

Import Uses and Domestic Value Added in Chinese Exports:
What can we learn from Chinese micro data?

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Motivation

- International input-output tables (e.g., GTAP, WIOD, EORA, and OECD)
- Problems:
China's trade structure not properly represented
- Solution:
develop China's DPN (or DP) framework
→ pioneered by Chen et al. (2001)

Motivation

- Key is to split-up the import use from intermediate deliveries
- Proportionality assumptions and firm survey
- Problems:
 - Over-simplified, Feenstra & Jensen (2012)
 - biased estimates, Bernard et al (2007).
- Solution:
 - explore existing firm level data
 - better survey
 - to narrow the scope of assumptions

A sketch of the DPN framework

	Intermediate use			Final use		
	D	P	N	DFD	EXP	TOT
D	\mathbf{Z}^{DD}	\mathbf{Z}^{DP}	\mathbf{Z}^{DN}	\mathbf{f}^D	0	\mathbf{x}^D
P	0	0	0	0	\mathbf{e}^P	\mathbf{x}^P
N	\mathbf{Z}^{ND}	\mathbf{Z}^{NP}	\mathbf{Z}^{NN}	\mathbf{f}^N	\mathbf{e}^N	\mathbf{x}^N
IMP	\mathbf{M}^D	\mathbf{M}^P	\mathbf{M}^N	\mathbf{f}^M	0	\mathbf{x}^M
VA	$(\mathbf{v}^D)'$	$(\mathbf{v}^P)'$	$(\mathbf{v}^N)'$			
TOT	$(\mathbf{x}^D)'$	$(\mathbf{x}^P)'$	$(\mathbf{x}^N)'$			

Source: Lau et al. (2007), Chen et al. (2012)

China micro data: available, but usable? (1/2)

Custom Trade Data

- firm ID
- HS-8 Product (6000-9000)
- export value
- import value (inputs, K, C)
- customs regime (normal/proc trade)
- ownership

Production Data

- firm ID
- CIC industry (500)
- gross output
- value added
- **total** input use
- ownership (equity share)

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graph TD; A[Custom Trade Data] --> C((Calculate domestic content)); B[Production Data] --> C;
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Calculate
domestic
content

China micro data: available, but usable? (2/2)

More problems:

- Imports resold to other firms
- Imported inputs not used in current year (inventory)
- Firm produces in multiple sectors

But, never mind, make assumption and use it!

Upward, Richard, Zheng Wang and Jinghai Zheng, 2012, "Weighing China's export basket: The domestic content and technology intensity of Chinese exports," *Journal of Comparative Economics*

Only a subset of exporting firm

Table 2. Summary statistics of the 2007 enterprise and trade data

	Firm numbers	exp	imp	output	sales
ASIP	336,768	7.34	n.a.	40.50	40.00
exporting ASIP	79,103	7.34	n.a.	21.90	21.30
trade data	236,505	9.27	7.27	n.a.	n.a.
L&M (matched)	65,545	2.58	1.23	7.54	7.34
L&M ASIP exp>0	50,277	2.31	1.05	5.95	5.81
L&M imp>0	37,536	2.17	1.23	5.48	5.38

Note: exp, imp output and sales value in trillion yuan

Firm heterogeneity calls for more effort in survey design

Table 3. Use of imported intermediates and exports breakdown by firm type, 2007

Firm type	imported intermediates, %				exp by customs regimes, %			
	for proc exp		for normal exp		proc exp		normal exp	
	Total	L&M firms	Total	L&M firms	Total	L&M firms	Total	L&M firms
Collective	41.6	41.0	37.8	14.9	24.1	15.4	75.9	84.6
WFFE	63.1	61.9	78.7	52.4	81.8	85.9	18.2	14.1
JV	48.3	46.7	73.7	59.2	59.7	65.5	40.3	34.5
Private	58.7	47.2	25.6	6.4	9.8	14.9	90.2	85.1
SOE	63.4	38.0	104.4	64.3	26.6	34.2	73.4	65.8
All	59.7	57.6	62.7	40.7	50.6	70.4	49.4	29.6
formula	proc imp/proc exp		normal BEC input imp / normal exp		proc exp/total exp		normal exp/total exp	

More on firm heterogeneity

Table 7. Summary average results (%) by ownership and firm size (employee), 2007

Indicator	Dataset	Average	All	domestic	foreign	<50	[50, 200)	[200, 1000)	>1000
imp input/input	L&M	weighted	22.8	6.3	29.4	28.7	24.6	21.3	23.9
		cross firm	59.0	22.0	71.0	38.0	57.4	69.5	29.7
imp input/output	L&M	weighted	17.3	4.8	22.2	21.6	18.6	16.2	18.2
		cross firm	16.1	5.3	19.6	18.9	15.8	15.4	18.5
exp/output	L&M	weighted	45.6	37.0	59.5	55.0	50.1	50.8	52.5
	ASIP exp>0	cross firm	62.1	51.1	68.9	58.9	60.9	63.8	62.6
	other exp	weighted	41.5	37.5	55.3	62.3	55.6	43.1	32.9
	ASIP	cross firm	66.7	64.3	71.4	70.5	69.4	62.8	46.2
va/output	L&M	weighted	25.9	25.8	26.0	25.7	25.4	26.1	26.0
		cross firm	26.7	25.6	27.4	24.4	26.1	27.6	28.4
	other exp	weighted	27.1	26.9	27.6	24.1	26.6	27.1	27.8
	ASIP	cross firm	28.3	27.5	30.0	23.8	27.5	31.1	31.8

$$r^{lowz} = \frac{M^{bec}}{Y - X^p}$$

$$r = \frac{M^{bec}}{Y - (X^p - M^{p\&a})} = \frac{M^{bec}}{DN}$$

$$VS^{lower} = M^p + \frac{M^{bec}}{Y - (X^p - M^{p\&a})} = M^p + r \cdot X^n$$

$$VS_i^{lower} = M_i^p + \frac{M_i^{bec}}{DN_i} \cdot X_i^n ,$$

$$VS^{lower} = \sum M_i^p + \frac{\sum M_i^{bec}}{\sum DN_i} \cdot \sum X_i^n , \text{ and}$$

$$VS^{lower} - \sum VS_i^{lower} = \sum \left(\frac{X_i^n}{DN_i} - \frac{\sum X_i^n}{\sum DN_i} \right) \cdot M_i^{bec}$$

$$VS^{upper} = M^p + M^{bec}$$

$$DV = 1 - \frac{VS}{X} = 1 - VSS .$$

Table 8. VS share (VSs) and DVS by sector estimated with micro data (%)

CIC	L&M imp>0		L&M	
	VSS_lower	Total DVS4_upper	VSS_lower	Total DVS5_upper
13	32.2	67.8	20.5	79.5
14	11.5	88.5	8.3	91.7
15	8.2	91.8	5.5	94.5
16	56.7	43.3	56.7	43.3
17	23.1	76.9	16.2	83.8
18	27.9	72.1	22.7	77.3
19	35.7	64.3	28.1	71.9
20	24.6	75.4	16.2	83.8
21	12.5	87.5	10.2	89.8
22	56.9	43.1	50.3	49.7
23	26.9	73.1	24.0	76.0
24	23.7	76.3	20.2	79.8
25	16.6	83.4	6.1	93.9
26	49.0	51.0	39.2	60.8
27	19.7	80.3	14.3	85.7
28	51.8	48.2	48.8	51.2
29	39.2	60.8	35.2	64.8
30	55.1	44.9	47.2	52.8
31	17.8	82.2	11.7	88.3
32	72.8	27.2	37.9	62.1
33	50.9	49.1	36.8	63.2
34	23.6	76.4	18.9	81.1
35	22.7	77.3	18.3	81.7
36	29.0	71.0	25.7	74.3
37	30.0	70.0	26.2	73.8
39	35.6	64.4	30.8	69.2
40	66.6	33.4	64.9	35.1
41	42.0	58.0	39.2	60.8
42	30.9	69.1	21.8	78.2
43	88.8	11.2	80.7	19.3
All	39.0	61.0	32.8	67.2

Note: Gross output (rather than total sales) is adopted in the denominator.

DVS can be any number within [38.9, 69.7]

Table 9. Estimated DVS Boundaries (%)

Data scope and imp input	Total DVS		Normal DVS		note: shares of P&A in PI
	lower	upper	lower	upper	
CA balances (DVS1)	25.3				
Total PI (DVS2)		69.7			
L&M PI (DVS3)		59.5			
L&M imp>0 PI BEC (DVS4)	50.7	61.0	66.9	94.5	17.0
L&M PI BEC (DVS5)	58.5	67.2	77.8	96.4	17.0
Total PI BEC	38.9	68.0	37.3	96.3	24.2

Conclusion & discussion

- Current micro data are not adequate to give precise DVS estimates
 - non-representative samples
 - trading agency problems
- A wide range of DVS estimates are given in our paper
- Suggestions for future firm survey work
- 1) identify the small production firms from firm level trade data. Then, the dataset L&M can be expanded to include large, medium and small firms (LMS).
- 2) select a sample of firms from LMS to be covered by the survey. Other aspects, such as ownership, sector, location and trading partners should also be considered.