Industry Origins of the US-Japan Productivity Gap, 1955-2010

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US-Japan Productivity Level Comparison

♦ Our studies from the 1980s:

- ♦ Jorgenson, Kuroda, and Nishimizu (1987)
- ♦ Jorgenson and Kuroda (1990)
- ♦ Kuroda and Nomura (1999)
- ♦ Nomura (2004)
- ♦ Jorgenson and Nomura (2007)
- ♦ Improvements in this study from JN (2007)
 - ♦ Use of new 2005 benchmark I/O PPPs (B1990 in JN(2007))
 - ♦ Use of improved Japan's KLEMS
 - ♦ Cover a longer time-series during 1955-2010 (1960-2004 in JN(2007))

The 2005 US-Japan Bilateral Input-Output -Adjusted and Extended at RIETI Project



- Duties and freights and insurance are distributed among products.
- ♦ Imports from RoW are divided by 19 foreign countries.

Elementary Level I/O PPPs

-Various concepts of PPPs on products are reconciled in our price model based on the Adjusted 2005 US-Japan Bilateral IOT

Producer's Prices

- ♦ Domestic Output Price: Pdi (inc./exc. indirect tax on products)
- \diamond Demand Price of Domestic Goods: Pd(H)i and Pd(I)i

- where (H) and (I) represent Purchases by Household and Industry, respectively

 \diamond Demand Price of Composite Goods (inc. imports): Pc(H)i, Pc(I)i

Purchaser's Prices

- ♦ Demand Price of Domestic Goods: Ppd(H)i and Ppd(I)i
- ♦ Demand Price of Composite Goods (inc. imports): Ppc(H)i , Ppc(I)i
- PPPs for output, intermediate inputs, and investment
 - ♦ For output: Pdi (exc. indirec tax on products)
 - ♦ For intermediate inputs: Pc(I)i
 - ♦ For investment: **P**pc(I)i

Data Sources used for the 2005 Benchmark PPPs

Sources	Target and Classification	Price Evaluation	Domestic / Imports	0
Eurostat-OECD	FD, ICP basic heading	Purchaser	inc. Imports	P ^{pc(H)} i
Energy Prices & Taxes (IEA)	Coal, crude oil, LNG, electricity, gas	Purchaser	Inc. Imports	P ^{pd} i
Consumer Price Comparison Survey (METI)	About 100 consumer goods & services	Purchaser	inc. Imports	P ^{pc(H)} i
Intermediate Goods Price Comparison Survey (METI)	About 200 products as intermediate inputs	Purchaser (Producer, partly)	inc. Imports	$P^{pc(I)}$ i
PPP Survey Committee (METI)	About 100 Products	Producer	Domestic	P ^d i
Transportation Service Price (MLIT)	Transportation	Purchaser	Domestic	₽ ^d i
Housing,Construction Price (MLIT)	Building & Const.	Producer (Cost)	Domestic	₽ ^d i
Foods and Restaurant Price(MAFF)	Foods and Restaurant	Purchase	inc. Imports	P ^{pc} i
Mobile Phone Price (MPT)	Communication	Purchaser	Domestic	P ^{pd} i
Woods Products Price (MAFF)	Woods Products	Purchaser	inc. Imports	$P^{pc(I)}_{i}$

PPPs for Output and KLEMS by Industry

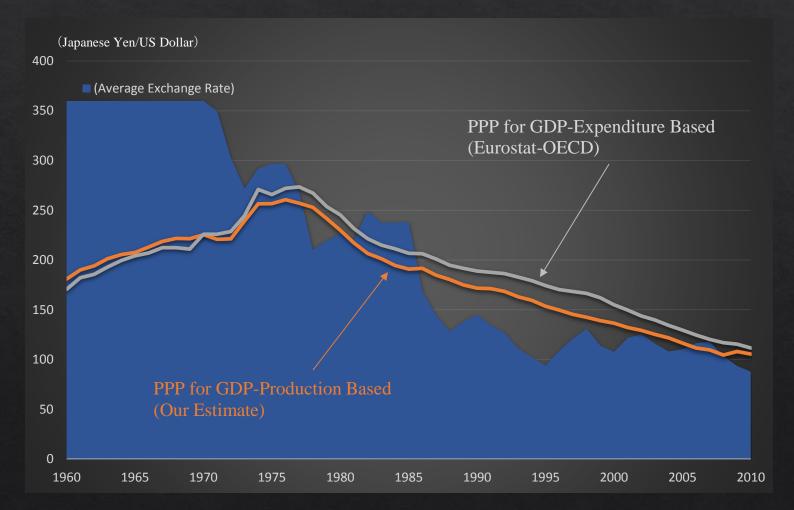
- ♦ Output: Trans-log aggregate of output PPPs (Pdi)
- EMS: Trans-log aggregate of intermediate demand PPPs of composite goods (Pc(I)i)
- K: Trans-log aggregate of PPPs for capital services by type of assets
 - ♦ 33 US-JP Common Asset Classification: inc. inventories and land
 - PPP for capital acquisition: Trans-log aggregate of Purchaser's price PPPs of composite goods
 - PPP for capital service: Consideration of relatives of annualization factors in the US and Japan (detailed tax systems are considered in each country)
 - ♦ U.S.: 59 assets in 36 industries
 - ♦ Japan: 103 assets in 47 industries
- ♦ L: Trans-log aggregate of PPPs for labor inputs by type of labor
 - ♦ 1728 US-JP Common Labor Classification: sex* 4 edu*6 age*36 ind
- ♦ V: Measured by the double deflation method, using industry-level PPPs for gross output and intermediate inputs (EMS).

Use of New Japan's KLEMS, 1955-2011

- Main improvements in Japan's KLEMS (KEO Database)
 - Labor: The unpublished cross-classified tables of Population Censuses (1990, 1995, 2000, and 2005) and Labor Force Surveys became available since 2013, due to the new Law of Statistics. Our benchmark estimates in number of workers and average hours per worker are replaced. See Nomura and Shirane (2013) for the detail and other improvements in our full revision of labor data.
 - ♦ Capital: The rates of depreciation are replaced by the detail estimates which are newly developed at ESRI, using data of the retired assets collected in the ESRI's Survey on Capital Expenditures and Disposals in Japan from 2006 to 2012. See Nomura and Suga (2013).
 - ♦ SUT: Improved consistency with the detail production accounts in JSNA, ESRI, Cabinet Office of Japan. Separate treatment of consumption taxes in SUT.
 - Prices: The noses by the introduction of consumption taxes are removed in our compilation of prices of KLEMS, which provides a better comparison of PPPs for value added.
 - ♦ Periods: expanded backwardly to 1955 and forward to 2011

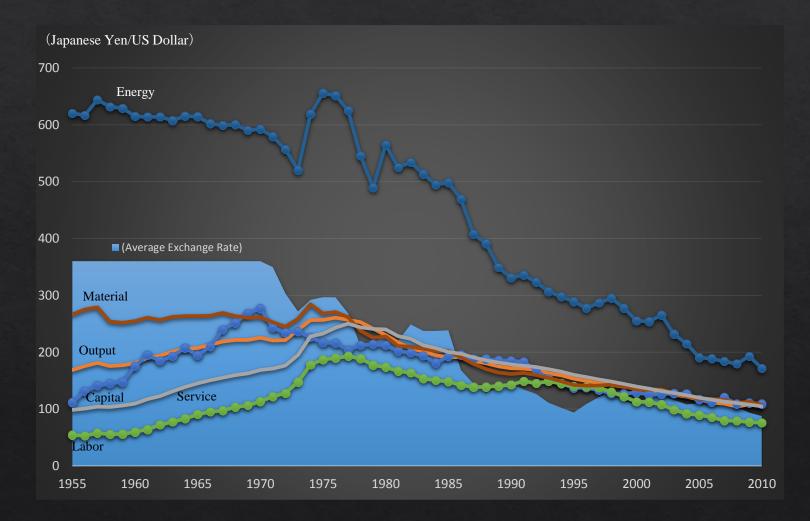
PPPs for GDP during 1960-2010

- Expenditure-based (Eurostat-OECD) vs Production-based (Our estimate)



Source: The PPP for GDP-Production Based is defined as a measure of trans-log index of industry-level PPPs for value added. This is the first estimate based on the 2005 benchmark estimates of PPPs, which is calculated in May 2014 by Nomura, Miyagawa, Shirane, and Okamoto at the RIETI Project.

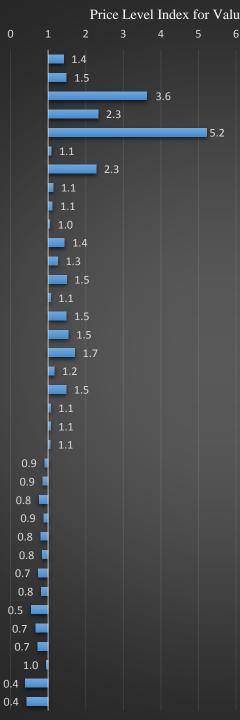
PPPs for Output and KLEMS: 1955-2010



Source: Our estimates in Jorgenson, Nomura, and Samuels (2014).

Industry Origins of PPP-for-GDP Gap in 2005

- PPP for GDP-output based=116.5
- PPP for GDP-expenditure based=129.6 (Eurostat-OECD)
- Exchanger rate=110.2

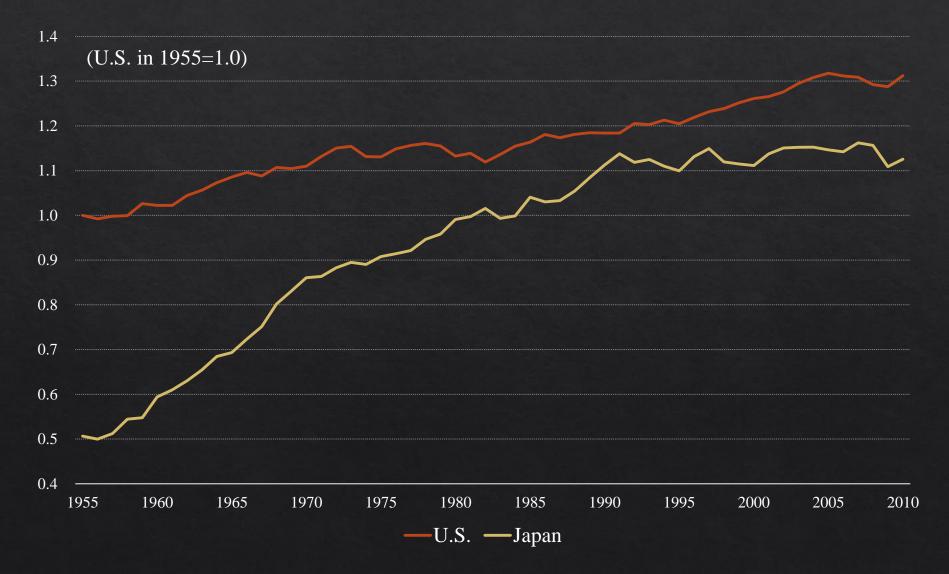


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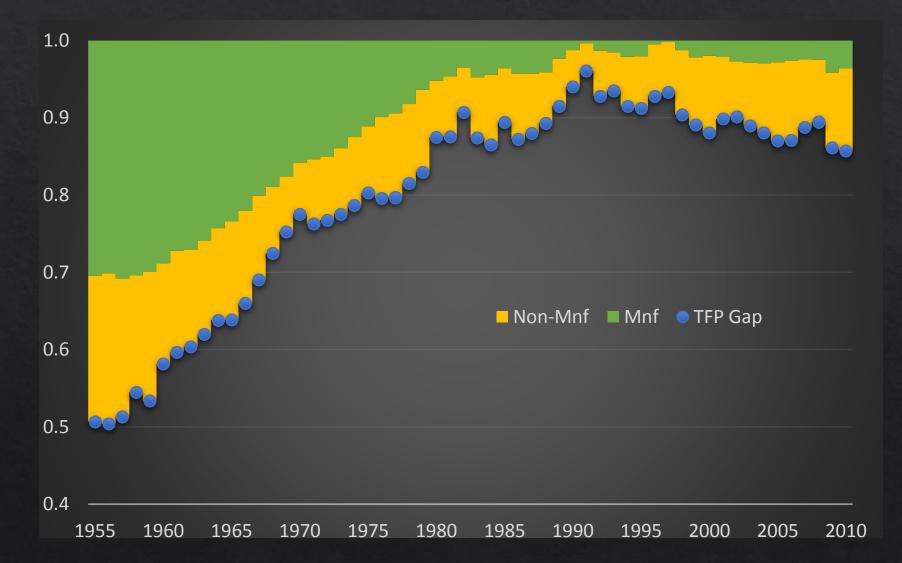
5.2

ue Added	Industry Contribution					
6	-6%	-4%	-2%	0%	2% 4	%
29.Wholesale and Retail						3.9%
31.Real Estate					2.5%	
28.Electricity and Gas					1.7%	
4.Foods					1.3%	
12.Petroleum and Coal Products				1	1%	
36.Household				1	1%	
1.Agriculture, Forestry, Fishery				0.3	8%	
30.Finance and Insurance				0.8	8%	
3.Construction				0.59	%	
35. Public Administration				0.49	6	
15.Metal Products				0.3%	6	
10.Printing and Publishing				0.3%		
2.Mining				0.3%		
27.Communications				0.1%		
24.Air Transportation				0.1%		
8.Furniture and Fixture				0.1%		
6.Apparel and Leather Products				0.1%		
22.Rail Transportation				0.1%		
5.Textile				0.1%		
26.Other Trans and Storage				0.0%		
20.0ther Transportation Equipment				0.0%		
23.Water Transportation				0.0%		
7.Woods and Related Products			0.0%			
13.Stone, Clay, Glass			-0.1%			
9.Paper and Pulp			-0.1%	•		
16.Machinery			-0.2%	•		
21.Misc Manufacturing			-0.2%	•		
11.Chemical Products			-0.2%	•		
18.Electrical Equipment			-0.3%			
32.Education			-0.4%			
14.Primary Metal			-0.5%			
17.Computer and Electronic Products	;		-0.6%			
25.Road Transportation			-0.6%			
34.Other Services			-0.8%			
19.Motor Vehicles			-1.4%			
33.Medical Care	-4.6%					

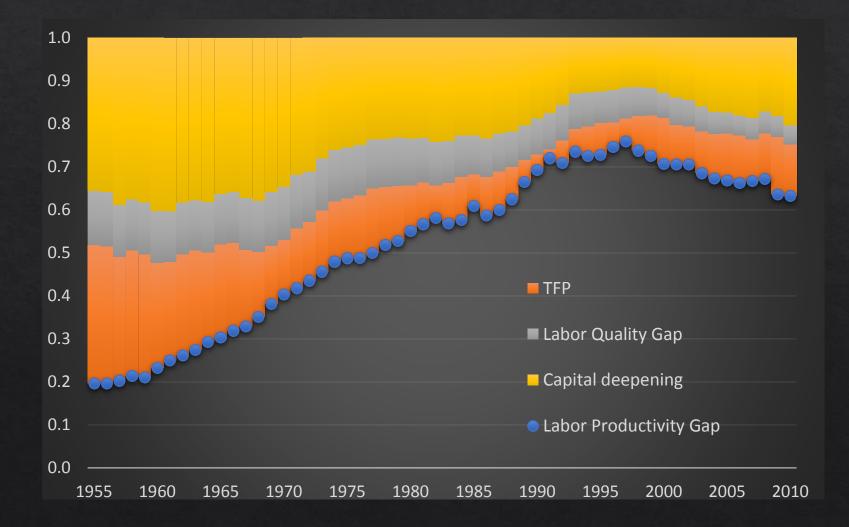
TFP-Gap at the Aggregate Level, 1955-2010



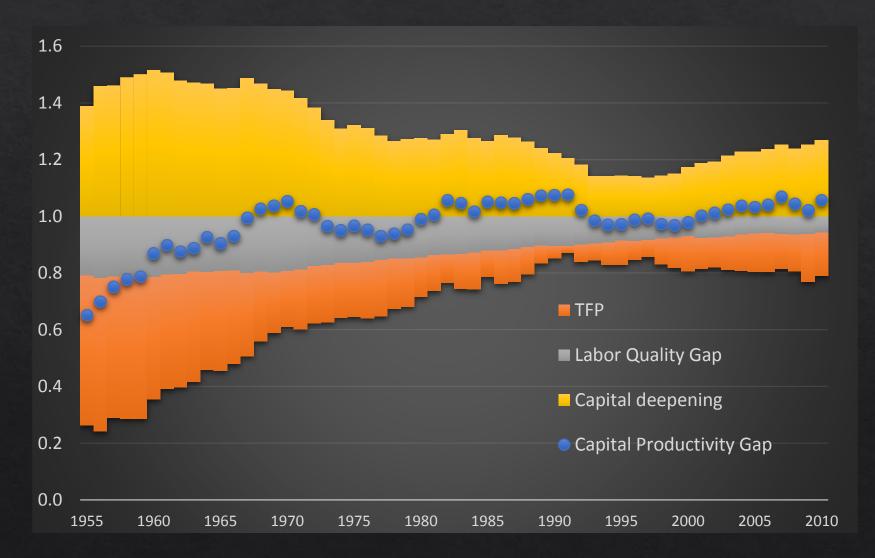
U.S.-Japan TFP Gap



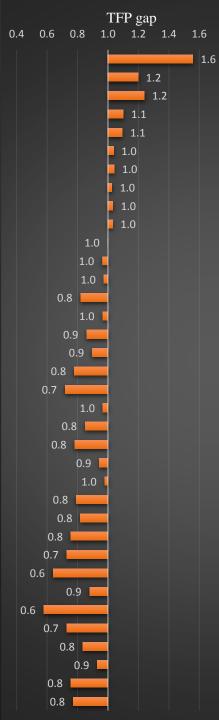
U.S.-Japan Labor Productivity Gap



U.S.-Japan Capital Productivity Gap



Industry Origins of TFP Gap in 2005 - A First Estimate



1.6

		Industry Contribution					
1.8	-5	-3	-1	1	3	5	
33.Medical Care					- 1	4.1	
19.Motor Vehicles				1.2			
32.Education				0.6			
14.Primary Metal				0.4			
27.Communications				0.3			
17.Computer and Electronic Products	s			0.1			
25.Road Transportation				0.1			
18.Electrical Equipment				0.1			
9.Paper and Pulp				0.0			
23.Water Transportation				0.0			
36.Household			0.0				
7.Woods and Related Products			0.0				
13.Stone, Clay, Glass			0.0				
5.Textile			-0.1				
21.Misc Manufacturing			-0.1				
24.Air Transportation			-0.1				
20.Other Transportation Equipment			-0.1				
8.Furniture and Fixture			-0.1				
6.Apparel and Leather Products			-0.1				
16.Machinery			-0.1				
22.Rail Transportation			-0.1				
26.Other Trans and Storage			-0.2				
11.Chemical Products			-0.3				
35.Public Administration			-0.3				
2.Mining			-0.3				
10.Printing and Publishing			-0.5				
15.Metal Products			-0.6				
1.Agriculture, Forestry, Fishery			9:3				
12.Petroleum and Coal Products							
3.Construction		-1.3	3				
28.Electricity and Gas		-1.6					
4.Foods		-1.6	_				
30.Finance and Insurance		-2.0					
34.Other Services		-2.0					
31.Real Estate	16	-2.6					
29.Wholesale and Retail	4.6						

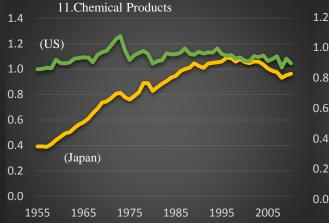
Industry Origins of TFP Gap in 2010 - A First Estimate

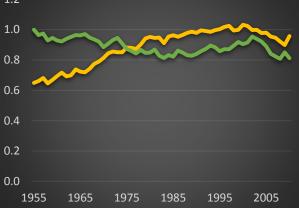


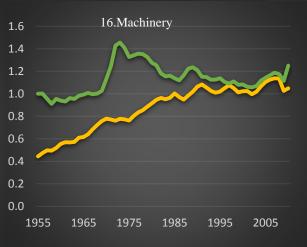
		Industry Contribution						
1.6 1.8		-7	-5	-3	-1	1	3	5
1.6 1.8 1.6 1.5	33.Medical Care 19.Motor Vehicles 32.Education 14.Primary Metal 36.Household 18.Electrical Equipment 27.Communications 25.Road Transportation Equipment 13.Stone, Clay, Glass 5.Textile 7.Woods and Related Products 6.Apparel and Leather Products 8.Furniture and Fixture 22.Rail Transportation 24.Air Transportation 24.Air Transportation 24.Air Transportation 10.Printing and Publishing 21.Misc Manufacturing 11.Chemical Products 15.Metal Products 14.Apriculture, Forestry, Fishery 2.Mining 34.Other Services 12.Petroleum and Coal Products 16.Machinery 35.Public Administration 17.Computer and Electronic Products 3.Construction	-7		-3 -3 -0 -1 -1.6	-1 0.0 0.0 -0.1 -0.1 -0.1 -0.1 -0.2 -0.2 -0.2 -0.2 -0.2 -0.2 -0.2 -0.2		3	5
	4.Foods 31.Real Estate			-1.7 -2.1				
	30.Finance and Insurance			2.9				
	29.Wholesale and Retail	-6.1						

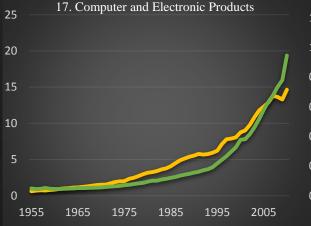
Industry-Level TFP 1955-2010 - Catching up in manufacturing sectors

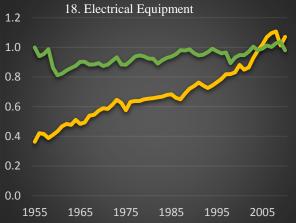
14.Primary Metal

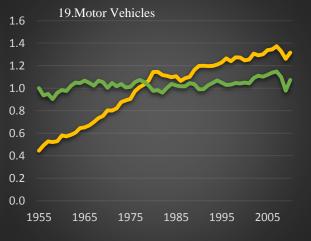




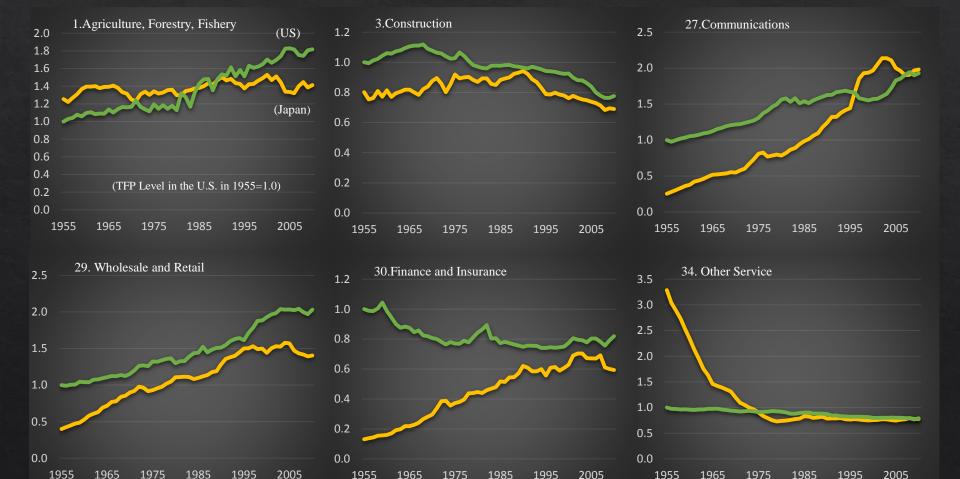








Industry-Level TFP 1955-2010 - Agriculture and service sectors



Conclusion

♦ A long-term story is not changed in TFP Gap

- ♦ Period of Convergence: from 45.8 in 1955 to 95.1 in 1991
 ♦ Period of Divergence: to 85.2 in 2010
- ♦ Wholesale and retail is still the largest contributor to this gap, accounting for 41% of the lower TFP of Japan.
 - \rightarrow We are going to investigate the difference in the type of wholesale and retail, to see the quality-gap in margin rates..
- The superiority of TFP in Japan's communication sector has vanished, since the middle of the 2000s
- Solution States and the sector seems to have a superior
 productivity. This may be true, but there is an implicit
 subsidies that are not recorded in the production accounts?