates of China's trade surplus with the United States include:

Official U.S. statistics	US\$68.7 billion
Official Chinese statistics	US\$22.4 billion
Fung and Lau (2001)	US\$47.8 billion

# A Hypothetical Example

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- ◆ Hypothetical example:
  - ◆ China exports US\$ 1 billion worth of shoes to the U.S. but imports US\$600 million worth of leather from the U.S.
  - ◆ China runs a bilateral trade surplus vis-à-vis the United States of US\$400 million on an f.o.b. basis
  - ◆ Total Chinese domestic value-added from its exports to the U.S. is therefore at most US\$400 million
  - ◆ U.S. domestic value-added from its exports to China can be as high as US\$600 million (This is likely to be the case if the cattle is raised entirely in the United States by U.S. cowboys using very little imported intermediate inputs either directly or indirectly)
- ◆ Thus, it is possible for the bilateral trading partner with a trade surplus to “benefit” less (and for the bilateral trading partner with a trade deficit to “benefit” more)

# Specific Empirical Objectives

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- ◆ Focus on the effects of Chinese exports on Chinese domestic value-added (GDP) and employment
- ◆ To measure the effects of a US\$1,000 increase in Chinese textile exports, in aggregate Chinese exports to the United States, and in aggregate Chinese exports to the World on value-added (GDP) and on employment in China
- ◆ Possible alternative indicators include GNP (gross national product) and labor earnings (possibly more relevant for comparative purposes than employment)

# Measurement of the Effects on Value-Added and Employment

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- ◆ Direct and indirect effects
  - ◆ The direct effect is the direct value-added and labor requirement per unit of the output being exported
  - ◆ The indirect effect is the value-added and labor requirements in the production of the domestic intermediate inputs necessary for the production of the output being exported; there are subsequent and higher rounds of indirect effects
  - ◆ What is the incremental direct and indirect domestic value-added or employment induced by the increase of US\$1,000 of exports at constant prices?
- ◆ Feasibility constraints are assumed to be non-binding (infinitely elastic supply), at least locally
  - ◆ Capacity constraints
  - ◆ Balance of payment constraints
- ◆ The possible feedback effects of the increases in value-added and employment on final demands are **not** taken into account

# The Methodology of Input-Output Analysis (Leontief)--Extensions/Innovations

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- ◆ The Basic Competitive-Imports Model
  - ◆ Imported goods and domestically produced goods are assumed to be close substitutes
- ◆ The Non-Competitive-Imports (NCI) Model
  - ◆ Imported goods and domestically produced goods are poor substitutes for each other--they must be separately distinguished as intermediate inputs
- ◆ Augmentation of the Input-Output Table to an Input-Occupancy-Output Table
  - ◆ Employment, fixed assets, working capital, land
- ◆ Disaggregation of net exports final demands into gross exports final demands and gross imports final demands
- ◆ Disaggregation of exports final demands by destination



# The Input-Output Table of the Chinese Economy (1995)

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- ◆ Updated version of the 1992 input-output table
- ◆ Most current input-output table available in 1999
- ◆ 33 sectors are distinguished
- ◆ Only a vector of net exports final demands is available
- ◆ Constructed with producers' prices
- ◆ Imports and domestically produced goods are treated as perfect substitutes

# The Input-Output Table of the Chinese Economy (1995): Sector Classification

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- ◆ 01 Agriculture
- ◆ 02 Coal mining
- ◆ 03 Crude petroleum & natural gas production
- ◆ 04 Metal ore mining
- ◆ 05 Other mining
- ◆ 06 Food manufacturing
- ◆ 07 Manufacture of textiles
- ◆ 08 Manufacture of wearing apparel, leather & products of leather and fur
- ◆ 09 Sawmills & manufacture of furniture
- ◆ 10 Manufacture of paper, cultural & educational articles
- ◆ 11 Electricity, steam & hot water production and supply
- ◆ 12 Petroleum refineries
- ◆ 13 Coking, manufacture of gas & coal products
- ◆ 14 Chemical industries
- ◆ 15 Manufacture of building materials & non-metallic mineral products
- ◆ 16 Primary metal manufacturing
- ◆ 17 Manufacture of metal products

# The Input-Output Table of the Chinese Economy (1995): Sector Classification

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- ◆ 18 Manufacture of machinery
- ◆ 19 Manufacture of transport equipment
- ◆ 20 Manufacture of electric machinery & instrument
- ◆ 21 Manufacture of electronic & communication equipment
- ◆ 22 Manufacture of instruments and meters, etc.
- ◆ 23 Maintenance & repair of machinery and equipment
- ◆ 24 Industries not elsewhere classified
- ◆ 25 Construction
- ◆ 26 Freight transport & communication
- ◆ 27 Commerce
- ◆ 28 Restaurants
- ◆ 29 Passenger transport
- ◆ 30 Public utilities & service to households
- ◆ 31 Culture, education, health & scientific research
- ◆ 32 Finance & insurance
- ◆ 33 Public administration

# The Competitive-Imports Model

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- ◆  $Ax + FD = x$ , where  $A$  is a matrix of input-output coefficients,  $x$  is a vector of gross outputs, and  $FD = C + INV + G + (E - M)$ , is a vector of final demands
- ◆ Holding  $C$ ,  $INV$ ,  $G$  and  $M$  constant, what is the total effect of an autonomous change in  $E$ ? Note that  $\Delta FD = \Delta E$
- ◆  $\Delta x = (I - A)^{-1} \Delta E$
- ◆  $\Delta VA = \{\text{diag. } A_V\} \Delta x = \{\text{diag. } A_V\} (I - A)^{-1} \Delta E$
- ◆  $\Delta L = \{\text{diag. } A_L\} \Delta x = \{\text{diag. } A_L\} (I - A)^{-1} \Delta E$
- ◆ where  $A_V =$  vector of value-added per unit gross output;  
 $A_L =$  vector of labor requirements per unit gross output.

# An Input-Output Table of the Non-Competitive Imports Type

Table 1: An Input-Output Table of the Non-Competitive-Imports Type

	Intermediate Demands	Final Demands	Gross Domestic Output ( $X_i$ ) or Imports ( $M_i$ )
	1, 2, ..., n total	Household Consumption + Government Consumption + Gross Capital Formation + Exports	
Domestic intermediate inputs 1 2 : n	$X_{ij}^D$	$F_i^D$	$X_i$
Imported intermediate inputs 1 2 : n	$X_{ij}^M$	$F_i^M$	$M_i$
Total intermediate inputs			
Value-added Depreciation Compensation of laborers Net taxes on production Operating surplus Total	$V_j$		
Total inputs	$X_j$		

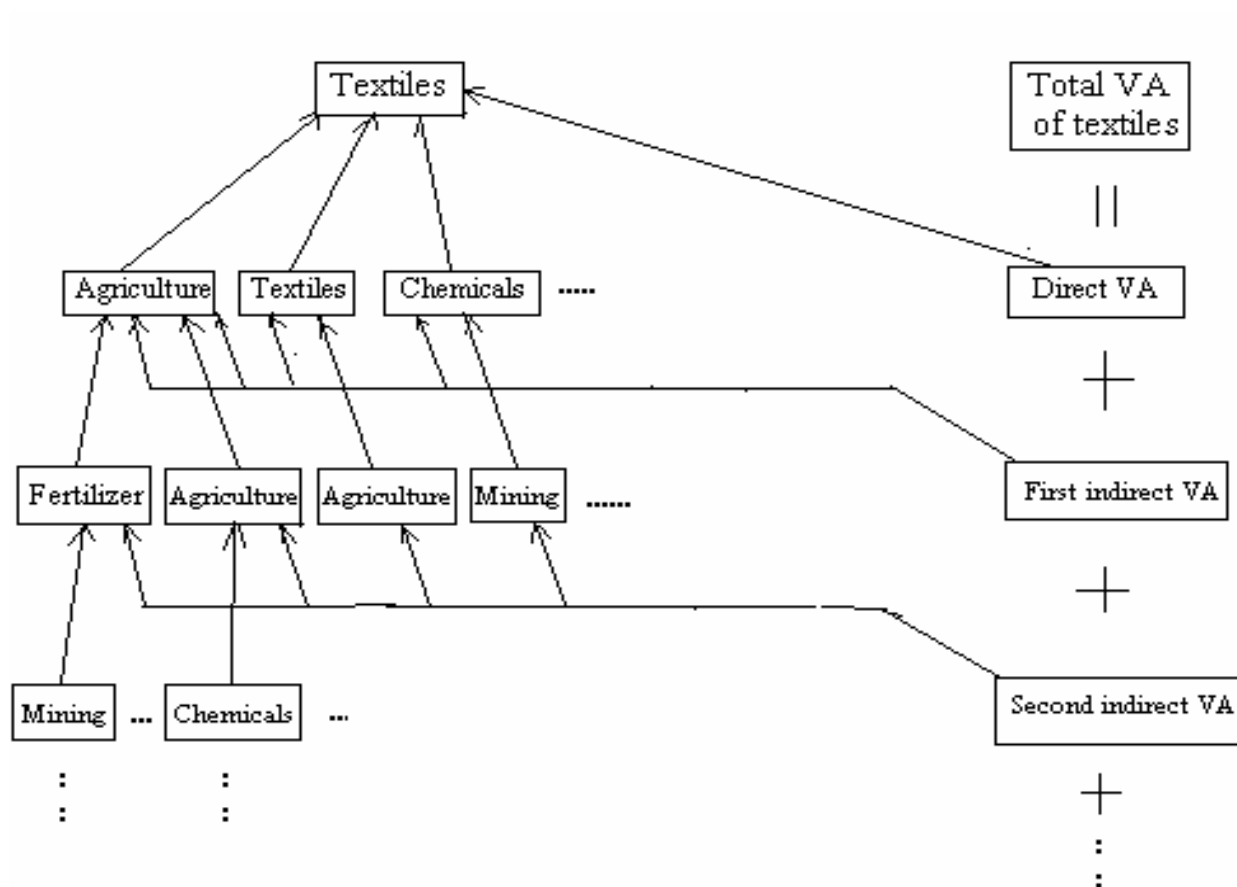
# The Non-Competitive-Imports Model

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- ◆  $A^D x + FD = x$ ;
- ◆  $A^M x + FM = M$ , where  $A^M$  is the matrix of imported input-output coefficients,  $FD = C + INV + G + E$ , and  $FM$  is a vector of final demands for imports
- ◆ Holding  $C$ ,  $INV$ ,  $G$  and  $FM$  constant, what is the total effect of an autonomous change in  $E$ ?
- ◆  $\Delta x = (I - A^D)^{-1} \Delta E$
- ◆  $\Delta M = A^M (I - A^D)^{-1} \Delta E$
- ◆  $\Delta VA = \{\text{diag. } A_V\} \Delta x = \{\text{diag. } A_V\} (I - A^D)^{-1} \Delta E$
- ◆  $\Delta L = \{\text{diag. } A_L\} \Delta x = \{\text{diag. } A_L\} (I - A^D)^{-1} \Delta E$

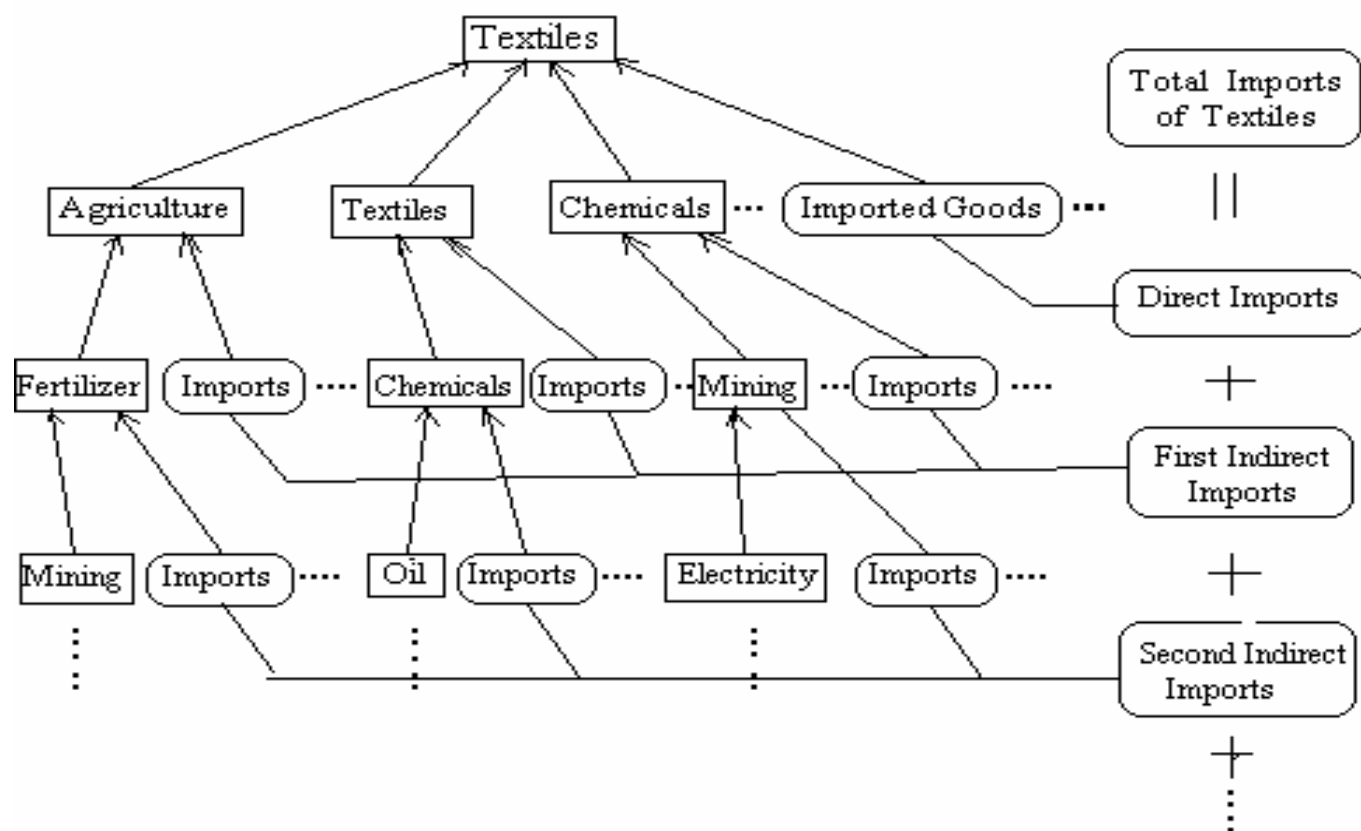
# The Total Value-Added Induced by Exports

Figure 1: The Total Value-Added Induced by Exports of US\$1,000 of Textiles



# The Total Imports Induced by Exports

Figure 2: The Total Imports Induced by Exports of US\$1,000 of Textiles





# Calculation of Total Value-Added

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- ◆ (1) Total Value-Added = Direct Value-Added +  $\Sigma$  All Indirect Value-Adds
- ◆ (2) Total Value-Added = Gross Value of Output – Total Imports Used in Producing the Output  
where  
Total Imports = Direct Imports +  $\Sigma$  All Indirect Imports
- ◆ The two formulae yield identical results

# The First Formula

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- ◆ The direct domestic value-added contained in US\$1,000 of Chinese textiles export is US\$177.7. The first-round indirect value-added is US\$174.9, the second-round indirect value-added is US\$119.2, and the third-round indirect value-added is US\$74.1. As expected, the higher is the round, the smaller is the magnitude of indirect value-added. After adding up the direct and all the indirect value-added, the total domestic value-added induced by US\$1,000 of textiles export is US\$657.0.

## The Second Formula

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- ◆ The direct imports used in the production of US\$1,000 of Chinese textiles for export is US\$300.5. The first-round indirect imports is US\$19.7; the second-round indirect imports is US\$9.1; the third-round indirect imports is US\$5.4. After adding up the direct and all indirect imports, the value of total imports is US\$343.0 for every US\$1,000 of exports of textiles produced. Total value-added is, by the second formula, therefore equal to  $US\$1,000 - US\$343.0 = US\$657.0$ , precisely the same as calculated with the first formula

# Differences in Measurement Conventions-- Input-Output Analysis and International Trade

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- ◆ Disaggregation of net exports final demands into gross exports final demands and gross imports final demands
- ◆ Matching input-output sectors with international trade sectors--a concordance between the 33 input-output sectors and the “Harmonized System (HS) of International Trade Classification”
- ◆ Input-output data are measured in terms of producers’s prices, ex factory, whereas trade data are measured on FOB and CIF bases--use of transformation matrices for transforming exports and imports measured in trade statistics into exports and imports on an input-output basis

# Differences in Measurement Conventions-- Input-Output Analysis and International Trade

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- ◆ US\$1 of textiles exports is recorded as follows in the exports final demand column:

07 Manufacture of textiles	0.8902
26 Freight transport & communication	0.0256
27 Commerce	0.0450
28 Restaurants	0.0078
29 Passenger transport	0.0110
30 Public utilities & household service	0.0120
32 Finance & insurance	0.0096

- ◆ Reconciliation between the input-output and trade data on the exports and imports of services

# The Problem of Re-Exports through Hong Kong

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- ◆ Chinese re-exports through Hong Kong to the United States should also be included as Chinese exports to the United States
- ◆ Unfortunately, there are large discrepancies between the value of Chinese exports to Hong Kong in Chinese trade statistics and the value of Hong Kong imports from China in Hong Kong trade statistics, even after f.o.b.-c.i.f. adjustments; re-exports markup adjustments are necessary
- ◆ For 1999, Fung and Lau (2001) estimates indicate that re-exports through Hong Kong constituted more than 40 percent of total Chinese exports to the United States

# Processing Exports: Processing and Assembling and Processing with Imported Materials

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- ◆ “Processing and Assembling” (P&A) exports refer to a situation in which foreign firms provide raw materials, components and parts and sometimes machinery and equipment as well as design under a contractual agreement to entities located in China that in turn manufacture products using the imported inputs and re-export them back to the foreign firms
- ◆ “Processing with Imported Materials” (PIM) exports refer to the type of processing other than "Processing and Assembling" in which raw materials or components are imported for the manufacture of the export-oriented products

# Processing Exports as a Proportion of Total Exports

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- ◆ The proportion of total Chinese exports accounted for by processing exports (including both P&A and PIM exports), has been rising:

1995	49.6%
1996	53.8%
1997	54.7%
1998	56.9%
1999	58.6%



# The Proportion of Processing Exports Varies across Sectors

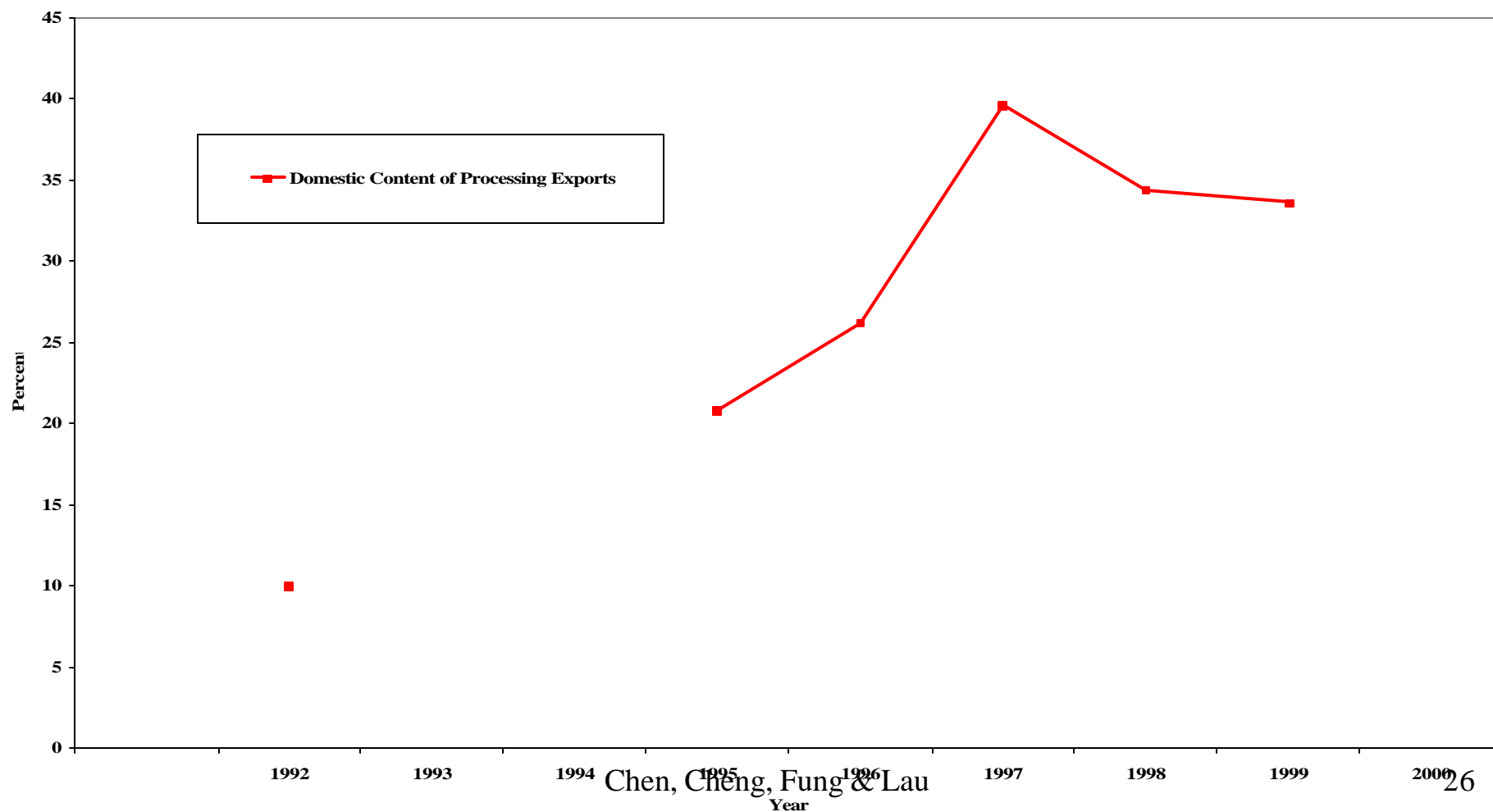
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◆ 01 Agriculture	8.02%
◆ 07 Manufacture of textiles	36.0%
◆ 16 Primary metal manufacturing	58.9%
◆ 18 Manufacture of machinery	72.7%
◆ 20 Electric machinery & instrument	84.9%
◆ 21 Electronic & communication equip.	85.5%
◆ 22 Instruments, meters, etc.	83.1%

# Domestic Content of Processing Exports

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Domestic Content of Processing Exports



# Processing and Non-Processing Exports Have Different Input-Output Coefficients

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◆ Sector-Specific Value-Added Ratio	Processing	Combined
◆ 01 Agriculture	19.65%	59.77%
◆ 07 Manufacture of textiles	14.75%	19.13%
◆ 14 Chemical industries	13.89%	25.71%
◆ 18 Manufacture of machinery	11.48%	27.24%

# The Distinction between Processing and Non-Processing Exports

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- ◆ Augmentation of the Non-Competitive Imports Model to distinguish explicitly processing exports and non-processing exports

# An Input-Output Table Distinguishing between Processing and Non-Processing Sectors

Table 2: An Input-Output Table of the Non-Competitive-Imports Type Distinguishing between Processing and Non-Processing Sectors

	Non-Processing Sector Intermediate Demands 1, 2, ..., n total	Processing Sector Intermediate Demands 1, 2, ..., n total	Final Demands Household Consumption + Government Consumption + Capital Formation + Exports	Gross Domestic Output ( $X_i$ ) or Imports ( $M_i$ )
Non-Processing Sector Domestic intermediate inputs 1 2 : n	$X^{DD}_{ij}$	$X^{DP}_{ij}$	$F^D_i$	$X^D_i$
Processing Sector Domestic intermediate inputs 1 2 : n	$X^{PD}_{ij}$	$X^{PP}_{ij}$	$F^P_i$	$X^P_i$
Imported intermediate inputs 1 2 : n Total intermediate inputs	$X^{MD}_{ij}$	$X^{MP}_{ij}$	$F^M_i$	$M_i$
Value-added Depreciation Compensation of laborers Net taxes on production Operating surplus Total	$V^D_i$	$V^P_i$		
Total inputs	$X^D_i$	$X^P_i$		

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# The Augmented Input-Output Model in Matrix Notation

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Let  $A^{DD} = [A_{ij}^{DD}] \equiv [X_{ij}^{DD} / X_j^D]$  = the matrix of input-output coefficients of the non-processing sector; similarly one can define matrices of input-output coefficients  $A^{DP}, A^{PD}, A^{PP}, A^{MD}, A^{MP}$ .

The entire system of input-output relations can be summarized as follows:

$$A^{DD} X^D + A^{DP} X^P + F^D = X^D;$$

$$A^{PD} X^D + A^{PP} X^P + F^P = X^P;$$

$$A^{MD} X^D + A^{MP} X^P + F^M = M.$$

We now make the assumptions that

$$A^{PD} = A^{PP} = 0;$$

that is, the non-processing sector does not use processed inputs and the processing sector does not use inputs from itself; then the equations simplify into:

# Calculating the Effects of Increased Exports on Gross Output

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$$A^{DD} X^D + A^{DP} X^P + F^D = X^D;$$

$$F^P = X^P;$$

$$A^{MD} X^D + A^{MP} X^P + F^M = M.$$

Solving these equations, we obtain:

$$[I - A^{DD}] X^D = F^D + A^{DP} X^P = F^D + A^{DP} F^P.$$

Thus,

$$X^D = [I - A^{DD}]^{-1} (F^D + A^{DP} F^P) \text{ and}$$

$$M = A^{MD} [I - A^{DD}]^{-1} (F^D + A^{DP} F^P) + A^{MP} F^P + F^M.$$

# Direct Value-Added and Labor Requirements of Gross Outputs (1)

◆ Sectors	Value-added	Labor
◆ *01 Agriculture	0.597720	0.000162
◆ *02 Coal mining	0.530195	0.000058
◆ *03 Crude petroleum & natural gas	0.601670	0.000012
◆ *04 Metal ore mining	0.378130	0.000031
◆ *05 Other mining	0.451548	0.000033
◆ 06 Food manufacturing	0.342552*	0.000008
◆ 07 Manufacture of textiles	<u>0.191300</u>	0.000012
◆ 08 Apparel & leather products	0.213282	0.000011
◆ 09 Sawmills & furniture	0.272845	0.000018****
◆ 10 Paper, printing & cultural articles	0.246915	0.000013
◆ *11 Electricity, steam & hot water	0.484501	0.000009
◆ 12 Petroleum refineries	0.279634	<u>0.000005</u>
◆ 13 Coking, gas & coal products	<u>0.143953</u>	0.000015
◆ 14 Chemical industries	0.257051	<u>0.000009</u>
◆ 15 Building materials & others	0.329620***	0.000019***
◆ 16 Primary metal manufacturing	0.268017	0.000012 <sup>32</sup>



# Direct Value-Added and Labor Requirements of Gross Outputs (2)

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◆ 17 Manufacture of metal products	0.236841	0.000014
◆ 18 Manufacture of machinery	0.272405	0.000015
◆ 19 Transport equipment	0.241262	0.000011
◆ 20 Electric machinery & instrument	0.246141	0.000010
◆ 21 Electronic & communication equipment	0.273682	0.000007
◆ 22 Instruments, meters, etc.	0.320447****	0.000029*
◆ 23 Repair of machinery & equipment	0.330123**	0.000024**
◆ 24 Industries not elsewhere classified	0.246205	0.000016
◆ *25 Construction	0.290451	0.000025
◆ *26 Freight transport & communication	0.582295	0.000045
◆ *27 Commerce	0.562378	0.000039
◆ *28 Restaurants	0.392610	0.000029
◆ *29 Passenger transport	0.585719	0.000040
◆ *30 Public utilities & household service	0.592462	0.000031
◆ *31 Culture, education, health & research	0.523252	0.000069
◆ *32 Finance & insurance	0.617442	0.000030
◆ *33 Public administration	0.477895	0.000075

# Chinese Domestic Value-Added Induced by US\$1 of Processing Exports, 1995 (US\$)

Sector	Direct Value-Added	Total Value-Added
01 Agriculture	0.197	0.227
02 Coal mining	0.242	0.296
03 Crude petroleum & natural gas production	0.279	0.319
04 Metal ore mining	0.156	0.198
05 Other mining	0.228	0.278
06 Food manufacturing	0.149	0.167
07 Manufacture of textiles	0.147	0.165
08 Manufacture of wearing apparel, leather & products of leather and fur	0.158	0.170
09 Sawmills & manufacture of furniture	0.128	0.160
10 Manufacture of paper, cultural & educational articles	0.138	0.166
11 Electricity, steam & hot water production and supply	0.209	0.308
12 Petroleum refineries	0.159	0.205
13 Coking, manufacture of gas & coal products	0.163	0.279
14 Chemical industries	0.139	0.167
15 Manufacture of building materials & non-metallic mineral products	0.159	0.214
16 Primary metal manufacturing	0.118	0.151
17 Manufacture of metal products	0.129	0.155
18 Manufacture of machinery	0.115	0.143
19 Manufacture of transport equipment	0.133	0.160
20 Manufacture of electric machinery & instrument	0.128	0.144
21 Manufacture of electronic & communication equipment	0.128	0.138
22 Manufacture of instruments and meters, etc.	0.135	0.159
23 Maintenance & repair of machinery and equipment	N.A.	N.A.
24 Industries not elsewhere classified	0.129	0.151
25 Construction	N.A.	N.A.
26 Freight transport & communication	0.372	0.416
27 Commerce	0.174	0.259
28 Restaurants	0.156	0.170
29 Passenger transport	0.444	0.511
30 Public utilities & service to households	0.268	0.334
31 Culture, education, health & scientific research	N.A.	N.A.
32 Finance & insurance	0.551	0.551
33 Public administration	N.A.	N.A.
Weighted Average	0.153	0.176

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# Chinese Domestic Value-Added Induced by US\$1 of Non-Processing Exports, 1995 (US\$)

Sector	Direct Value-Added	Total Value-Added
01 Agriculture	0.598	0.964
02 Coal mining	0.532	0.932
03 Crude petroleum & natural gas production	0.606	0.923
04 Metal ore mining	0.379	0.910
05 Other mining	0.453	0.926
06 Food manufacturing	0.345	0.956
07 Manufacture of textiles	0.195	0.934
08 Manufacture of wearing apparel, leather & products of leather and fur	0.229	0.944
09 Sawmills & manufacture of furniture	0.286	0.907
10 Manufacture of paper, cultural & educational articles	0.261	0.939
11 Electricity, steam & hot water production and supply	0.485	0.927
12 Petroleum refineries	0.280	0.892
13 Coking, manufacture of gas & coal products	0.144	0.902
14 Chemical industries	0.261	0.916
15 Manufacture of building materials & non-metallic mineral products	0.332	0.926
16 Primary metal manufacturing	0.273	0.900
17 Manufacture of metal products	0.242	0.904
18 Manufacture of machinery	0.289	0.862
19 Manufacture of transport equipment	0.246	0.851
20 Manufacture of electric machinery & instrument	0.261	0.894
21 Manufacture of electronic & communication equipment	0.312	0.859
22 Manufacture of instruments and meters, etc.	0.338	0.863
23 Maintenance & repair of machinery and equipment	0.330	0.880
24 Industries not elsewhere classified	0.250	0.914
25 Construction	0.290	0.912
26 Freight transport & communication	0.591	0.925
27 Commerce	0.563	0.953
28 Restaurants	0.401	0.957
29 Passenger transport	0.595	0.924
30 Public utilities & service to households	0.598	0.950
31 Culture, education, health & scientific research	0.523	0.939
32 Finance & insurance	0.478	0.958
33 Public administration	0.478	0.928
Weighted Average	0.329	0.925

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# Chinese Domestic Value-Added Induced by US\$1 of Aggregate Exports, 1995 (US\$)

Sector	Direct Value-Added	Total Value-Added
01 Agriculture	0.566	0.905
02 Coal mining	0.504	0.871
03 Crude petroleum & natural gas production	0.574	0.865
04 Metal ore mining	0.367	0.874
05 Other mining	0.419	0.829
06 Food manufacturing	0.302	0.784
07 Manufacture of textiles	0.178	0.657
08 Manufacture of wearing apparel, leather & products of leather and fur	0.183	0.441
09 Sawmills & manufacture of furniture	0.221	0.599
10 Manufacture of paper, cultural & educational articles	0.178	0.417
11 Electricity, steam & hot water production and supply	0.458	0.868
12 Petroleum refineries	0.272	0.846
13 Coking, manufacture of gas & coal products	0.146	0.842
14 Chemical industries	0.212	0.616
15 Manufacture of building materials & non-metallic mineral products	0.274	0.685
16 Primary metal manufacturing	0.182	0.459
17 Manufacture of metal products	0.194	0.583
18 Manufacture of machinery	0.162	0.339
19 Manufacture of transport equipment	0.160	0.327
20 Manufacture of electric machinery & instrument	0.148	0.257
21 Manufacture of electronic & communication equipment	0.155	0.243
22 Manufacture of instruments and meters, etc.	0.169	0.278
23 Maintenance & repair of machinery and equipment	0.330	0.880
24 Industries not elsewhere classified	0.199	0.592
25 Construction	0.290	0.912
26 Freight transport & communication	0.488	0.685
27 Commerce	0.354	0.580
28 Restaurants	0.311	0.667
29 Passenger transport	0.543	0.781
30 Public utilities & service to households	0.465	0.700
31 Culture, education, health & scientific research	0.523	0.939
32 Finance & insurance	0.478	0.738
33 Public administration	0.478	0.928
Weighted Average	0.240	0.545

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# Direct and Total Effects of Non-Competitive-Imports (NCI) Model (Value-Added)

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	Direct	Total
◆ Processing Exports	0.153	0.176
◆ Textiles	0.147	0.165
◆ Wearing Apparel	0.158	0.170
◆ Non-Processing Exports	0.329	0.925
◆ Textiles	0.195	0.934
◆ Wearing Apparel	0.229	0.944
◆ All Exports (Weighted Average of Processing and Non-Processing Exports)	0.240	0.545
◆ Textiles	0.178	0.657
◆ Wearing Apparel	0.183	0.441

# Value-Added Induced by Chinese Exports

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Chinese Domestic Value-Added Induced by US\$1 of Aggregate Chinese Exports to the United States and to the World, 1995 (US\$)

	Chinese Exports to the United States (based on adjusted U.S. import data)	Chinese Exports to the United States (based on adjusted Chinese export data)	Chinese Exports to the World
Direct Value-Added	0.190	0.207	0.240
Total Value-Added	0.481	0.458	0.545

# Chinese Domestic Employment Induced by US\$1,000 of Processing Exports, 1995 (Person-Year)

Sector	Direct Employment	Total Employment
01 Agriculture	0.171	0.181
02 Coal mining	0.151	0.169
03 Crude petroleum & natural gas production	0.054	0.066
04 Metal ore mining	0.090	0.103
05 Other mining	0.113	0.128
06 Food manufacturing	0.048	0.054
07 Manufacture of textiles	0.044	0.050
08 Manufacture of wearing apparel, leather & products of leather and fur	0.048	0.052
09 Sawmills & manufacture of furniture	0.062	0.075
10 Manufacture of paper, cultural & educational articles	0.046	0.058
11 Electricity, steam & hot water production and supply	0.030	0.069
12 Petroleum refineries	0.017	0.039
13 Coking, manufacture of gas & coal products	0.052	0.109
14 Chemical industries	0.038	0.049
15 Manufacture of building materials & non-metallic mineral products	0.065	0.085
16 Primary metal manufacturing	0.035	0.048
17 Manufacture of metal products	0.047	0.058
18 Manufacture of machinery	0.041	0.052
19 Manufacture of transport equipment	0.038	0.050
20 Manufacture of electric machinery & instrument	0.035	0.041
21 Manufacture of electronic & communication equipment	0.023	0.027
22 Manufacture of instruments and meters, etc.	0.082	0.090
23 Maintenance & repair of machinery and equipment	0.000	0.000
24 Industries not elsewhere classified	0.054	0.061
25 Construction	0.000	0.000
26 Freight transport & communication	0.152	0.165
27 Commerce	0.132	0.156
28 Restaurants	0.100	0.104
29 Passenger transport	0.135	0.153
30 Public utilities & service to households	0.106	0.125
31 Culture, education, health & scientific research	0.000	0.000
32 Finance & insurance	0.000	0.133
33 Public administration	0.000	0.000
Weighted Average	0.048	0.057

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# Chinese Domestic Employment Induced by US\$1,000 of Non-Processing Exports, 1995 (Person-Year)

Sector	Direct Employment	Total Employment
01 Agriculture	1.357	1.800
02 Coal mining	0.485	0.709
03 Crude petroleum & natural gas production	0.098	0.266
04 Metal ore mining	0.257	0.567
05 Other mining	0.278	0.580
06 Food manufacturing	0.066	0.957
07 Manufacture of textiles	0.107	0.845
08 Manufacture of wearing apparel, leather & products of leather and fur	0.108	0.745
09 Sawmills & manufacture of furniture	0.160	0.610
10 Manufacture of paper, cultural & educational articles	0.121	0.696
11 Electricity, steam & hot water production and supply	0.073	0.323
12 Petroleum refineries	0.043	0.298
13 Coking, manufacture of gas & coal products	0.130	0.591
14 Chemical industries	0.078	0.522
15 Manufacture of building materials & non-metallic mineral products	0.161	0.512
16 Primary metal manufacturing	0.103	0.438
17 Manufacture of metal products	0.120	0.485
18 Manufacture of machinery	0.133	0.439
19 Manufacture of transport equipment	0.095	0.414
20 Manufacture of electric machinery & instrument	0.092	0.427
21 Manufacture of electronic & communication equipment	0.064	0.329
22 Manufacture of instruments and meters, etc.	0.259	0.542
23 Maintenance & repair of machinery and equipment	0.201	0.496
24 Industries not elsewhere classified	0.135	0.643
25 Construction	0.207	0.558
26 Freight transport & communication	0.383	0.548
27 Commerce	0.325	0.571
28 Restaurants	0.251	0.932
29 Passenger transport	0.344	0.506
30 Public utilities & service to households	0.262	0.479
31 Culture, education, health & scientific research	0.577	0.839
32 Finance & insurance	0.251	0.450
33 Public administration	0.630	0.898
Weighted Average	0.214	0.703

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# Chinese Domestic Employment Induced by US\$1,000 of Aggregate Exports, 1995 (Person-Year)

Sector	Direct Employment	Total Employment
01 Agriculture	1.262	1.670
02 Coal mining	0.453	0.657
03 Crude petroleum & natural gas production	0.094	0.247
04 Metal ore mining	0.248	0.543
05 Other mining	0.254	0.512
06 Food manufacturing	0.062	0.760
07 Manufacture of textiles	0.084	0.558
08 Manufacture of wearing apparel, leather & products of leather and fur	0.069	0.294
09 Sawmills & manufacture of furniture	0.120	0.389
10 Manufacture of paper, cultural & educational articles	0.070	0.265
11 Electricity, steam & hot water production and supply	0.069	0.298
12 Petroleum refineries	0.041	0.280
13 Coking, manufacture of gas & coal products	0.122	0.545
14 Chemical industries	0.062	0.332
15 Manufacture of building materials & non-metallic mineral products	0.129	0.368
16 Primary metal manufacturing	0.063	0.208
17 Manufacture of metal products	0.089	0.302
18 Manufacture of machinery	0.066	0.158
19 Manufacture of transport equipment	0.052	0.139
20 Manufacture of electric machinery & instrument	0.043	0.099
21 Manufacture of electronic & communication equipment	0.029	0.070
22 Manufacture of instruments and meters, etc.	0.112	0.166
23 Maintenance & repair of machinery and equipment	0.201	0.496
24 Industries not elsewhere classified	0.101	0.398
25 Construction	0.207	0.558
26 Freight transport & communication	0.274	0.367
27 Commerce	0.222	0.348
28 Restaurants	0.196	0.628
29 Passenger transport	0.272	0.384
30 Public utilities & service to households	0.198	0.335
31 Culture, education, health & scientific research	0.577	0.839
32 Finance & insurance	0.274	0.279
33 Public administration	0.630	0.898
Weighted Average	0.130	0.375

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# Direct and Total Effects of Non-Competitive-Imports (NCI) Model (Employment)

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	Direct	Total
◆ Processing Exports	0.048	0.057
◆ Textiles	0.044	0.050
◆ Wearing Apparel	0.048	0.052
◆ Non-Processing Exports	0.214	0.703
◆ Textiles	0.107	0.845
◆ Wearing Apparel	0.108	0.745
◆ All Exports (Weighted Average of Processing and Non-Processing Exports)	0.130	0.375
◆ Textiles	0.084	0.558
◆ Wearing Apparel	0.069	0.294

# Employment Induced by Chinese Exports

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Chinese Domestic Employment Induced by US\$1,000 of Chinese Exports  
to the United States and the World, 1995 (Person-Year)

	Chinese Exports to the United States (based on adjusted U.S. import data)	Chinese Exports to the United States (based on adjusted Chinese export data)	Chinese Exports to the World
Direct Effect	0.074	0.083	0.130
Total Effect	0.277	0.271	0.375