Producing an Input Price Index

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125 YEARS
BLS

An Input Price Index

- What is it?
- Why is it Important?
- What is BLS experience in producing an input price index?
- What are the 5 steps in constructing an input price index?
- What are the questions that need to be answered?
- Next Steps

Estimating GDP

- $Y = C + I + G + (X - M)$ (Expenditures/Final Sales Approach)

- $Y = \Sigma (S_i - C_i)$ Production, or Value-Added Approach)
  - Where S represents total Sales for of industry i. and C are the inputs costs for industry i.

- All of these Values must be put into Real terms using appropriate price indexes
- BLS only directly measures X, M and S.

The Basic Argument

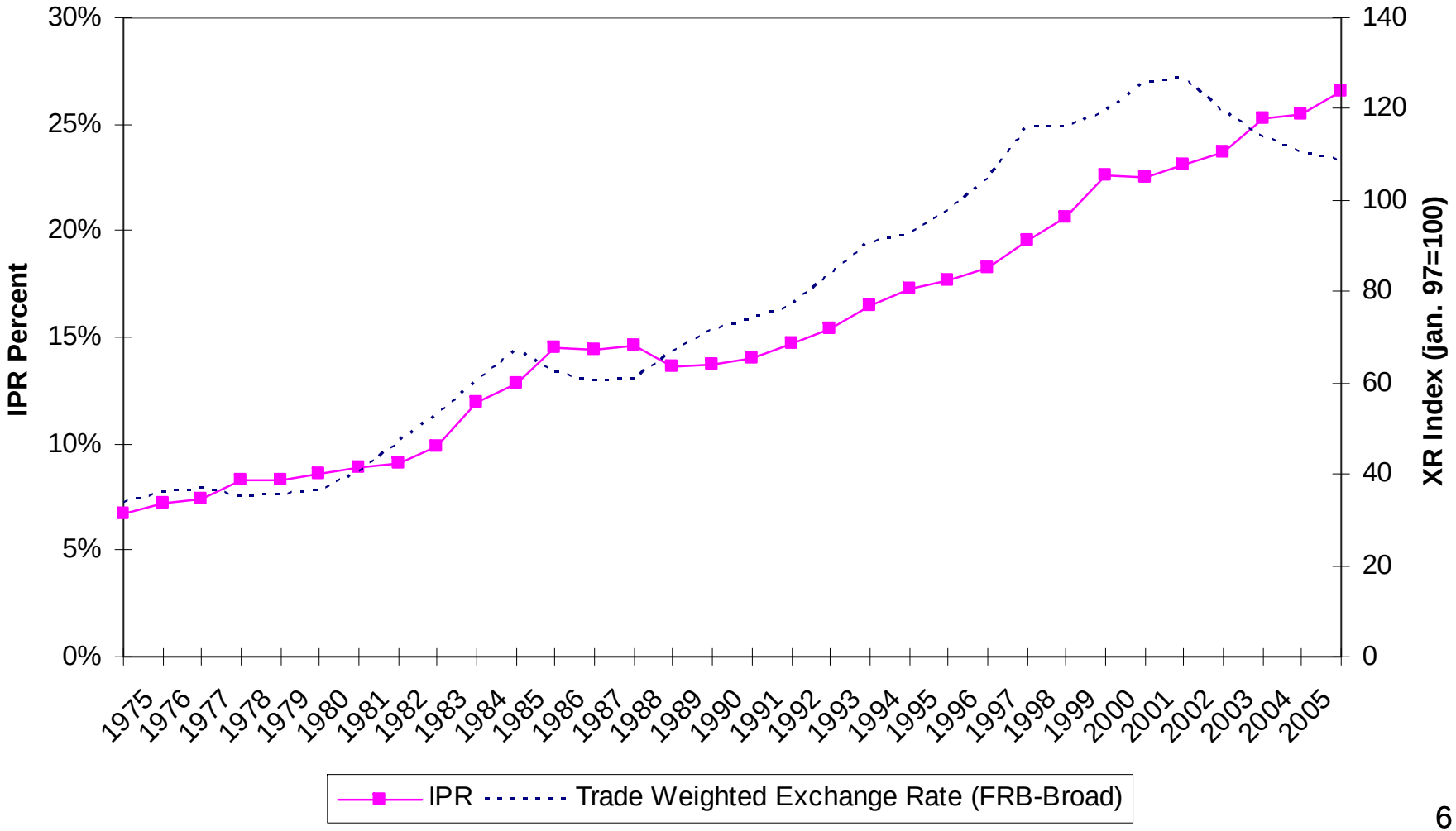
(from BW)

- Import Price Index ONLY Measures Price Changes of Imports
- Producer Price Index ONLY Measures Prices Change of Domestic Production
- BLS Industrial Price Indexes Do NOT explicitly measure price shifts as goods (and services) move from domestic sourcing to foreign sourcing (and vice versa)

The Problem

		9-Jan	9-Feb	9-Mar	9-Apr	9-May	9-Jun
Chair A	Domestic	$10	$10	$10	$10	$10	$10
Chair B	Domestic	$10	$10				
Chair B	Imported			$5	$5	$5	$5
Chair C	Domestic	$10	$10	$10	$10		
Chair C	Imported					$5	$5
Chair D	Imported	$5	$5	$5	$5	$5	$5
PPI		100	100	100	100	100	100
MPI		100	100	100	100	100	100
Combined Index		100	100	100	100	100	100
Input Index		100	100	85.7	85.7	71.4	71.4

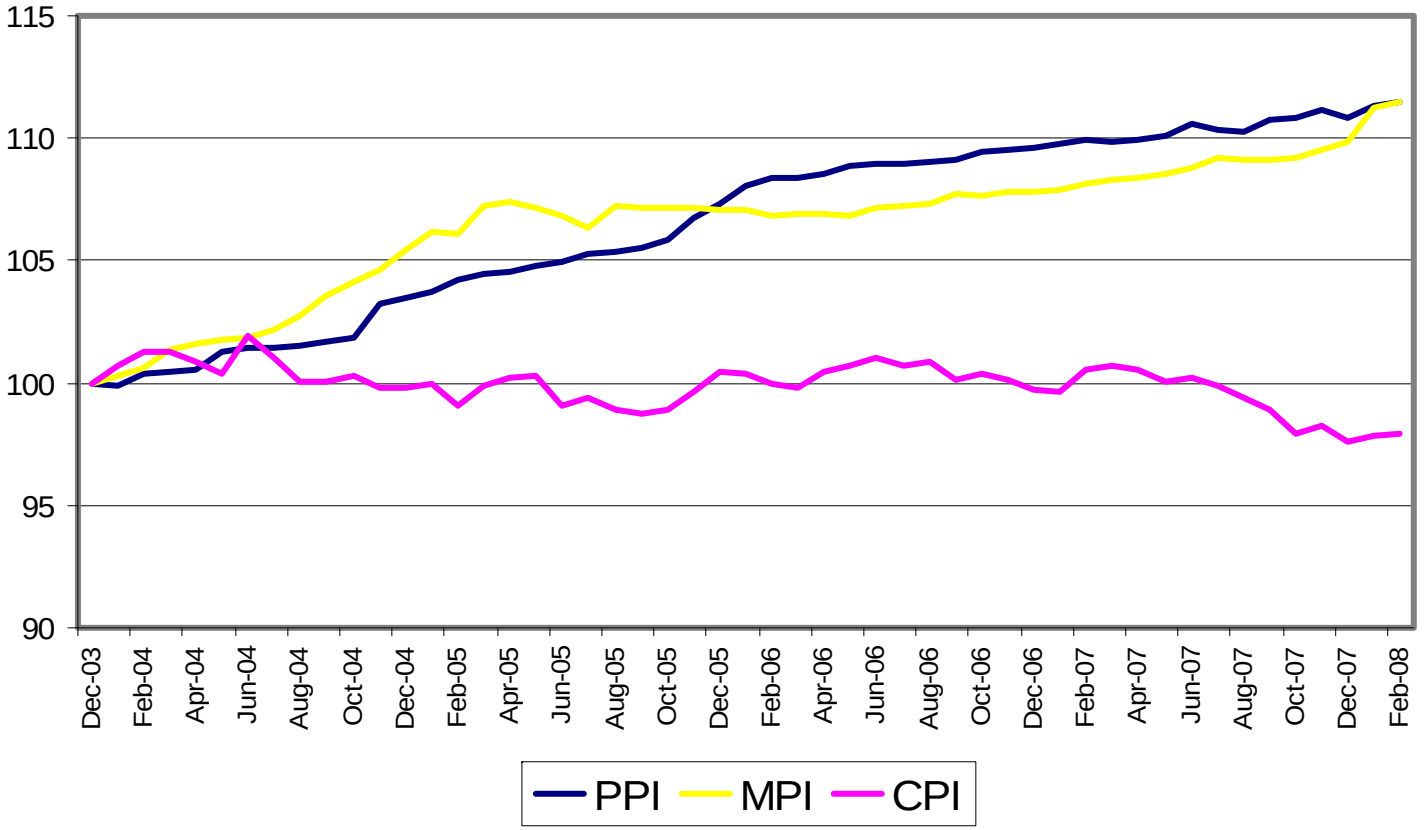
Import Penetration Ratio for U.S. Manufacturing Outputs, and Exchange Rate Movements (1975-2006)



Evidence of Shift in Sourcing (?)

- From Business Week Article
- Furniture Prices (Dec. 2003-April 2007)
  - CPI went down 0.5 percent
  - PPI went up 9.0 percent.
  - Imports went up 6.7 percent.
  - Value of Imported Furniture soared 76 percent.
  - Official BLS measure of productivity indicated that productivity in the furniture industry went up 23 percent between 2000 and 2005.
  - Output in Furniture Industry up 3 percent.

Furniture Prices



Evidence of Shift in Sourcing

- Department of Commerce revised Estimate of Size of US Wood Furniture Industry
- Value of Production in 2006
  - As originally Reported: $13.5 bil.
  - As recently Revised: $8.6 bil.

Implications

- Increases in ‘Real’ Imports are Underestimated.
- Increase in Domestic Production has been Overestimated.
- Increase in GDP has been Overestimated.
- Gains as a result of ‘Terms of Trade’ are being incorrectly Measured as Productivity Gains.

BLS Had Proposed Input Price Index

- "Improving the Measurement of producer price change"
  Monthly Labor Review, April 1978
- Described comprehensive changes to the concepts and structure of the then Wholesale Price Index, subsequently renamed the Producer Price Index
- Included segment for Industry input price indexes
- Also addressed issue of collecting buyer's prices

Composite Input Price Index

- BLS actually produced an “Input Price Index” between 1988 and 2003.
- Based on PPI Output Price indexes only
- Imports NOT included

Net Material Input Price Index

Table 11. Producer price indexes and percent changes for net material inputs to industry stage of process and final demand, not seasonally adjusted

(June 1987=100)

Grouping 1/	Relative Importance	Unadjusted Index 2/			Percent changes					
					11 months ending	3 months ending--				Jun. 1996 To
	Jun. 1996	Mar. 1996 2/	Jun. 1996 2/	Jul. 1996 2/	Jul. 1996	Oct. 1995	Jan. 1996	Apr. 1996	Jul. 1996	Jul. 1996
Net material input to:										
Primary processors	100.000	122.5	123.3	123.7	7.7	-0.5	6.6	3.9	-2.3	0.3
Foods and agricultural products	18.073	154.5	176.9	182.1	47.4	6.2	13.7	11.3	9.6	2.9
Crude food and agricultural products	12.810	166.6	196.3	203.9	56.5	6.0	15.1	15.3	11.2	3.9
Processed foods	5.263	138.9	148.9	150.0	29.5	6.5	11.8	2.8	5.9	0.7
Energy	33.965	111.9	108.2	109.5	16.1	-1.7	17.6	10.3	-8.9	1.2
Goods less food and energy	47.963	132.9	131.7	129.9	-7.2	-1.0	-2.4	-2.4	-1.7	-1.4
Mining products less energy	1.222	117.9	118.1	113.7	-5.7	-2.3	0.9	-0.8	-3.6	-3.7
Nondurables less food and energy	32.051	132.0	130.0	128.5	-8.5	-0.9	-3.3	-3.0	-1.7	-1.2
Durables	14.691	136.6	136.9	134.9	-4.3	-1.1	-0.9	-1.1	-1.3	-1.5
Semifinished processors	100.000	119.6	121.8	121.6	0.7	0.5	-0.7	-0.6	1.5	-0.2
Foods and agricultural products	24.614	100.5	107.4	109.0	11.2	3.7	0.1	-0.8	8.0	1.5
Crude food and agricultural products	22.869	99.1	106.1	107.8	11.1	3.6	-0.2	-1.0	8.6	1.6
Processed foods	1.745	119.4	125.0	125.3	11.9	3.9	2.9	2.2	2.4	0.2
Energy	6.486	142.5	151.1	150.5	4.2	-3.3	1.0	4.2	2.3	-0.4
Goods less food and energy	68.900	127.8	127.5	126.6	-2.9	-0.2	-1.1	-0.9	-0.8	-0.7
Mining products less energy	2.075	115.5	116.0	107.3	-11.5	0.4	-3.0	-2.6	-6.8	-7.5
Nondurables less food and energy	30.612	130.1	128.7	128.2	-3.3	0.2	-1.1	-1.4	-1.0	-0.4
Durables	36.212	126.2	126.9	126.2	-2.0	-0.5	-0.9	-0.5	-0.2	-0.6
Finished processors	100.000	120.8	121.4	121.1	0.6	0.2	0.2	0.0	0.2	-0.2
Foods and agricultural products	12.453	124.8	130.7	130.2	13.3	2.9	3.6	2.3	4.0	-0.4
Crude food and agricultural products	4.063	135.0	139.2	139.1	25.8	5.5	11.0	2.9	4.4	-0.1
Processed foods	8.390	120.0	126.7	126.0	7.6	1.7	0.1	1.9	3.7	-0.6
Energy	3.274	144.9	153.2	152.8	3.0	-3.3	0.4	2.9	3.1	-0.3
Goods less food and energy	84.273	120.5	120.2	119.9	-1.1	0.1	-0.2	-0.5	-0.4	-0.2
Mining products less energy	0.067	118.7	119.3	118.0	2.3	-0.1	1.7	1.2	-0.6	-1.1
Nondurables less food and energy	32.856	128.8	128.0	127.7	-1.8	0.2	-0.5	-0.8	-0.5	-0.2
Durables	51.350	115.9	115.9	115.7	-0.6	0.0	-0.1	-0.3	-0.3	-0.2
Final demand	100.000	124.1	125.7	125.5	2.8	0.4	0.7	1.1	0.6	-0.2
Consumers	74.448	125.3	127.5	127.3	3.4	0.2	0.9	1.4	0.9	-0.2
Foods and agricultural products	23.388	123.1	124.9	124.9	5.3	1.3	1.2	0.7	1.9	0.0
Crude food and agricultural products	2.086	160.0	152.3	145.2	19.3	4.4	12.4	3.6	-1.8	-4.7
Processed foods	21.302	120.0	122.5	123.1	4.2	1.1	0.3	0.5	2.2	0.5
Energy	14.534	141.3	150.0	149.3	5.6	-3.4	2.1	6.0	0.9	-0.5
Consumer goods less food and energy	36.526	127.9	128.4	128.2	1.6	1.0	0.3	0.0	0.2	-0.2
Mining products less energy	0.013	123.0	124.7	124.6	2.9	0.2	1.3	-0.3	1.7	-0.1
Nondurables less food and energy	19.914	133.2	134.2	134.2	1.6	0.5	0.5	0.1	0.6	0.0
Durables	16.599	120.5	120.4	120.1	1.5	1.6	0.2	-0.1	-0.2	-0.2
Capital investment	25.552	121.3	121.1	121.0	0.9	0.9	0.2	-0.1	-0.2	-0.1
Special groupings:										
Final demand less foods and agricultural products	76.612	124.5	126.1	125.9	2.1	0.2	0.6	1.0	0.2	-0.2
Final demand less energy	85.466	124.5	125.1	125.0	2.3	1.1	0.5	0.2	0.5	-0.1
Final demand less food and energy	62.078	125.1	125.3	125.2	1.3	1.0	0.2	0.0	0.1	-0.1
Consumer goods less energy 4/	80.477	125.9	126.9	126.8	3.0	1.1	0.6	0.3	0.9	-0.1
Consumer goods less foods and agricultural products 4/	68.585	126.9	129.4	129.1	2.7	-0.2	0.7	1.7	0.5	-0.2
Consumer nondurables less food and energy 4/	46.272	131.1	135.0	134.7	3.1	-1.1	1.1	2.5	0.7	-0.2

[1] The indexes in this table are derived from the product indexes in table 5. These indexes are composed of the goods used by the industries in each of the industry stage of process output indexes as shown by the 1977 input/output relationships. These material inputs include only domestic material input and do not include any imported materials which may be used.

[2] The indexes for March 1996 have been recalculated to incorporate late reports and corrections by respondents. All indexes are subject to revision 4 months after original publication.

[3] Not available.

[4] Percent of final input to consumer.

Worth Mentioning

- CPI does account for shift in sourcing
- PPI may be measuring this shift in sourcing in cases where respondent continues to price output even when sourcing shifts
- Domestic Industries may be responding to competitive pressures and lowering prices to match foreign prices

Five Steps

- Sampling
- Initiation
- Repricing
- Estimation
- Publication

Publication Requirements

- Major Users
  - BEA: Real Value-Added
  - BLS: Multifactor Productivity
- Publication Classification Structure
  - BLS has different multifactor productivity estimates
    - 18 3-digit NAICS manufacturing industries
    - 86 4-digit NAICS manufacturing industries
  - BEA Requirements focus on industry accounts
    - Used in constructing price and quantity measures
    - Publish detail for 65 industries, including 19 manufacturing
- Level of detail
  - 1,179 six-digit NAICS Industries (473 are manufacturing)
  - Alternatively, Up to 3,500 detailed product cells
- Periodicity
  - Current use of data is primarily Annual

Availability of Sampling Universe

- Census of Manufactures (every 5 years)
  - Detailed data on value of inputs by 10-digit Census Material Code
  - Does NOT include detailed data on Capital investment costs. (Motor vehicles, computers, other)
  - Includes approximately 12 categories of purchased services
- Service Annual Survey (sample detail as Census) only break out costs into capital equipment, other materials, and approximately 12 categories of purchased services.

2007 Economic Census: MC-33702 Manufacturing, Household Furniture and Wood Housings

17 DETAILED COST OF MATERIALS, PARTS, AND SUPPLIES

Materials, parts, and supplies 0634	Census material code 0630	Consumption of purchased materials and of materials received from other establishments of your company — Cost, including delivery cost (freight-in) $ Bil. 0631	Mil.	Thou.
Wood furniture frames	337215 00			
Lumber, rough and dressed				
Hardwood	321000 25			
Softwood	321000 31			
Plywood, hardwood and softwood	321000 91			
Hardwood veneer	321211 04			
Particleboard (wood)	321219 02			
Medium density fiberboard (MDF)	321219 06			
Hardboard (wood fiberboard)	321219 09			
Hardwood cut stock and dimension (excluding furniture frames)	321912 03			
Furniture and builders' hardware, including cabinet hardware, casters, glides, handles, hinges, locks, etc.	332510 01			
Coated and laminated fabrics, including vinyl coated	313320 06			

2007 Economic Census: WH-42305 Wholesale, Furniture and Home Furnishings

11–15 Not Applicable.

16 SELECTED EXPENSES

		Mark "X" if None	2007 $ Bil.	Mil.	Thou.	Dol.
A.	Operating expenses *(Include payroll. Exclude cost of goods sold and interest expense.)* 0140	☐				
B.	Purchases of merchandise for resale, net of returns, allowances, and trade and cash discounts *(Include amounts allowed for trade-ins.)* 1160	☐				

C. For the value reported on line B, were any of these goods ordered over an Internet, Extranet, Electronic Data Interchange (EDI) network, electronic mail, or other online system?

0441 ☐ Yes

0442 ☐ No

0443 ☐ Do not know

17 and 18 Not Applicable.

2007 Economic Census: RT-44201, Retail Furniture Stores

Form RT-44201 (12/01/2006)

If not shown, please enter your 11-digit Census File Number (CFN) from the mailing address.

8–**18** Not Applicable.

19 KIND OF BUSINESS

Which ONE of the following best describes this establishment's principal *(Mark "X" only ONE box.)*

NAICS 333111
Farm Machinery and Equipment Manufacturing

Companies	Establishments with 100 employees or More	Total Value of Shipments ($1,000)	Total Capital expenditures ($1,000)	Total Cost of, Purchased materials ($1,000)
1,079	104	$21,181,238	$348,399	$9,903,172

NAICS 333111
Farm Machinery and Equipment Manufacturing
(Cost of Materials)

Material Code	**Description**	**Delivered cost ($1,000)**
971000	Materials, ingredients, containers, and supplies, nsk	2,718,394
970099	All other materials/components/parts/containers/supplies	967,152
33000019	Engines (diesel/semidiesel/gasoline/carburetor-type/etc.) & parts	680,000
33000067	Fluid power products, hydraulic and pneumatic	607,834
33100022	Steel sheet and strip (including tinplate)	586,586
33200046	Other fabricated metal products (excl. Forgings/castings etc.)	504,553
32621103	Pneumatic tires and inner tubes	389,781
33635003	Transmissions and parts	288,496
33100025	Steel struct shapes & sheet piling (excl castings/forgings/etc.)	286,917
33361200	Mechanical speed changers, gears, & ind. high-speed drives	281,122
33120092	All other steel shapes/forms (exc. castings/forgings/etc.)	280,209
33151001	Iron and steel castings (rough and semifinished)	268,893
33632200	Engine electrical equip. (incl. spark plugs/magnetos/etc.)	226,547

Expenditures on Fluid Power products (Material Code 33000067) by Industry

NAICS Code	Description	Delivered cost ($1,000)
333111	Farm machinery and equipment manufacturing	607,834
333112	Lawn and garden equipment manufacturing	218,356
333319	Other commercial and service industry machinery manufacturing	422,091
333512	Machine tool (metal cutting types) manufacturing	66,118
333513	Machine tool (metal forming types) manufacturing	43,371
333516	Rolling mill machinery and equipment manufacturing	12,355
333518	Other metalworking machinery manufacturing	29,007
333611	Turbine and turbine generator set units manufacturing	4,687
333618	Other engine equipment manufacturing	284,283
336312	Gasoline engine and engine parts manufacturing	268,662
336330	Motor vehicle steering and suspension parts	89,222
336340	Motor vehicle brake system manufacturing	47,397
336350	Motor vehicle transmission and power train parts manufacturing	237,914
336399	All other motor vehicle parts manufacturing	405,854

Current Work

- Currently Reviewing Detailed Company Data
- Attempt to Draw Sample Using Standard BLS Parameters
- Sample by Both Industry and Product

Initiation

- Would item be repriceable?
- Is information from buyers as readily available as information from Sellers?
- Are we burdening same companies?
- Is data considered more sensitive?

Repricing

- BLS has experience in collecting pricing data from establishments
- Web-Based application or mail-fax process
- Key issue may be periodicity (how often does establishment buy same good.)
- How often do item specifications change?
- What if and how often does supplier change?

Estimation

- Comparatively easy
- Weights should be available
- Formula is not totally straightforward
  - e.g. (arithmetic vs. Geomeans)
- Major issue: Industry-specific or product indexes?
- Minor issue: Imputation method may be more important than in other price indexes

Next Steps

- Interview handful of Companies
- Continuing to verify how BLS and BEA would use these data
- Seek Funding and OMB Approval
- Develop a proposal for conducting a field pilot using a limited number of respondents

Long Term Approach

1. Input Indexes covering manufacturers' material costs,
2. Input Indexes covering manufacturers' capital equipment costs,
3. Input Indexes covering manufacturers' business services costs,
4. Input Indexes covering service industries' material, capital equipment and business services costs

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