

Experimental PPI Aggregation System



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Introduction

- Prior to the mid-1980s, PPI produced only goods based price indexes
- Due to the rapid growth of the services sector, the PPI undertook an effort to expand its coverage to include services and construction price indexes

Introduction

- January 1985 - first services price index for rail transportation published
- Through Mid 1990s- mainly transportation sector indexes added
- Last two decades- coverage expanded to include sectors for information, health care, real estate, professional services, administrative services, finance and insurance, and wholesale and retail trade

Introduction

- The Stage of Processing system indexes are currently the focus of the PPI press release
- The SOP system indexes are aggregate indexes comprised only of goods prices
- Since the initiative began, PPI planned to add services and construction price indexes to the aggregate indexes featured in the press release

Introduction

- PPI now believes coverage of these areas is high enough to produce meaningful aggregate inflation numbers

- 77.4 percent of services covered

- 28.6 percent of construction covered

Introduction

- PPI introduced the experimental aggregation system in January 2011
- System aggregates goods, services and construction price indexes
- PPI plans to transition to new system as primary focus of the press release as early as January 2014
- All indexes in the current SOP system will continue to publish as part of the new system

Important Criteria for PPI Aggregation Systems

- Include all commodities for which PPI currently has indexes.
- Cover both intermediate and final demand.
- Additional indexes should be able to be added to the system.
- Eliminate or minimize multiple counting problems.
- Conceptually understandable.
- Analytically useful:
 - Price transmission analysis
 - Source of inflation pressures

Background Research

Research

- International PPI aggregation systems
- US PPI Aggregation Systems
- Academic work- Joel Popkin, Robert Archibald
- Internal BLS meetings

I/O Table

Commodity Produced		Consuming Industry:															
		Intermediate Demand												Final Demand			
Commodity Type	Detailed Commodity	1	2	3	4	5	6	7	8	9	10	11	12	PC	CI	Gov	Exp
Unprocessed Goods	1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	2					Q											
	3					R											
Processed Goods	4					S											
	5					T											
	6					U											
Construction	7					V											
Traditional Services	8					W											
	9					X											
Trans Services	10					Y											
Trade Services	11					Z											
	12					AA											
	Imports					AB											

PPI Aggregate Coverage Expansion






Commodity Produced		Consuming Industry:															
		Intermediate Demand												Final Demand			
Commodity Type	Detailed Commodity	1	2	3	4	5	6	7	8	9	10	11	12	PC	CI	Gov	Exp
Unprocessed Goods	1																
	2																
	3																
Processed Goods	4																
	5																
	6																
Construction	7																
Traditional Services	8																
	9																
Trans Services	10																
Trade Services	11																
	12																
	Imports																

Experimental PPI System- Final demand

- Commodities assigned to aggregate indexes based commodity type.
- Commodity types: goods, transportation services, trade services, traditional services

Final Demand Indexes

Commodity Produced		Intermediate demand												Final Demand			
Commodity type	Detailed Commodity	1	2	3	4	5	6	7	8	9	10	11	12	PC	CI	Gov	Exp
Unprocessed Goods	1																
	2																
	3																
Processed goods	4																
	5																
	6																
Construction	7																
Traditional Services	8																
	9																
Trans Services	10																
Trade Services	11																
	12																
Imports																	

	FD goods		FD construction
	FD traditional services		FD trade services
	FD transportation services		

Final Demand Structure

Index	Relative Importance
Final demand	100.000
Final demand goods	37.205
Final demand foods	5.954
Final demand energy	7.036
Final demand goods less foods and energy	24.215
Final demand services	60.738
Final demand traditional services	37.609
Final demand transportation services	4.250
Final demand trade services	18.879
Final demand construction	2.057

Final Demand Structure (Continued)

Index	Relative Importance
Final demand services	60.738
Final demand traditional services	37.609
Finished traditional services	33.312
Finished consumer traditional services	31.677
Private capital investment traditional services	1.635
Government purchased traditional services	2.948
Government purchased traditional services, excluding capital investment	2.848
Government purchased traditional capital investment services	0.101
Traditional services for export	1.349
Final demand transportation services	4.250
Final demand trade services	18.879

Final Demand Special Indexes

Special Groupings	Relative Importance
Final demand less exports	89.091
Final demand less government	91.635
Final demand less foods, food and beverage for immediate consumption, and energy	86.466
Final demand less foods and energy	87.010
Final demand less foods and food and beverage for immediate consumption	93.502
Final demand less foods	94.046
Final demand less energy	92.964
Final demand less trade services	81.121
Final demand less distributive services	77.980
Final demand goods less energy	30.169
Final demand goods less foods	31.251
Final demand services less trade services	41.859
Final demand distributive services	22.020
Final demand goods plus final demand distributive services	59.225

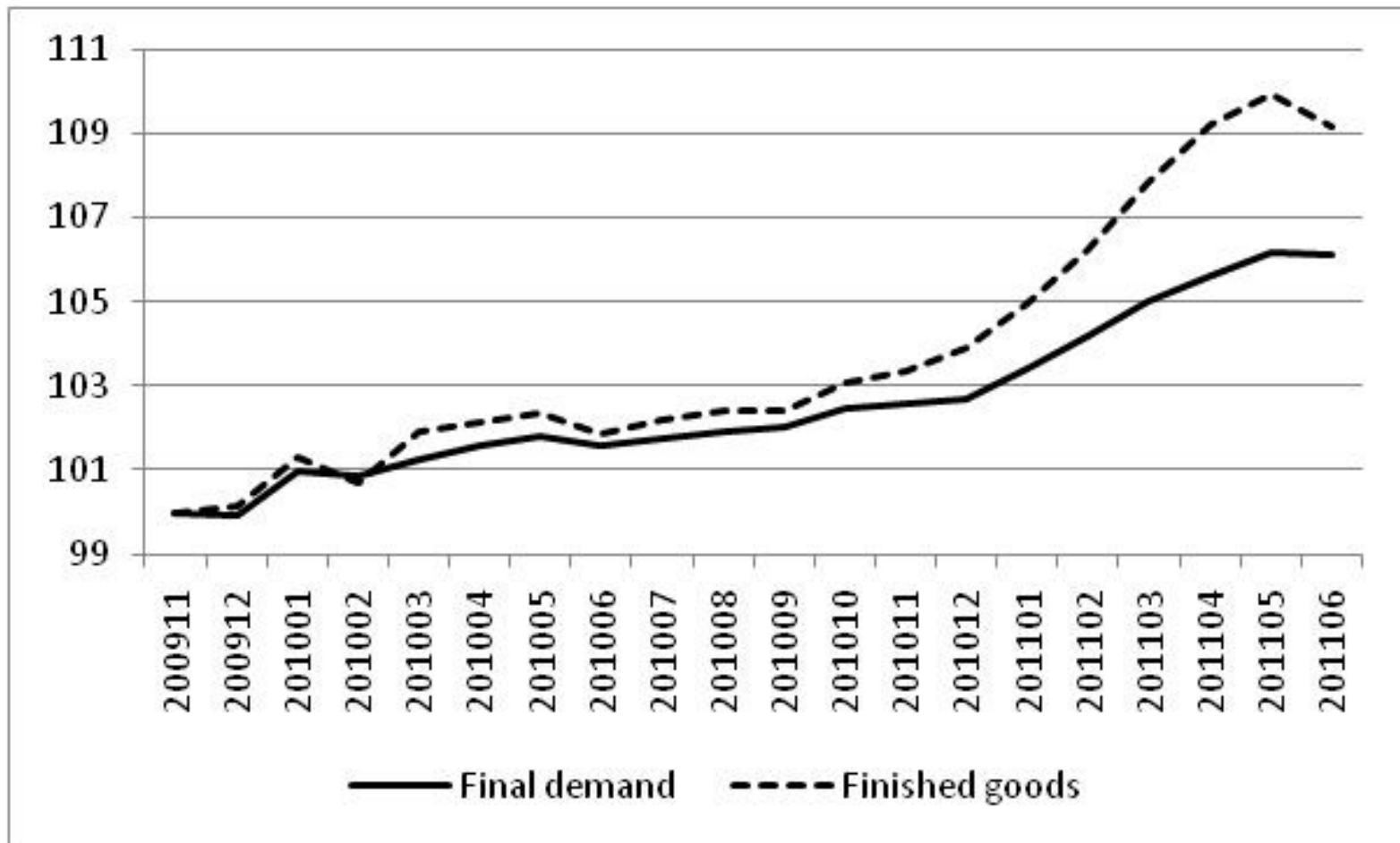
Final Demand Special Indexes

Total finished goods, services, and construction	80.726
Total finished less foods, food and beverage for immediate consumption, and energy	69.477
Total finished less foods and energy	70.022
Total finished less foods and food and beverage for immediate consumption	75.343
Total finished less foods	75.888
Total finished less energy	74.860
Finished goods	26.063
Finished goods less energy	20.197
Finished goods, excluding foods	21.225
Finished services	53.365
Private capital investment services	3.958
Finished distributive services	19.124
Finished services less trade services	36.203
Finished services less distributive services	34.241
Total private capital investment (goods, services, and construction)	11.888
Finished goods plus finished distributive services	45.187

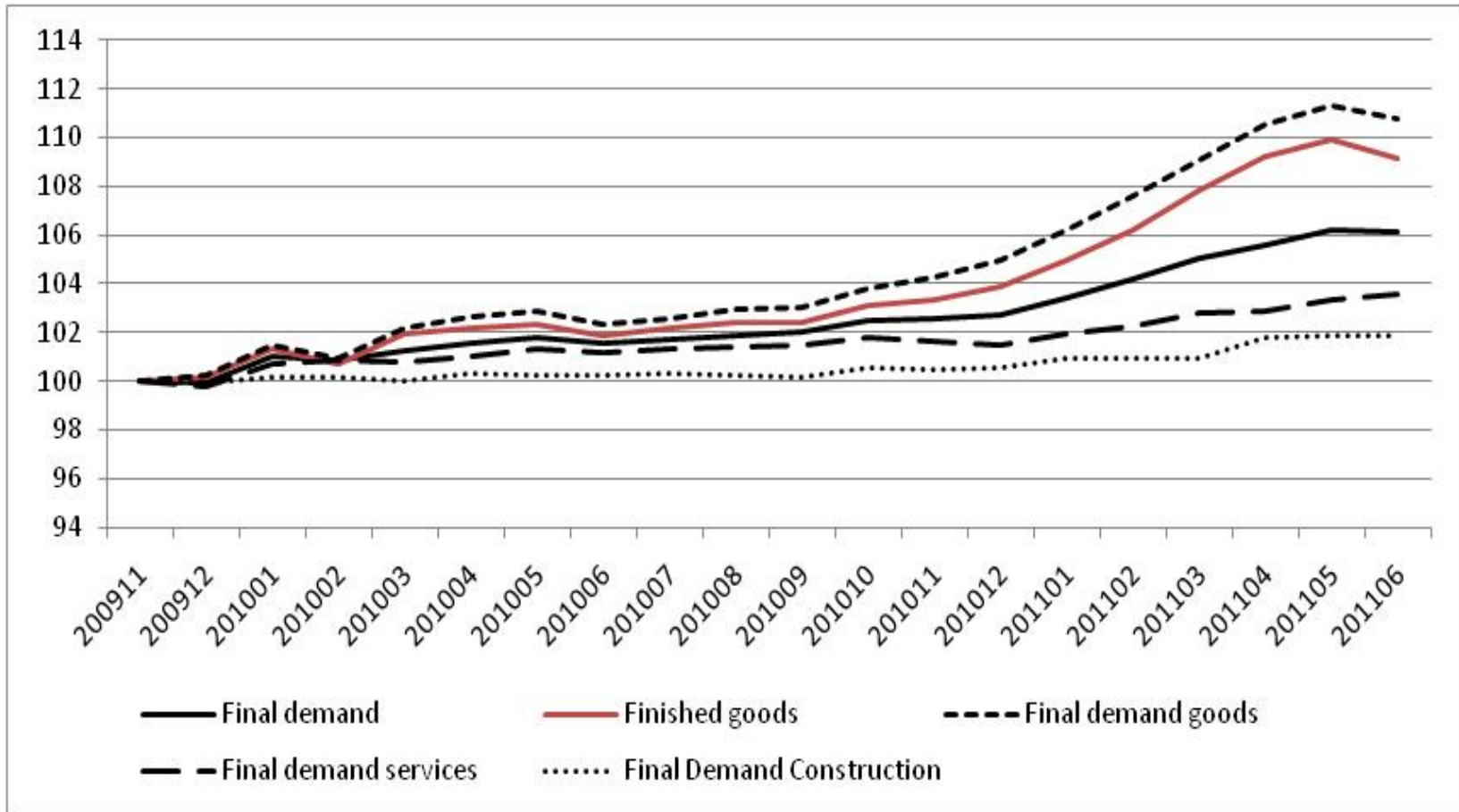
Final Demand Special Indexes

Total exports	10.909
Goods for export	7.552
Services for export	3.357
Total government purchases	8.365
Government purchased goods	3.590
Government purchased services	4.016
Personal consumption	68.837
Personal consumption goods (finished consumer goods)	19.430
Personal consumption goods less energy	13.564
Personal consumption goods less foods	14.592
Personal consumption services	49.407
Personal consumption less trade services	53.613
Personal consumption less distributive services	52.036

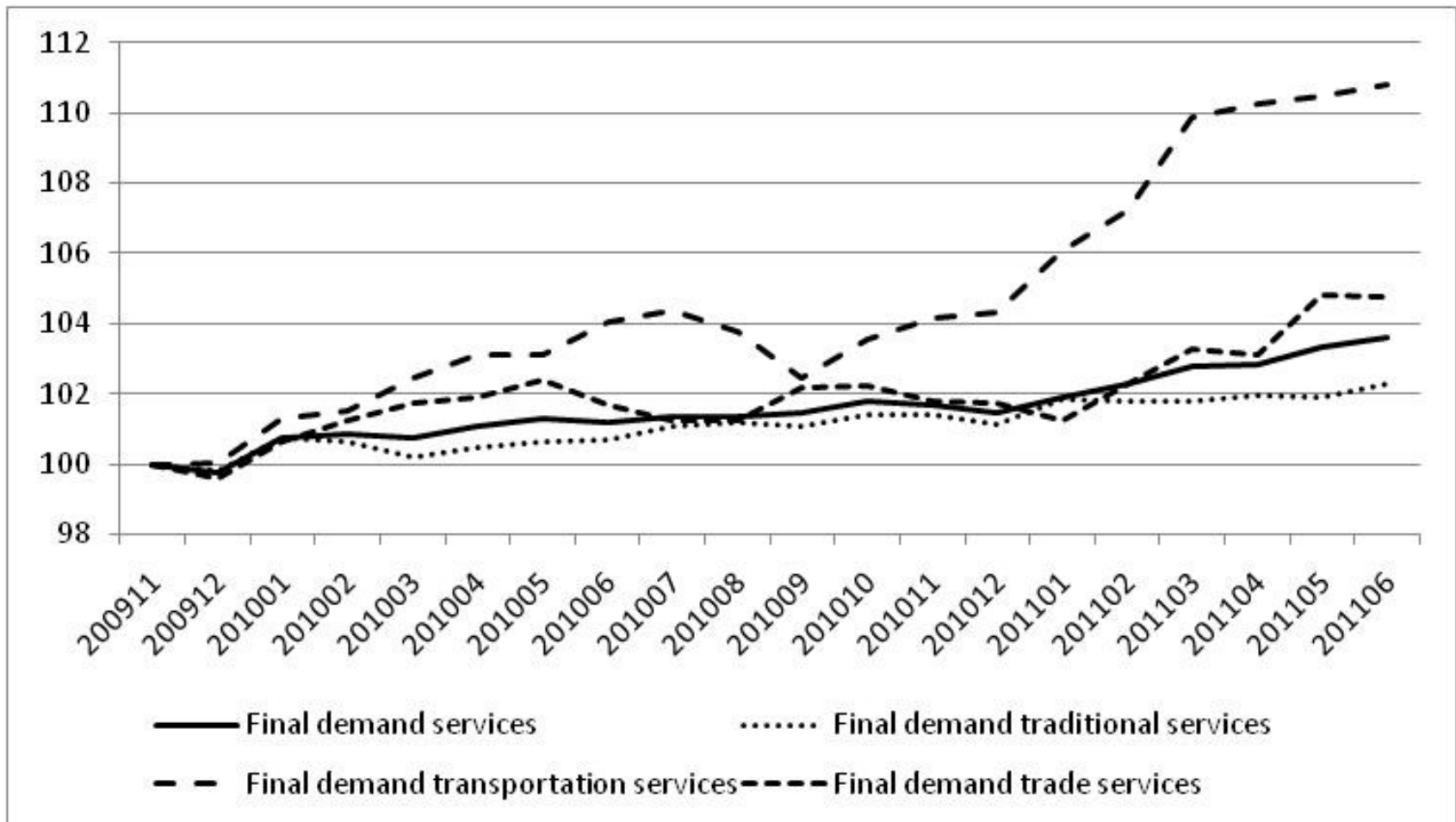
Final Demand versus Finished Goods



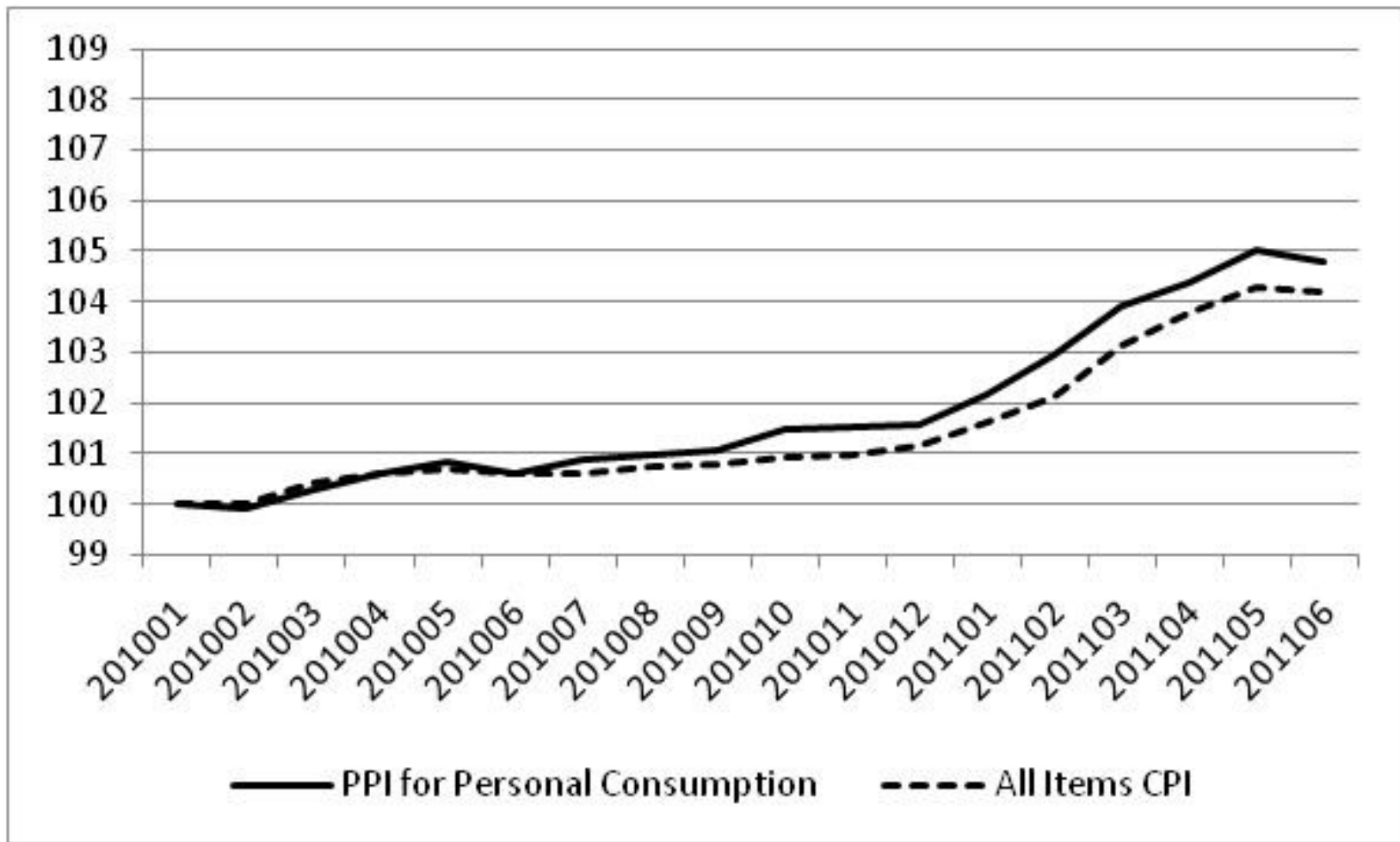
Final Demand and Components versus Finished Goods



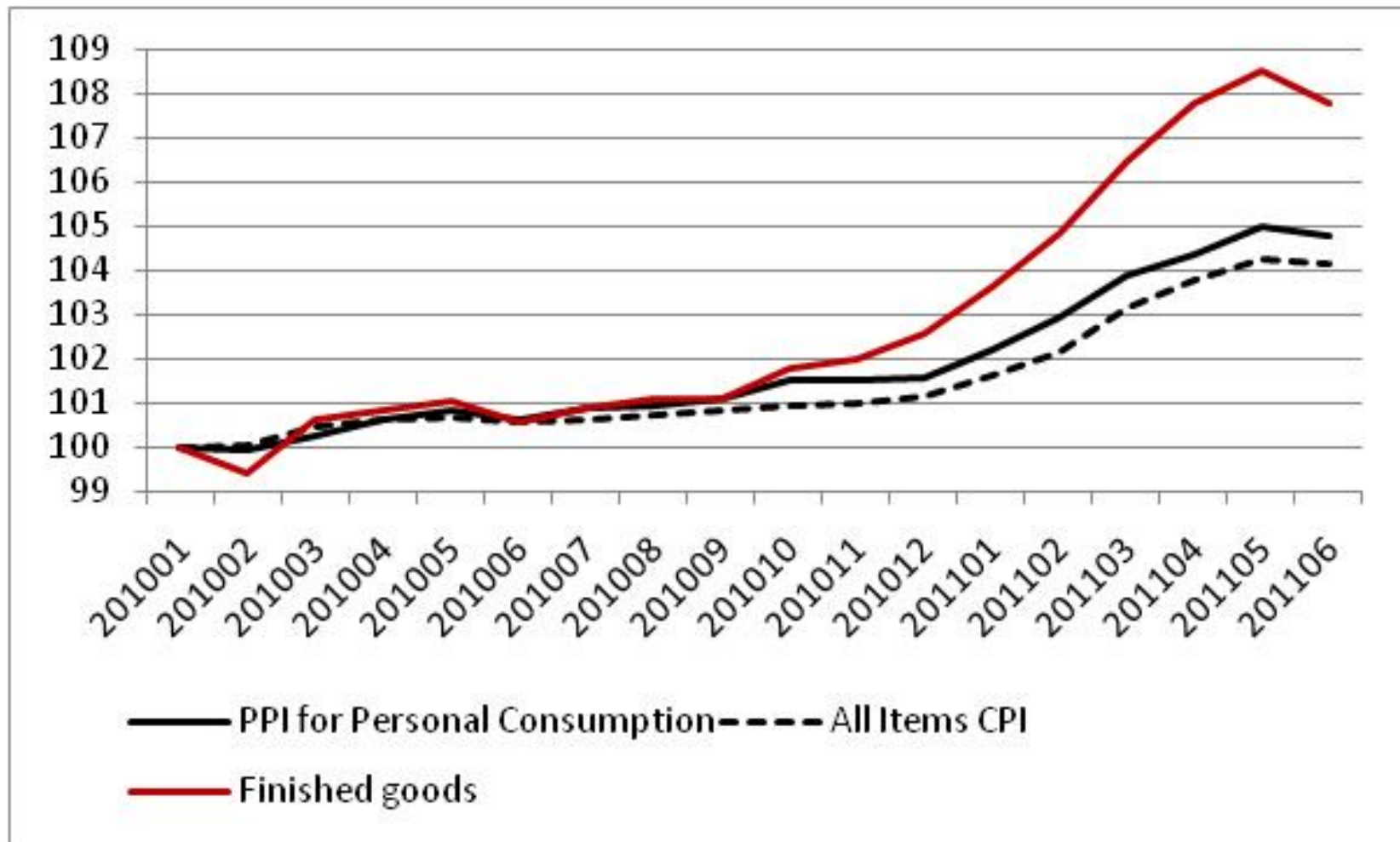
Final demand Services by Type



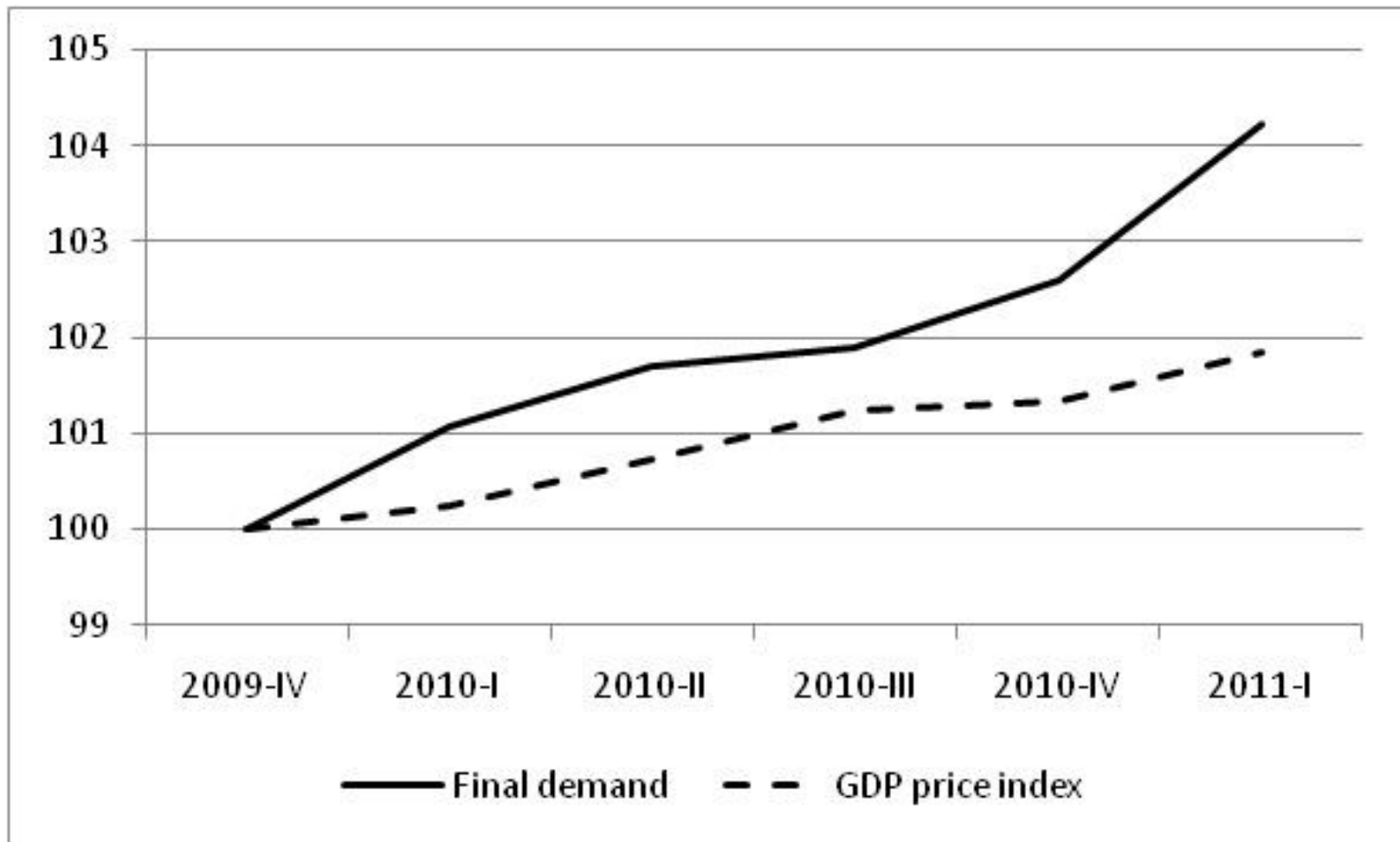
PPI for Personal Consumption versus CPI



PPI for Personal Consumption versus CPI and Finished Goods



PPI for Final Demand versus BEA GDP Price Index



Value Added of New Final Demand Indexes

- Adds services and construction to current PPI coverage
- Detailed indexes by type of buyer and type of commodity
- Available monthly
- Trade and transportation services separated from value of good
- Producer perspective

Two Treatments of Intermediate Demand

- Two separate treatments have been created for different data users.
 - ▶ **Commodity Type**
 - Similar to current SOP
 - Adds intermediate services and intermediate construction
 - Does not prevent multiple counting
 - ▶ **Commodity Flow**
 - Adds intermediate services and intermediate construction
 - Eliminates multiple counting

Commodity Type

- No overall Intermediate Demand index.
- Indexes track price change for intermediate demand commodities grouped by type of commodity.
- Six commodity types: unprocessed goods, processed goods, construction, traditional services, transportation services, and trade services.

ID by Commodity Type Relative Importances

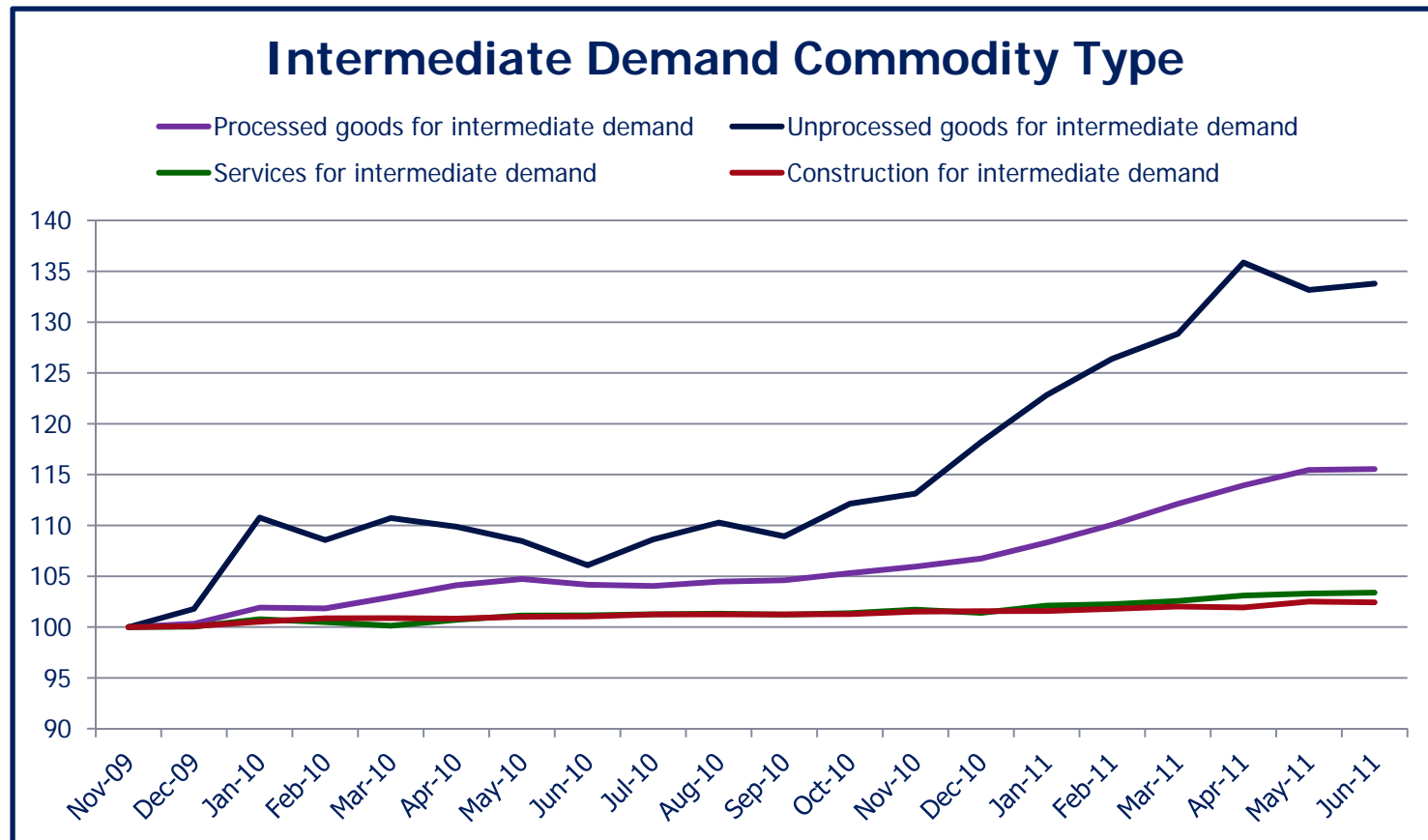
Index	Relative Importance (Decemeber 2009)
Total	100.00
Processed Goods for Intermediate Demand	43.90
Materials and components for manufacturing	19.41
Materials and components for construction	4.26
Processed fuels and lubricants	8.66
Containers	1.16
Supplies	10.41
Unprocessed goods for intermediate demand	9.19
Services for intermediate demand	46.45
Intermediate demand traditional services	33.63
Intermediate demand transportation services	5.57
Intermediate demand trade services	7.25
Construction for intermediate demand	0.46

Special groupings

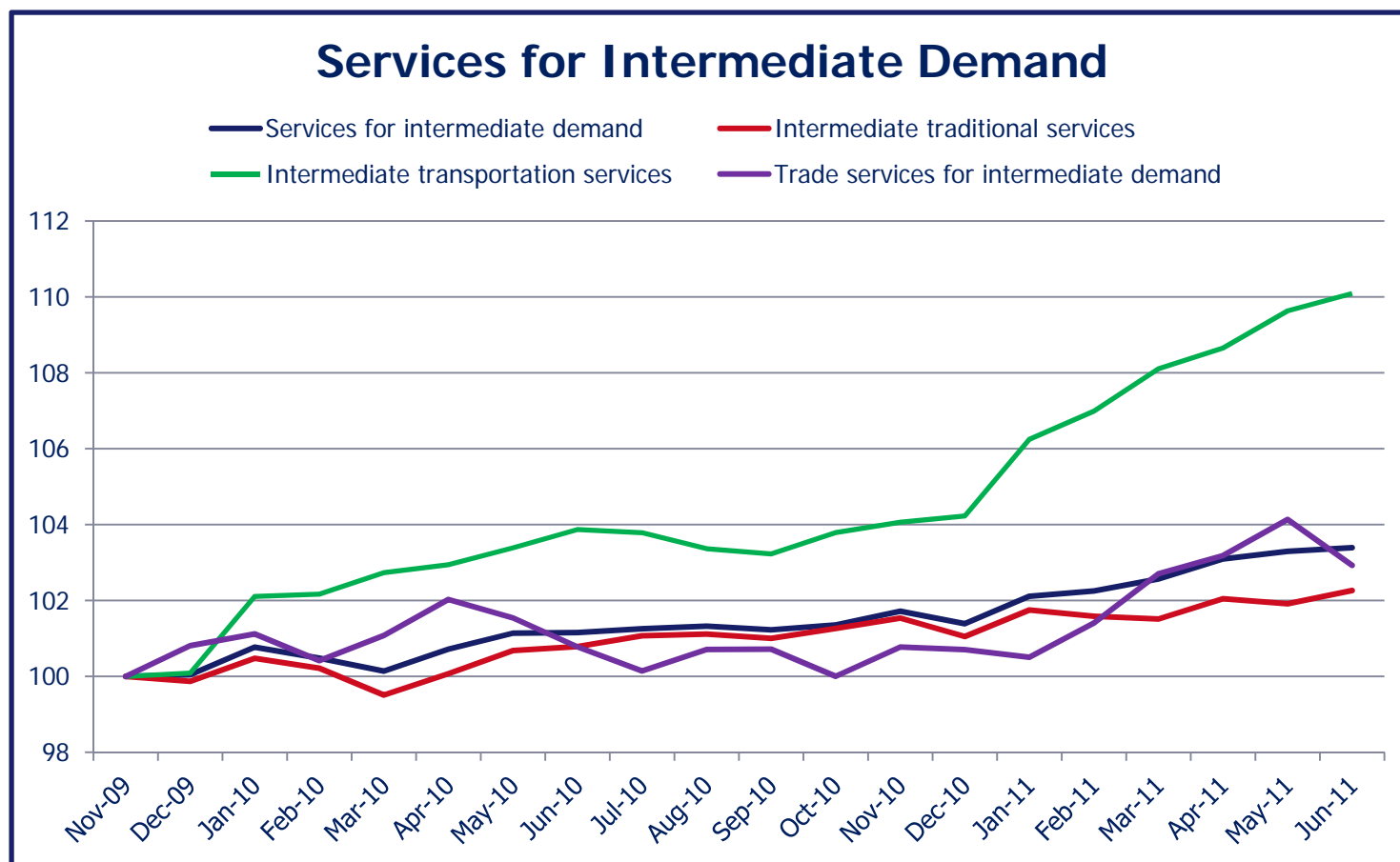
- Eleven special groupings
- Relative importance for each special grouping is by commodity type.
- Are there other special groupings that should be created?

Special groupings	
Processed materials less foods and feeds	
Processed foods and feeds	
Processed energy goods	
Processed materials less energy	
Processed materials less foods and energy	
Intermediate distributive services	
Processed goods plus intermediate distributive services	
Unprocessed materials less agricultural products	
Unprocessed energy materials	
Unprocessed materials less energy	
Unprocessed nonfood materials less energy	

Intermediate Demand Commodity Type



Services for Intermediate Demand



Intermediate Demand by Production Flow

- Commodities assigned to aggregates based on production flow.
- Four intermediate demand stages

Intermediate Demand by Production Flow

- Intermediate demand indexes constructed using a four step process.
- **Step 1:** determine the total production of each industry (both primary and secondary).

Intermediate Demand by Production Flow

- **Step 2:** ascertain where the total output (both primary and secondary) of each industry is consumed.

Intermediate Demand by Production Flow

- **Step 3:** assign industries to one of four stages of production.

Stage 1 → Stage 2 → Stage 3 → Stage 4 → Final Demand

- **Example:**

Iron ore mining (S1) → Steel mills (S2) → Car parts Mfg (S3) → Car Mfg (S4) → FD

Intermediate Demand by Production Flow

- Forward flow of output- output of industry is sold to a forward stage in system.
- Backflow of output - output of industry is sold to an earlier stage in system.
- Forward flow of inputs – inputs to an industry come from an earlier stage in system.
- Backflow of inputs – inputs to an industry come from a latter stage in the system.

Intermediate Demand by Production Flow

- Assignments are made to stages with goal of maximizing net forward flow.
- **Net forward flow** = (forward shipments of the industry + inputs received from prior stages of process) – (backward shipments of the industry + inputs received from forward stages of process).

Intermediate Demand by Production Flow

- Various numbers of stages were tried.
- Four stage system performed the best in terms of net forward flow.

Intermediate Demand by Production Flow

- **Step 4:** calculate the intermediate demand indexes.
- Indexes do not track prices for the output of the four industry stages
- Indexes track prices for the net inputs consumed by industries in each stage of production.

Intermediate Demand by Production Flow

- IO table is a modified version of the earlier tables.
- Table organizes the industries into four stages.

Intermediate Demand by Production Flow

- Stage 1: Industries 1, 3, 8
 - Stage 2: Industries 2, 4, 10
 - Stage 3: Industries 5, 9, 11
 - Stage 4: Industries 6, 7, 12
-
- Industries were assigned to maximize net forward flow.

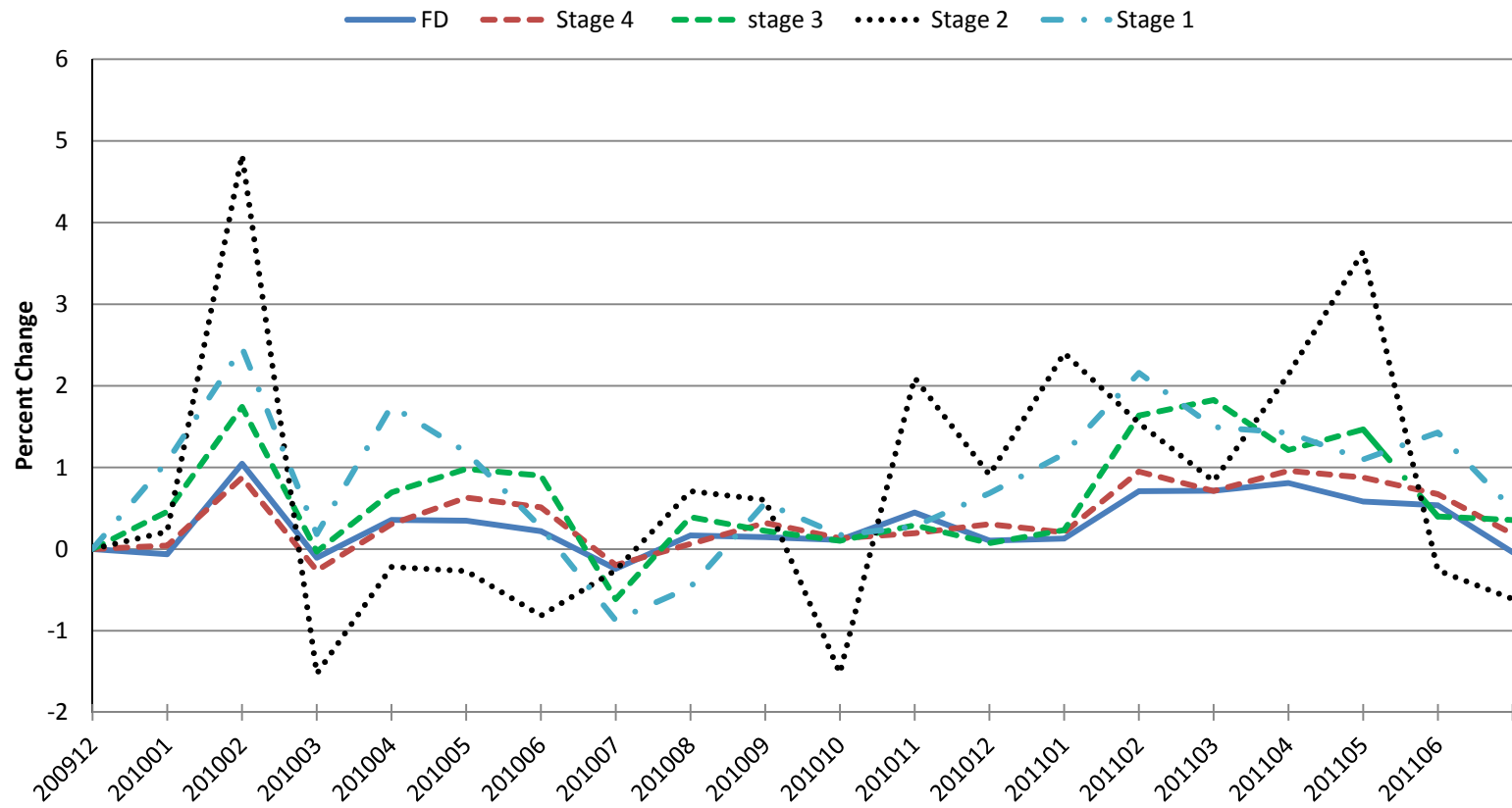
Intermediate Demand by Production Flow

Commodity Produced		Consuming Industry:																
		Intermediate demand												Final Demand				
Commodity type	Detailed Commodity	Stage 1			Stage 2			Stage 3			Stage 4			PC	CI	Gov	Exp	
		Ind 1	Ind 3	Ind 8	Ind 2	Ind 4	Ind 10	Ind 5	Ind 9	Ind 11	Ind 6	Ind 7	Ind 12					
Unprocessed Goods	1	Yellow	a	Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
	2	Yellow		Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
	3	Yellow		Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
Processed goods	4	Yellow		Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
	5	Yellow		Yellow	Red	b	Red	Orange	Orange	Orange	Grey	Grey	Grey					
	6	Yellow		Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
Construction	7	Yellow		Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
Traditional Services	8	Yellow		Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
	9	Yellow		Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
Trans Services	10	Yellow		Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
Trade Services	11	Yellow		Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
	12	Yellow		Yellow	Red	Red	Red	Orange	Orange	Orange	Grey	Grey	Grey					
	Imports																	
		Yellow	Stage 1 ID			Red	Stage 2 ID			Orange	Stage 3 ID			Grey	Stage 4 ID			

ID by Commodity Flow Relative Importances

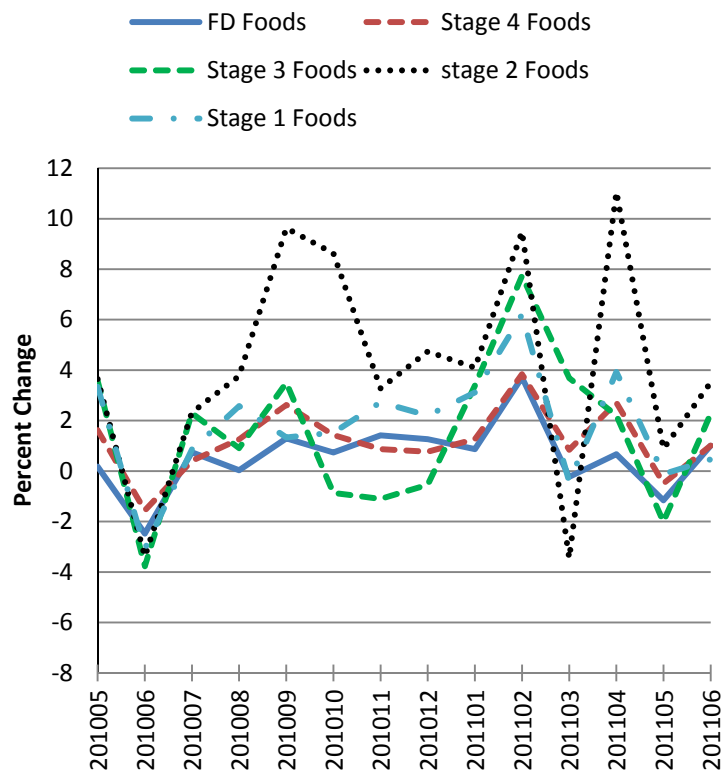
Index	Relative Importance (December 2009)
Total	100.00
Stage 1	11.41
Goods	6.51
Services	4.90
Construction	0.01
Stage 2	17.38
Goods	10.26
Services	7.00
Construction	0.13
Stage 3	22.47
Goods	12.68
Services	9.66
Construction	0.13
Stage 4	48.74
Goods	24.75
Services	23.82
Construction	0.18

Intermediate Demand by Flow Index Change FD and all ID Stages

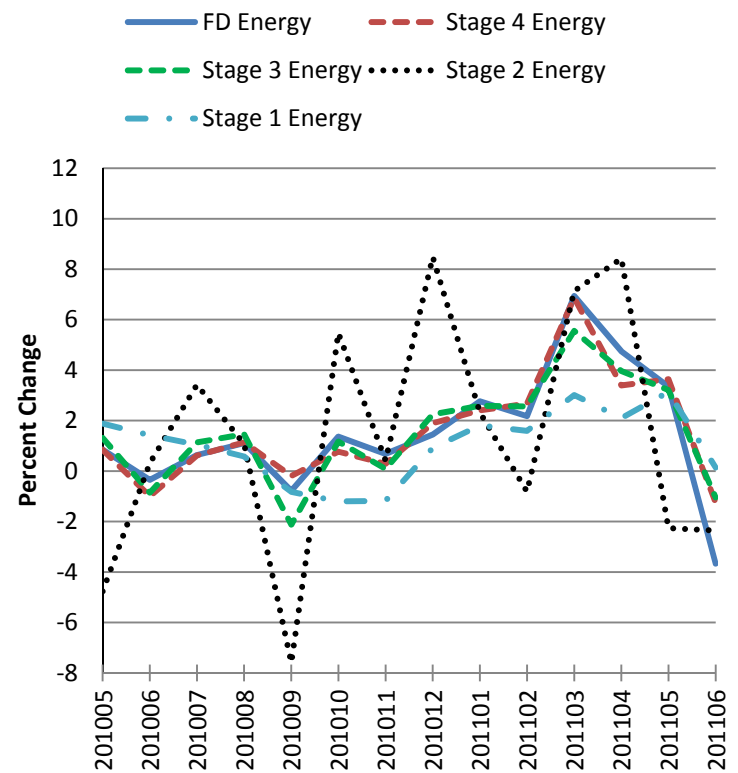


Intermediate Demand by Flow Index Change by Stage

Foods Inputs

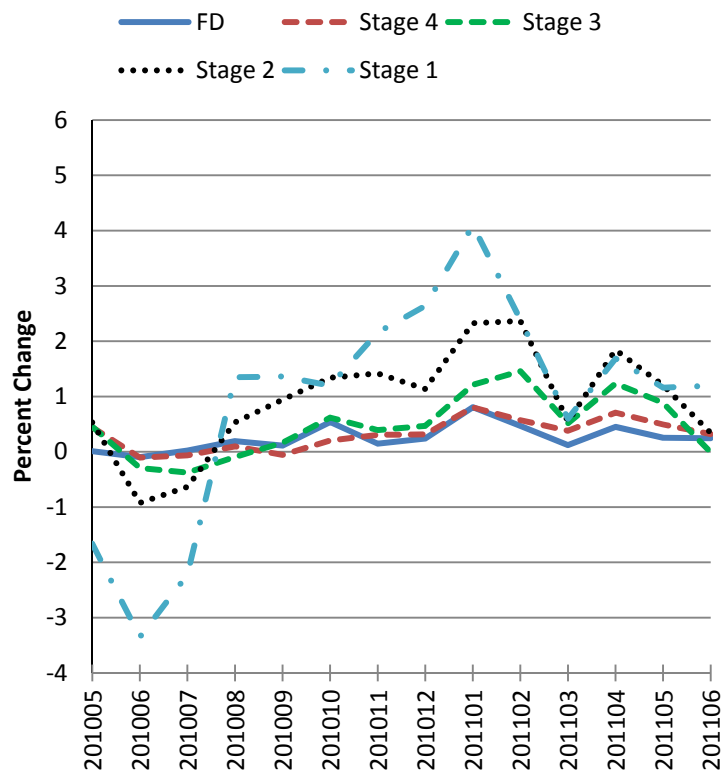


Energy Inputs

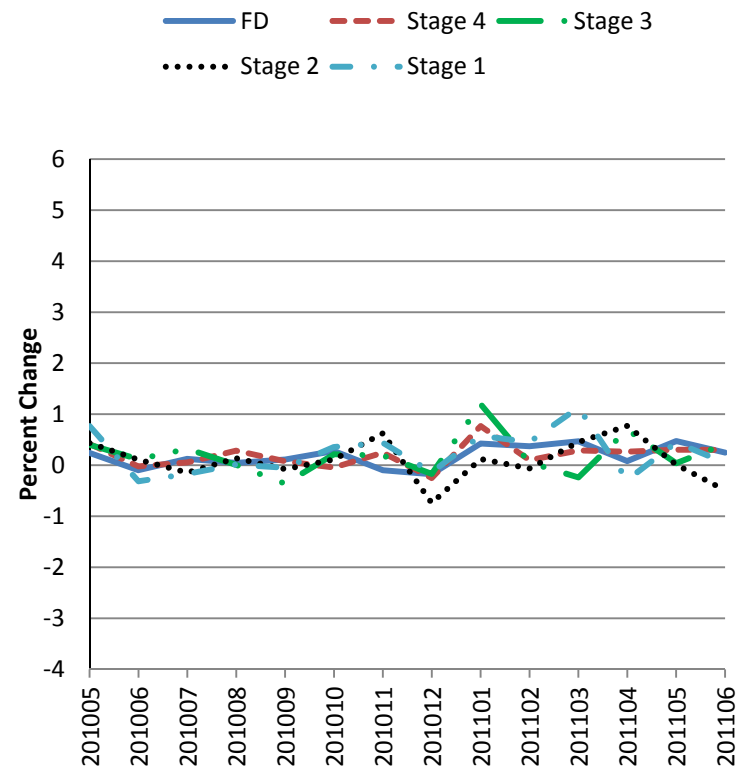


Intermediate Demand by Flow Index Change by Stage

Goods less Food & Energy Inputs



Services Inputs



Intermediate Demand by Flow Value Added

- Flow based approach facilitates pass-through analysis
- Includes services and construction
- Eliminates multiple counting through stage creation and net weighting

Comparison of ID treatments

Intermediate demand by Commodity Type:

- ▶ Allocates commodities based on type: unprocessed goods, processed goods, traditional services, transportation services, trade services.
- ▶ Each commodity is allocated to a single intermediate demand index based on type
- ▶ Does not combine goods, construction, and services
- ▶ Minimizes, but does not alleviate multiple counting.
- ▶ Analytically useful- provides information as to sources of inflation in the economy at both intermediate and final demand levels.

Intermediate demand by Commodity Flow:

- ▶ Four stages of forward flowing intermediate demand.
- ▶ Commodities can be assigned to multiple intermediate demand indexes.
- ▶ Indexes combines goods, construction, and services.
- ▶ Alleviates multiple counting with net input ratios.
- ▶ Analytically useful- price transmission

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