

Appendix to
Domestic Segment of Global Value Chains in China under State Capitalism

Heiwai Tang
Johns Hopkins

Fei Wang
UIBE

Zhi Wang
UIBE and George Mason

Appendix A: The Backward-Linkage Approach

To implement the backward-linkage approach that decomposes each firm group's gross exports into their original value-added source by sector and firm-type, we pre-multiply both sides of eq. (5) by the 1×252 unit row vector u . This operation essentially sums up each sector-firm-type's DVA vertically to obtain a measure of DVA at the sector-firm-type level. Formally, the backward-linkage based DVA in exports is

$$\mathbf{DVA}_{bw} = \mathbf{uDVA} = \mathbf{u}\hat{\mathbf{A}}_V\hat{\mathbf{E}} + \mathbf{u}\hat{\mathbf{A}}_V(\mathbf{B} - \mathbf{I})\hat{\mathbf{E}}. \quad (\text{A-1})$$

By replacing $\mathbf{u}\hat{\mathbf{A}}_V\hat{\mathbf{E}}$ in eq. (A-1) by eq. (4), we can completely decompose China's gross exports according to its various DVA sources as follows:

$$\mathbf{u}\hat{\mathbf{E}} = \mathbf{u}\hat{\mathbf{A}}_V\hat{\mathbf{E}} + \mathbf{u}\hat{\mathbf{A}}_V(\mathbf{B} - \mathbf{I})\hat{\mathbf{E}} + \mathbf{\vartheta}\mathbf{A}^m\mathbf{B}\hat{\mathbf{E}}. \quad (\text{A-2})$$

Notice that all terms in eq. (A-2) are 1×252 row vectors.

The first column of the first term, $\mathbf{u}\hat{\mathbf{A}}_V\hat{\mathbf{E}}$, represents the direct DVA by large state-owned enterprises (SL) in all 42 sectors. Notice the direct DVA based on the forward-linkage and backward-linkage approaches are identical (i.e. $(\mathbf{u}\hat{\mathbf{A}}_V\hat{\mathbf{E}})^T$ in eq. (A-2) = $\hat{\mathbf{A}}_V\hat{\mathbf{E}}\boldsymbol{\mu}$ in eq. (6)). However, the indirect value-added exports measures can be very different for each firm group-sector pair. The two measures are only equal to each other at the country level (see Wang, Wei, and Zhu, 2013 for details). In the second term, $\mathbf{u}\hat{\mathbf{A}}_V(\mathbf{B} - \mathbf{I})\hat{\mathbf{E}}$, the first column is the sum of 6 multiples as

$$\begin{aligned} & \tilde{\mathbf{u}}\hat{\mathbf{A}}_V^{\text{SL}}(\mathbf{B}^{\text{SL,SL}} - \mathbf{I})\hat{\mathbf{E}}^{\text{SL}} + \tilde{\mathbf{u}}\hat{\mathbf{A}}_V^{\text{SS}}\mathbf{B}^{\text{SS,SL}}\hat{\mathbf{E}}^{\text{SL}} + \tilde{\mathbf{u}}\hat{\mathbf{A}}_V^{\text{FL}}\mathbf{B}^{\text{FL,SL}}\hat{\mathbf{E}}^{\text{SL}} \\ & + \tilde{\mathbf{u}}\hat{\mathbf{A}}_V^{\text{FS}}\mathbf{B}^{\text{FS,SL}}\hat{\mathbf{E}}^{\text{SL}} + \tilde{\mathbf{u}}\hat{\mathbf{A}}_V^{\text{PL}}\mathbf{B}^{\text{PL,SL}}\hat{\mathbf{E}}^{\text{SL}} + \tilde{\mathbf{u}}\mathbf{B}^{\text{PS,SL}}\hat{\mathbf{E}}^{\text{SL}} \end{aligned} \quad (\text{A-3})$$

where $\tilde{\mathbf{u}}$ is a 1×42 row vector. $\tilde{\mathbf{u}}\hat{\mathbf{A}}_V^{\text{SL}}(\mathbf{B}^{\text{SL,SL}} - \mathbf{I})\hat{\mathbf{E}}^{\text{SL}}$ is large state-owned enterprises' indirect DVA via other large state-owned enterprises; $\tilde{\mathbf{u}}\hat{\mathbf{A}}_V^{\text{SS}}\mathbf{B}^{\text{SS,SL}}\hat{\mathbf{E}}^{\text{SL}}$, $\tilde{\mathbf{u}}\hat{\mathbf{A}}_V^{\text{FL}}\mathbf{B}^{\text{FL,SL}}\hat{\mathbf{E}}^{\text{SL}}$, $\tilde{\mathbf{u}}\hat{\mathbf{A}}_V^{\text{FS}}\mathbf{B}^{\text{FS,SL}}\hat{\mathbf{E}}^{\text{SL}}$, $\tilde{\mathbf{u}}\hat{\mathbf{A}}_V^{\text{PL}}\mathbf{B}^{\text{PL,SL}}\hat{\mathbf{E}}^{\text{SL}}$, and $\tilde{\mathbf{u}}\mathbf{B}^{\text{PS,SL}}\hat{\mathbf{E}}^{\text{SL}}$ represent small state-owned, large foreign, small foreign, large private, and small and medium-sized enterprises' value-added embodied in large state-owned enterprises' gross exports, respectively. Other columns of $\mathbf{u}\hat{\mathbf{A}}_V(\mathbf{B} - \mathbf{I})\hat{\mathbf{E}}$ in eq. (A-2) can be interpreted similarly for other firm groups. In sum, eq. (A-3) provides detailed information about the sources of DVA produced by each firm group. By considering all 42 sectors within each firm-group-pair, we can analyze the value-added composition for each firm group by sector.¹

¹ The full decomposition of each firm group's exports by value-added sourced from the 6 firm groups and 42 sectors are available upon request.

Results on DVA based on the Backward-Linkage Approach

So far, we have been using the forward-linkage approach to estimate direct and indirect DVA by firm group, which involves summing up the entries of $\hat{A}_V \mathbf{B} \hat{E}$ (in eq. (5)) horizontally along each row of the matrix. In this section, we show how to use the backward-linkage approach and answer the question: “For each dollar of Chinese exports (aggregate or by firm group), how much of it is ultimately coming from state-owned, foreign, large private and small and medium-sized firms, respectively?” While the forward-linkage approach focuses on the channels through which each firm group’s DVA (by sector or at the aggregate) is generated, the backward-linkage approach decomposes a country’s gross exports into its direct VA and indirect VA from different firm groups. The decomposition can be done for each firm group as well. For example, state-owned enterprises’ gross exports can be decomposed into its own direct DVA, but also domestic VA originating from all other upstream firm groups, including other state-owned enterprises, as well as other firm groups’ VA embedded in inputs used to produce those exports.² This decomposition exercise permits an analysis of the distribution of DVA across firm groups embedded in each group’s downstream exports, complementing the forward-linkage approach that focuses on the “paths” of DVA.

Using this backward-linkage DVA measure, we provide another set of results to examine how the domestic VA in Chinese exports is distributed across firm groups, and how the distribution changed between 2007 and 2010. As reported in column (1) of Table A6, of the 10 trillion RMB Chinese gross exports in 2007, 14% can be attributed to state-owned enterprises, directly and indirectly; while the contribution by FIE, LP, and SME are 18%, 7% and 29%, respectively. The findings of high contributions by state-owned and small and medium-sized enterprises to China’s exports resonate well with the findings that both types of firms have high DVA ratios, as reported in Table 2 of the main text.

We also decompose each firm group’s gross exports into contributions from different firm groups’ indirect exports. For instance, as shown in column (2), we find that for each dollar of enterprises’ gross exports, state-owned enterprises themselves contribute about 39 cents (24 cents directly and 15 cents indirectly), followed by 18 cents from SME and 10 cents from FIE. Imports account for 26 cents, lower than their contribution to China’s aggregate gross exports. Notice that the numbers along the diagonal of Table A5 are always the highest compared to other numbers in the same column, suggesting that each firm group contributes the most VA to its own gross exports, compared to other firm groups.

(Insert Table A1 here)

The lower panel of Table A6 reveals that while Chinese gross exports increased by only 9.7% from 2007 to 2010, the contribution by state-owned enterprises in terms of DVA increased by 14.8%. Specifically, for each dollar of Chinese gross exports, 16 cents came from state-owned enterprises in 2010, compared to 14 cents in 2007. State-owned enterprises are not the only group that experienced an increase in DVA shares between the two years. All three other groups also experienced an increase, at the expense of foreign VA (imports). These results are consistent with Kee and Tang (2016), who show that using firm-level data the increase in China’s domestic content in exports in 2000s were mainly driven by exporters substituting domestic inputs for foreign inputs. However, it is the state-owned enterprises that experienced the sharpest increase in DVA contribution, followed by foreign firms that had its DVA share increased by 9.2%. Another fact revealed in Table A6 is that state-owned enterprises’ DVA shares increased for exports by all firm groups. This is not observed for other firm groups. For instance, foreign firms’ DVA shares increased only in their own exports but not for other firm groups.

The backward-linkage approach can be used to distribute sectoral DVA in exports into different firm groups’ origins. Such an exercise provides another perspective to portray the cross-sector pattern of

² Such a backward-linkage perspective aligns well with case studies of GVC of specific sectors and products, such as the iPod or iPhone examples frequently cited in the literature.

contributions by firm group. As reported in Table A7, a few sectors have more than 30% DVA originating from state-owned enterprises. In 2007, these sectors include “Mining and Washing of Coal” (state-owned enterprises’ share in the sector’s DVA = 39.98%), “Extraction of Petroleum and Natural Gas” (49.56%), “Mining of Non-Ferrous Metal Ores” (32.50), “Processing of Petroleum, Coking and Nuclear Fuel” (44.16), “Smelting and Rolling of Metals” (36.67), “Production and Supply of Electricity and Heat” (52.05). These are obviously “upstream” sectors that provide essential inputs to downstream exporters.

(Insert Table A2 here)

While state-owned enterprises appear to have a dominant position in some sectors, they are not the firm group that has the highest DVA shares for most sectors. It is the SME that often contribute more than 30% of DVA in most sectors. In fact, state-owned enterprises’ DVA share exceeded 30% in only 13 sectors (out of 40) compared to 24 for SME. For example, SME’s shares of DVA in “Foods and Tobacco” and “Manufacture of Textile Products” are 60% and 52%, respectively. These findings suggest that SME have been playing an important role driving Chinese exports. This is consistent with the hypothesis that a lot of SME do not export directly, possibly because of high fixed export costs. Instead, they participate actively by supplying intermediate inputs and services to larger downstream exporters. In 2010, the number of sectors in which state-owned enterprises’ share in DVA exceeded 30% actually dropped from 13 to 11. However, in sectors in which state-owned enterprises had the highest DVA share in 2007, state-owned enterprises’ DVA shares have increased substantially. For example, in the “Mining and Washing of Coal” sector, state-owned enterprises’ DVA share was 40% in 2007, which increased to 56% in 2010.

Appendix B: Extending the method by Antras et al. (2012) to measure industry upstreamness

To measure industry upstream based on our IO table with 6 sub-accounts, we need to modify the method proposed by Antras et al. (2012). First, we construct a 42x42 matrix for each firm group $g1$ with the following elements

$$\delta_{ij}^{g1} = \frac{\sum_p a_{ij}^{g1,g2} X_j^{g2} + E_{ij}^{g1}}{X_i^{g1}} \quad (A4)$$

where superscripts $g1, g2 \in \{SL, SS, FL, FS, PL, PS\}$ represent 6 firm groups, $a_{ij}^{g1,g2}$ is the IO coefficient between a pair of firm-type-sector discussed in Section 2 in the text. X_j^{g1} and X_j^{g2} are gross output by group $g1$ and $g2$ in sector j , respectively. E_{ij}^{g1} represents exports from sector i by firm group $g1$ used in sector j abroad.

When computing industry upstreamness, Antràs et al. (2012) assume that the share of imports (and exports) of sector i that is used by sector j is the same as the share of domestic intermediate inputs of sector i used by sector j . We improve upon their computation by relaxing both of these assumptions. First, in eq. (A4), we do not need to subtract imports from total intermediate inputs. It is because when we estimate our extended IO model, we already make the corresponding adjustment to deal with imported materials by having a separate A^m matrix. In other words, our IO coefficients, $a_{ij}^{g1,g2}$, do not include imported intermediate inputs. Thus, we do not need to make the proportionality assumptions as Antras et al. (2012) to exclude imports from domestic intermediate inputs in our computation of upstreamness.

Second, when computing E_{ij}^{g1} , we use data of exported intermediate inputs at the sector-pair level (ij) from China’s customs. To assign exported intermediate inputs to each firm group, we use the share of each

supplier's firm group in domestic inter-sector transaction volume (i.e., $\frac{\sum_{g2} a_{ij}^{g1,g2}}{\sum_{g1,g2} a_{ij}^{g1,g2}}$) as the weight. For sectors that we do not have exported intermediate inputs from China's Customs (most of them are service sectors), we follow Antras et al. (2012) and make the same proportionality assumption to obtain E_{ij}^{g1} .

We also adjust for the change in inventory at the sector level carefully. First, we obtain inventory by firm group and sector. Then following the approach proposed by Antràs et al., (2012), we subtract inventory from X_i^{g1} in eq. (A4). After obtaining a 42x42 block matrix of δ_{ij}^{g1} , we use eq. (4) in Antràs et al. (2012) to compute upstreamness by firm-group-sector.

References to the Appendix

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Appendix

Table A1: Classification of Large, Medium and small firms (NBS of China, 2011)

Industry	Indicator	Unit	Large	Medium	Small
Manufacture	Employment	Persons	≥ 1000	300-1000	< 300
	Total Sales	RMB10,000	≥ 40000	2000-40000	< 2000
	Total Assets	RMB10,000	≥ 40000	4000-40000	< 4000
Construction	Total Sales	RMB10,000	≥ 80000	6000-80000	< 6000
	Total Assets	RMB10,000	≥ 80000	5000-80000	< 5000
Wholesales	Employment	Persons	≥ 200	20-200	< 20
	Total Sales	RMB10,000	≥ 40000	5000-40000	< 5000
Retails	Employment	Persons	≥ 300	50-300	< 50
	Total Sales	RMB10,000	≥ 20000	500-20000	< 500
Transportation	Employment	Persons	≥ 1000	300-1000	< 300
	Total Sales	RMB10,000	≥ 30000	3000-30000	< 3000
Postal Services	Employment	Persons	≥ 1000	300-1000	< 300
	Total Sales	RMB10,000	≥ 30000	2000-30000	< 2000
Accommodation & Catering	Employment	Persons	≥ 300	100-300	< 100
	Total Sales	RMB10,000	≥ 10000	2000-10000	< 2000
Finance and Banking	Employment	Persons	≥ 200	< 200	
	Total Sales	RMB10,000	≥ 30000	< 30000	
Real Estates	Employment	Persons	≥ 200	< 200	
	Total Sales	RMB10,000	≥ 30000	< 30000	
Other Service Industries	Employment	Persons	≥ 500	< 500	

1. Manufacture above includes three industries: mining, manufacturing and Electricity, Gas, and Utility production and supply.

2. Total sale in manufacturing industry is expressed by the annual sale/revenue of products calculated according to the current statistic system; total sale in construction firms is represented by the annual receipt from projects done according to the current statistic system; total sale of wholesales and retails is shown as the annual sales calculated according to the current accounting forms; total sale in transportation, postal services, accommodation and catering firms is the annual operating revenue calculated according to the current statistic system; the total asset is replaced by accumulated assets according to the current statistic system.

3. The large and medium firms should meet all the criteria defined for the large firm and medium firm, respectively. Otherwise, it will be classified to the next lower category of firm size.

Other definitions (authors' definition according to the rule of NBS of China):

Large firms of finance and banking industry are those firms with more than 200 employees and more than 300 million Yuan (RMB) in sales.

Large firms of real estate industry are those firms with more than 200 employees and more than 300 million Yuan (RMB) in sales.

Large firms of other service industries are those firms with more than 500 employees.

Remarks: the lowest standard of employment and the highest standard of total sale are used to define large firms considering the properties of finance and banking industry and real estate industry. The firm in other service industries will use the only criteria of employment to distinguish large firms and small and medium-sized firms.

Table A2: Indirect DVA/ Total DVA 2007 (6 types, 42 sectors)

Sector	SL	SS	FL	FS	PL	PS
Mining and Washing of Coal	0.96	0.93	0.92	0.90	0.93	0.95
Extraction of Petroleum and Natural Gas	0.92	0.84	1.00	0.85	0.88	0.99
Mining of Ferrous Metal Ores	1.00	0.95	0.90	1.00	1.00	0.95
Mining of Non-Ferrous Metal Ores	0.75	0.74	0.82	0.72	0.82	0.65
Foods and Tobacco	0.66	0.65	0.65	0.67	0.66	0.80
Manufacture of Textile Products	0.62	0.59	0.50	0.30	0.44	0.60
Wearing apparel, leather, fur, down and related products	0.67	0.66	0.40	0.13	0.48	0.23
Processing of wood and Manufacture of Furniture	-	0.69	0.57	0.40	0.58	0.40
Paper Products and Articles for Culture, Education and Sports Activities	0.87	0.84	0.74	0.46	0.81	0.55
Processing of Petroleum, Coking and Nuclear Fuel	0.88	0.91	0.84	0.85	0.90	0.89
Manufacture of Chemical Products	0.82	0.87	0.72	0.49	0.67	0.78
Manufacture of non-ferrous metal products	0.62	0.60	0.46	0.27	0.40	0.42
Smelting and Rolling of metals	0.66	0.89	0.86	0.81	0.76	0.88
Manufacture of Metal Products	0.80	0.79	0.70	0.41	0.74	0.36
Manufacture of General Purpose and Special Purpose Machinery	0.76	0.82	0.67	0.33	0.66	0.52
Manufacture of Transport Equipment	0.63	0.70	0.51	0.59	0.55	0.65
Manufacture of Electrical Machinery and Equipment	0.76	0.75	0.30	0.24	0.44	0.37
Manufacture of Communication Equipment, computers and Other Electronic Equipment	0.62	0.70	0.17	0.27	0.45	0.61
Manufacture of Measuring Instruments and Machinery for Office Work	0.18	0.20	0.06	0.09	0.14	0.10
Handicrafts and other Manufacturing	1.00	0.58	0.36	0.26	0.39	0.25
Scrap and Waste						0.98
production and supply of Electricity and heat	1.00	0.99	0.99	0.99	0.99	0.99
Production and Supply of Gas	1.00	1.00	1.00	1.00	1.00	1.00
Production and Supply of Water	1.00	1.00	1.00	1.00	1.00	1.00
construction industry	0.38	0.38	0.31	0.38	0.38	0.38
Transportation and warehousing	0.82	0.54	0.89	0.90	0.91	0.45
Post service	0.75	0.75	0.76	0.78	0.80	0.77
IT industry	0.76	0.76	0.76	0.76	0.76	0.76
wholesale and retailing	0.72	0.74	0.82	0.82	0.76	0.28
Hotels and Catering Services	0.74	0.75	0.75	0.75	0.75	0.75
Finance	0.98	0.98	0.88	0.98	0.98	0.99
Real Estate	1.00	1.00	1.00	1.00	1.00	1.00
Leasing and commerce service	0.56	0.44	0.60	0.57	0.60	0.18
Research and test development industry	0.91	0.91	0.91	0.90	0.91	0.91
Polytechnic Services	1.00	1.00	1.00	1.00	1.00	1.00
Water, environment and public facilities	1.00	1.00	1.00	1.00	1.00	1.00
Resident and Other Services	0.81	0.81	0.80	0.81	0.81	0.82
Education	0.86	0.87	0.86	0.87	0.87	0.87
Health and Social service	0.88	0.88	0.88	0.88	0.88	0.88
Culture , Sports and entertainment	0.57	0.57	0.57	0.57	0.57	0.57

Note: SL, SS, FL, FS, PL, and PS stand for large state-owned, small state-owned, large foreign, small foreign, large private, and small private firms, respectively.

Table A3: Original data from NBS Firm Census (2008) and customs (2007) used to extend the IO table

Unit: %	Output						Value Added						Exports					
	SL	SS	FL	FS	PL	PS	SL	SS	FL	FS	PL	PS	SL	SS	FL	FS	PL	PS
2 Mining and Washing of Coal	47	5	2	0	9	36	52	5	2	0	10	30	67	0	3	0	21	8
3 Extraction of Petroleum and Natural Gas	53	12	0	2	30	2	53	11	0	1	33	1	15	63	0	11	12	0
4 Mining of Ferrous Metal Ores	10	6	2	3	7	72	13	8	3	3	9	64	0	0	24	0	0	76
5 Mining of Non-Ferrous Metal Ores	3	7	1	6	4	78	5	9	1	6	6	73	5	8	1	30	1	56
6 Foods and Tobacco	11	3	9	18	11	48	27	3	9	15	11	35	2	1	8	43	11	34
7 Manufacture of Textile Products	1	1	4	19	18	57	1	1	4	19	17	57	1	1	10	38	15	35
8 Wearing apparel, leather, fur, down and related products	0	1	10	35	11	43	0	1	11	36	10	41	0	0	14	51	8	27
9 Processing of wood and Manufacture of Furniture	0	1	5	20	6	68	0	1	5	20	7	67	0	1	13	45	8	33
10 Paper Products and Articles for Culture, Education and Sports Activities	3	3	11	26	8	50	3	3	10	28	8	48	0	1	24	53	3	19
11 Processing of Petroleum, Coking and Nuclear Fuel	34	4	5	4	34	19	28	5	5	6	32	24	63	0	7	8	19	2
12 Manufacture of Chemical Products	7	3	8	22	14	46	7	3	9	22	15	44	6	1	14	45	13	21
13 Manufacture of non-ferrous metal products	1	4	3	14	9	69	1	4	4	14	9	67	1	1	9	43	12	34
14 Smelting and Rolling of metals	25	2	7	7	29	30	31	2	8	6	29	24	40	1	9	16	26	8
15 Manufacture of Metal Products	2	3	6	25	7	58	2	3	6	24	8	57	2	2	22	41	8	26
16 Manufacture of General Purpose and Special Purpose Machinery	7	4	7	19	11	52	8	4	8	20	11	48	5	1	16	40	14	23
17 Manufacture of Transport Equipment	16	3	25	14	18	24	15	3	29	14	17	21	13	2	29	20	25	11
18 Manufacture of Electrical Machinery and Equipment	2	2	15	21	18	42	2	2	16	21	18	41	1	1	34	36	14	15
19 Manufacture of Communication Equipment, computers and Other Electronic Equipment	2	1	63	19	8	8	3	1	51	22	11	12	1	0	76	16	6	2
20 Manufacture of Measuring Instruments and Machinery for Office Work	3	4	30	27	7	30	3	5	17	31	7	36	0	0	56	32	4	7
21 Handicrafts and other Manufacturing	0	2	8	30	6	55	0	1	9	31	6	52	0	0	12	43	6	39
22 Scrap and Waste	0	0	0	0	0	100	0	0	0	0	0	100	0	0	0	0	0	100
23 production and supply of Electricity and heat	54	25	2	5	3	10	49	29	2	6	4	10	14	82	0	0	1	2
24 Production and Supply of Gas	10	15	7	30	5	32	11	14	10	31	4	30	29	9	0	62	0	0
25 Production and Supply of Water	17	45	1	13	1	23	13	45	1	20	0	21	15	1	0	81	0	3
26 construction industry	18	13	0	1	15	53	6	10	0	1	6	77						
27 Transportation and warehousing	14	30	6	0	2	47	18	24	5	0	0	52						
28 Post service	48	39	6	1	0	5	40	43	6	2	0	9						
29 IT industry	5	18	18	21	10	27	7	21	21	23	8	20						
30 wholesale and retailing	13	12	4	3	10	58	14	10	5	3	9	59						
31 Hotels and Catering Services	3	12	9	5	6	66	5	21	9	8	6	50						
32 Finance	13	17	0	3	1	66	7	26	0	4	1	63						
33 Real Estate	5	5	9	5	32	44	5	7	11	5	32	40						
34 Leasing and commerce service	10	21	6	9	6	49	16	21	2	7	5	51						
35 Research and test development industry	22	28	5	7	11	27	29	15	9	8	8	32						
36 Polytechnic Services	27	13	3	4	16	36	26	14	3	4	13	40						
37 Water, environment and public facilities	10	26	2	5	7	51	10	23	3	5	10	50						
38 Resident and Other Services	3	6	2	4	8	77	2	5	1	3	8	80						
39 Education	1	6	1	2	18	72	2	6	1	2	19	71						
40 Health and Social service	15	11	1	1	11	61	12	12	1	1	10	64						
41 Culture , Sports and entertainment	29	34	2	3	4	29	24	31	3	3	4	34						
42 Public administration and social organization	0	12	0	0	2	86	0	11	0	0	2	87						
Total	14	8	9	10	14	46	15	9	9	11	13	44	5	1	39	30	11	15

Note: SL, SS, FL, FS, PL, and PS stand for large state-owned, small state-owned, large foreign, small foreign, large private, and small private firms, respectively.

Data Sources: (1) 2008 China's NBS Firm Census. Data for Sector 27 (Transportation and warehousing) is inferred from information from 2008 NBS Economic Census and the railway sector in the 2007 135-sector I/O table. (2) Import data are from 2007 customs. (3) Total is the sum of all data for manufacturing, mining and services (agriculture is excluded).

Table A4: Original data from NBS Firm Census (2008) and customs (2007) used to extend the IO table (cont)

Unit: %		Employment						Imported Materials		
		SL	SS	FL	FS	PL	PS	SOE	FE	Others
2	Mining and Washing of Coal	53	8	1	0	7	32	33	5	61
3	Extraction of Petroleum and Natural Gas	66	2	0	0	29	3	37	0	63
4	Mining of Ferrous Metal Ores	13	6	1	2	7	70	65	2	32
5	Mining of Non-Ferrous Metal Ores	4	15	1	4	4	71	19	47	34
6	Foods and Tobacco	4	4	8	16	11	57	18	30	52
7	Manufacture of Textile Products	1	3	4	22	13	58	9	51	40
8	Wearing apparel, leather, fur, down and related products	0	1	10	44	5	39	7	55	38
9	Processing of wood and Manufacture of Furniture	0	2	5	24	5	65	13	36	51
10	Paper Products and Articles for Culture, Education and Sports Activities	1	4	8	34	4	49	17	33	49
11	Processing of Petroleum, Coking and Nuclear Fuel	25	5	6	4	27	33	58	7	35
12	Manufacture of Chemical Products	6	4	6	21	11	52	15	40	45
13	Manufacture of non-ferrous metal products	1	6	3	12	7	71	10	51	39
14	Smelting and Rolling of metals	27	2	5	5	27	33	31	38	31
15	Manufacture of Metal Products	1	2	5	25	6	61	16	56	28
16	Manufacture of General Purpose and Special Purpose Machinery	5	6	5	18	7	59	24	42	35
17	Manufacture of Transport Equipment	10	5	11	16	15	42	16	18	66
18	Manufacture of Electrical Machinery and Equipment	1	2	15	27	11	44	13	57	30
19	Manufacture of Communication Equipment, computers and Other Electronic Equipment	2	2	45	31	6	15	7	68	25
20	Manufacture of Measuring Instruments and Machinery for Office Work	3	5	17	34	4	37	8	68	25
21	Handicrafts and other Manufacturing	0	1	4	43	4	48	7	53	40
22	Scrap and Waste	0	0	0	0	0	100	14	23	64
23	production and supply of Electricity and heat	40	36	2	3	5	15	97	0	3
24	Production and Supply of Gas	16	27	5	19	7	26			
25	Production and Supply of Water	12	66	0	5	0	16			
26	Construction industry	7	12	0	1	6	74			
27	Transportation and warehousing	1	31	2	0	0	66			
28	Post service	39	48	4	1	0	8			
29	IT industry	3	16	11	16	5	48			
30	wholesale and retailing	5	7	3	2	7	76			
31	Hotels and Catering Services	1	13	6	5	3	72			
32	Finance	8	9	0	2	3	79			
33	Real Estate	3	10	2	5	16	64			
34	Leasing and commerce service	3	19	1	5	2	71			
35	Research and test development industry	19	14	6	8	6	47			
36	Polytechnic Services	15	14	2	3	10	56			
37	Water, environment and public facilities	13	19	1	2	12	53			
38	Resident and Other Services	2	4	2	3	12	77			
39	Education	1	5	0	1	11	81			
40	Health and Social service	10	11	1	1	7	70			
41	Culture , Sports and entertainment	18	17	3	4	5	53	7	86	7
42	Public administration and social organization	1	4	0	0	7	87			
Total		7	9	3	8	8	65	19	44	36

Note: SL, SS, FL, FS, PL, and PS stand for large state-owned, small state-owned, large foreign, small foreign, large private, and small private firms, respectively.

Data Source: (1) 2008 China's NBS Firm Census. Data for Sector 27 (Transportation and warehousing) is inferred from information from 2008 NBS Economic Census and the railway sector in the 2007 135-sector I/O table. (2) Import data are from 2007 customs. (3) Total is the sum of all data for manufacturing, mining and services (agriculture is excluded).

Table A5: Gross Exports and Distribution of the Source of DVA (Backward-linkage Approach)

		(1)	(2)	(3)	(4)	(5)
		Total	State-owned	Foreign	Large Private	Small and Medium Private
2007						
Gross Exports		10199	1231	5046	1028	2895
	State-owned	14.17	39.46 (24.03, 15.43)	10.11	15.38	10.08
	Foreign	18.05	9.81	28.11 (19.59, 8.52)	10.25	6.79
DVA Contribution (%)	Large Private	7.05	6.50	4.56	26.25 (19.42, 6.83)	4.80
	Small and Medium Private	28.84	18.30	15.56	20.66	59.37 (37.37, 22.00)
	Foreign VA	31.88	25.92	41.66	27.47	18.95
			change relative to 07			
2010						
Gross Exports		11191	9.72	1052	6340	1164
	State-owned	16.27	14.77	50.32 (34.44, 15.89)	12.53	16.41
	Foreign	19.71	9.17	8.09	28.95 (19.77, 9.18)	9.82
DVA Contribution (%)	Large Private	7.46	5.81	5.54	5.18	27.78 (21.29, 6.49)
	Small and Medium Private	30.44	5.56	18.14	20.83	23.56
	Foreign VA	26.12	-18.07	17.90	32.50	22.42
						61.53 (34.59, 26.93)

Note: Authors' estimation based on China's firm census data from 2008 and IO tables for 2007 and 2010, respectively. Numbers in brackets are direct and indirect DVA shares, respectively,

Table A6: Gross Exports via Different Firm Types (Backward-linkage Approach)

Sector	2007					2010					
	Share in VAX (%)				VAX share	Share in VAX (%)				VAX share	
	SOE	FIE	LP	SME	> 30%	SOE	FIE	LP	SME	> 30%	
2	Mining and Washing of Coal	39.98	17.57	13.93	28.52	SOE	55.60	7.64	16.67	20.09	SOE
3	Extraction of Petroleum and Natural Gas	49.56	16.52	23.31	10.61	SOE	61.64	10.52	14.37	13.47	SOE
4	Mining of Ferrous Metal Ores	27.17	21.78	7.10	43.95	SME	27.19	12.95	7.15	52.71	SME
5	Mining of Non-Ferrous Metal Ores	32.50	24.00	12.91	30.58	SOE, SME	25.67	17.53	7.59	49.21	SME
6	Foods and Tobacco	15.56	17.32	7.25	59.86	SME	13.34	17.90	6.58	62.18	SME
7	Manufacture of Textile Products	15.34	22.60	10.51	51.55	SME	13.56	23.04	10.20	53.20	SME
8	Wearing apparel, leather, fur, down and related products	14.53	32.29	8.76	44.41	FIE, SME	13.90	28.71	9.08	48.32	SME
9	Processing of wood and Manufacture of Furniture	16.01	20.61	9.25	54.13	SME	19.13	26.47	8.76	45.64	SME
10	Paper Products and Articles for Culture, Education and Sports Activities	16.07	23.26	7.79	52.88	SME	17.12	36.05	7.27	39.56	FIE, SME
11	Processing of Petroleum, Coking and Nuclear Fuel	44.16	17.63	15.57	22.64	SOE	53.60	13.27	17.64	15.49	SOE
12	Manufacture of Chemical Products	20.80	26.23	10.61	42.36	SME	24.01	26.92	11.36	37.71	SME
13	Manufacture of non-ferrous metal products	22.76	16.48	9.15	51.60	SME	24.41	25.88	11.00	38.71	SME
14	Smelting and Rolling of metals	36.67	14.04	19.08	30.21	SOE, SME	38.12	16.25	15.62	30.01	SOE, SME
15	Manufacture of Metal Products	22.88	19.25	12.02	45.85	SME	25.36	29.05	11.80	33.79	SME
16	Manufacture of General Purpose and Special Purpose Machinery	20.98	26.46	11.43	41.14	SME	23.46	29.47	12.31	34.77	SME
17	Manufacture of Transport Equipment	25.58	29.49	15.85	29.07	None	24.71	29.44	15.25	30.60	SME
18	Manufacture of Electrical Machinery and Equipment	23.09	28.44	14.10	34.37	SME	22.80	31.43	12.87	32.90	FIE, SME
19	Manufacture of Communication Equipment, computers and Other Electronic Equipment	16.17	55.43	8.09	20.31	FIE	17.14	42.92	9.35	30.59	FIE, SME
20	Manufacture of Measuring Instruments and Machinery for Office Work	25.39	33.29	13.79	27.53	FIE	18.58	44.16	9.59	27.66	FIE
21	Handicrafts and other Manufacturing	17.25	26.26	11.71	44.78	SME	10.84	41.80	6.93	40.44	FIE, SME
22	Scrap and Waste	1.94	1.25	0.78	96.03	SME	-	-	-	-	None
23	production and supply of Electricity and heat	52.05	13.59	11.56	22.80	SOE	64.01	7.15	6.44	22.40	SOE
24	Production and Supply of Gas	-	-	-	-	None	-	-	-	-	None
25	Production and Supply of Water	-	-	-	-	None	-	-	-	-	None
26	construction industry	29.70	17.39	13.40	39.51	SME	25.31	9.70	9.75	55.24	SME
27	Transportation and warehousing	32.17	7.58	5.00	55.25	SOE, SME	38.32	9.12	6.02	46.54	SOE, SME
28	Post service	30.21	30.79	12.14	26.86	SOE, FIE	65.71	11.71	5.53	17.05	SOE
29	IT industry	30.41	31.96	13.92	23.70	SOE, FIE	27.80	36.17	9.23	26.80	FIE
30	wholesale and retailing	13.85	7.10	4.96	74.09	SME	23.48	8.82	8.12	59.58	SME
31	Hotels and Catering Services	19.21	16.08	8.29	56.42	SME	19.16	13.18	6.08	61.58	SME
32	Finance	34.88	16.08	10.94	38.10	SOE, SME	27.85	6.97	2.58	62.61	SME
33	Real Estate	-	-	-	-	-	-	-	-	-	-
34	Leasing and commerce service	22.12	15.43	8.40	54.05	SME	30.00	15.85	6.87	47.28	SOE, SME
35	Research and test development industry	33.83	22.61	15.96	27.60	SOE	38.35	14.94	10.52	36.19	SOE, SME
36	Polytechnic Services	-	-	-	-	None	-	-	-	-	None
37	Water, environment and public facilities	-	-	-	-	None	-	-	-	-	None
38	Resident and Other Services	26.16	21.35	12.79	39.70	SME	15.45	10.26	10.22	64.07	SME
39	Education	26.88	20.64	14.81	37.67	SME	18.69	10.46	16.89	53.95	SME
40	Health and Social service	31.85	20.85	14.58	32.72	SOE, SME	31.79	12.40	14.20	41.61	SOE, SME
41	Culture , Sports and entertainment	34.84	21.85	14.51	28.80	SOE	48.37	9.05	4.51	38.08	SOE, SME

Notes: Authors' estimation based on China's firm census data from 2008 and IO tables for 2007 and 2010, respectively.

Table A7: Industry Upstream Index

Industry	2007					2010				
	All	SOE	By Type			All	SOE	By Type		
			LFIE	LGE	SME			LFIE	LGE	SME
3 Extraction of Petroleum and Natural Gas	5.09	6.02	5.31	4.99	4.39	5.22	6.31	4.91	5.32	4.22
4 Mining of Ferrous Metal Ores	5.03	5.80	5.79	5.27	4.30	5.04	5.66	5.84	5.24	4.68
2 Mining and Washing of Coal	4.90	5.72	5.35	4.91	3.98	5.13	5.86	5.09	5.04	4.68
23 production and supply of Electricity and heat	4.46	5.09	4.69	4.35	3.75	4.60	5.31	4.30	4.14	3.85
11 Processing of Petroleum, Coking and Nuclear Fuel	4.27	5.22	4.77	4.04	3.59	4.38	5.57	5.08	4.19	4.06
14 Smelting and Rolling of metals	3.98	4.86	4.73	4.27	3.22	3.95	5.00	4.92	4.31	3.52
12 Manufacture of Chemical Products	3.83	3.70	4.20	3.92	3.89	4.02	3.65	4.54	4.50	4.30
5 Mining of Non-Ferrous Metal Ores	3.77	3.78	4.16	3.70	3.92	3.94	3.84	4.86	3.94	3.98
24 Production and Supply of Gas	3.35	3.70	3.75	3.56	3.01	2.92	4.25	3.10	4.87	2.11
10 Paper Products and Articles for Culture, Education and Sports Activities	3.32	3.89	3.65	3.90	2.97	3.76	3.50	4.08	4.24	4.14
27 Transportation and warehousing	3.31	3.82	4.34	4.08	2.47	3.46	4.13	4.68	4.53	3.08
32 Finance	3.28	4.42	4.54	4.22	2.32	3.49	4.69	5.01	4.84	3.04
15 Manufacture of Metal Products	3.27	3.88	4.14	3.68	2.57	3.60	3.45	4.34	4.20	3.48
25 Production and Supply of Water	3.22	3.48	3.72	3.72	2.75	2.51	2.28	4.20	4.75	2.39
28 Post service	3.21	3.54	3.62	3.45	2.83	3.45	3.84	4.79	4.60	3.56
34 Leasing and commerce service	3.14	3.80	3.93	3.66	2.33	3.38	4.51	4.77	4.62	2.78
36 Polytechnic Services	3.11	3.28	3.54	3.12	2.56	3.15	3.56	4.74	3.87	2.46
7 Manufacture of Textile Products	3.06	2.96	4.01	3.14	2.76	3.40	3.67	3.12	4.38	3.54
16 Manufacture of General Purpose and Special Purpose Machinery	2.90	3.98	3.73	3.46	2.04	2.93	4.39	3.67	3.46	2.37
13 Manufacture of non-ferrous metal products	2.73	2.89	3.21	2.80	2.65	2.85	2.69	4.45	3.63	2.67
17 Manufacture of Transport Equipment	2.72	3.36	3.02	3.02	2.14	2.46	3.06	2.87	2.69	2.15
18 Manufacture of Electrical Machinery and Equipment	2.71	3.94	3.84	2.92	1.79	2.71	4.85	3.62	3.03	2.12
9 Processing of wood and Manufacture of Furniture	2.65	3.27	3.18	3.31	2.11	2.90	4.40	3.41	3.74	2.80
30 wholesale and retailing	2.64	3.60	4.01	3.52	1.66	2.84	4.09	4.72	4.22	2.23
29 IT industry	2.46	2.94	2.69	2.93	1.96	2.34	3.11	2.72	3.58	1.84
38 Resident and Other Services	2.44	3.45	3.57	3.29	1.46	2.43	4.65	4.99	4.48	1.83
31 Hotels and Catering Services	2.43	3.59	3.69	3.51	1.46	2.81	4.42	4.83	4.56	2.14
6 Foods and Tobacco	2.42	2.85	2.44	2.52	2.09	2.54	3.15	2.73	2.73	2.34
35 Research and test development industry	2.41	2.90	2.36	2.70	2.32	2.28	2.26	3.65	3.35	1.86
20 Manufacture of Measuring Instruments and Machinery for Office Work	2.36	2.90	3.11	2.28	1.86	2.91	4.59	2.67	3.73	3.44
21 Handicrafts and other Manufacturing	2.29	2.50	2.69	2.72	1.84	3.12	4.88	3.94	4.32	2.77
41 Culture , Sports and entertainment	2.19	2.48	2.26	2.58	2.02	2.33	2.35	4.76	4.42	1.99
19 Manufacture of Communication Equipment, computers and Other Electronic Equipment	2.17	3.38	3.91	2.54	2.10	2.62	4.80	2.56	3.90	3.38
37 Water, environment and public facilities	1.95	1.97	2.09	1.96	1.70	1.86	1.91	3.95	3.12	1.30
8 Wearing apparel, leather, fur, down and related products	1.85	2.97	1.92	2.37	1.39	2.05	4.89	2.34	3.32	1.66
33 Real Estate	1.67	2.65	2.58	1.53	1.22	1.60	3.41	3.00	1.46	1.22
40 Health and Social service	1.26	1.50	1.48	1.48	1.08	1.20	1.34	3.03	1.37	1.05
39 Education	1.20	1.43	1.46	1.31	1.05	1.09	1.39	1.77	1.11	1.02
26 Construction industry	1.06	1.08	1.24	1.08	1.02	1.06	1.10	2.83	1.09	1.02
42 Public administration and social organization	1.02	1.05	1.10	1.05	1.01	1.03	1.11	2.50	1.13	1.01