Domestic Value Added in Chinese Exports

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World Bank and Tufts University

December 2011

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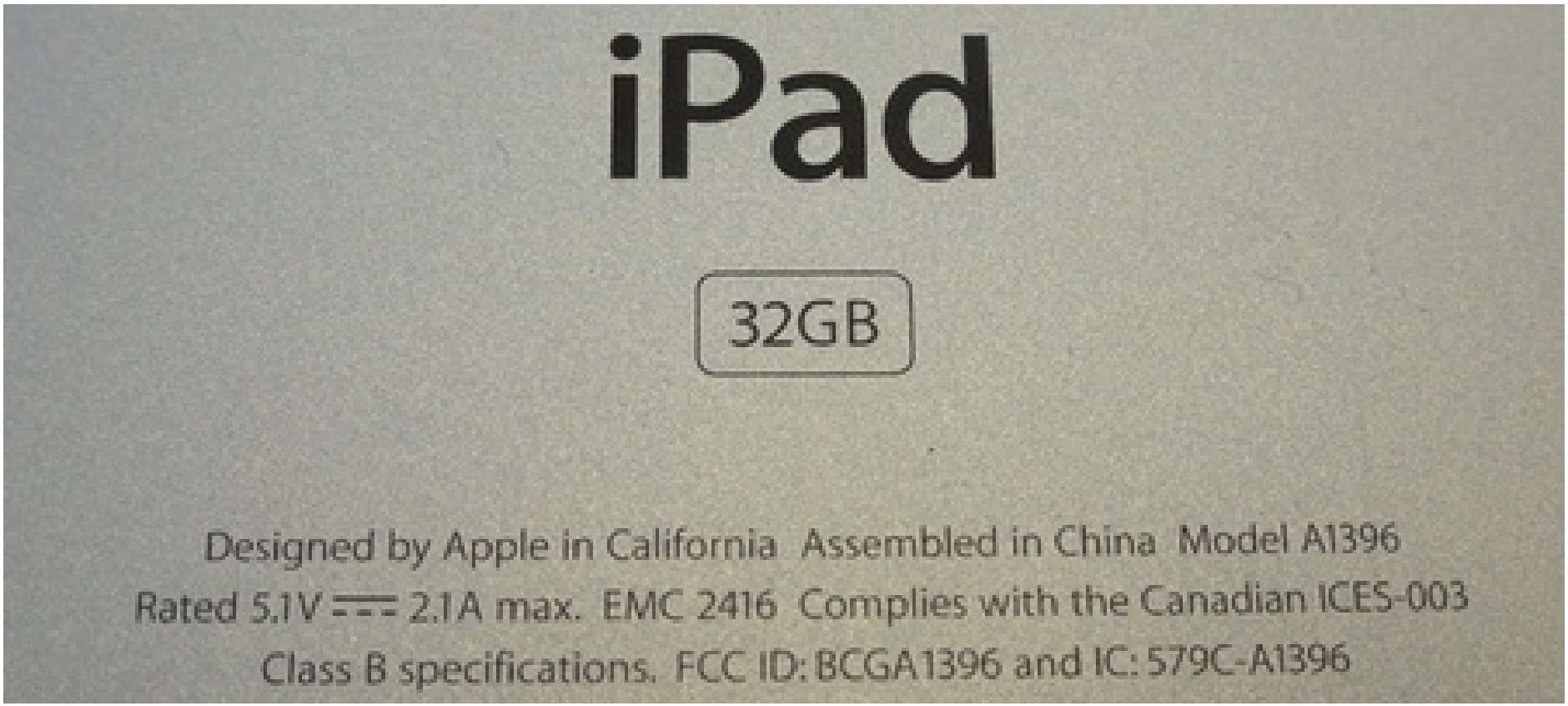
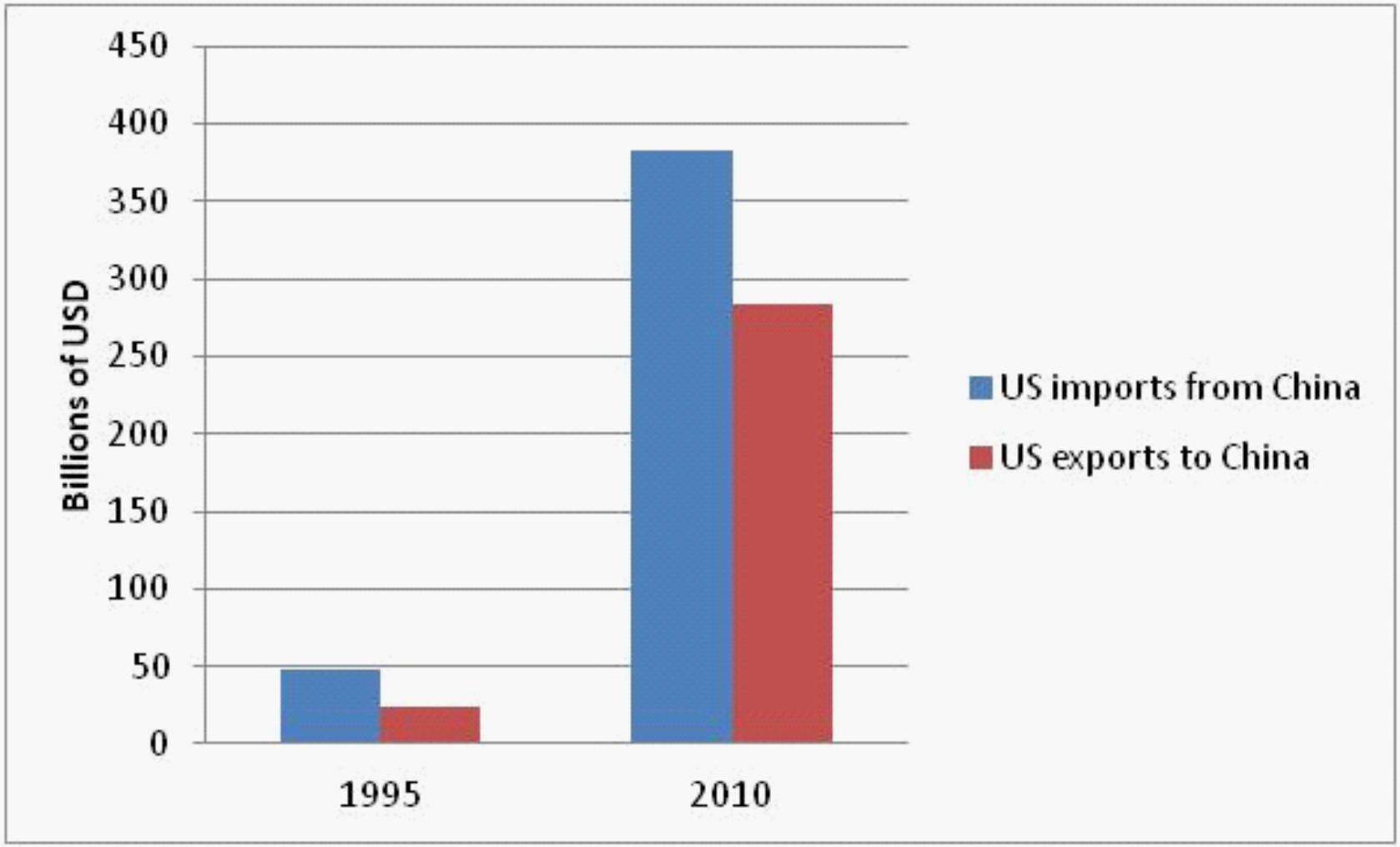
Designed by Apple in California, Assembled in China



US-China Trade, 1995 and 2010



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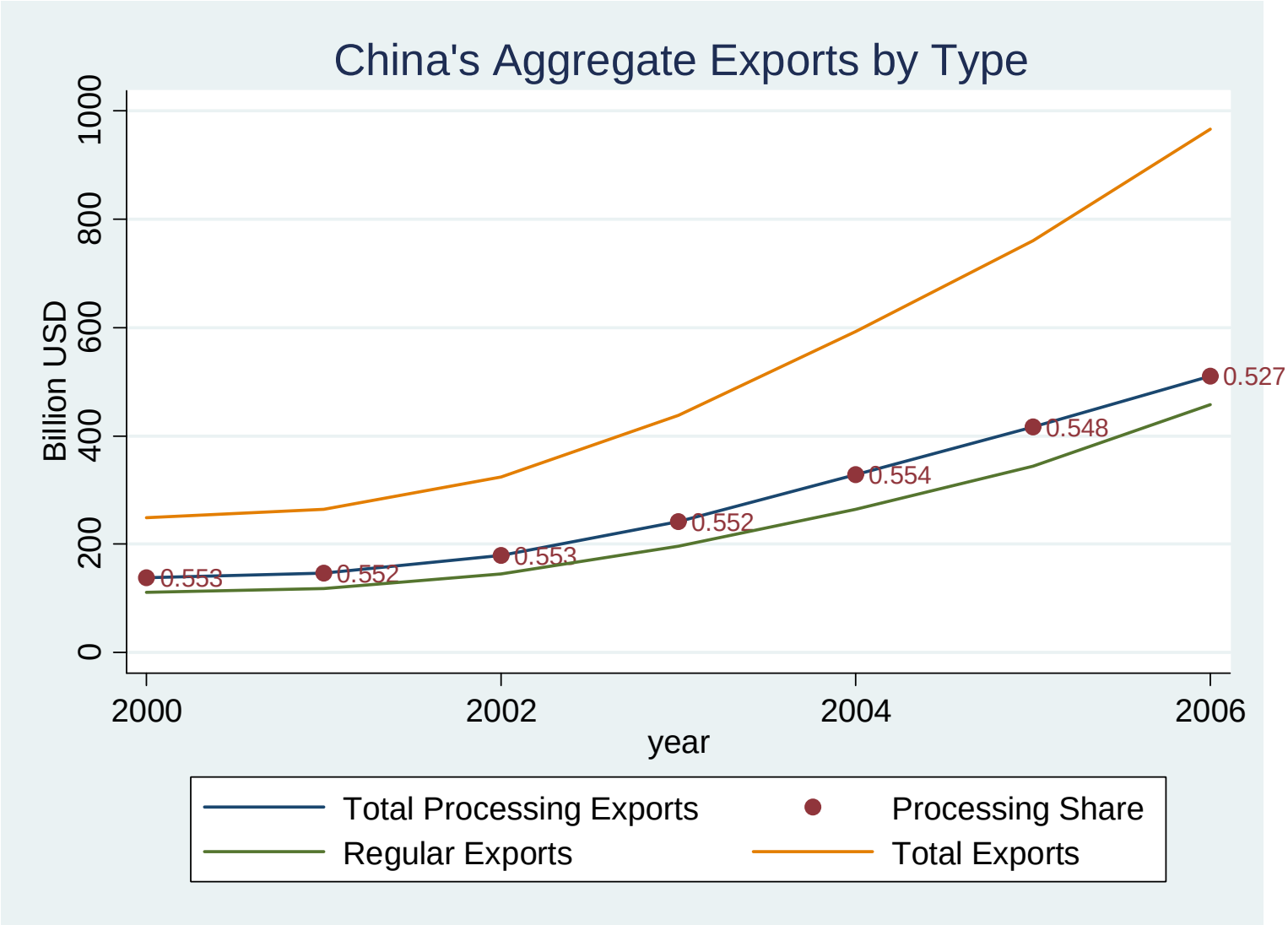
- Domestic value added in Chinese exports may be far less than actual gross exports


China's Aggregate Exports by Type
Billion USD
0
200
400
600
800
1000
2000
2002
2004
2006
year
0.553
0.552
0.553
0.552
0.554
0.548
0.527
Total Processing Exports
Regular Exports
Processing Share
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- These studies mainly rely on input-output tables at the sector level to assess foreign content in Chinese exports
- This paper takes a ground-up approach: we use transaction-level trade data and firm-level production data to assess the domestic value added in Chinese exports from 2000 to 2006

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- Rising *DVAR* is not driven by rising domestic production costs
- This result suggests that China may be moving up the global production chain and is no longer only responsible for the final stage of productions
- However, foreign content remains high in Chinese exports $\Rightarrow$ policy analysis based on gross trade flows will grossly overestimate the impact of Chinese exports

Road Map Ahead

- Data
- Methodology
  1. Multiproduct firms
  2. Negative domestic value added
- Results
- Conclusions

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- The surveys cover all state-owned firms and all non-state-owned firms with sales above 5 million yuan
- The data set contains detailed information for about 100 variables, including firm ID, address, ownership, output, value added, four-digit industry code (480 categories), six-digit geographic code, exports, employment, original value of fixed asset, and intermediate inputs

Figure 1: Chinese exports by type, 2000-2006

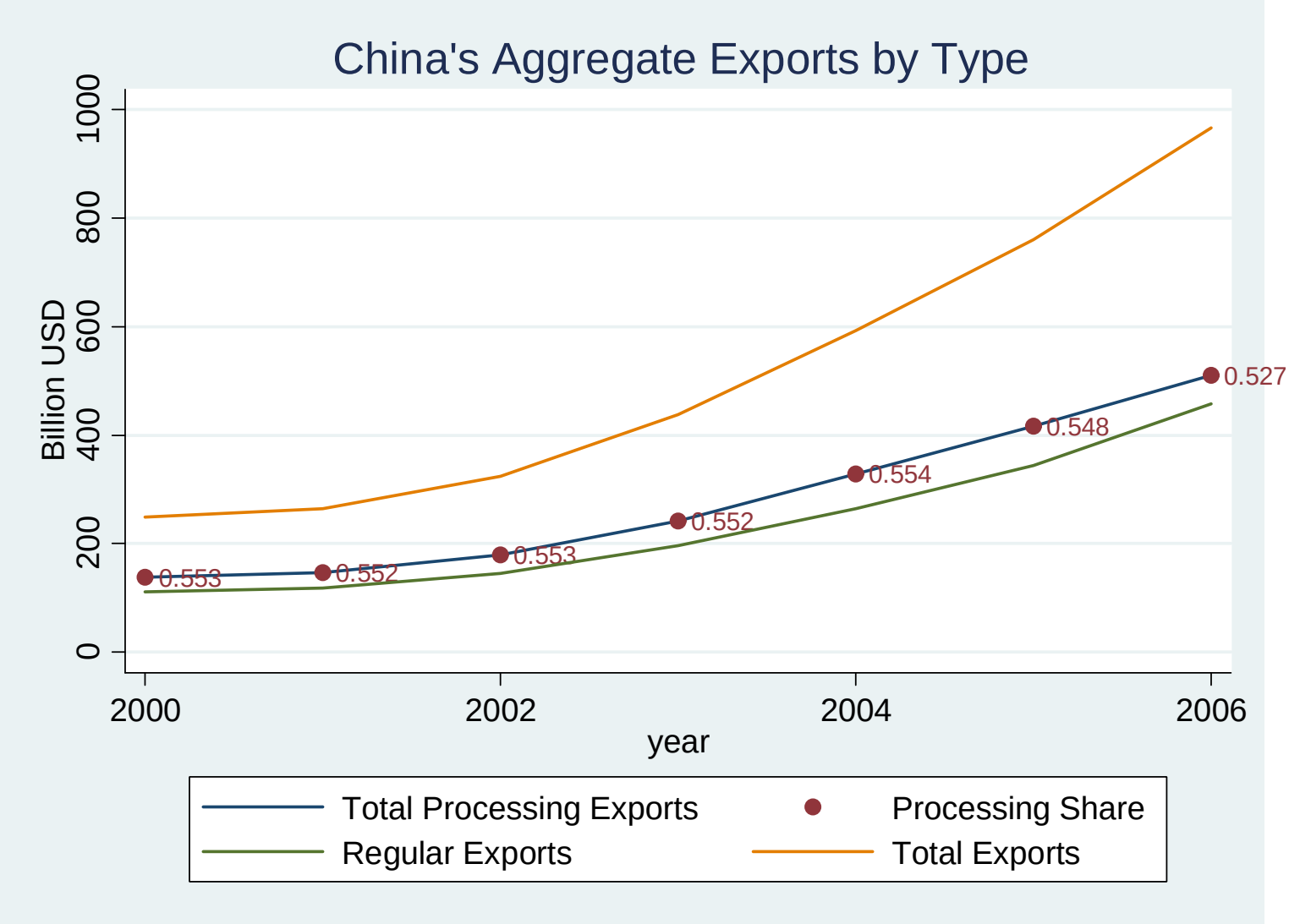


Table 1: Top 10 Destinations for Chinese Processing Exports

	2000			2003			2006		
Rank		Share	$ (Bil)		Share	$ (Bil)		Share	$ (Bil)
1	United States	0.25	25	United States	0.25	50.1	United States	0.25	113
2	Hong Kong	0.22	22.2	Hong Kong	0.23	44.6	Hong Kong	0.23	105
3	Japan	0.18	18.2	Japan	0.15	30.1	Japan	0.1	47.1
4	Korea	0.04	4.17	Germany	0.04	8.65	Germany	0.05	21.3
5	Germany	0.04	3.8	Netherlands	0.04	7.85	Netherlands	0.04	18.9
6	Singapore	0.03	3.17	Korea	0.04	7.81	Korea	0.04	18.2
7	Netherlands	0.03	3.07	Singapore	0.02	4.92	Singapore	0.03	12.8
8	UK	0.03	2.77	UK	0.02	4.81	UK	0.02	11.1
9	Taiwan	0.02	2.06	Taiwan	0.02	4.45	Taiwan	0.02	9.89
10	France	0.02	1.59	France	0.02	3.94	Malaysia	0.02	7.17
Total			101			198			449

Figure 2: Share of processing exports in top 10 destinations

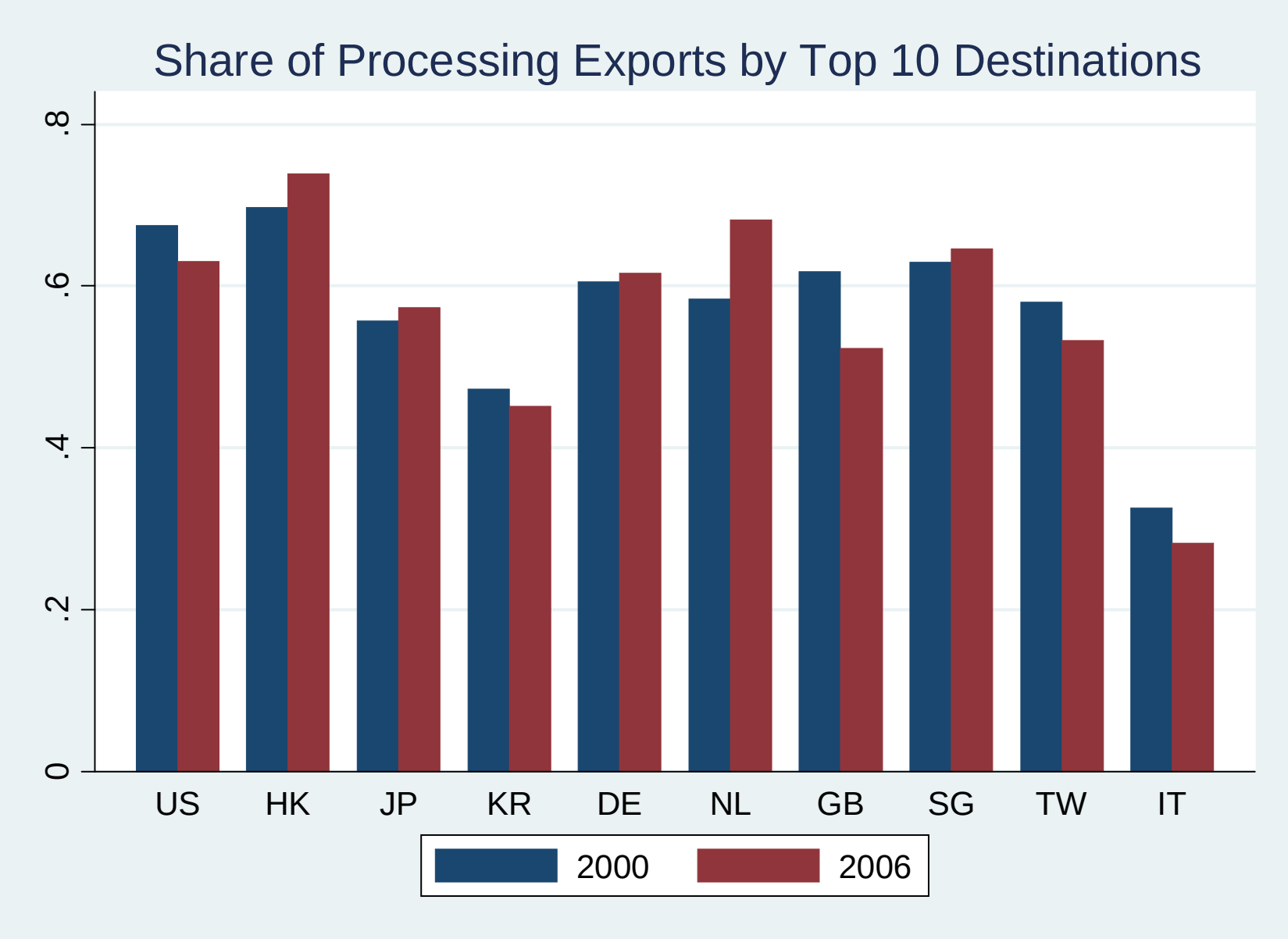
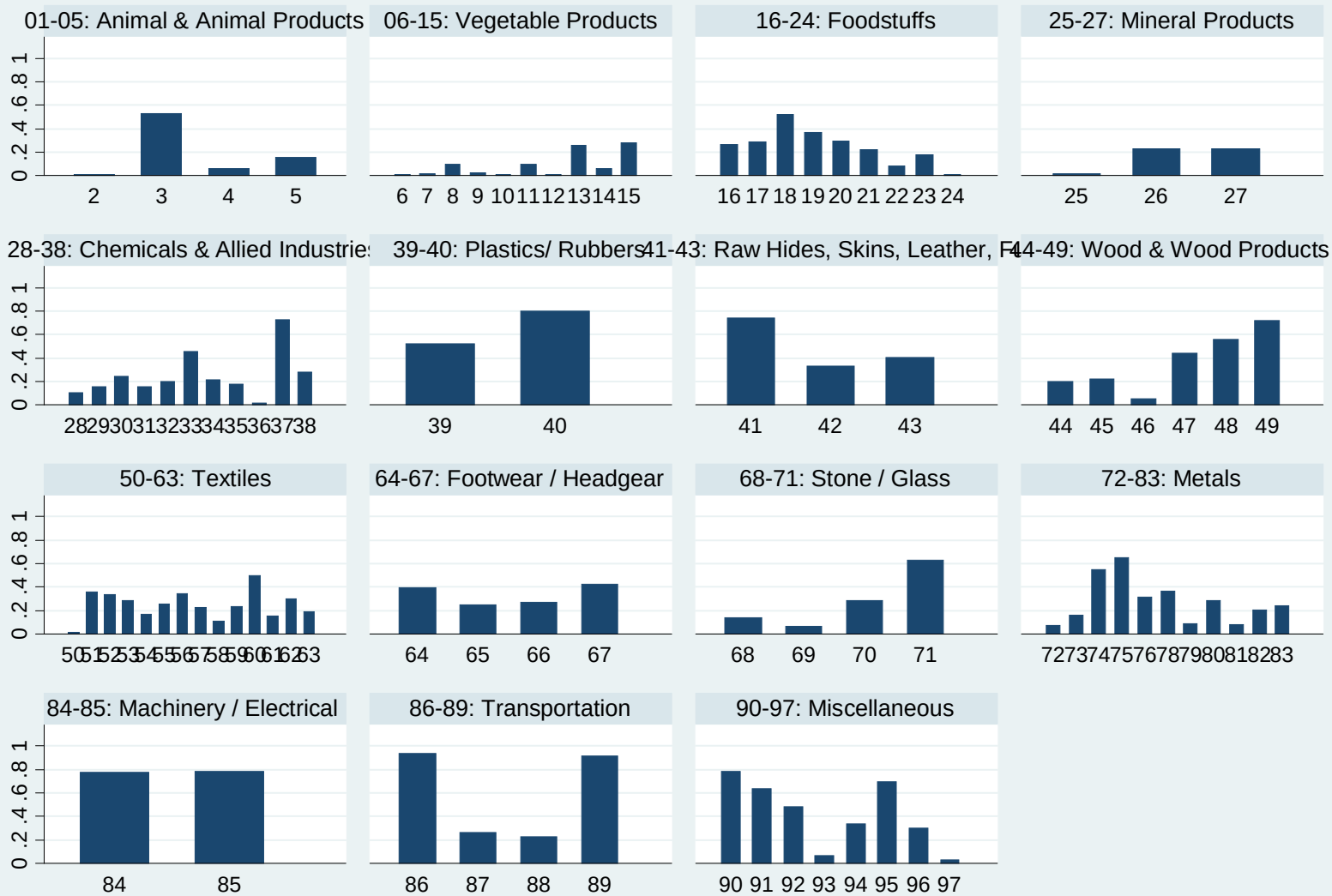


Figure 3: Shares of processing exports in HS 2 industries



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- For many industries, such as Electronics, Transportation, Plastic Products, Toys, processing trade is the main form of exports from China
- Given the high imported content in processing exports, any analysis based on gross trade flows can be highly misleading

Methodology

- Start with a textbook identity, where the total revenue of a firm (PY), consists of the following components: profits, (π), wages (wL), cost of capital (rK), cost of domestic material $\left(P^D M^D\right)$ and cost of imported material $\left(P^I M^I\right)$

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- Domestic value added ratio $(DVAR)$ is therefore

$$DVAR = \frac{DVA}{EXP} = \frac{EXP - IMP}{EXP} = 1 - \frac{IMP}{EXP}$$

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- If violated, the first assumption will lead to an over-estimation of *DVA*
- If violated, the second assumption will lead to an under-estimation of *DVA*
- The overall bias due to the two assumptions is not clear, but there is nothing we can do at this stage to assess the direction of bias.

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- For these set of single HS 2 industry processing firms, all its imports are for exports within their HS 2 industry $\Rightarrow$ estimate the average *DVA* for each HS 2 industry using the sample of single-HS2 exporters

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- For those firms that operate across multiple HS 2 industries, we apply the export weighted average *DVA* ratio of the industries they are in to obtain their firm level *DVA* ratio

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- But this may not be a big problem, as once we weed out firms with excessive imports, *DVA* are mostly positive

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- Rising *DVAR* is observed across industries and across destinations

Figure 5: Estimated average domestic value added ratio in Chinese exports

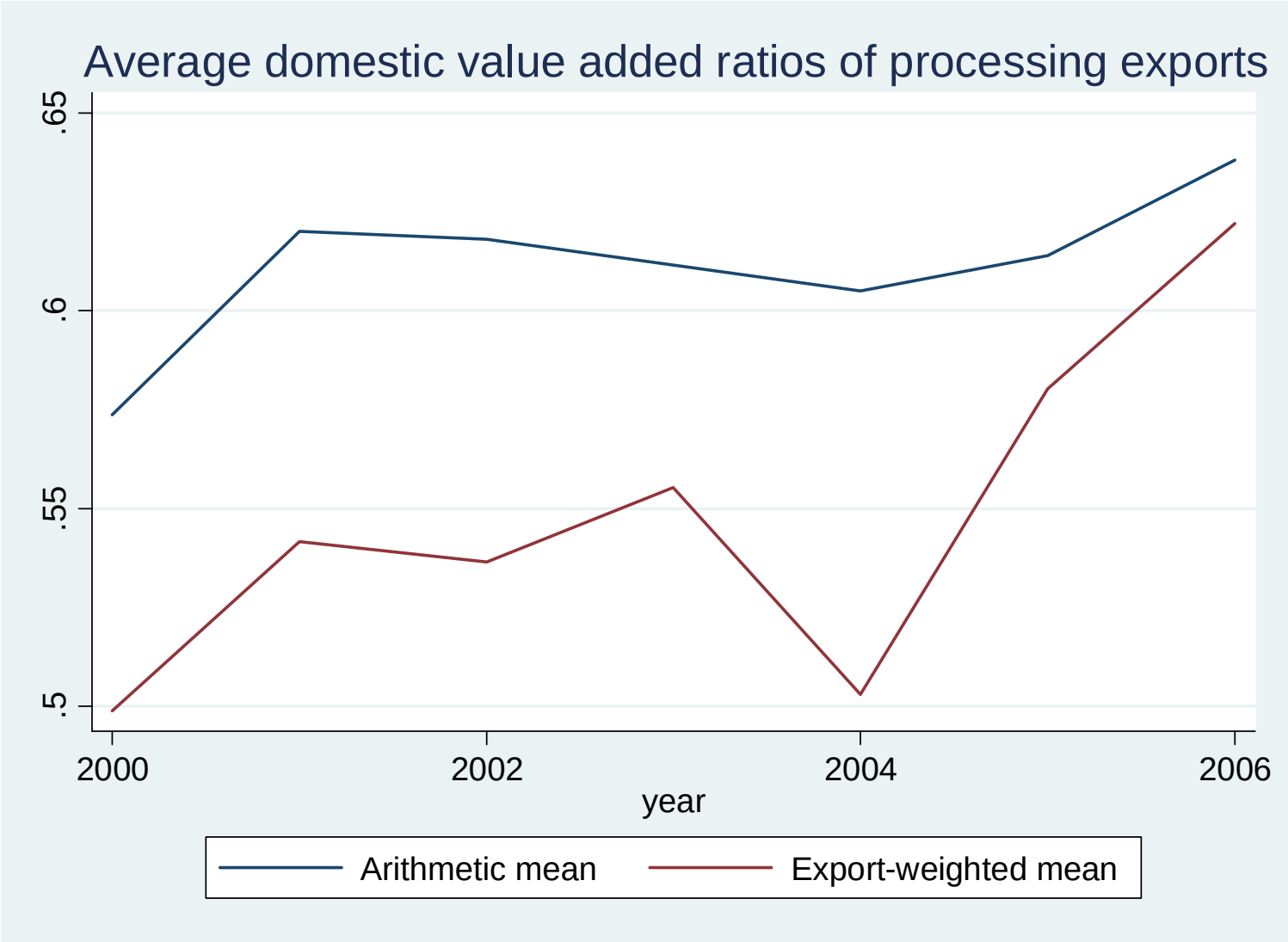


Figure 6: Estimated domestic value added ratios by HS 2 industries

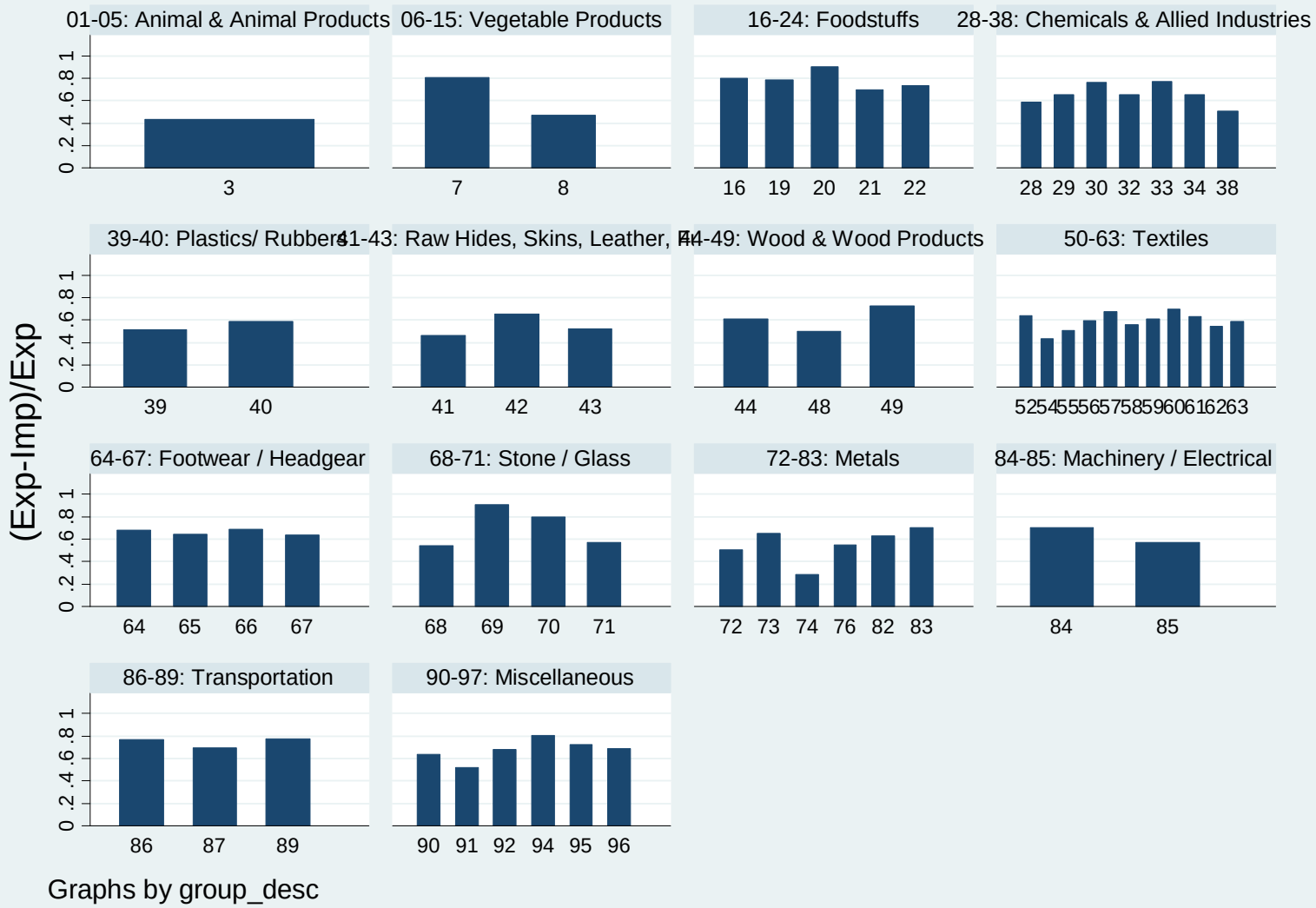


Figure 6: Distributions of domestic value added ratios

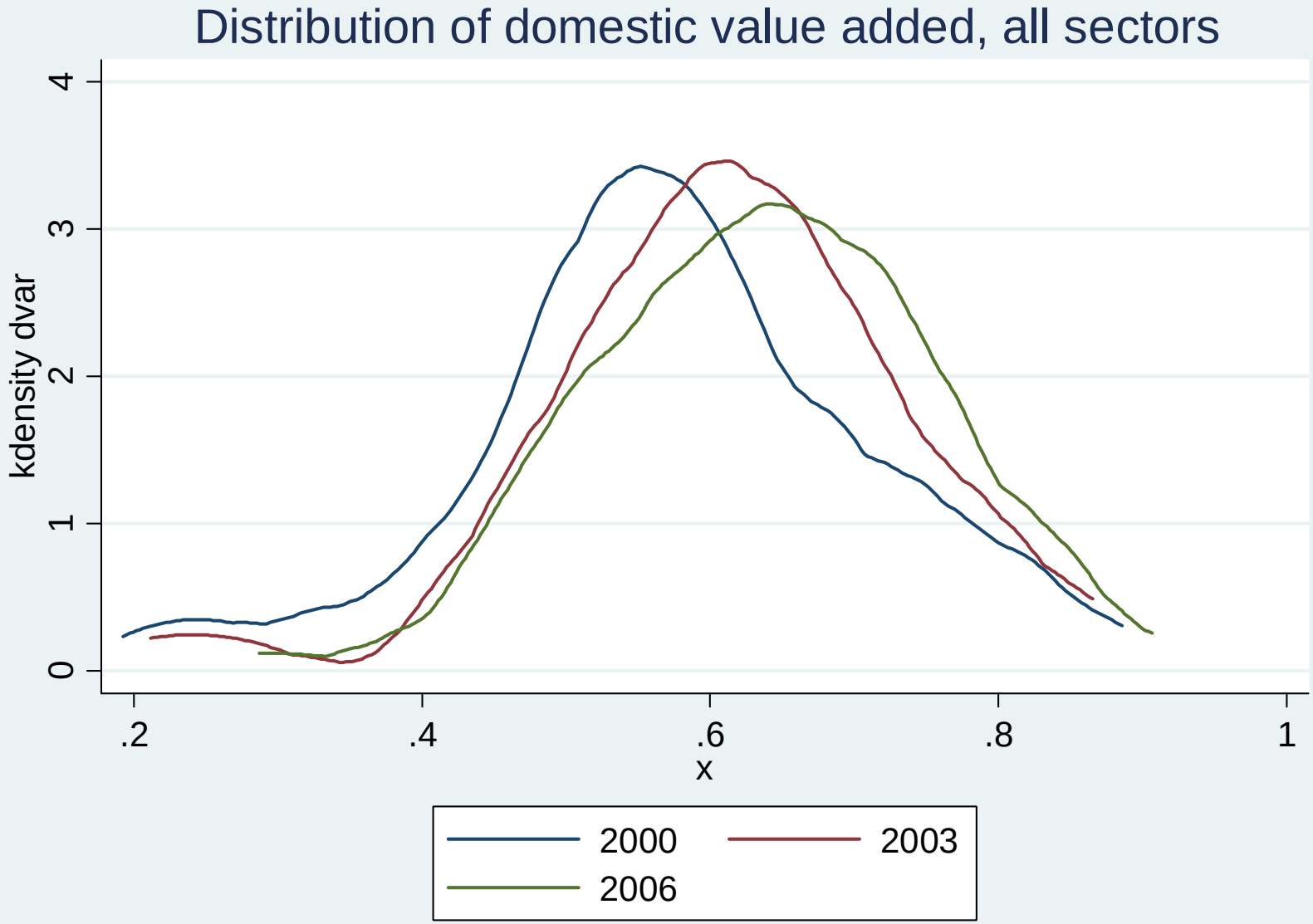
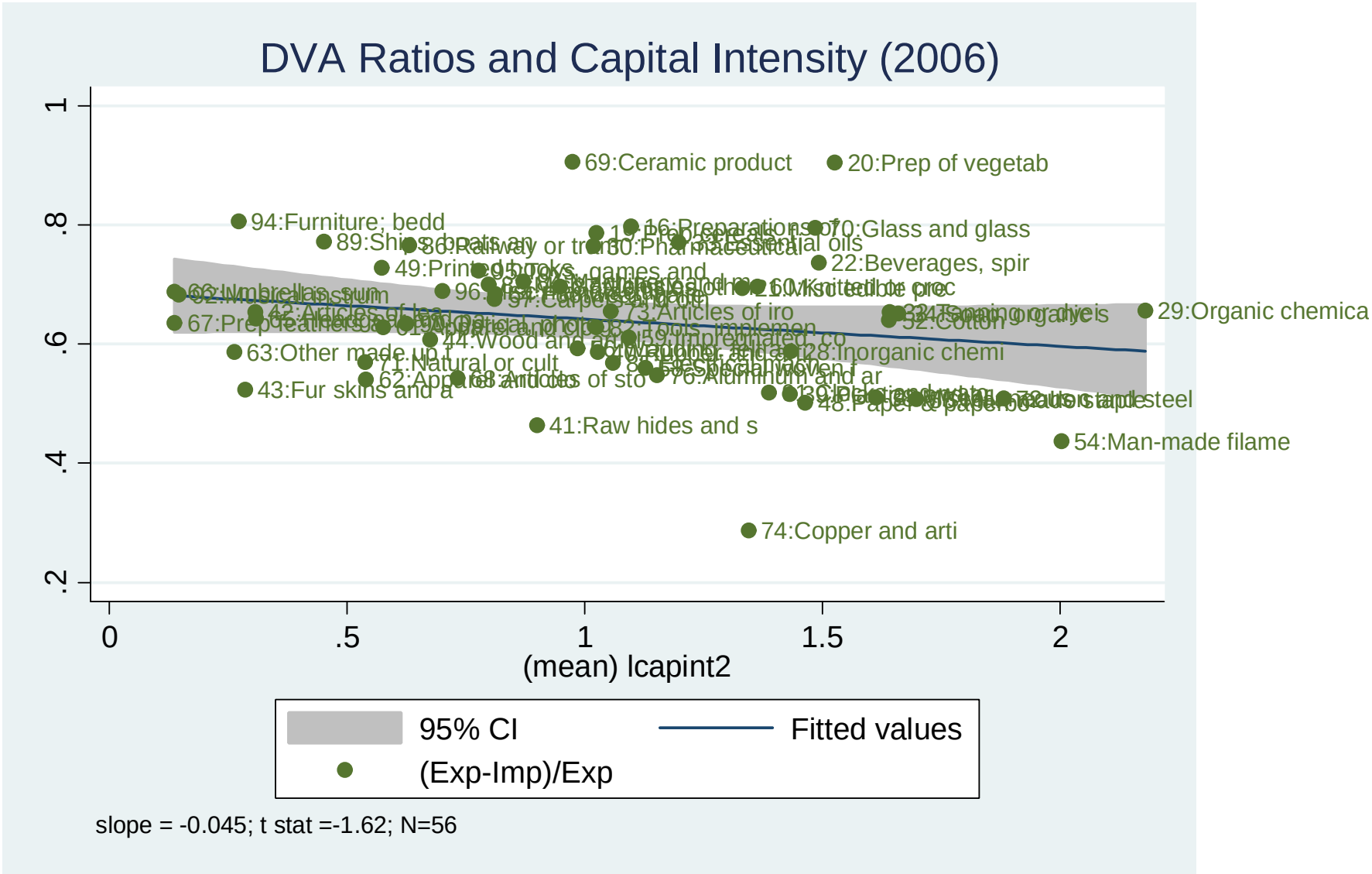


Figure 7: Domestic value added vs capital intensity



Why is domestic value added ratio rising?

- It could be due to rising production costs in China $\Rightarrow$ China is losing competitiveness

Why is domestic value added ratio rising?

- It could be due to rising production costs in China $\Rightarrow$ China is losing competitiveness
- It could be because firms substitution imported materials with domestic materials $\Rightarrow$ China is moving up the value added chain in global production network

Dependent variable: domestic value added ratio

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sample	all	all	all	all	all	private	dom. private	foreign	High K/L	Low K/L
$\alpha_{2001} - \alpha_{2000}$	0.034***	0.033***	0.034***	0.034***	0.033***	0.033***	0.073**	0.031***	0.032**	0.032***
	(7.64)	(7.36)	(7.63)	(7.64)	(7.35)	(7.33)	(2.41)	(6.79)	(2.57)	(6.83)
$\alpha_{2002} - \alpha_{2000}$	0.044***	0.043***	0.044***	0.044***	0.043***	0.043***	0.061**	0.042***	0.049***	0.042***
	(9.52)	(9.19)	(9.50)	(9.52)	(9.16)	(9.12)	(2.09)	(8.96)	(3.77)	(8.48)
$\alpha_{2003} - \alpha_{2000}$	0.059***	0.058***	0.059***	0.059***	0.058***	0.058***	0.082***	0.057***	0.049***	0.057***
	(12.26)	(11.88)	(12.23)	(12.28)	(11.85)	(11.83)	(2.68)	(11.49)	(3.45)	(11.02)
$\alpha_{2004} - \alpha_{2000}$	0.059***	0.058***	0.059***	0.059***	0.058***	0.058***	0.080**	0.057***	0.042***	0.059***
	(11.97)	(11.56)	(11.94)	(11.96)	(11.52)	(11.51)	(2.57)	(11.09)	(2.83)	(11.14)
$\alpha_{2005} - \alpha_{2000}$	0.094***	0.093***	0.094***	0.094***	0.093***	0.093***	0.114***	0.092***	0.072***	0.093***
	(18.83)	(17.93)	(18.81)	(18.83)	(17.91)	(17.95)	(3.61)	(17.57)	(4.68)	(17.13)
$\alpha_{2006} - \alpha_{2000}$	0.123***	0.122***	0.123***	0.123***	0.122***	0.122***	0.154***	0.121***	0.105***	0.122***
	(23.77)	(22.36)	(23.73)	(23.77)	(22.32)	(22.33)	(4.85)	(21.52)	(6.42)	(21.13)
ln(wage rate)		0.002			0.002	0.002	-0.010	0.002	0.001	0.001
		(0.60)			(0.44)	(0.46)	(-0.61)	(0.43)	(0.15)	(0.13)
wage bill/Rev.			0.006		0.013	0.013	-0.028	0.016	0.003	0.016
			(0.83)		(0.66)	(0.65)	(-0.34)	(0.78)	(0.05)	(0.77)
Mat./Rev.				-0.000***	-0.000***	-0.000***	-0.037	-0.000***	-0.000***	-0.075***
				(-6.34)	(-6.44)	(-6.46)	(-0.83)	(-6.87)	(-20.19)	(-5.60)
N	54071	53205	54060	54071	53194	53046	6216	46154	8620	44574
R-sq	.0547	.0547	.0547	.0549	.055	.0553	.0486	.0573	.0368	.0718

Note: Firm and year fixed effects are always included. Data set: merged NBS and customs data. "High K/L" means all HS2 industries that have average ln(K/L) above the median of all HS2. "Low K/L" includes all HS2 below the median.

Dependent variable: import to material ratio

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
sample	all	all	all	all	all	private	dom. private	foreign
$\delta_{2001} - \delta_{2000}$	-0.026***	-0.026***	-0.026***	-0.027***	-0.027***	-0.027***	0.010	-0.028***
	(-6.00)	(-5.85)	(-6.06)	(-6.04)	(-6.17)	(-6.11)	(0.56)	(-6.01)
$\delta_{2002} - \delta_{2000}$	-0.040***	-0.040***	-0.040***	-0.039***	-0.041***	-0.041***	0.007	-0.043***
	(-8.27)	(-8.13)	(-8.42)	(-8.18)	(-8.55)	(-8.47)	(0.43)	(-8.50)
$\delta_{2003} - \delta_{2000}$	-0.059***	-0.059***	-0.060***	-0.060***	-0.061***	-0.061***	0.003	-0.064***
	(-11.81)	(-11.61)	(-11.96)	(-11.87)	(-11.96)	(-11.90)	(0.15)	(-11.94)
$\delta_{2004} - \delta_{2000}$	-0.059***	-0.059***	-0.060***	-0.060***	-0.061***	-0.061***	0.011	-0.064***
	(-10.98)	(-10.74)	(-11.12)	(-11.04)	(-11.15)	(-11.07)	(0.59)	(-11.15)
$\delta_{2005} - \delta_{2000}$	-0.089***	-0.089***	-0.090***	-0.089***	-0.090***	-0.090***	0.005	-0.095***
	(-16.15)	(-15.65)	(-16.26)	(-16.14)	(-15.83)	(-15.76)	(0.27)	(-16.05)
$\delta_{2006} - \delta_{2000}$	-0.113***	-0.113***	-0.114***	-0.113***	-0.115***	-0.114***	-0.000	-0.123***
	(-19.68)	(-18.73)	(-19.73)	(-19.63)	(-19.09)	(-19.03)	(-0.00)	(-19.45)
ln(wage rate)		-0.003			-0.012***	-0.012***	-0.010	-0.012***
		(-0.86)			(-2.85)	(-2.87)	(-1.02)	(-2.63)
wage bill/Rev.			0.0389		0.208***	0.209***	0.106	0.212***
			(1.11)		(5.71)	(5.71)	(1.19)	(5.51)
$\ln(K/L)$				-0.008***	-0.004	-0.004	0.004	-0.006**
				(-2.96)	(-1.60)	(-1.61)	(0.46)	(-2.12)
N	54071	53205	54060	53862	53000	52853	6209	45970

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- Our results are similar to those existing papers that use aggregate input-output table
- Domestic value added only consists of about 60 percent of Chinese exports
- Bilateral imbalance between US and China could be grossly overestimated based on gross trade figures