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

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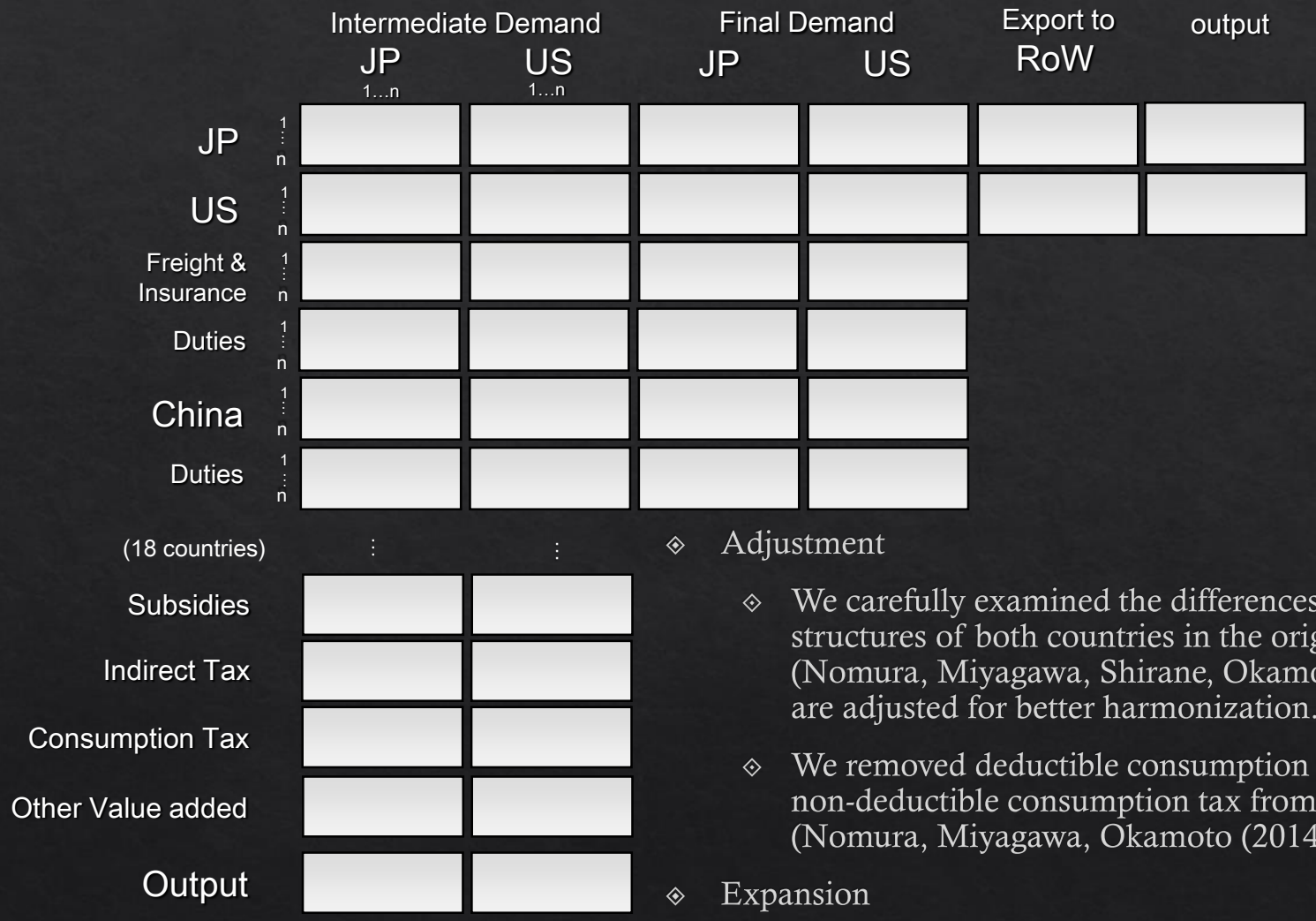
Contents

- US-Japan Productivity Level Comparison
- Data and Framework
  - Elementary-level PPPs and Bilateral I-O Framework
  - Industry-level PPPs for output and KLEMS inputs
- “First” Results
  - PPPs for Output and KLEMS
  - Economic Growth in the U.S. and Japan
  - Level Comparison of Output and KLEMS
  - Level Comparison of ALP and TFP
  - Industry Origins of TFP-gap

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



- Adjustment
  - We carefully examined the differences in input-output structures of both countries in the original METI's BIOT (Nomura, Miyagawa, Shirane, Okamoto (2013)). And some are adjusted for better harmonization.
  - We removed deductible consumption taxes and separated non-deductible consumption tax from the indirect-taxes. (Nomura, Miyagawa, Okamoto (2014))
- Expansion
  - 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: **P**di (inc./exc. indirect tax on products)
  - Demand Price of Domestic Goods: **P**d(H)i and **P**d(I)i
    - where (H) and (I) represent Purchases by Household and Industry, respectively
  - Demand Price of Composite Goods (inc. imports): **P**c(H)i, **P**c(I)i
- Purchaser's Prices
  - Demand Price of Domestic Goods: **P**pd(H)i and **P**pd(I)i
  - Demand Price of Composite Goods (inc. imports): **P**pc(H)i , **P**pc(I)i
- PPPs for output, intermediate inputs, and investment
  - For output: **P**di (exc. indirec tax on products)
  - For intermediate inputs: **P**c(I)i
  - For investment: **P**pc(I)i

Data Sources used for the 2005 Benchmark PPPs

Sources	Target and Classification	Price Evaluation	Domestic goods / Imports	
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	P^{d}_i
Housing,Construction Price (MLIT)	Building & Const.	Producer (Cost)	Domestic	P^{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

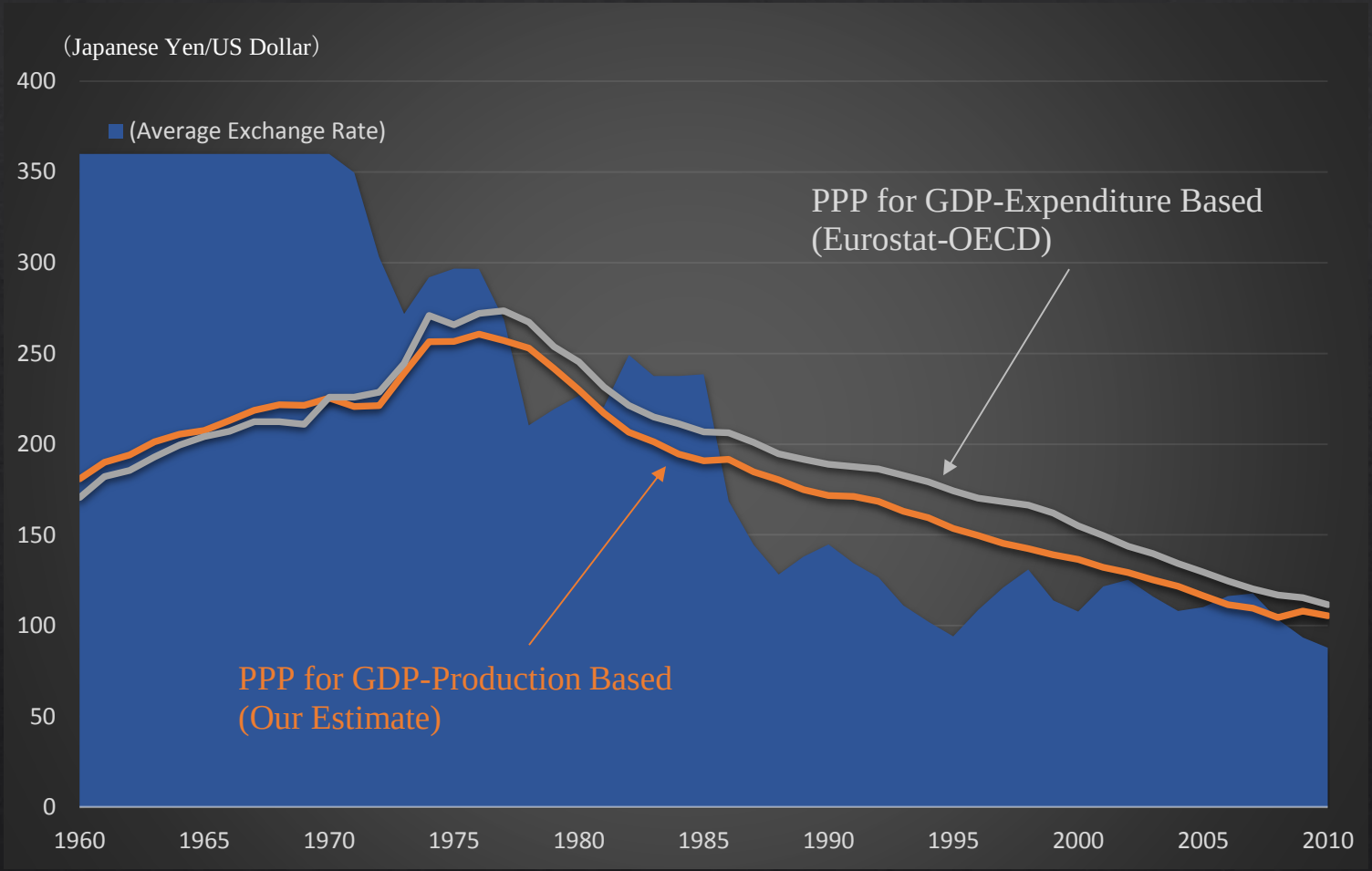
- Output: Trans-log aggregate of output PPPs (**P**di)
- EMS: Trans-log aggregate of intermediate demand PPPs of composite goods (**P**c(I)i)
- K: Trans-log aggregate of PPPs for capital services by type of assets
  - 33 US-JP Common Asset Classification: inc. inventories and land
  - PPP for capital 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

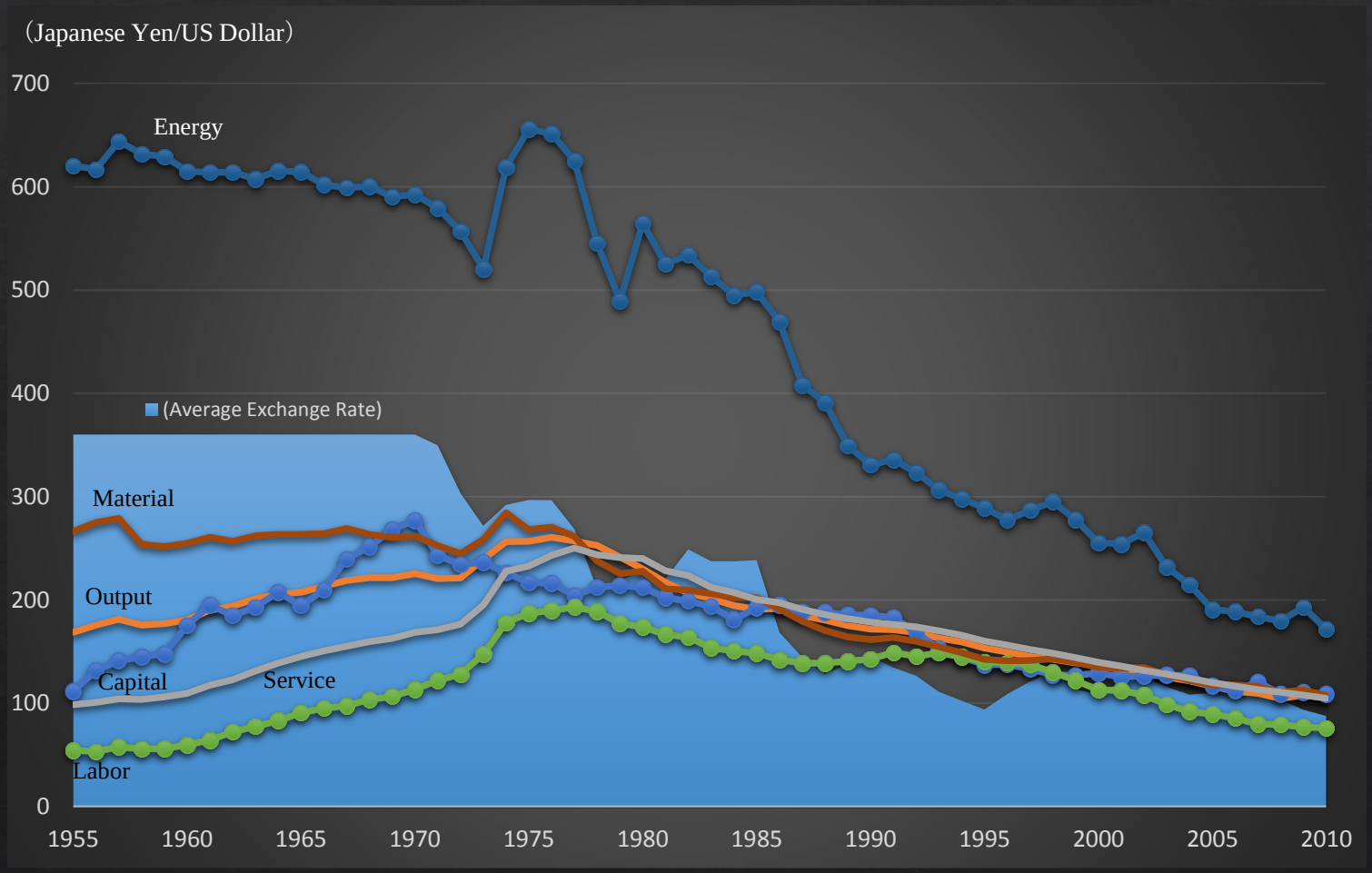
PPPs for GDP during 1960-2010

- 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.

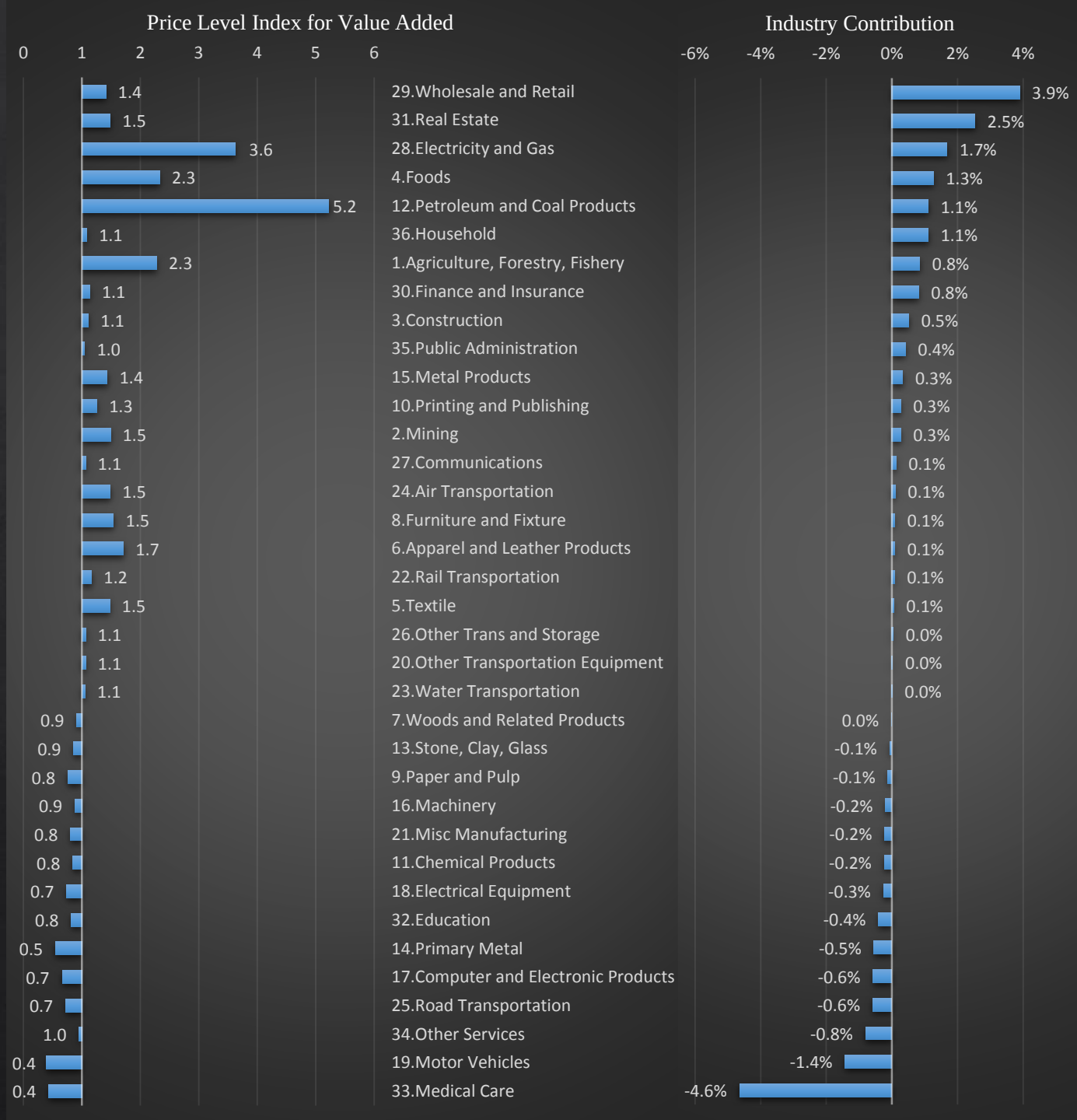
PPPs for Output and KLEMS: 1955-2010



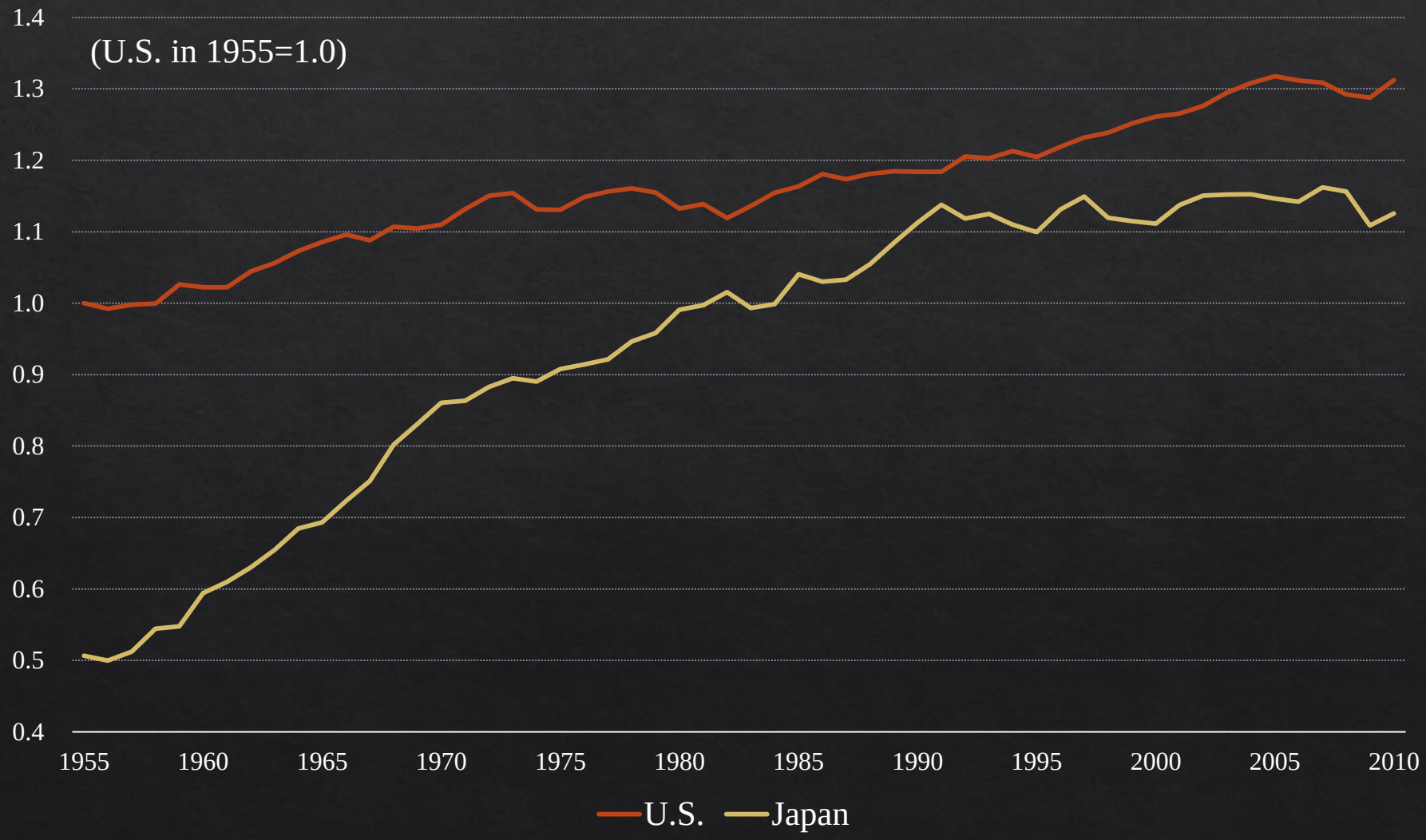
Source: Our estimates in Jorgenson, Nomura, and Samuels (2014).

Industry Origins of PPP-for-GDP Gap in 2005

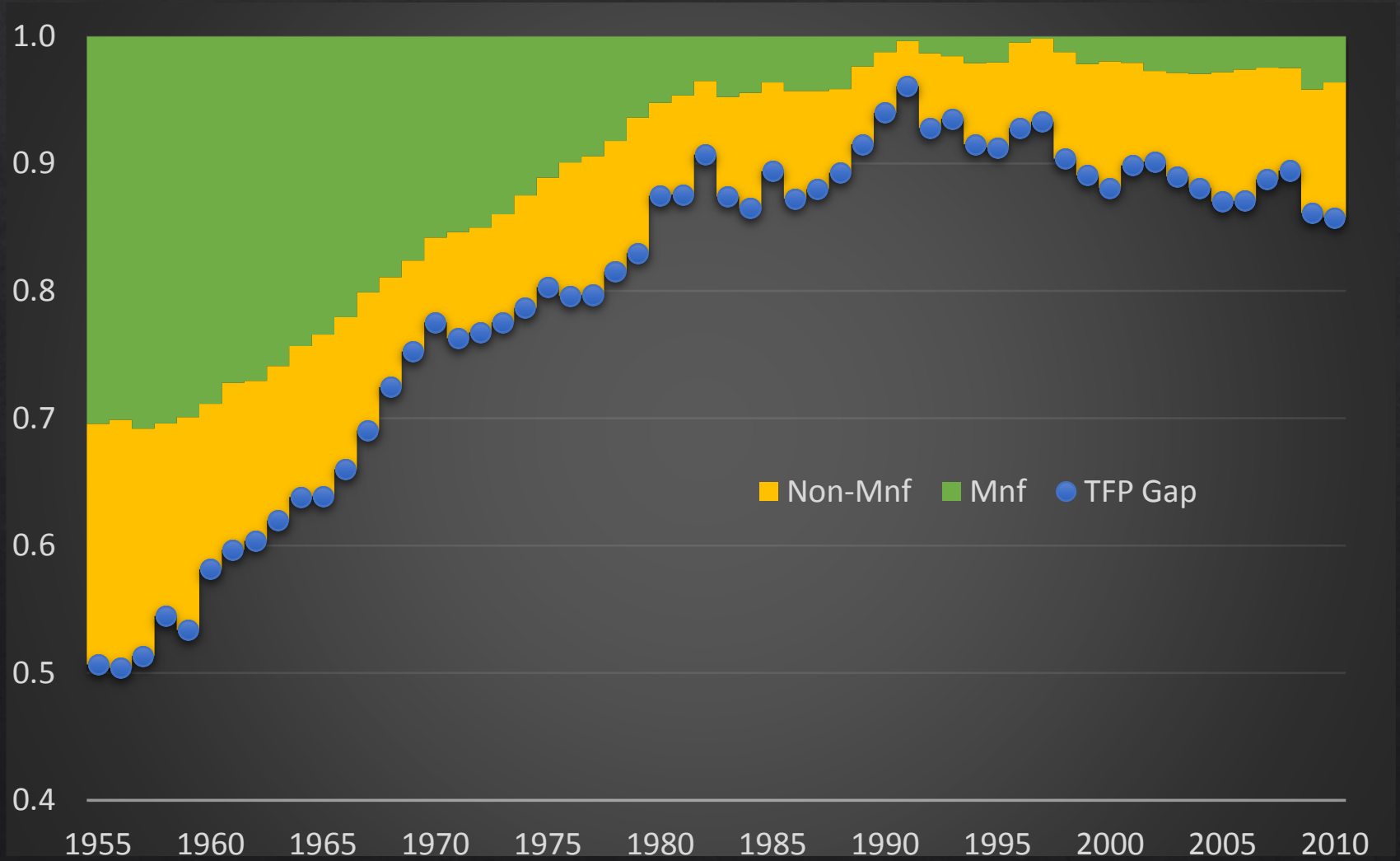
- PPP for GDP-output based=116.5
- PPP for GDP-expenditure based=129.6 (Eurostat-OECD)
- Exchanger rate=110.2



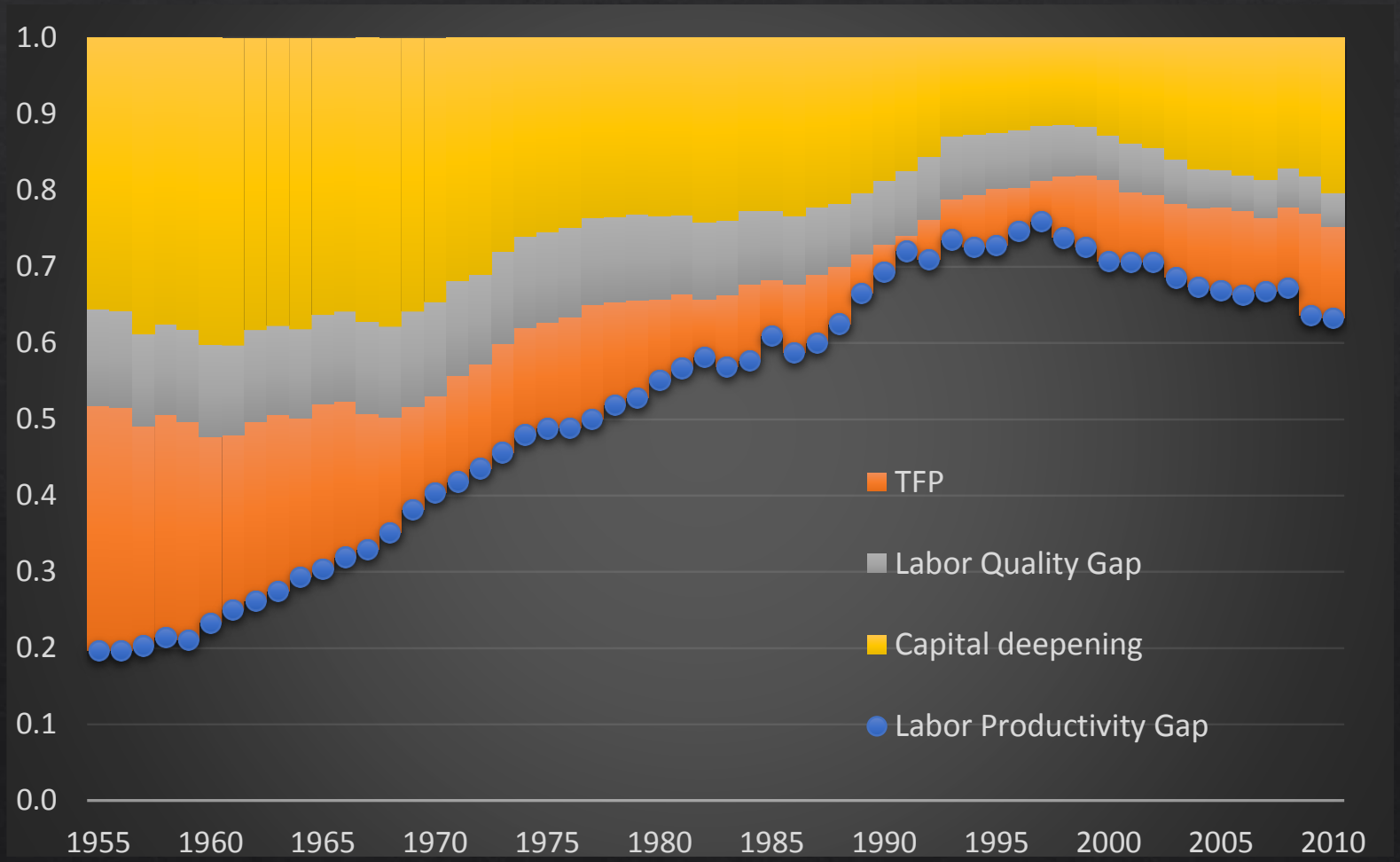
TFP-Gap at the Aggregate Level, 1955-2010



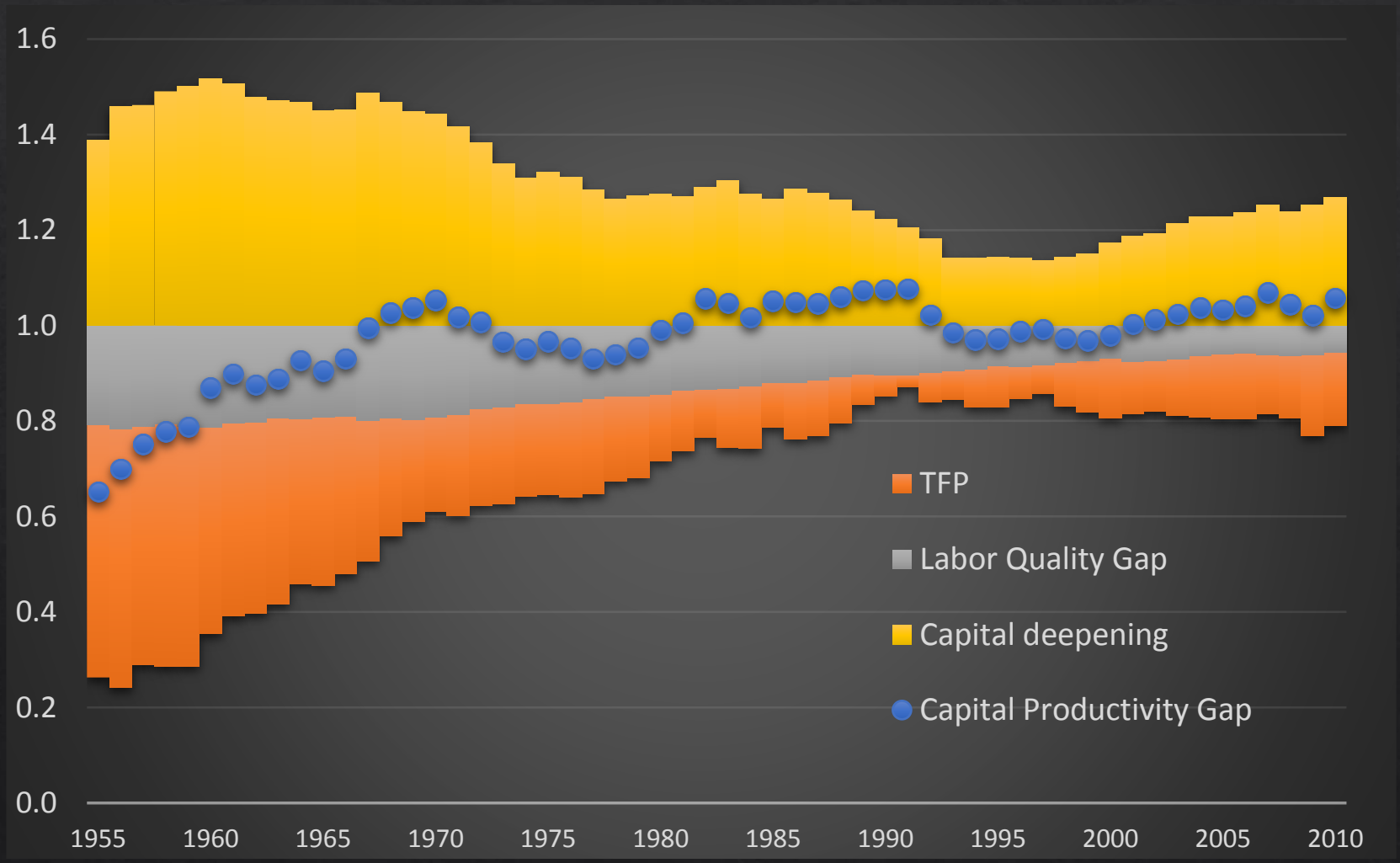
U.S.-Japan TFP Gap



U.S.-Japan Labor Productivity Gap

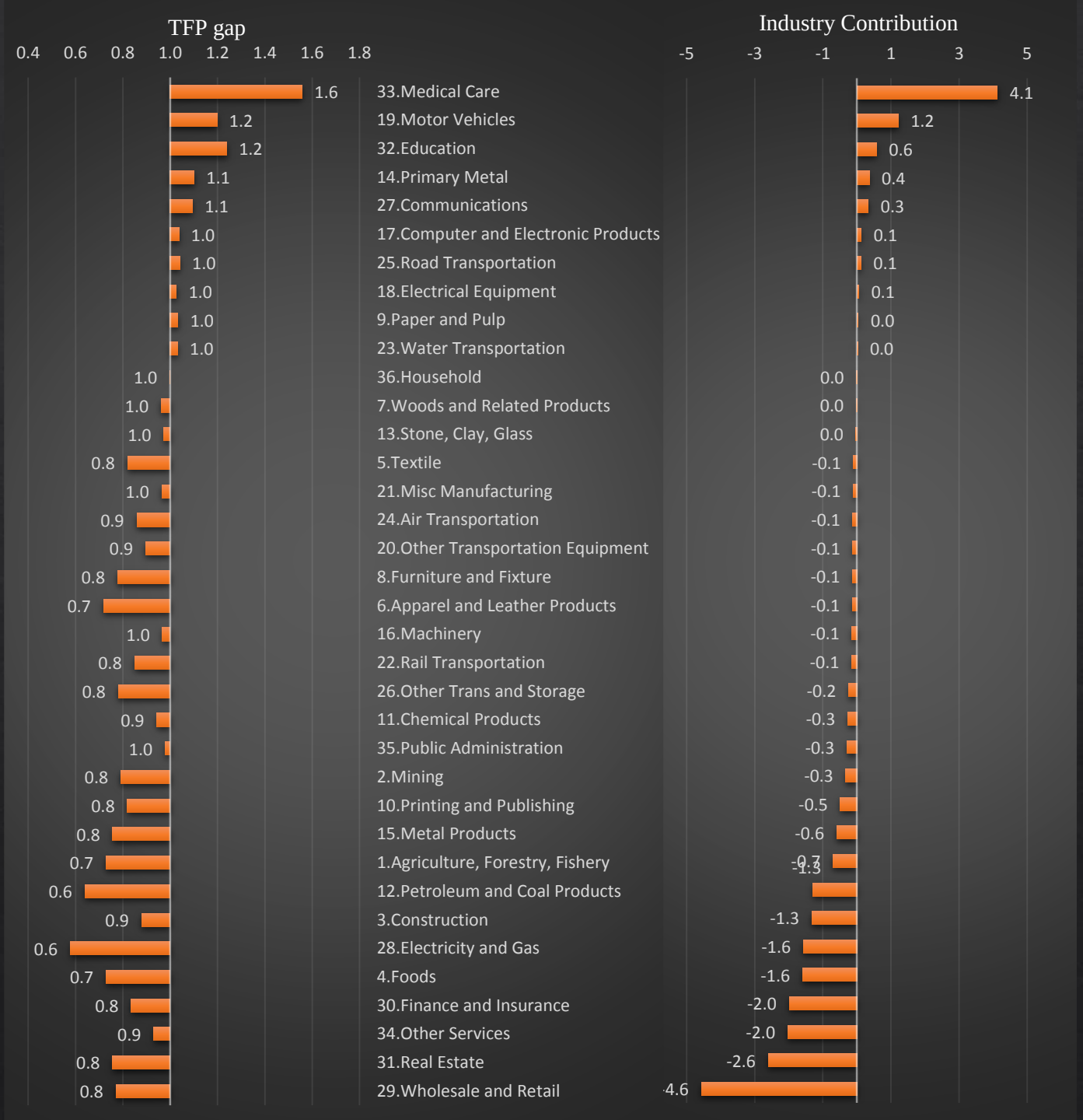


U.S.-Japan Capital Productivity Gap



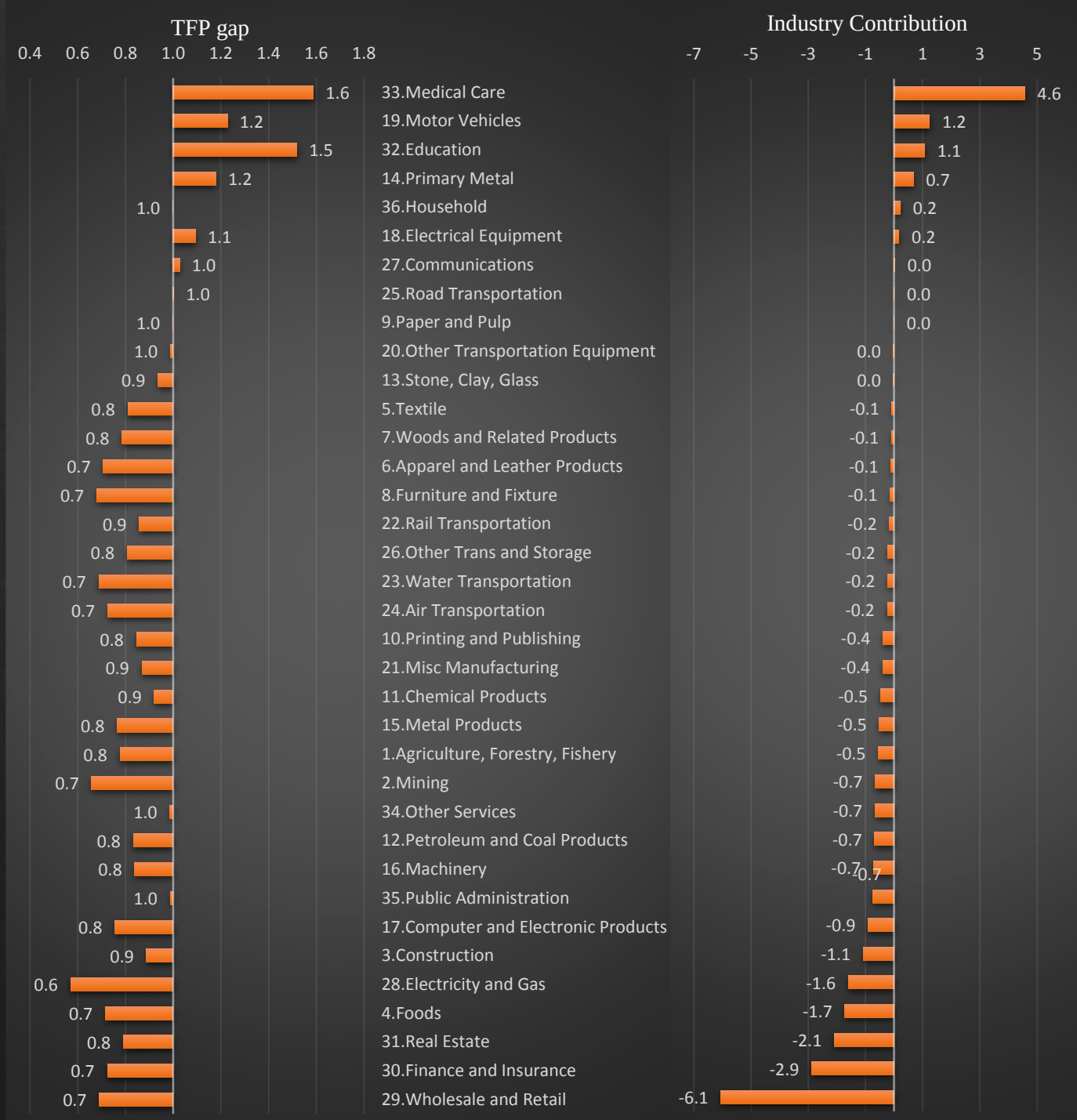
Industry Origins of TFP Gap in 2005

- A First Estimate

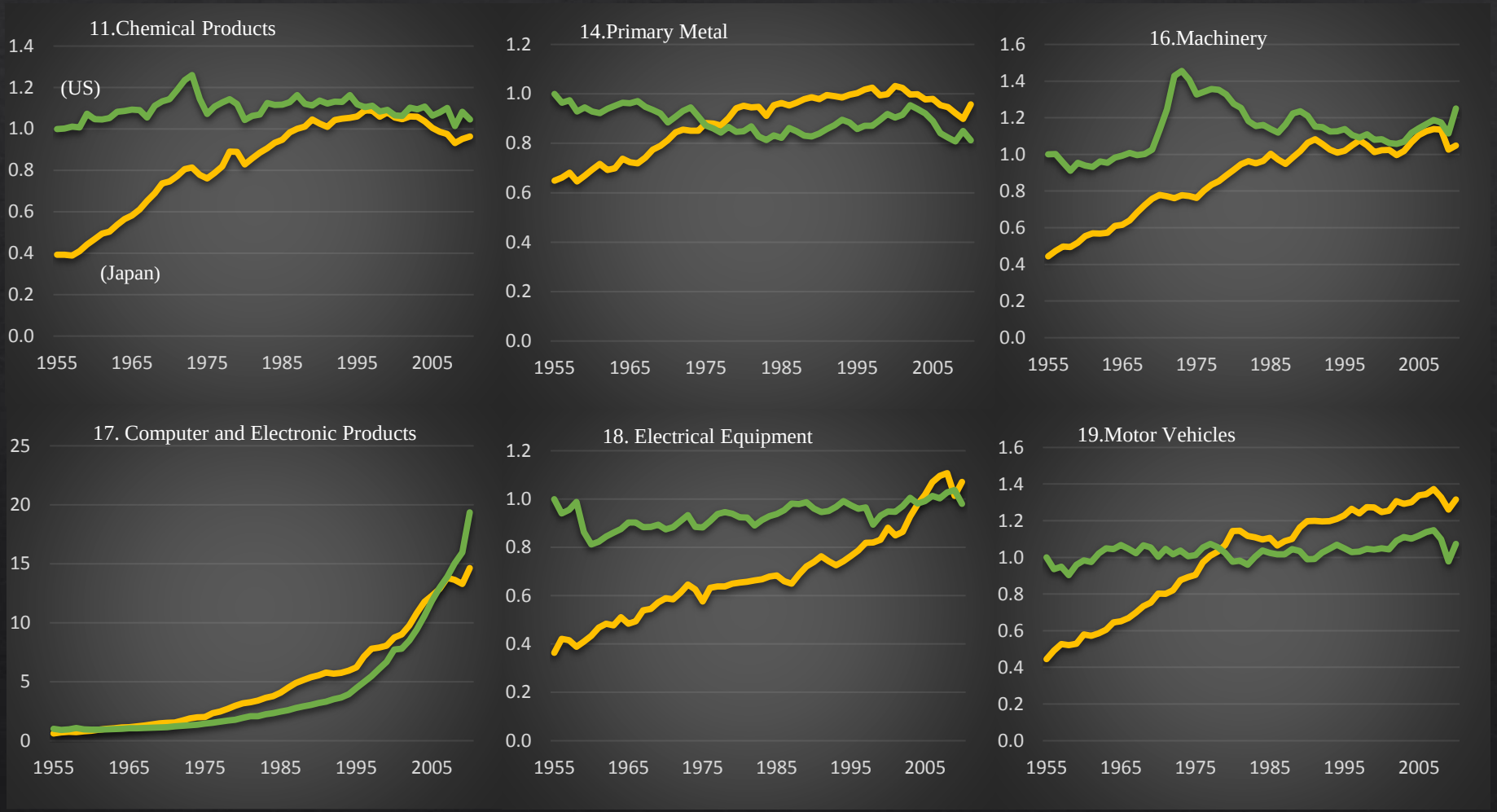


Industry Origins of TFP Gap in 2010

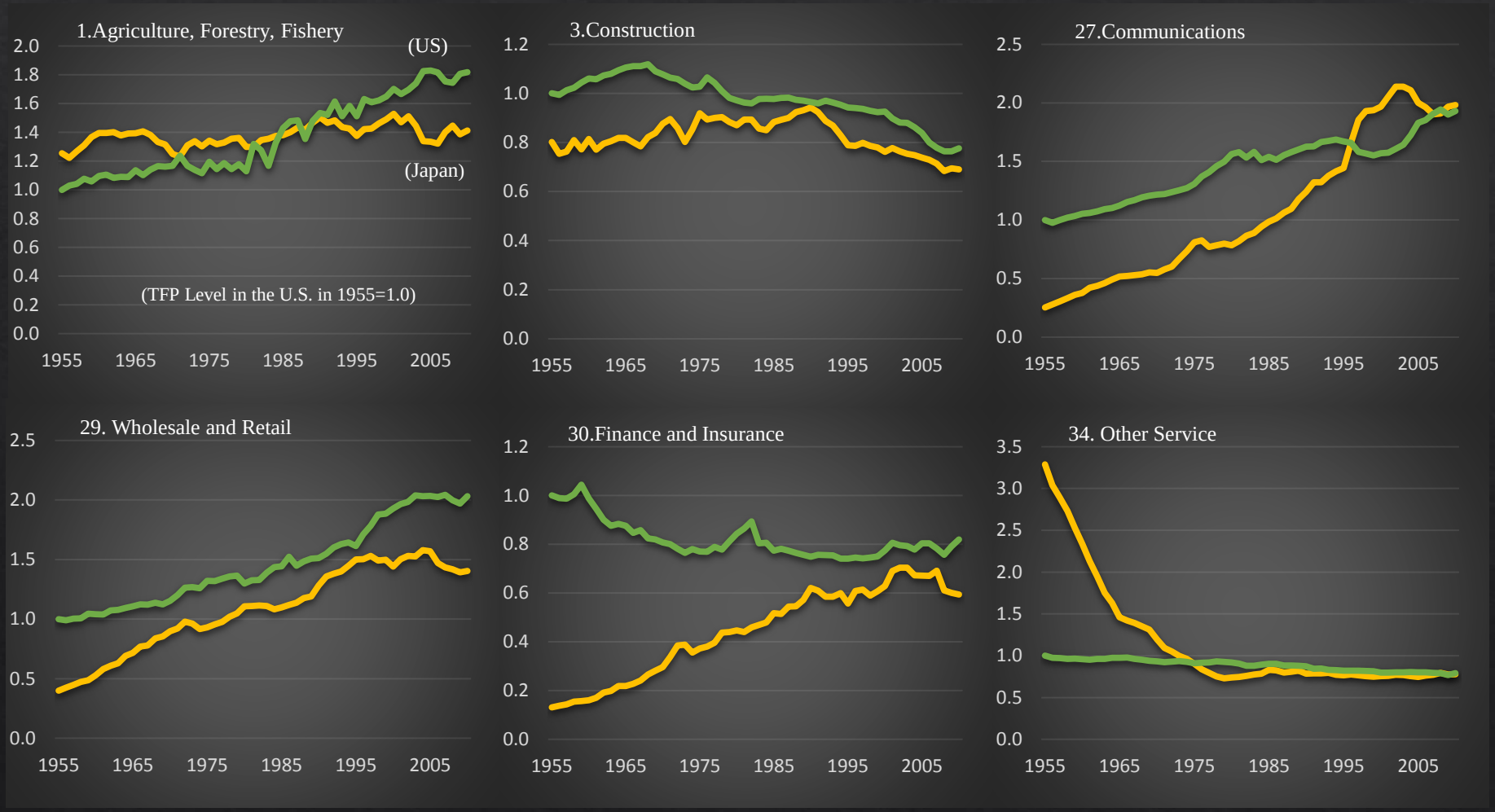
- A First Estimate



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



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.

  → 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
- Japan's medical 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?