

Globalization, Prices of IT Software & Services: Measurement Issues

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Why Focus on IT Software & Services?

- A page from the IT hardware narrative
- Economically important
- Being globalized
- Have significant measurement issues
- Some puzzles

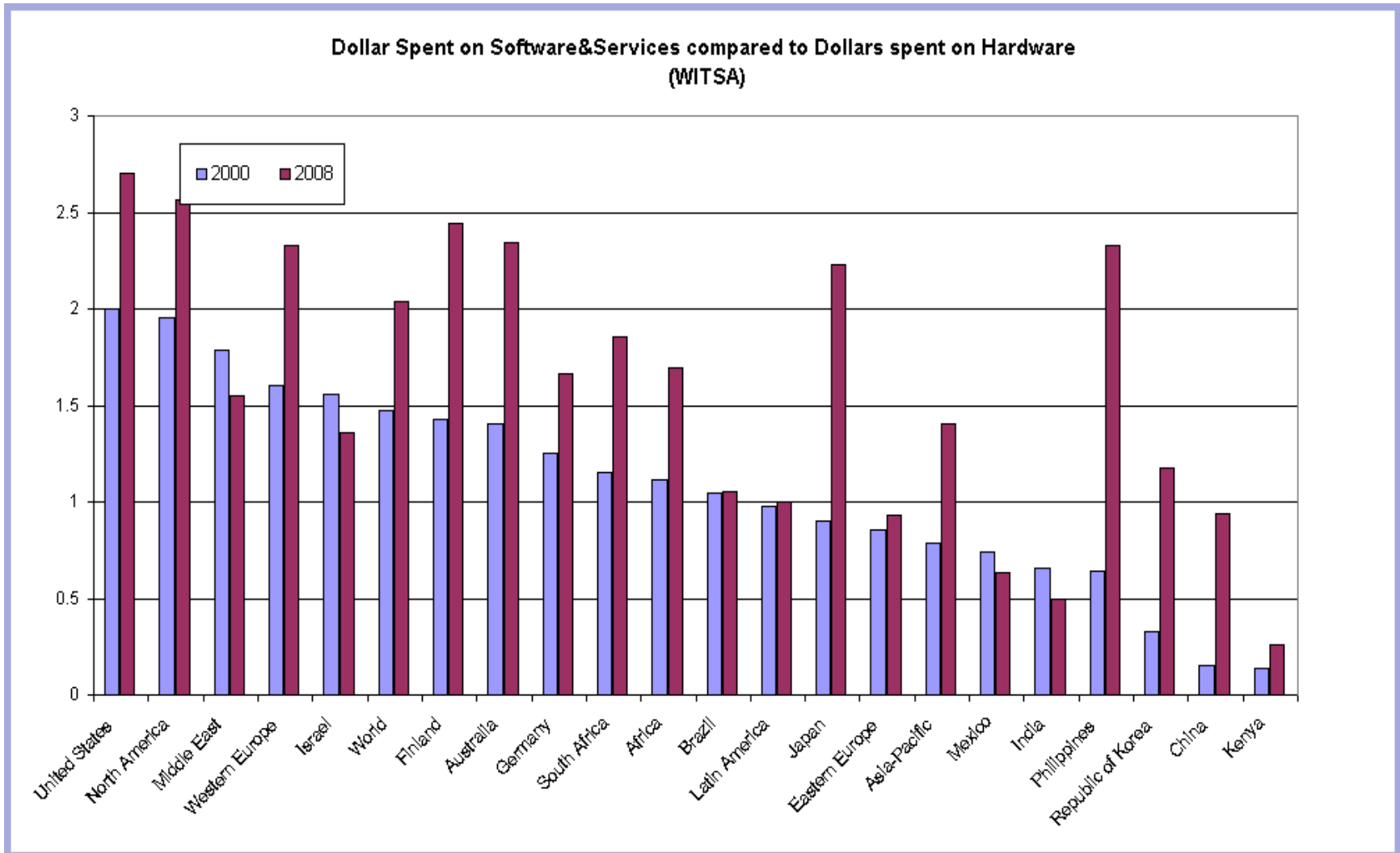
A Page From the IT Hardware Narrative

- US domestic production
 - high wage, high value added
- Technological change
 - Quality improvements... QA prices fall
- Globalization
 - Fragmentation of the global supply chain
 - QA prices fall more... or just transfer prices?
- Deeper integration throughout economy
 - Real trade and productivity implications

Vocabulary

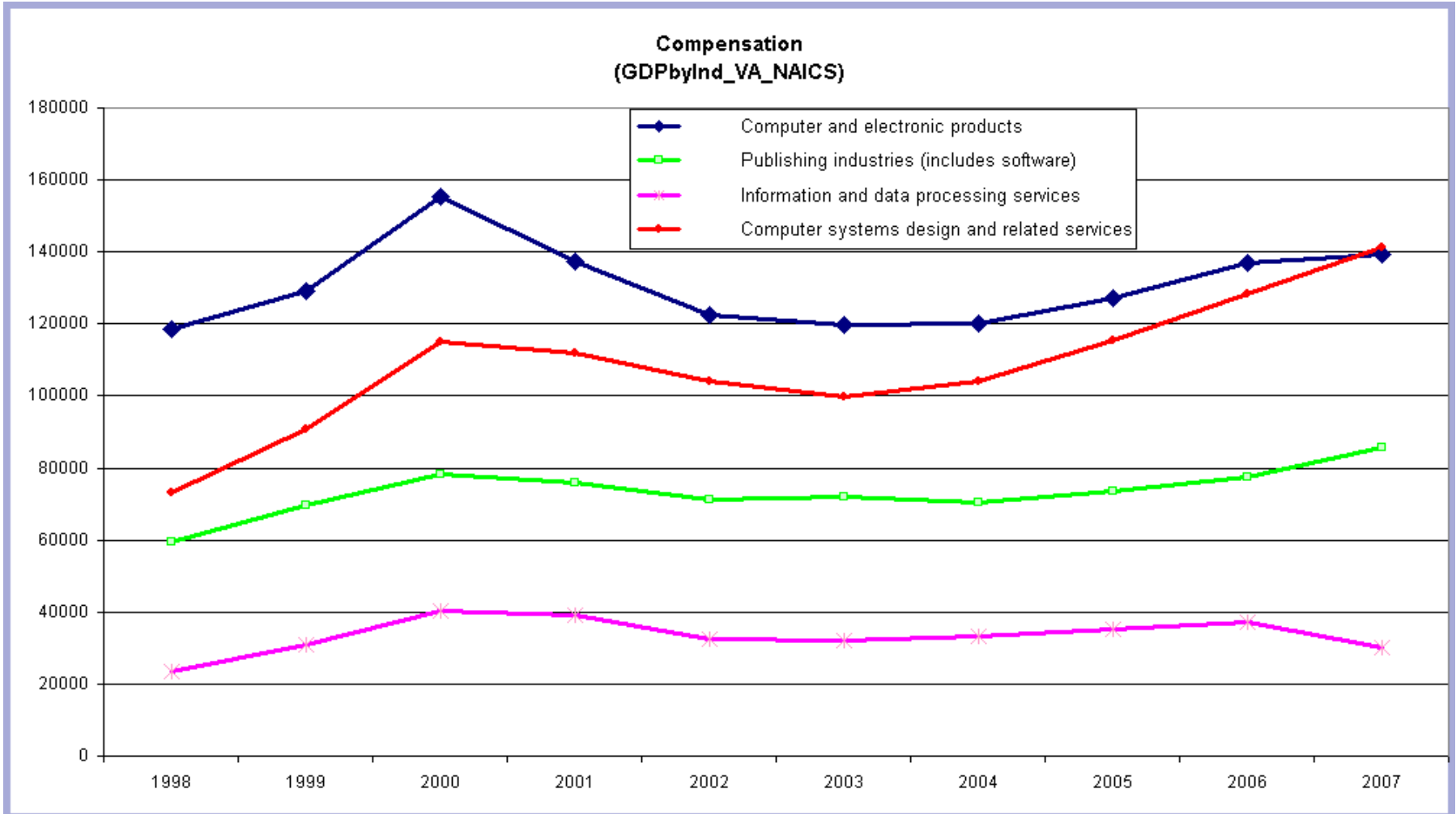
- **Hardware**
 - Computers, parts and peripherals
 - Semiconductors
- **Software**
 - General purpose, custom
 - Bundled (a particular problem)
 - Receipts and payments of IP (various ways treated)
- **Services**
 - CSD: computer systems design
 - IDP: Information data processing
 - CIS: Computer and information systems ~ IDP+CSD

Economically Important: Global



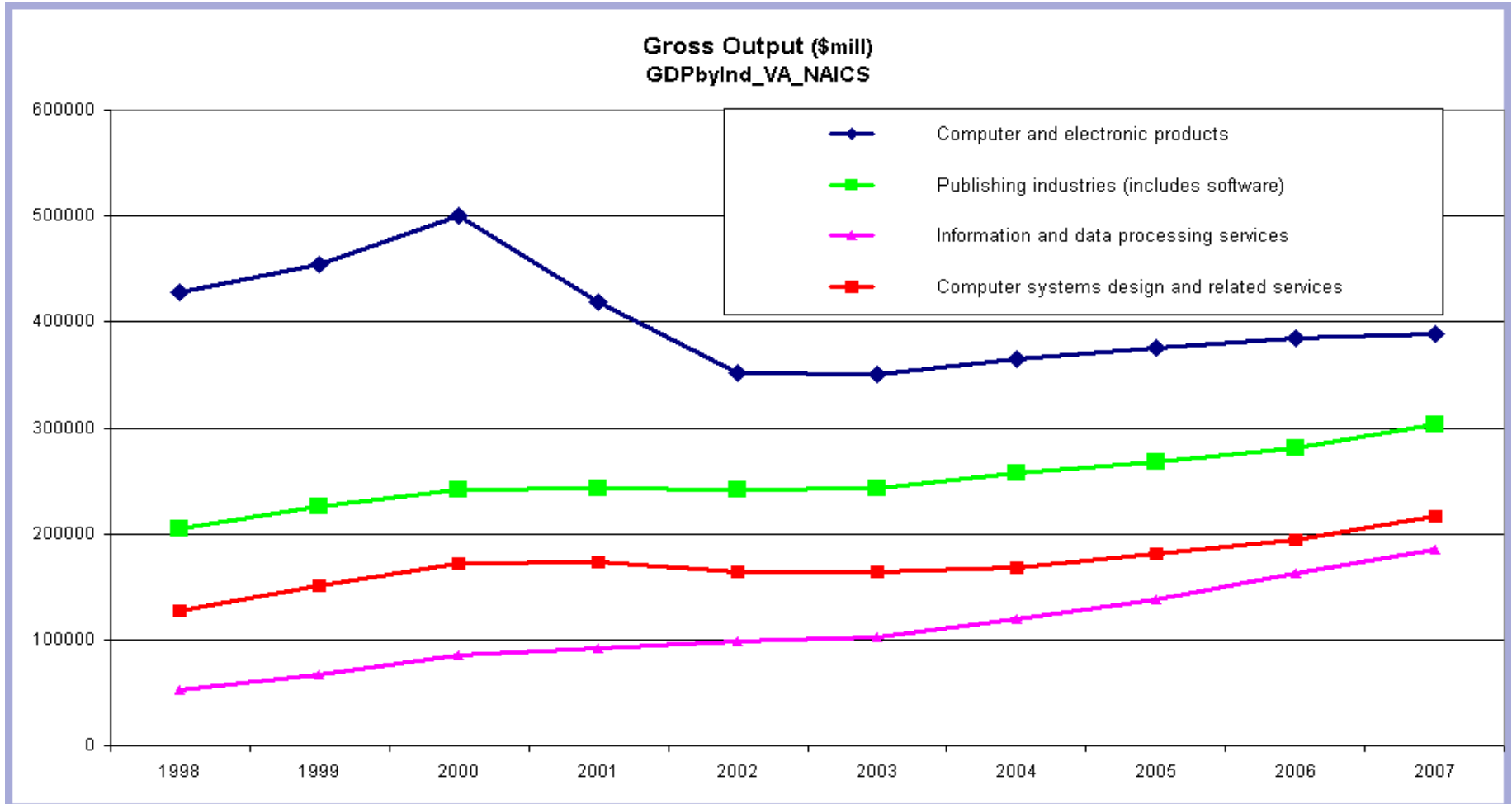
**Increasing share of spending on IT products is on S&S,
all countries, regardless of income level**

Economically Important: US Compensation



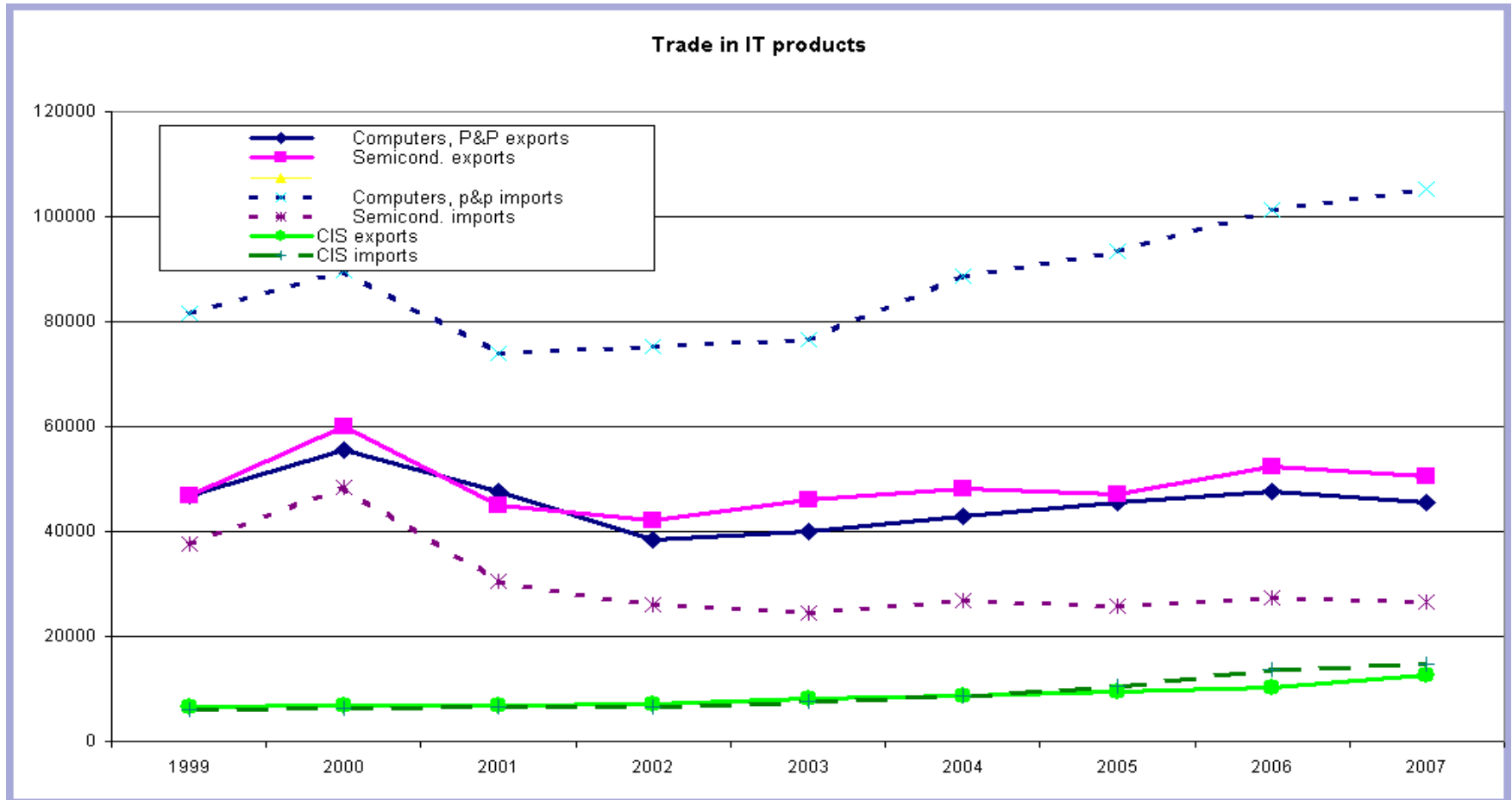
S&S compensation exceeds hardware, with CSD leading

Economically Important: US Gross Output



S&S gross output is growing; collectively is larger than hardware

Not So Economically Important: US Trade*



**Gross flows of hardware components dwarf services flows (IDP and CSD)
 Net trade semiconductors in surplus; computer P&P in deficit; CIS now in deficit
 *software not broken out**

Economically Important: MNC sales

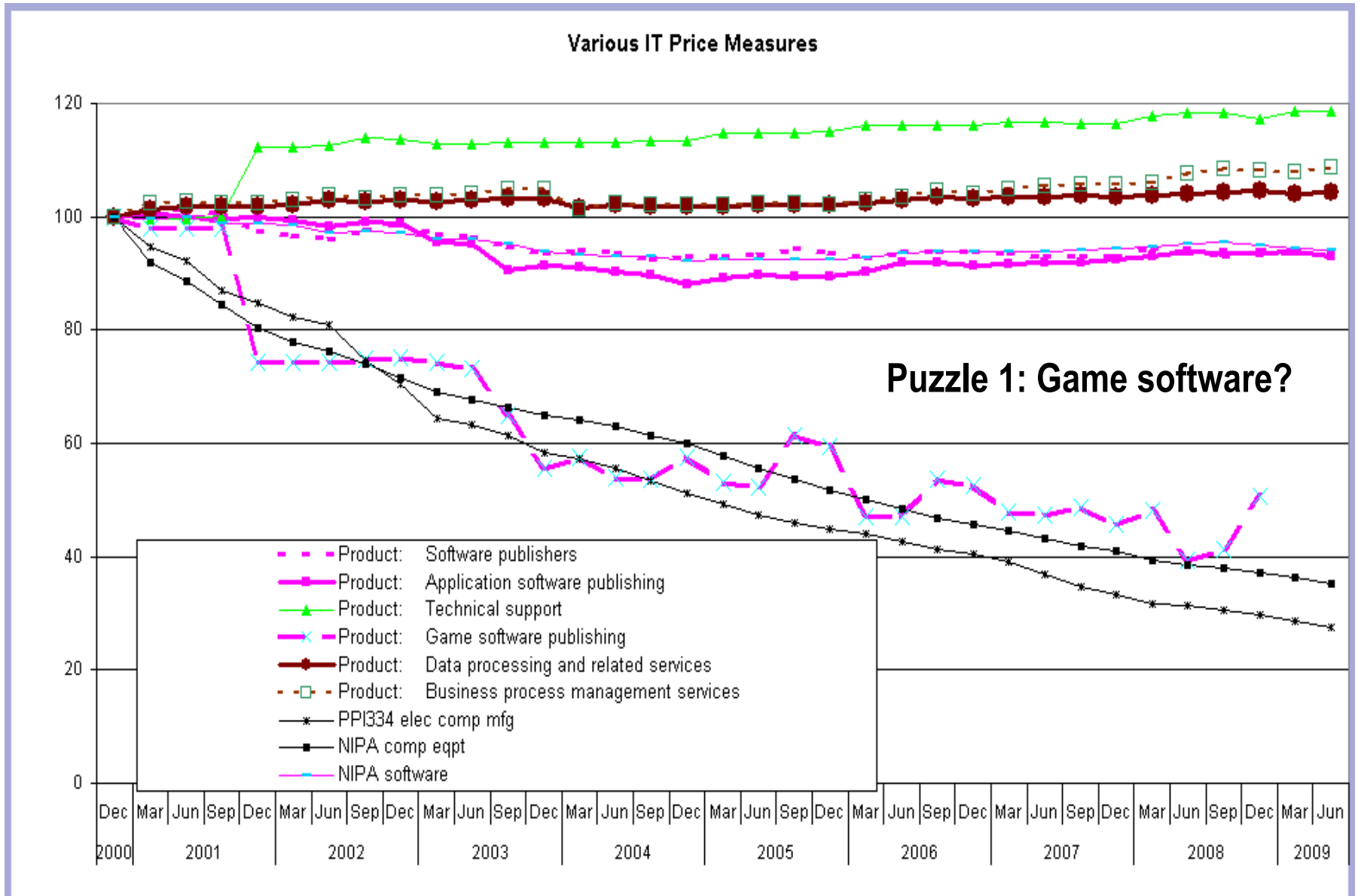
\$ million	1999	2000	2001	2002	2003	2004	2005	2006
Foreign MNCs to US persons								
Computers and electronic products	6392	8142	2746	7258	8446	3726	4884	6338
Software publishers	2200	2153	2215	2989	3726	4352	4383	3916
Internet service providers, web search portals, data processing services, internet publishing and broadcasting, and other	4022	5079			9132	8396		
Computer systems design and related services	4312	5021	6169	4998	10767	11347	12140	14847
US MNCs to Foreign persons								
Computers and electronic products	6855	4951	5239	5324	3745	4432		15671
Software publishers	7534	8086	9807	10624	12224	9879	12864	13679
Internet service providers, web search portals, data processing services, internet publishing and broadcasting, and other information services	14708		16866	18383			24636	29432
Computer systems design and related services						43914	52210	52102

**Sales of S&S services through affiliates is economically meaningful
And larger than trade flows**

Derivation of Price Measures

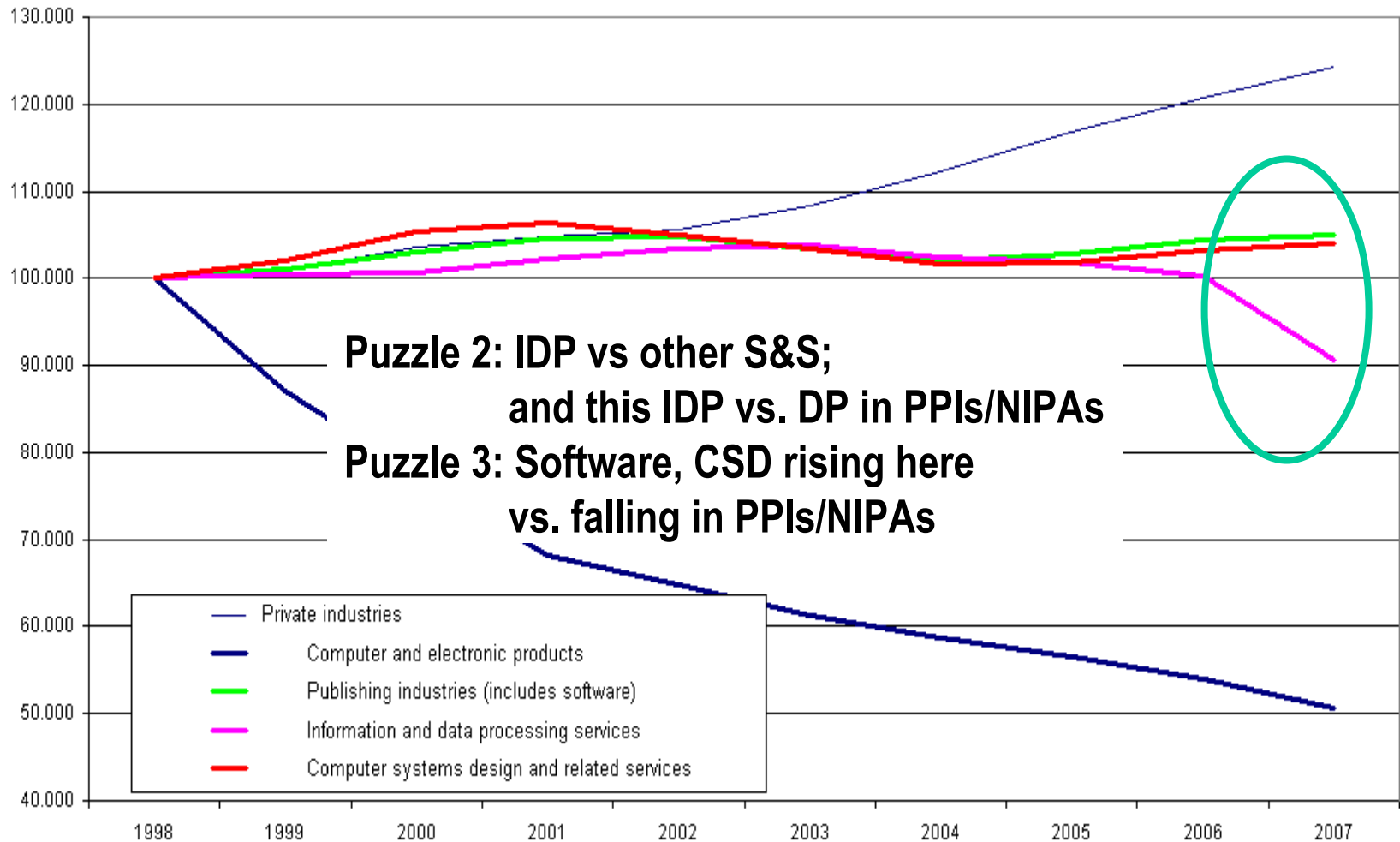
- **Hardware**
 - Hedonic methods based on characteristics
- **Software**
 - Matched model
 - QA based on development cost of new features
- **Services**
 - functionality?

Comparative Price Dynamics: PPIs, NIPAs



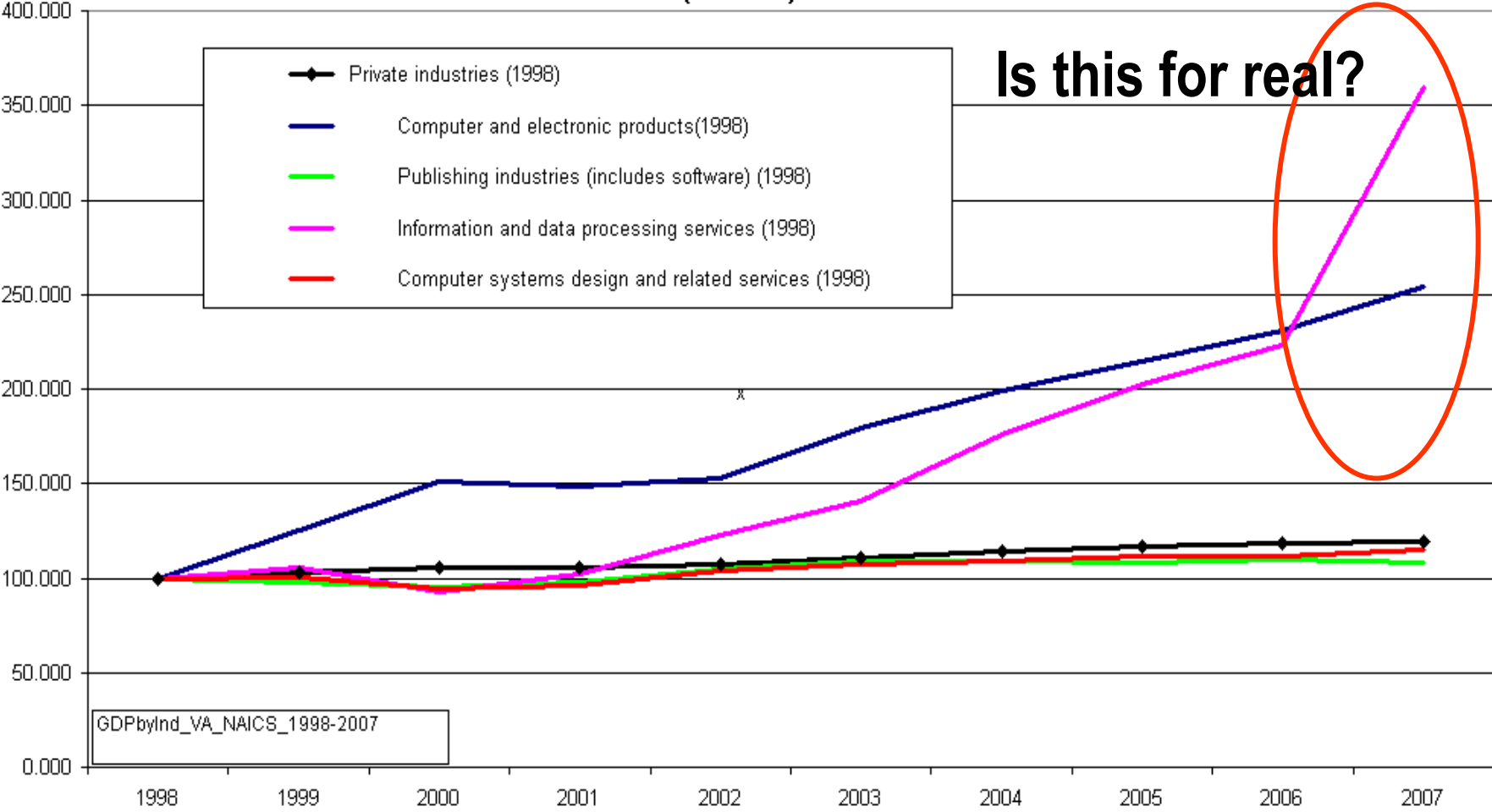
Comparative Price Dynamics: GDPbyInd

Price Index Gross Output
(GDPbyInd_VA_NAICS)

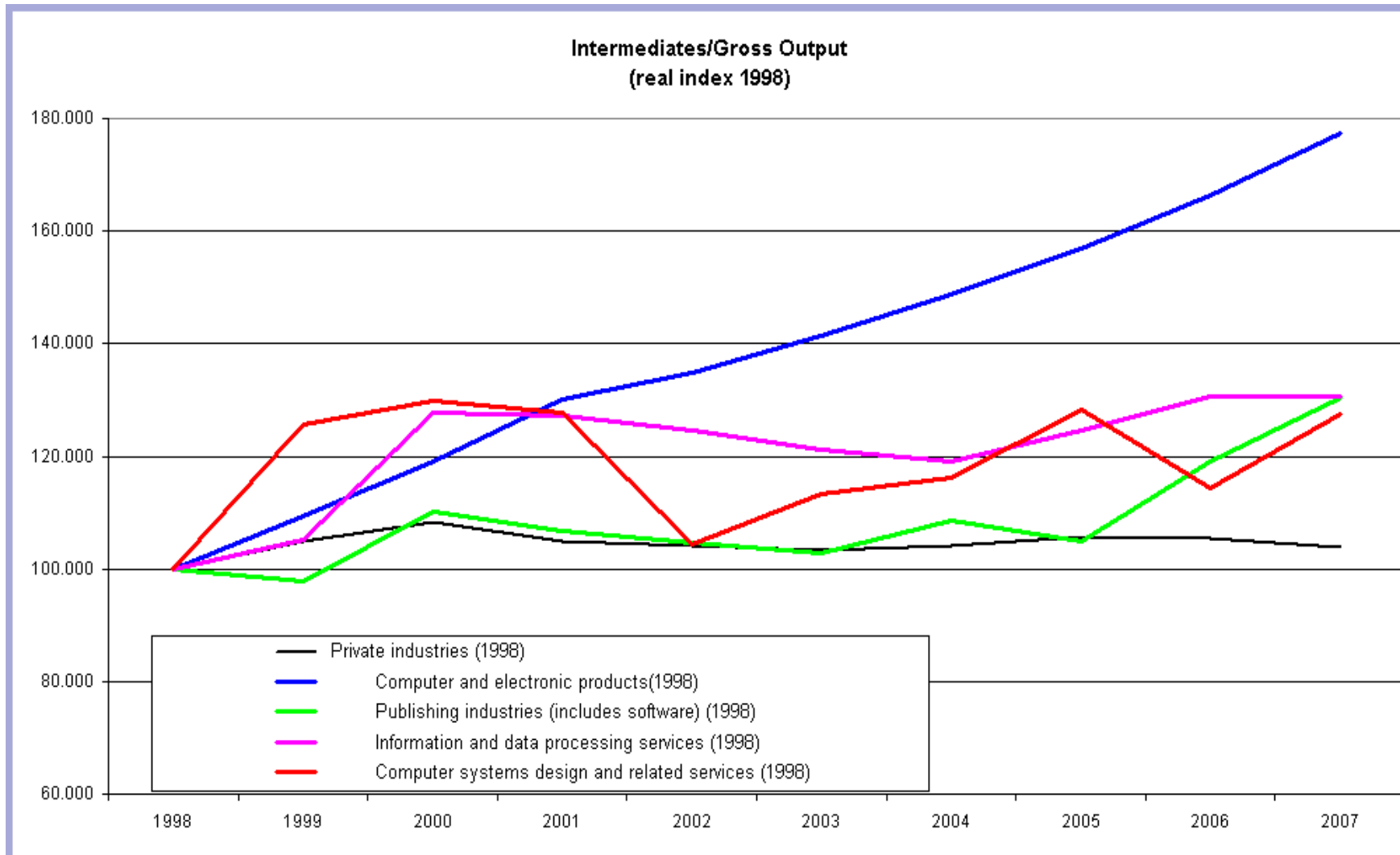


Productivity Implication of Price Metric

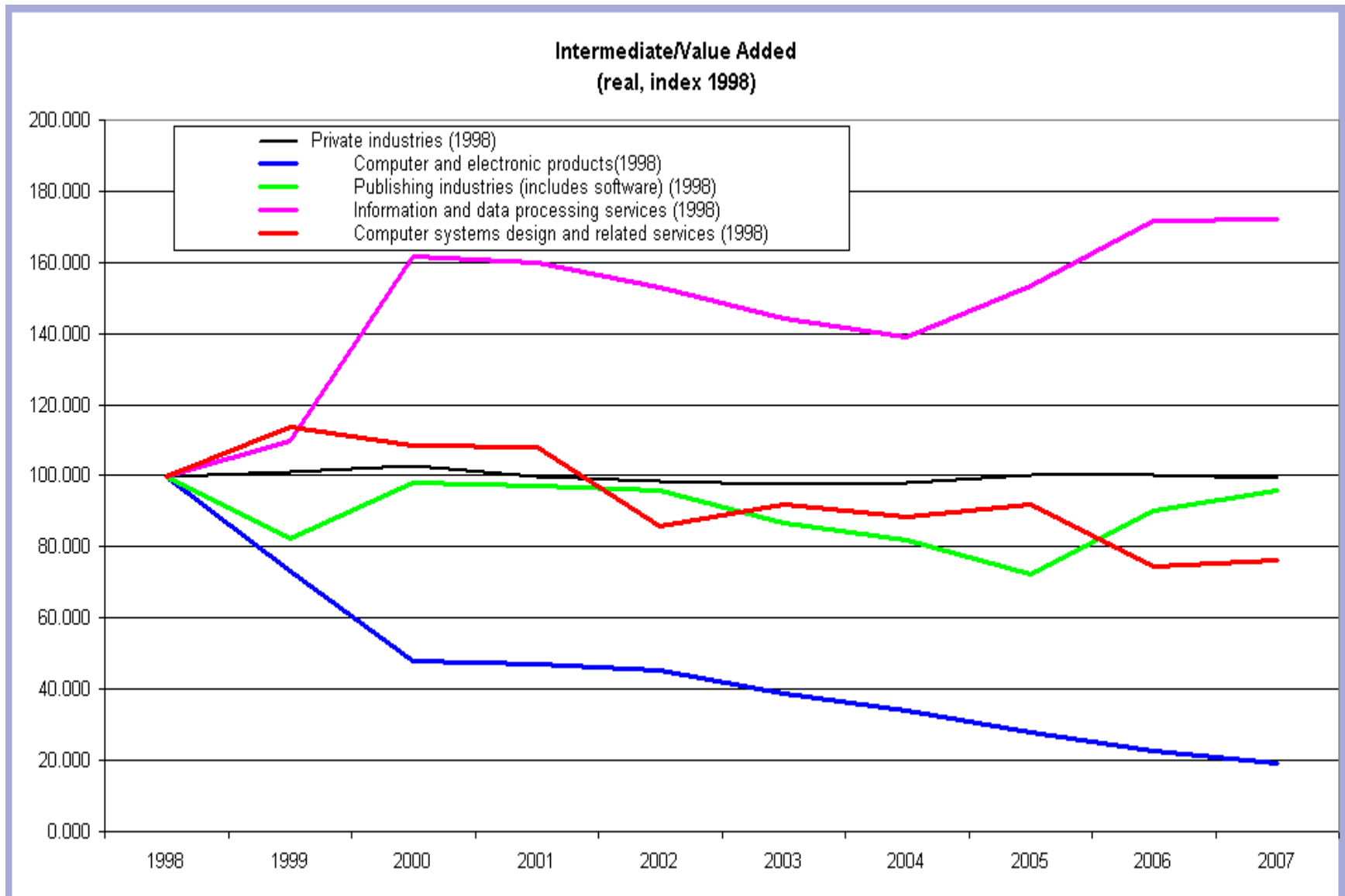
Real Gross Output Per Employee
(1998=100)



Puzzle Answers in Intermediates?



Puzzle Answers in Intermediates or Value Added?



Puzzle Answers in Share of IT in Intermediates?

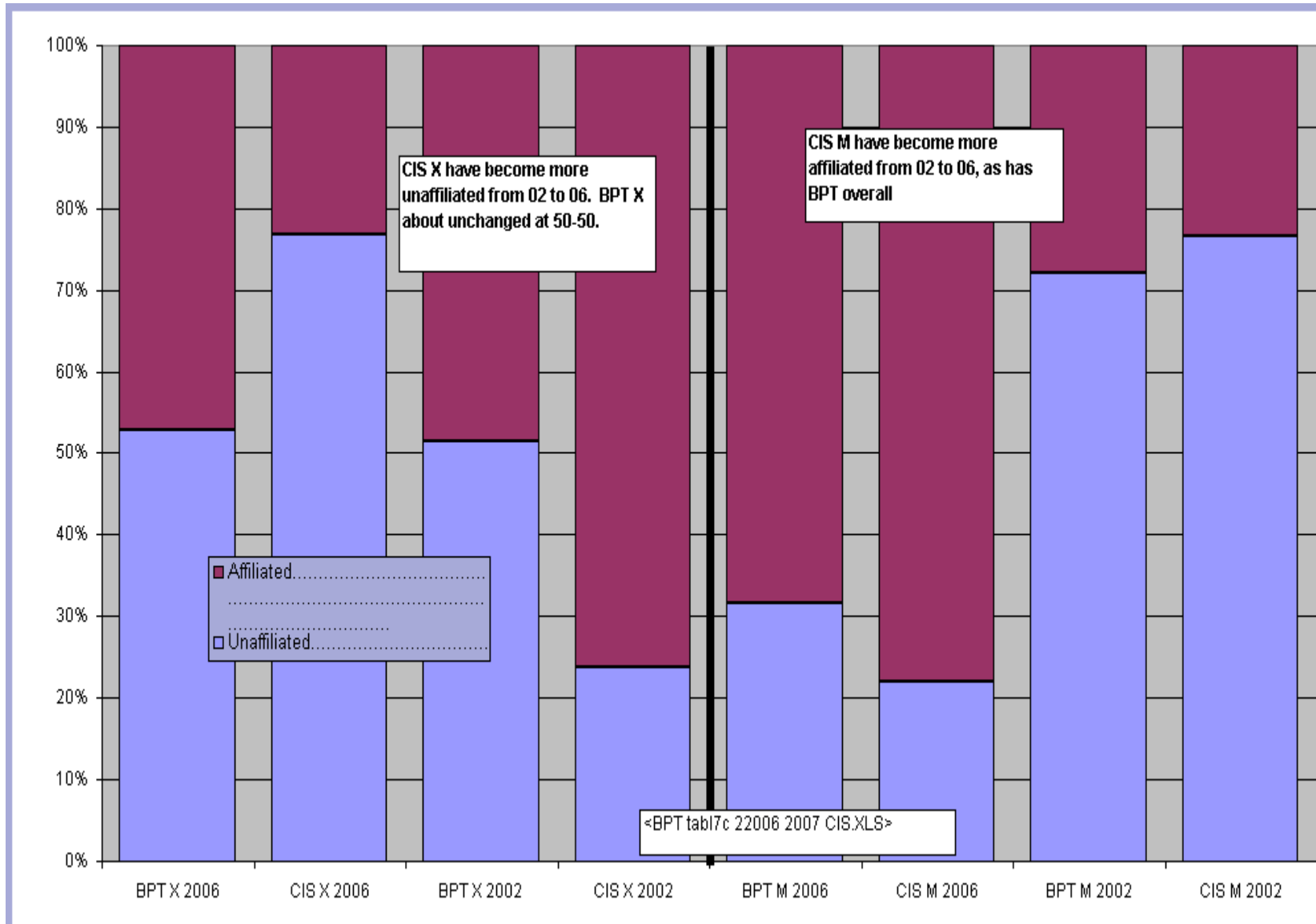
2000	Computer and electronic product manufacturing	Publishing industries (includes software)	Information and data processing services	Computer systems design and related services
Computer and Peripheral Equipment Products	15713	1107	4821	2612
Semiconductor and Other Electronic Component Products	82271	3791	721	4614
Software Publishers	9934	5198
Information Services	460	2659	773	478
Data Processing Services	1849	805	1003	1095
Computer Systems Design and Related Services	5136	3173	1418	1635
Noncomparable imports	4923	1214	686	2177
share Noncomparable imports in intermediate inputs	3.99	1.47	1.85	6.02
share IT services in purchased services	14.09	14.30	8.64	8.87
share IT H&S&S in matls and purch servc	36.96	13.46	8.32	16.81

2006	Computer and electronic product manufacturing	Publishing industries (includes software)	Information and data processing services	Computer systems design and related services
Computer and Peripheral Equipment Products	12616	934	8133	2383
Semiconductor and Other Electronic Component Products	40736	2874	719	3984
Software Publishers	8377	7610
Information Services	521	3703	2150	721
Data Processing Services	1653	851	1776	1111
Computer Systems Design and Related Services	5435	4645	1673	1112
share Noncomparable imports in intermediate inputs	9.40	2.40	1.66	8.41
share IT services in purchased services	23.20%	20.03%	9.45%	15.76%
share IT H&S&S in matls and purch servc	32.85%	17.46%	17.80%	25.29%

Puzzle Answers in Imported Share of IT Incl. Non-comparable imports?

	Computer and electronic products	Publishing industries (includes software)	Information and data processing services	Computer systems design and related services
<ImportMatrices_Redefinitions_2002-2007.xls>				
2002				
share IT H and IT soft, IDP, CSD services in total imports	83.44%	62.74%	92.30%	85.84%
share of IT software + IDP + CSD in services imports	19.17%	60.49%	11.46%	5.62%
% non-comparable imports in total imports2002	18.75	38.80	14.12	58.83
2007				
share IT H + soft + IDP+ CSD services in total imports	76.89%	60.65%	90.05%	80.52%
share of IT soft CSD IDP in services imports	22.40%	54.22%	9.90%	5.16%
% non-comparable imports	25.95	45.03	10.65	96.79

Puzzle Answers in Affiliated Trade in IT Services?



Observations

- IT software and services economically important, globalizing, deeply integrated into economy.
- From hardware experience, we know that getting the prices 'right' is very important for real production, trade, and productivity
- Puzzles in IT soft&services prices, rapid globalization, limited ability to explain their movements, and continued data-matching problems means we have a lot of work to do