4-b

Exchange rate pass-through on Japanese prices: Import price, corporate goods price and core CPI

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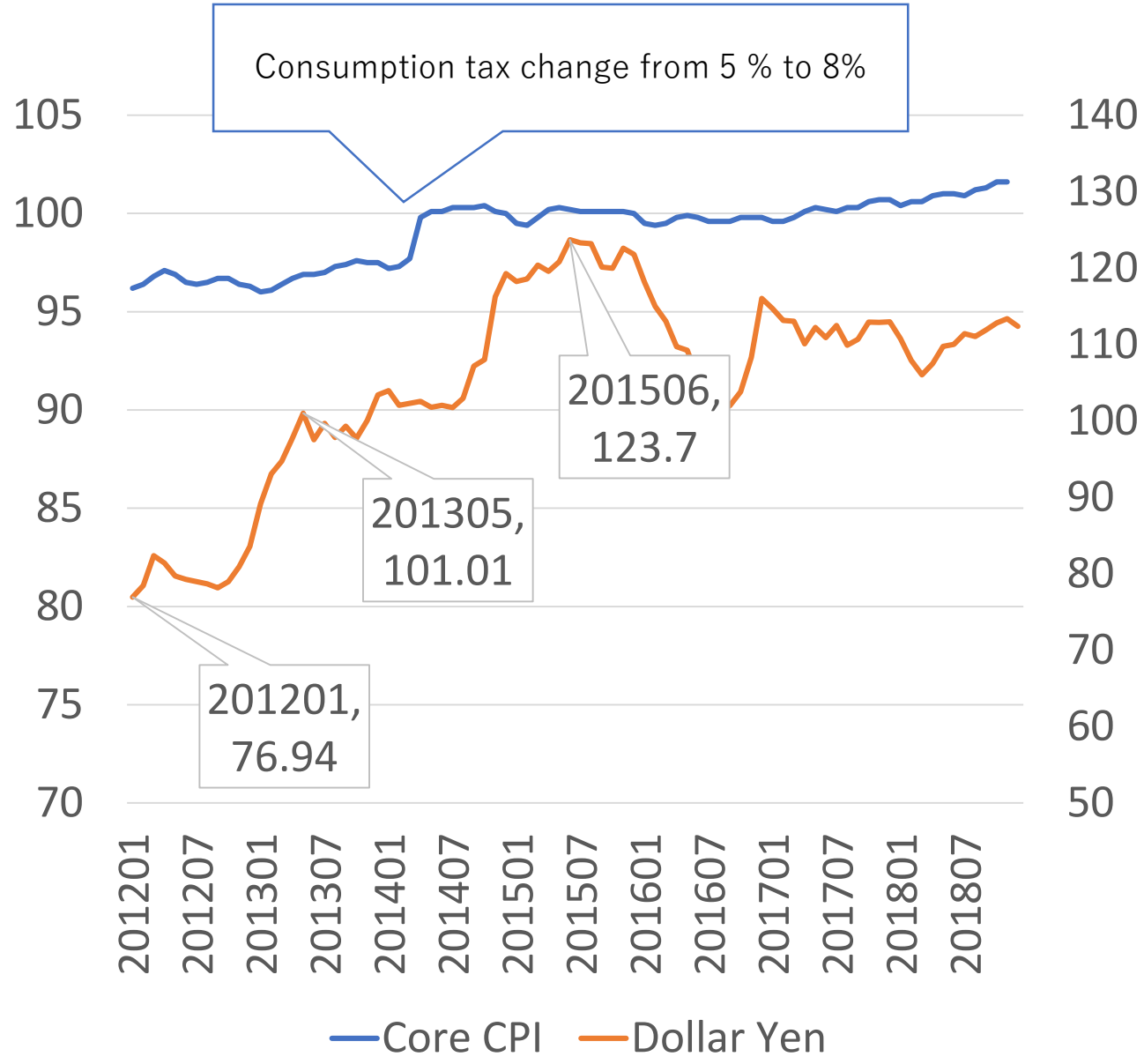
Yuri Sasaki
Yushi Yoshida
Piotr Kansho Otsubo

Back Ground of this paper

- ABENOMICS: Since late 2012, Prime Minister Abe and his government unveiled a comprehensive policy package called Abenomics.
- The main policy of Abenomics is monetary policy, which adopts 2% inflation targeting policy.
- In 2013, BOJ stated that they would make inflation rate 2% in two years, but they haven't yet reached their goal.
- There are so many discussions and researches on this issue.

Did the yen depreciation affect on inflation?

- One of the channel to raise inflation rate is exchange rate depreciation, which affect inflation rate through import price changes.
- It seems the sharp depreciation of Japanese Yen since 2012 didn't raise core CPI.
- This paper examines how the exchange rate changes affected Japanese prices.



The results

Deprecition of Japanese Yen => Inflaton Since 2010

- The effect of yen depreciation on core CPI started to go up since around 2010 and became significant.

Depreciation of Yen => Inflation rate 1% up in 2012.

- The degree of the shock effect is very low, like 0.02 at most. However, the rate of yen huge depreciation from 2012 was over 50%. It should raise inflation rate more than 1% (=0.02*50%.) It is not so small impact.

The relation between Exchange rate change and consumer prices – Previous studies

Mishkin (2008) :

Sizeable depreciations of the nominal exchange rate exert small effects on consumer prices across a wide set of industrial countries, and these effects have declined over the past two decades…Nevertheless, exchange rate fluctuations can still have an effect on inflation and economic activity and hence factor into monetary policy decisions.

Devereux and Yetman (2010)

:develops a simple theoretical model that can be used to account for the determinants of exchange rate pass-through to consumer prices.

ERPT Exchange rate pass through

Exchange rate pass-through

- Exchange rate changes => import prices

This paper

- Exchange rate changes => import prices => **core CPI**
- Exchange rate changes => import prices =>**domestic price** => **core CPI**

Our papers on ERPT

- Y. Yoshida & Y. Sasaki, 2015, Automobile Exports: Export Price and Retail Price, Discussion Papers 15-E-024 , Research Institute of Economy, Trade and Industry (RIETI)

- Yuri Sasaki, Yushi Yoshida, Decomposition of Japan's trade balance, International Review of Economics & Finance,Volume 56, 2018.

Previous studies

- Etsuro Shioji, Time varying pass-through: Will the yen depreciation help Japan hit the inflation target?,
  Journal of the Japanese and International Economies, Volume 37, 2015.

  - It is shown that exchange rate pass-through to domestic prices has come back strong in recent years.
  - The paper focus on the items that households purchase frequently. It shows that 25% depreciation of the yen would produce a 2% increase in the prices of those items.
  - It uses time-varying VAR.
  - We focus on intermediate process using import prices and domestic prices, rather than high frequency traded goods.

Features of this paper

(1) Data

- First, nominal effective exchange rates are constructed to precisely fit the BOJ's industry classification of import prices. The country weights for Japanese imports are calculated for each industry and these are modified every year to reflect changes in the industry composition of Japanese imports.

- Second, to measure direct impact of import price changes on the prices of domestically produced goods in the same category, the industry-level producer price index is reconstructed to match the corresponding industry-level import price index. For some industries, this matching process is simple, but in most of the case careful inspection of sub-categories was necessary.

Feature of this paper (2) :

Time varying parameter VAR

- The TVP-VAR model enables us to capture a possible time-varying nature of underlying structure in the economy in a flexible and robust manner.
- All parameters in the VAR specification are assumed to follow the first-order random walk process, thus allowing both temporary and permanent shift in the parameters.
- Jochi Nakajima(2001)

- **Basic Analysis**
- Industry level(I)
- Industry level (II)

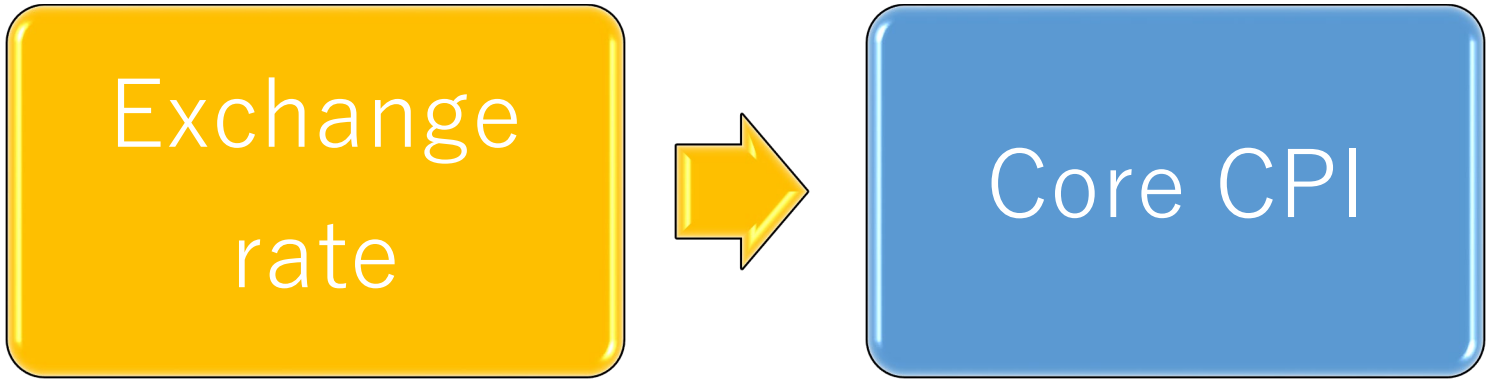
How do exchange rates affect on core CPI?

Basic analysis (TVP-VAR)

Effective ER,
General IPI,
General PPI,
Core CPI

Data (January 1988 – December 2017)

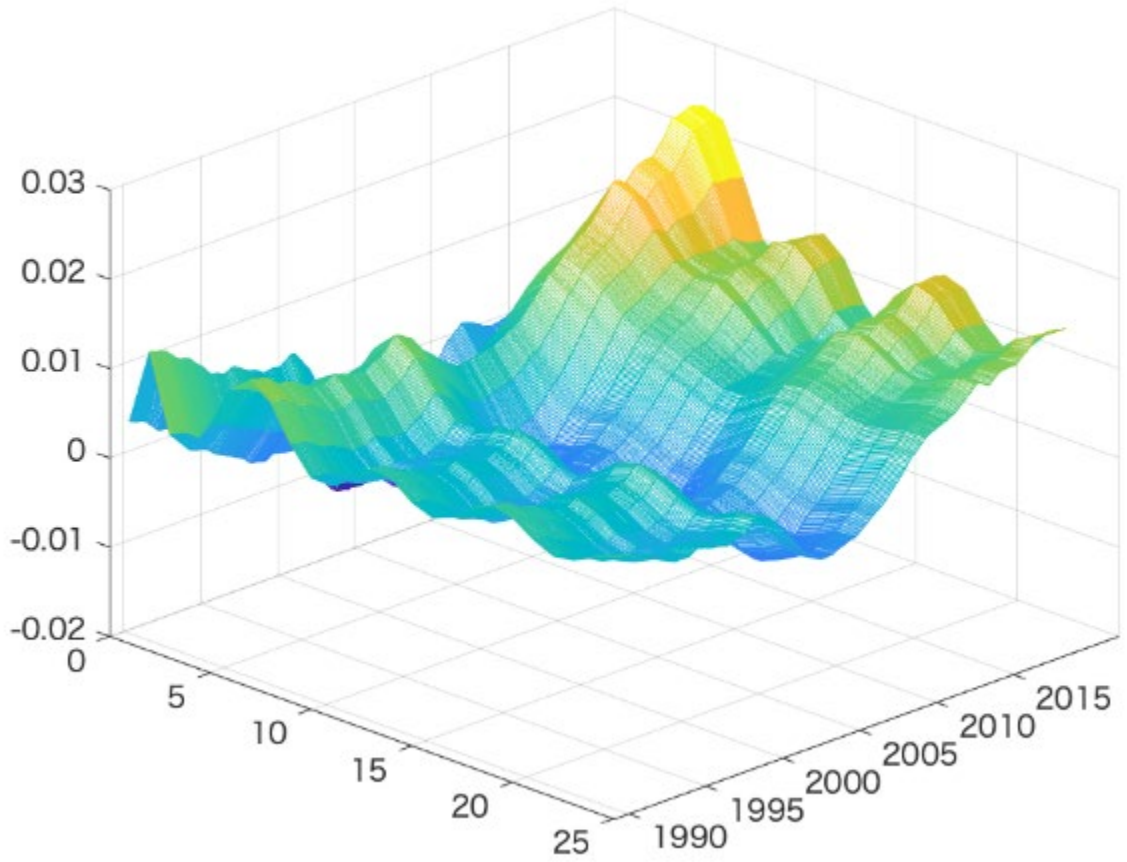
- Goods level nominal effective exchange rate
  - Not BOJ data, but we made more appropriate data. Nominal effective exchange rates are constructed to precisely fit the BOJ's industry classification of import prices. The country weights for Japanese imports are calculated for each industry and these are modified every year to reflect changes in the industry composition of Japanese imports.
- General Import Price Index (yen basis, from BOJ)
  - Many papers use this data.
  - Bank of Japan collects survey data from companies and they control quality changes.
- General Producer Price Index (from BOJ)
- Core CPI (all items, less fresh food, from MIC)
  - Bank of Japan use core CPI for inflation measure.



- First, we want to check the direct effect of FX shock on CPI.

- Depending on…
  - ERPT on imported final goods.
  - Indirect effects through IPI and through IPI+PPI.
  - Macro effect in the long run.

Evolution of the pass-through rate from the exchange rate to CPI



Cumlated inpulse response of CPI to FX shock)/(Cumulated iinpulse response of FX to FX shock

The vertical axis: the strength of the response,
The left horizontal axis: the response period,
The right horizontal axis: the year.

The results:

The effects are very small from -0.02 to 0.02.

It is getting higher since around 2010.

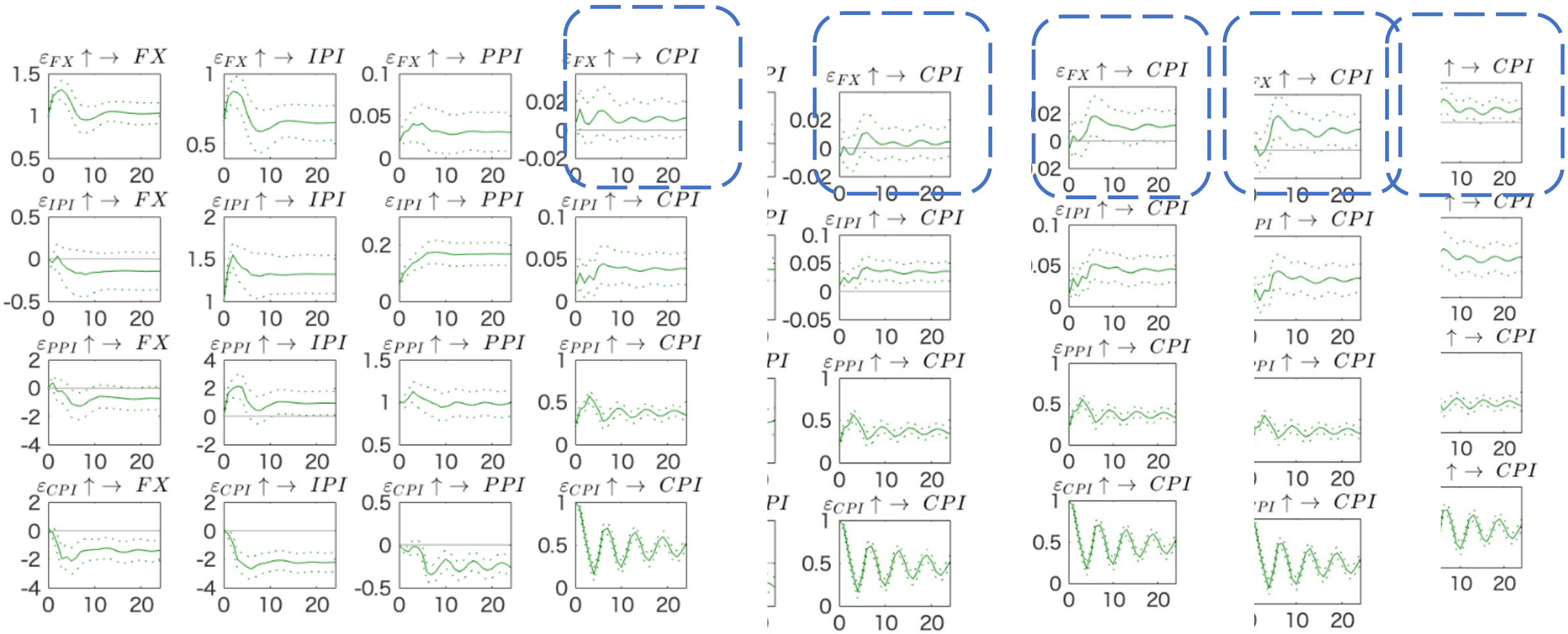
The effect of exchange rate on core CPI

- The effect was negative before 2000, but it has been getting higher since around 2010.

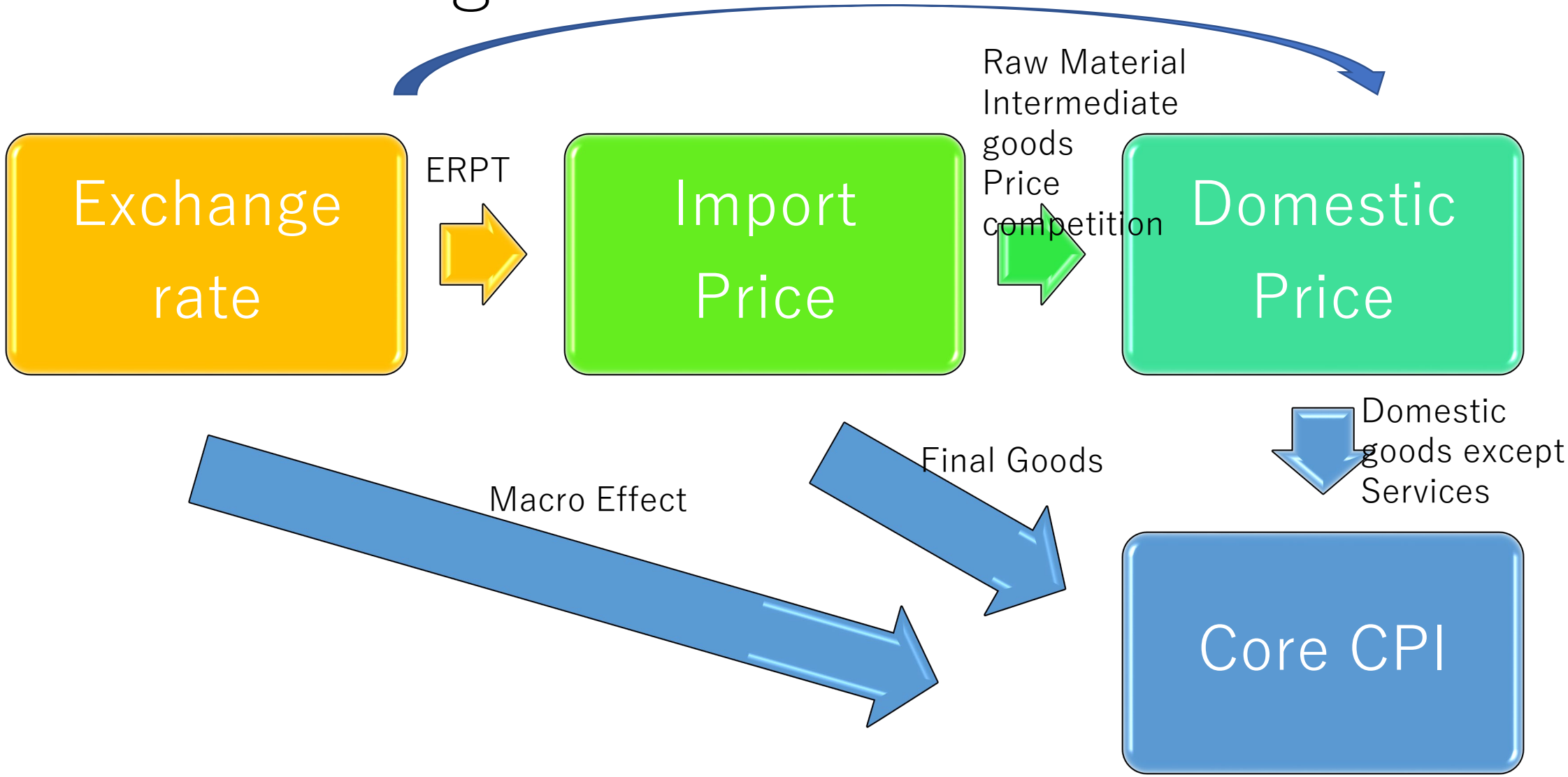
- To check whether the results are significant or not, we checked the confidence intervals in five points of time: Jan 1990, Jan 2000, Jan 2010, Dec 2013 and Jan 2017. We found that the FX shock on CPI are significant since 2010.

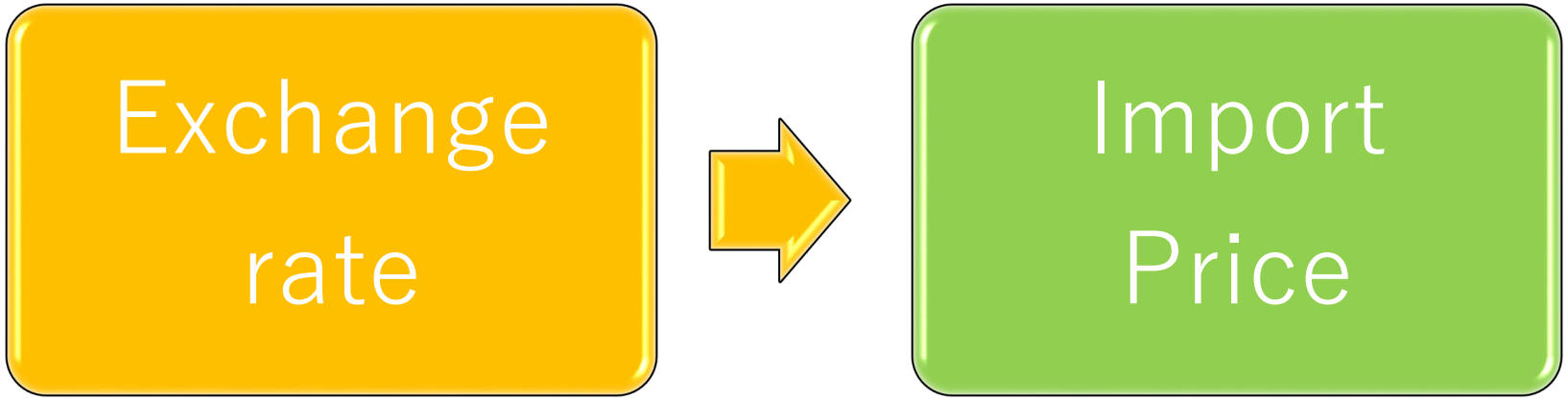
- The response is very small like 0.02. But FX changed more than 50% when Abenomics started. 50% X 0.02 =1% FX caused 1% CPI change.

1/1990 1/2001 1/2010 12/2013 1/2017



How do exchange rates affect on core CPI?



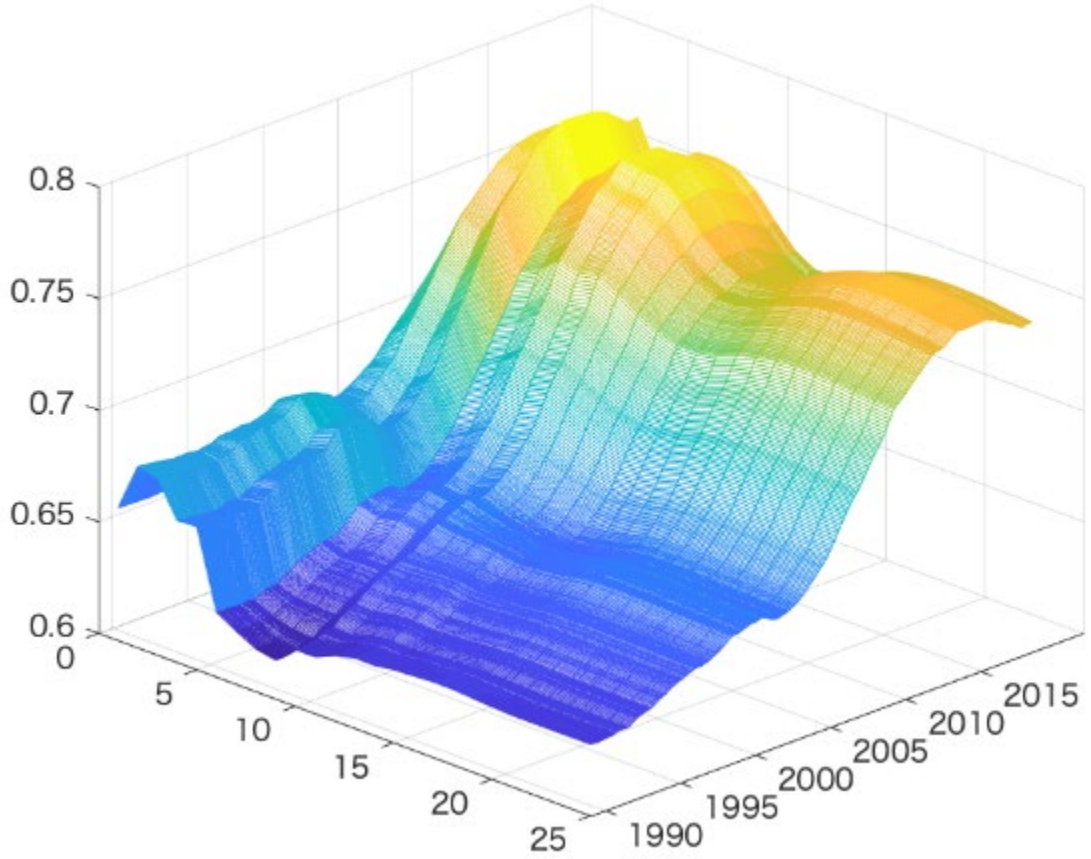


Exchange rate pass through on import prices.

Depending on…

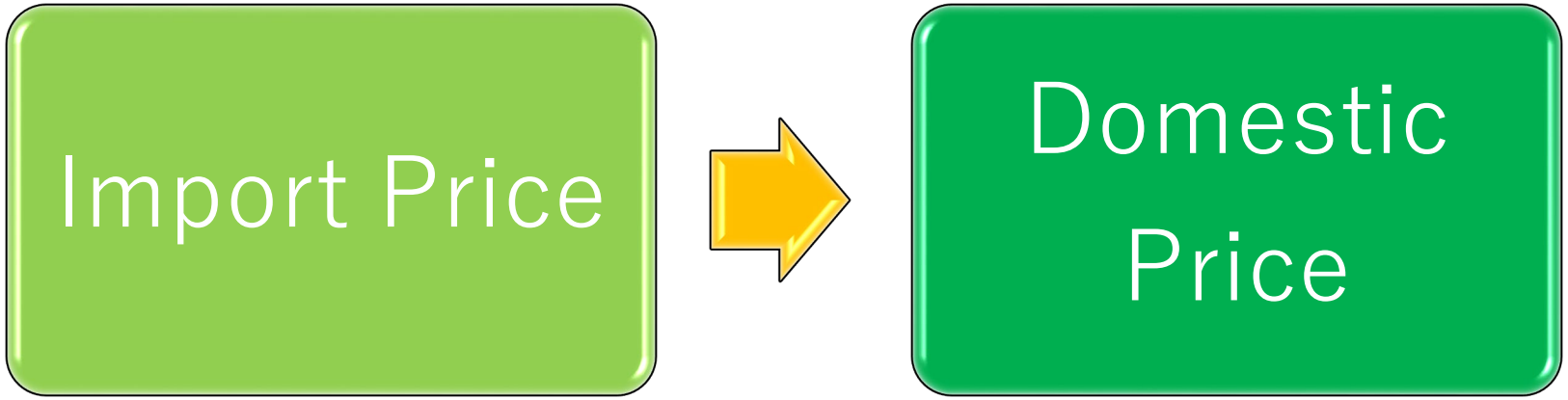
- Invoice currency
- Industry
- Source country
- Price in international commodity market …

Yen depreciation shock on Import price Index



Cumlated inpulse response of FXto IPI shock)/(Cumulated iinpulse response of FX to IPI shock

The results:
Ranging from 0.6 to 0.75.
The effect is getting stronger.



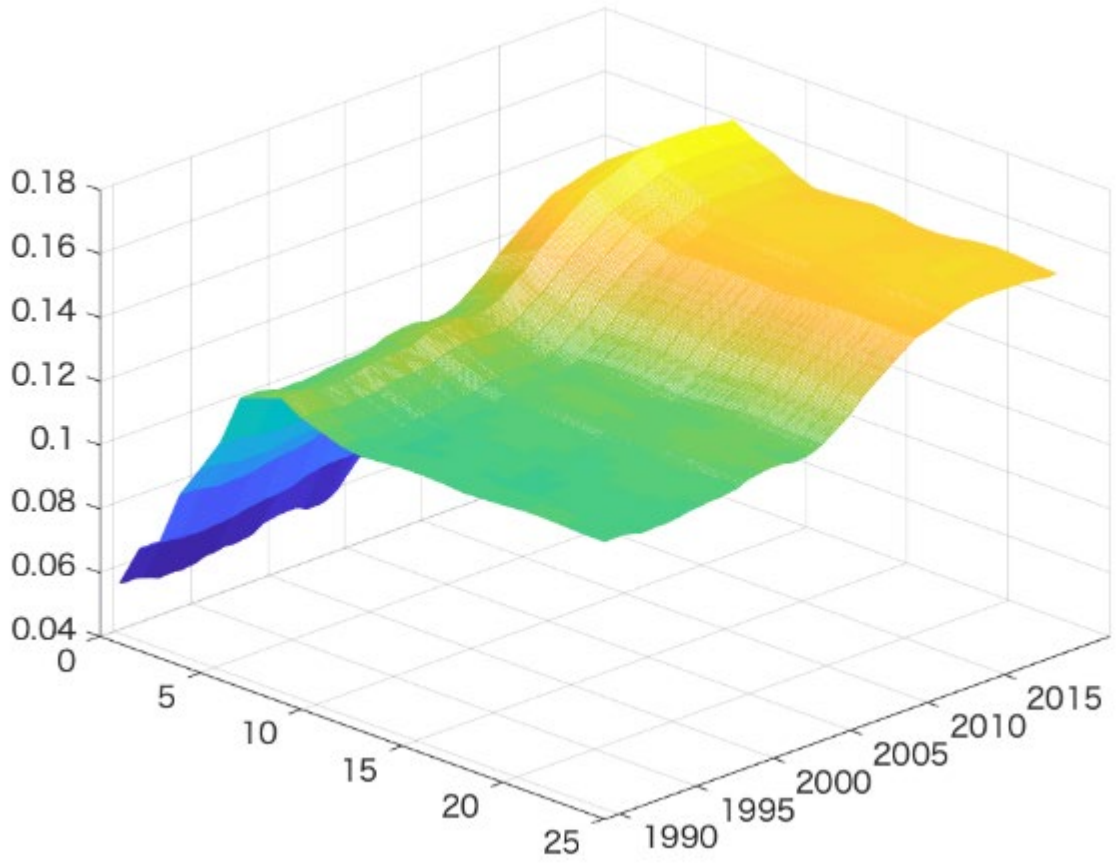
Import price shock on domestic price

For example

- Energy: Oil ＝＞Petroleum products　Woods => Wooden board
- Intermediate goods: Iron boards => automobile cars

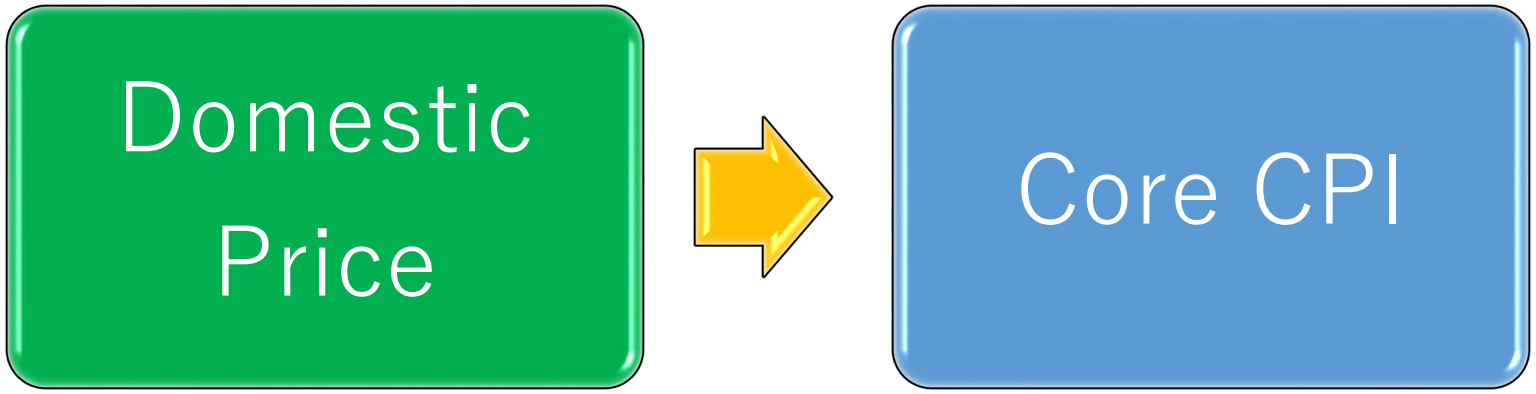
- Factors affecting on the effect
  - Share of imported inputs
  - The ratio of added value
  - Price competition
  - Margin between importers and retailers
  - Invoice currency, international goods market pricing…

The shock of Import prices on domestic prices



Cumlated inpulse response of PPI to IPI shock)/(Cumulated iinpulse response of IPI to IPI shock

The results:
From 0.05 to 0.16
Smaller than ERPT(FX to IPI)

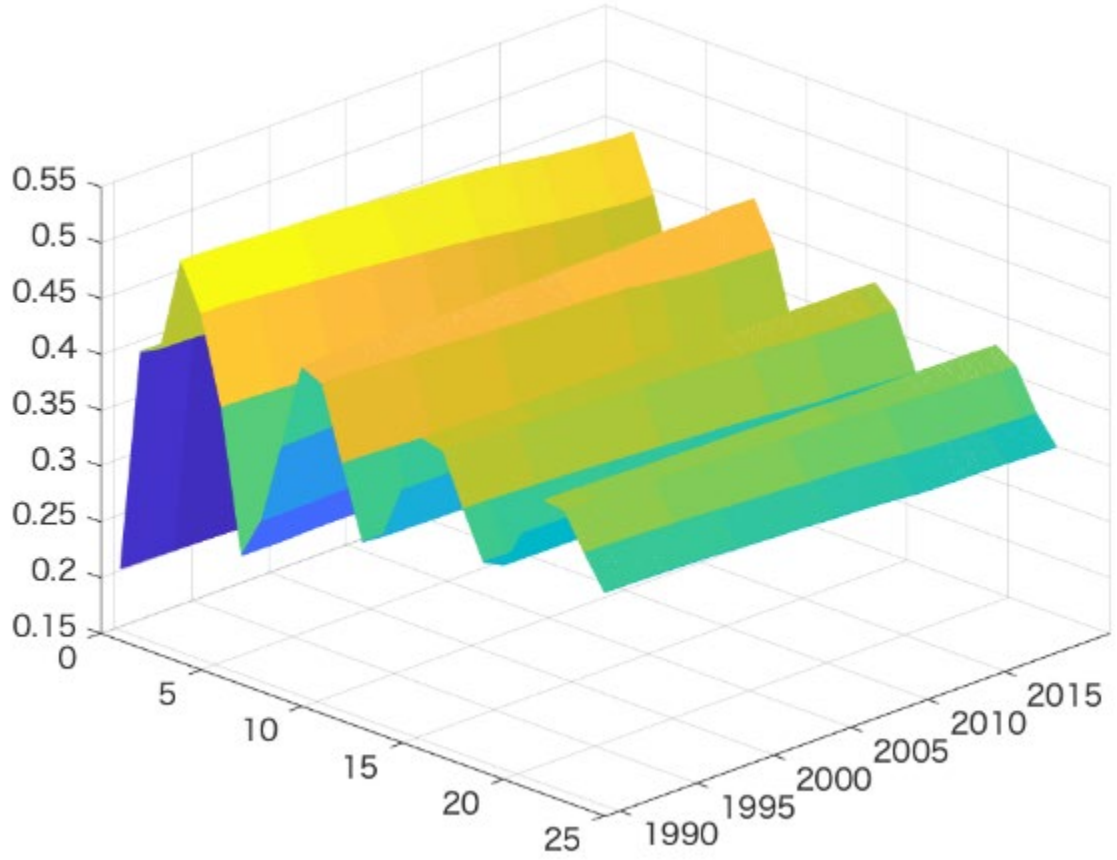


The shock of domestic price on core CPI

- Final goods: Automobiles etc.

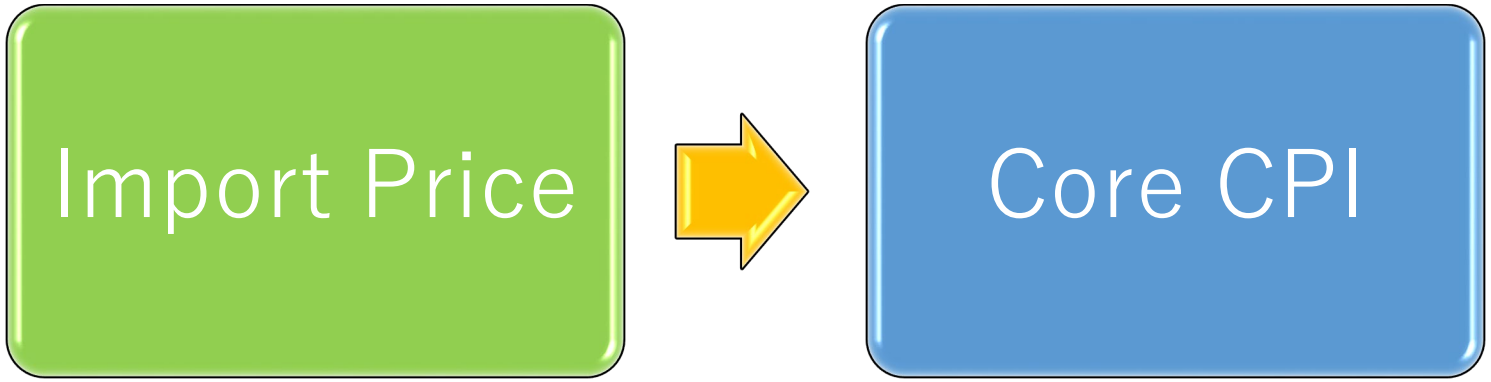
- Fators
  - Core CPI: 50% Services 50% goods
  - Services price depends heavily on wages
  - Part of goods reflect the import price changes because of exchange rate changes
  - The margin between domestic price and retail price.
  - Invoice currency, international goods market pricing…

The shock of domestic prices on core CPI



Cumlated inpulse response of CPI to PPI shock)/(Cumulated iinpulse response of PPI to PPI shock

The results
From 0.2 to 0.5
Not getting higher

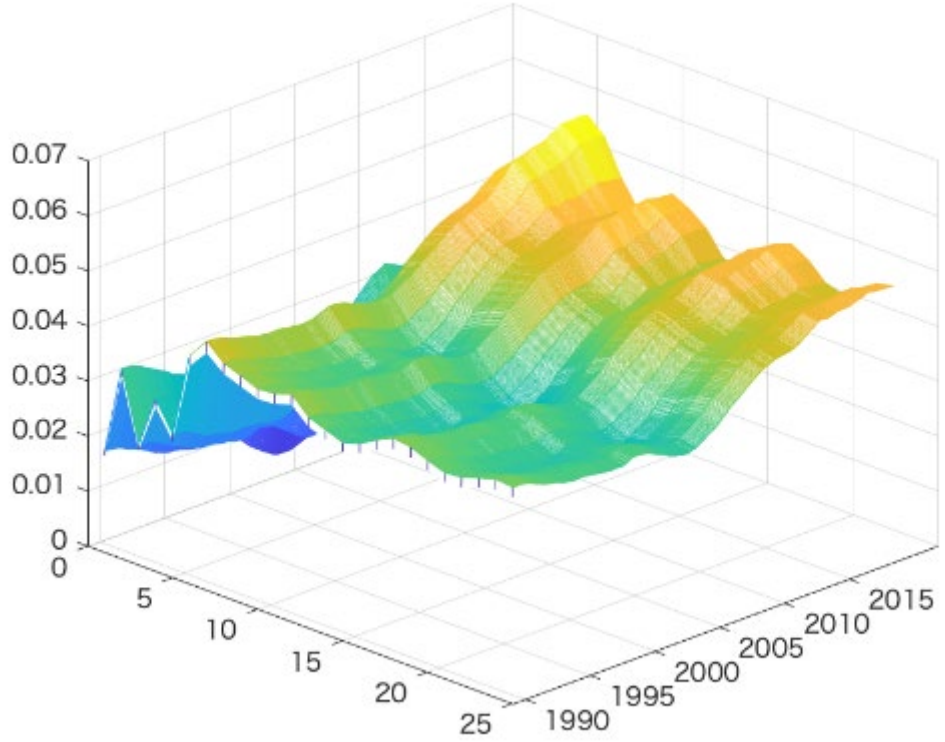


Import price shock on core CPI

- Imported final goods
  - The share of imported goods in core CPI: about 50%
  - Margin between imported goods and CPI(Yoshida and Sasaki's retail price analysis)
  - Invoice currency, international goods market pricing…

IPI => CPI

Accumulated response of CPI



Cumlated inpulse response of CPI to IPI shock (not devided by Cumulated iinpulse response of IPI to IPI shock)

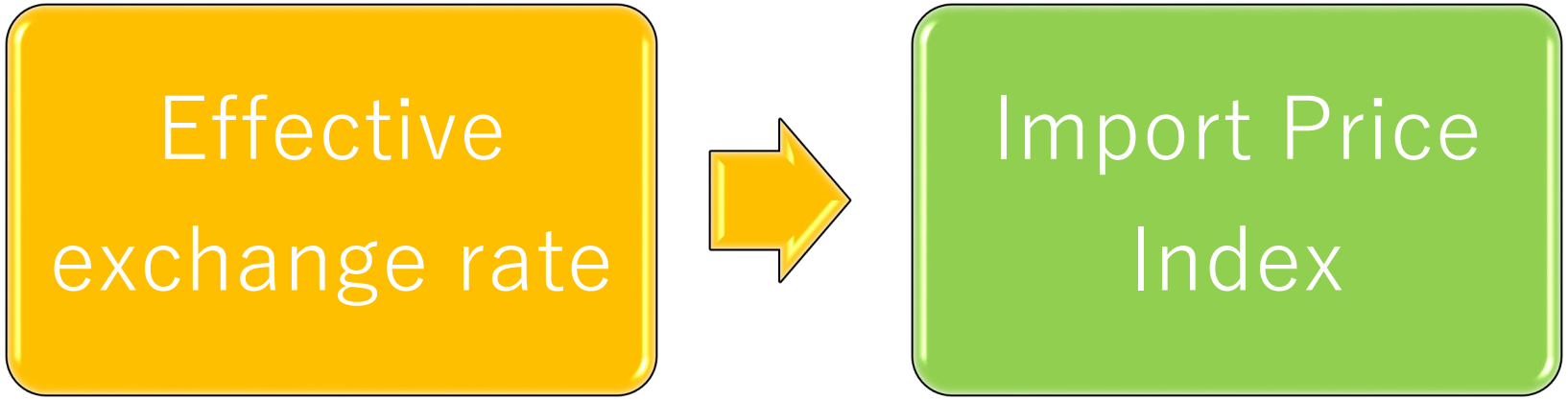
The results
From 0.02 to 0.05
Getting higher

Industry level analysis (I)

Industry ER,
Industry IPI,
General PPI,
Core CPI

Data (January 1988 – December 2017)

- **Industry level nominal effective exchange rate** (we made):
  Textiles, Lumber & wood products and forest products
  Chemicals & related products, Electric & electronic products
- **Import Price Index (yen basis, from BOJ)**:
  Textiles, Lumber & wood products and forest products
  Chemicals & related products, Electric & electronic products
- (General) Producer Price Index (from BOJ)
- CPI (all items, less fresh food, from MIC)



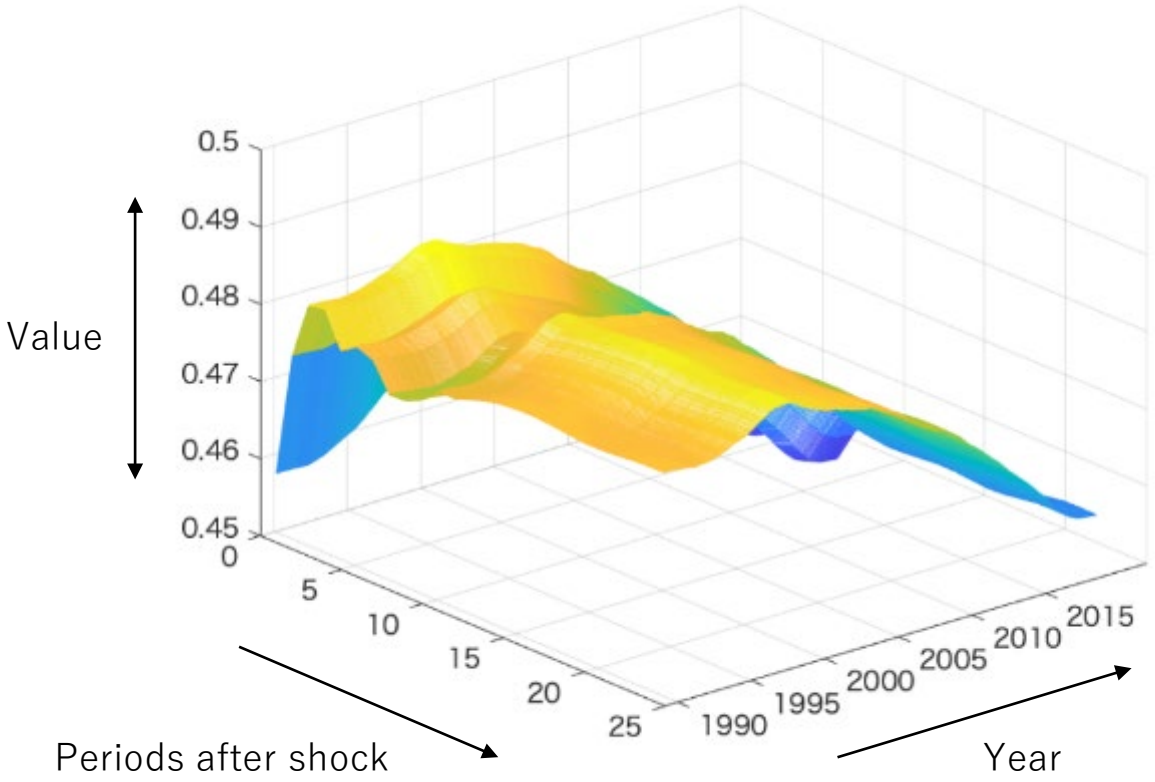
- ERPT on Import Price

- Factors
  - Industry
  - Source country
  - Currency denominated
  - Priced in international commodity market …

TVP-VAR (ER⇒IPI)

Exchange rate: Textile

Evolution of the pass-through rate from the exchange rate to IPI

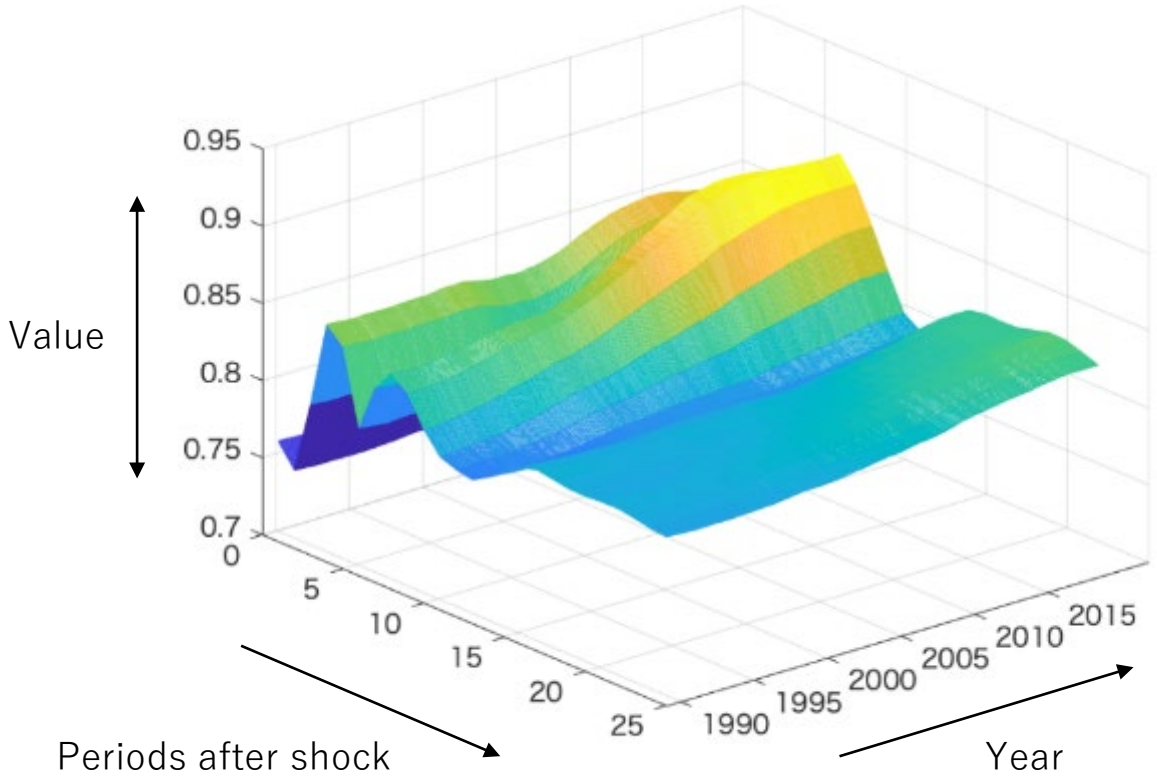


Pass-through rate of textiles has declined since 2000.

TVP-VAR (ER⇒ IPI)

Exchange rate: Woods・Woods products

Evolution of the pass-through rate from the exchange rate to IPI

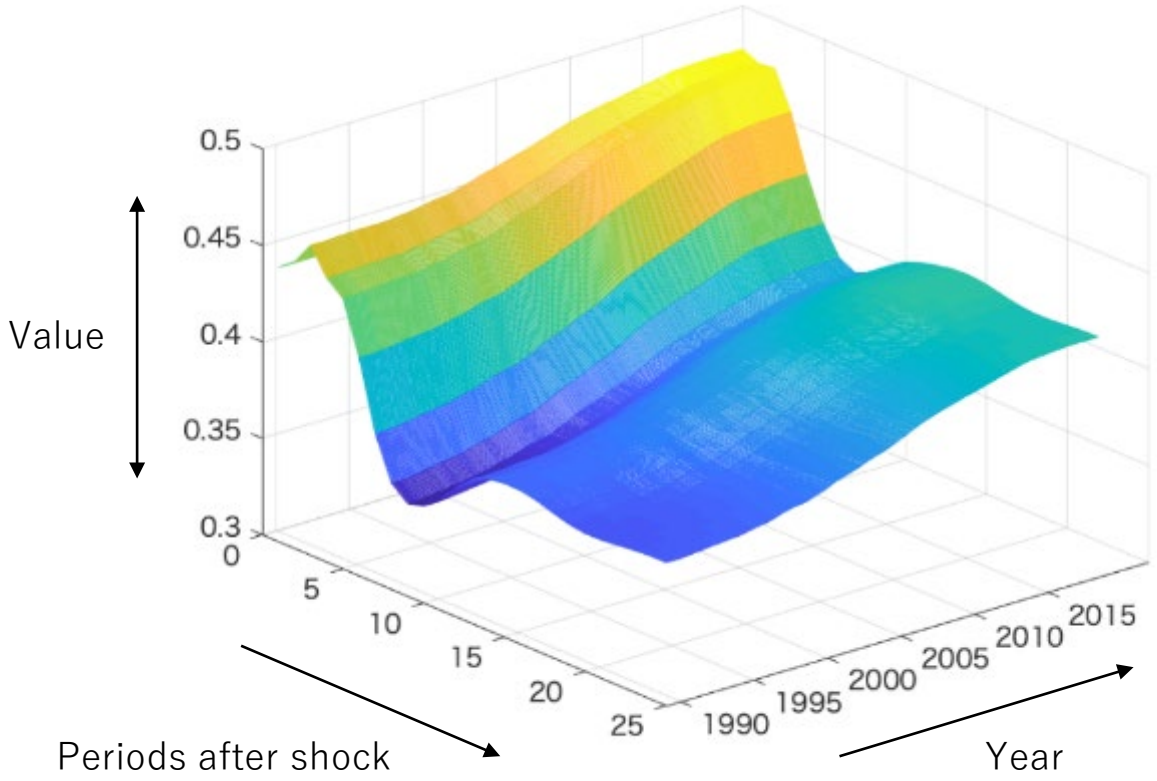


Pass-through rate of wood products has risen since 2000. In addition, the pass-through rate is higher than others.

TVP-VAR (ER⇒ IPI)

Exchange rate: Chemical Poducts

Evolution of the pass-through rate from the exchange rate to IPI

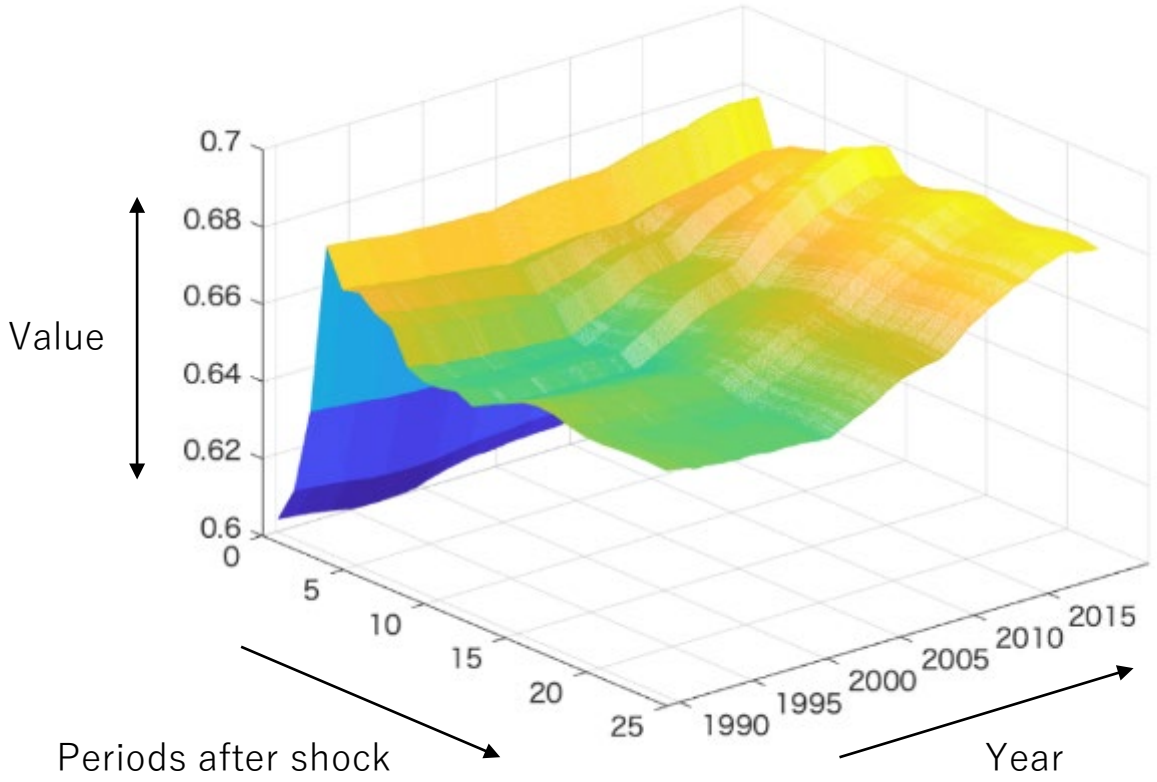


Pass-through rate of chemicals products has risen since 2000.

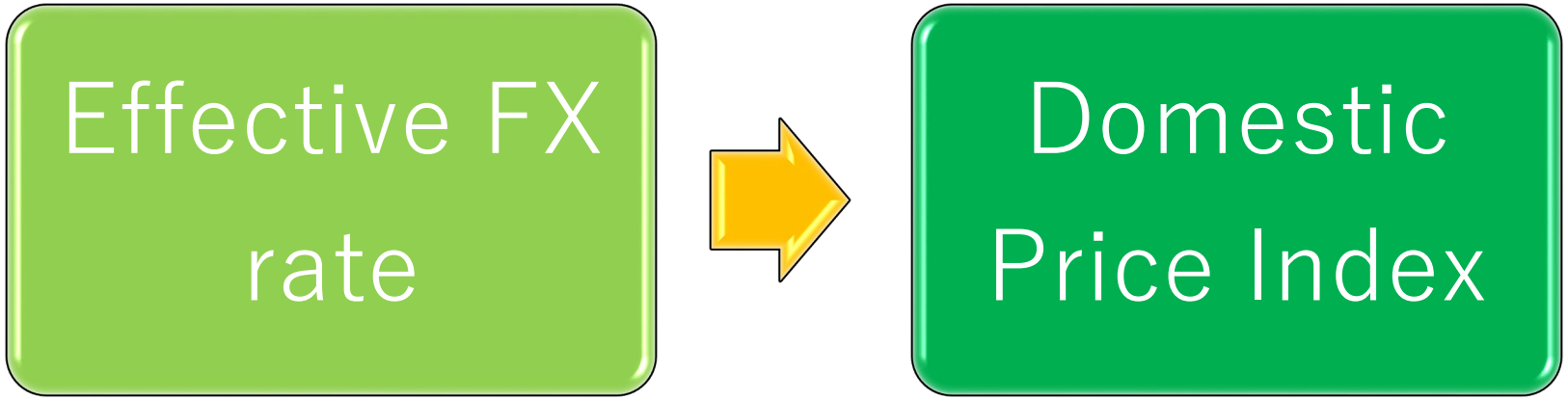
TVP-VAR (ER⇒ IPI)

Exchange rate: Electronics・Electronics products

Evolution of the pass-through rate from the exchange rate to IPI



Pass-through rate of electric products has risen since 2000.



- Raw materials:

  Crude Oil > Gasoline,

  Wood >Wood products

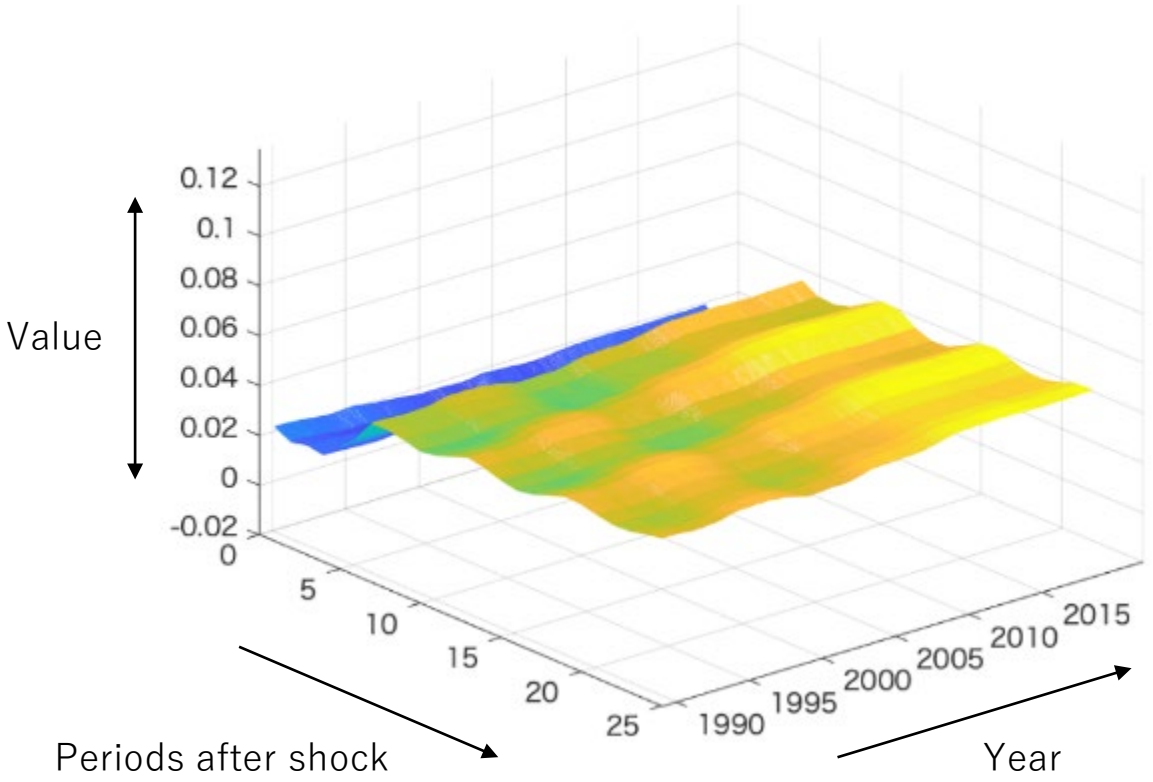
Intermediate goods: Steel plates > Cars

- The factors that affect the degree of the exchange rate Pass through are…
  -
  - Competitors' import price
  - Share of import intermediate goods
  - Ratio of domestic added value

TVP-VAR (ER⇒ PPI)

Industry:繊維品

Evolution of the pass-through rate from the exchange rate to PPI

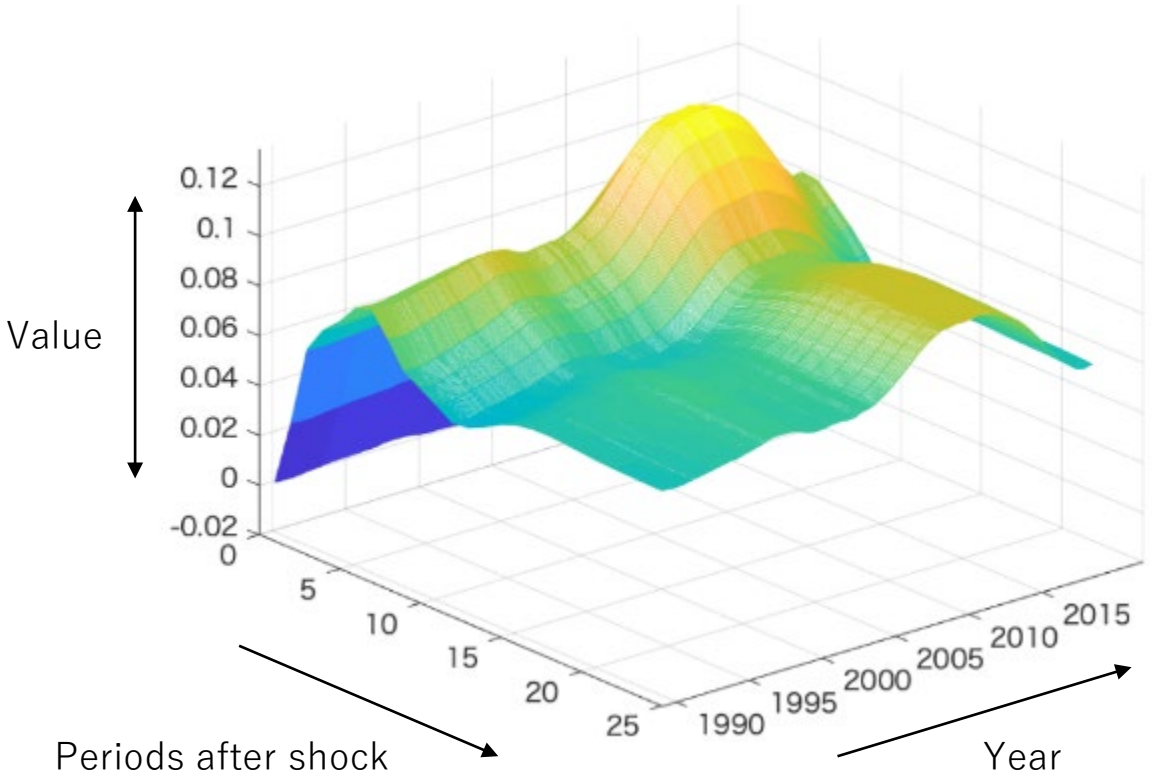


Although it cannot confirm a noticeable trend, there is a slight upward trend.

TVP-VAR (ER⇒ PPI)

Industry:木材・木製品・林産物

Evolution of the pass-through rate from the exchange rate to PPI

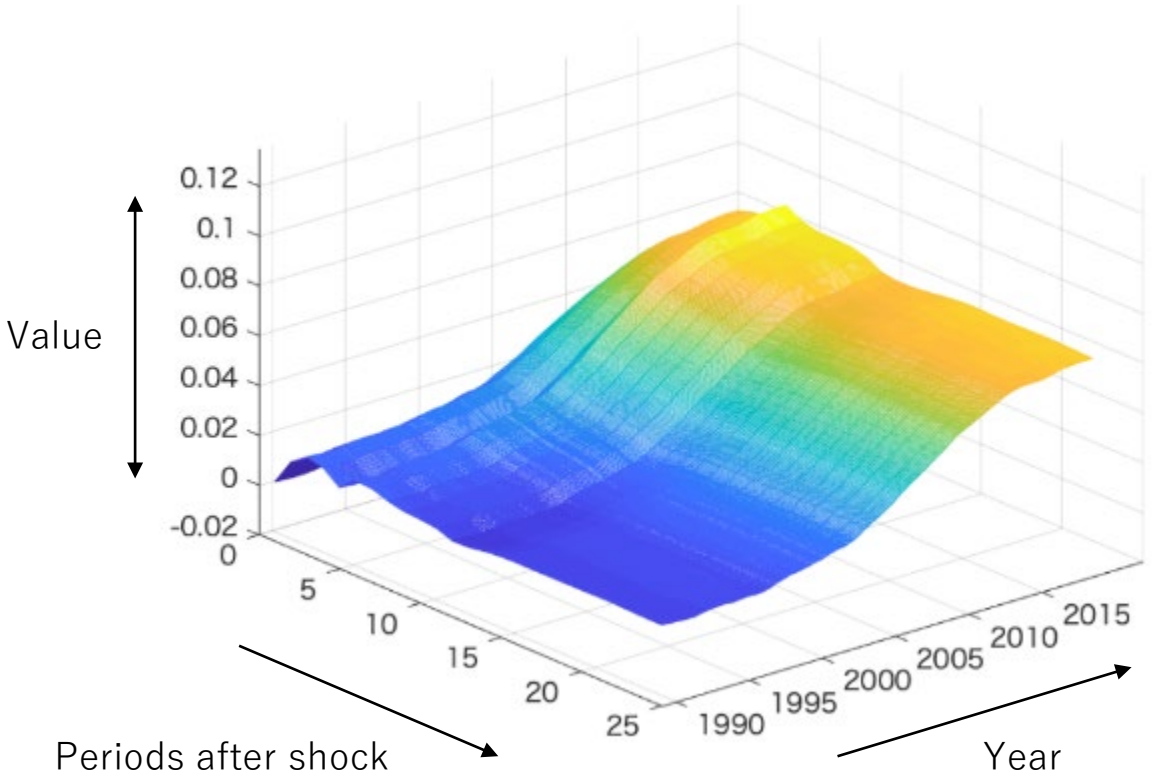


Although it had been rising since 2000, it has declined from around Bankruptcy of Lehman Brothers.

TVP-VAR (ER⇒ PPI)

Industry:化学製品

Evolution of the pass-through rate from the exchange rate to PPI

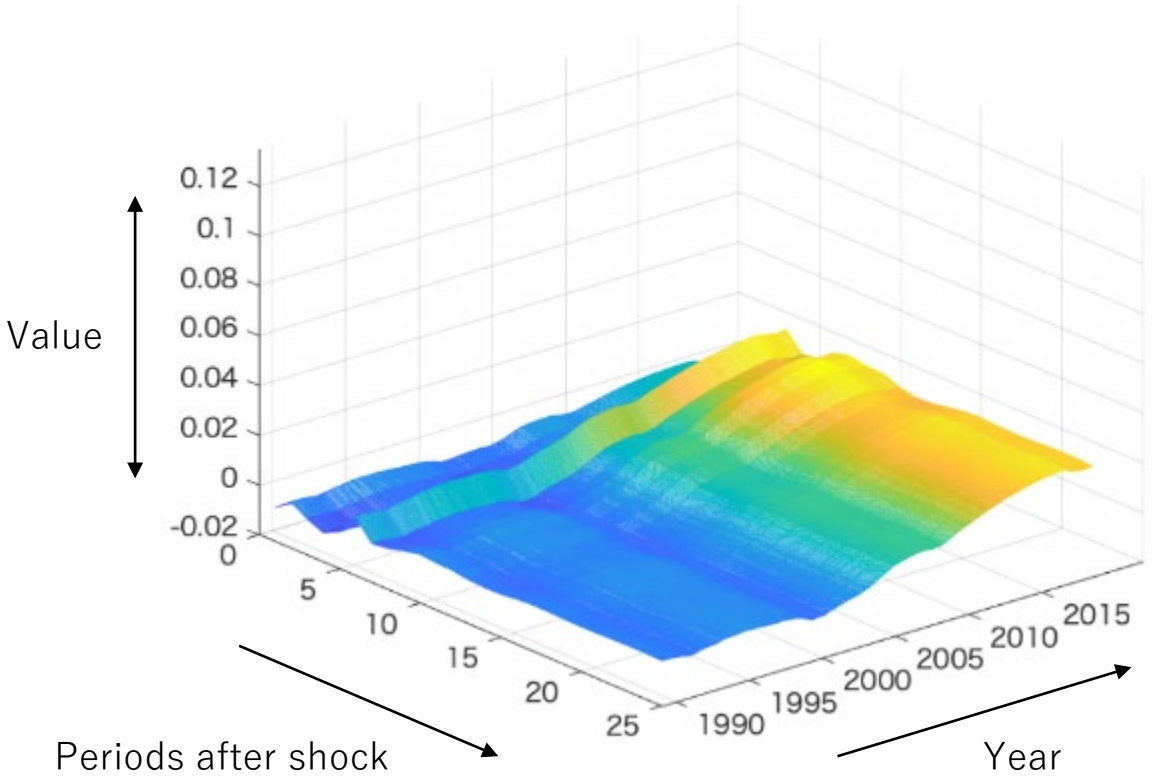


Pass-through rate has been rising since around 2000.

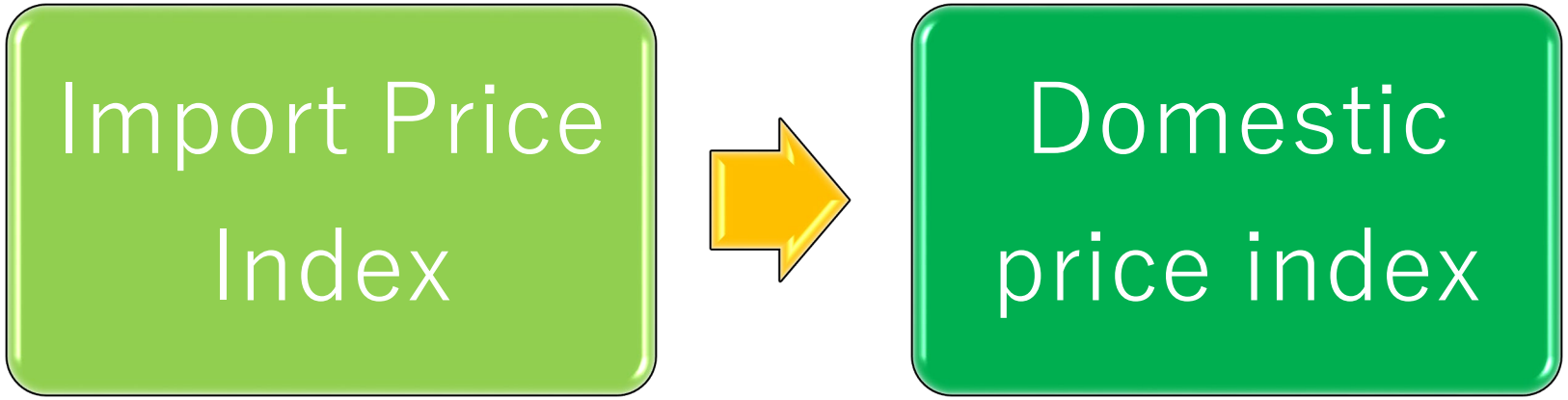
TVP-VAR (ER⇒ PPI)

Industry:Electronics

Evolution of the pass-through rate from the exchange rate to PPI



Pass-through rate has been slightly rising since 2000. In addition, the value is the smallest as compared with others.



Intermediate goods: Steel plates > Cars

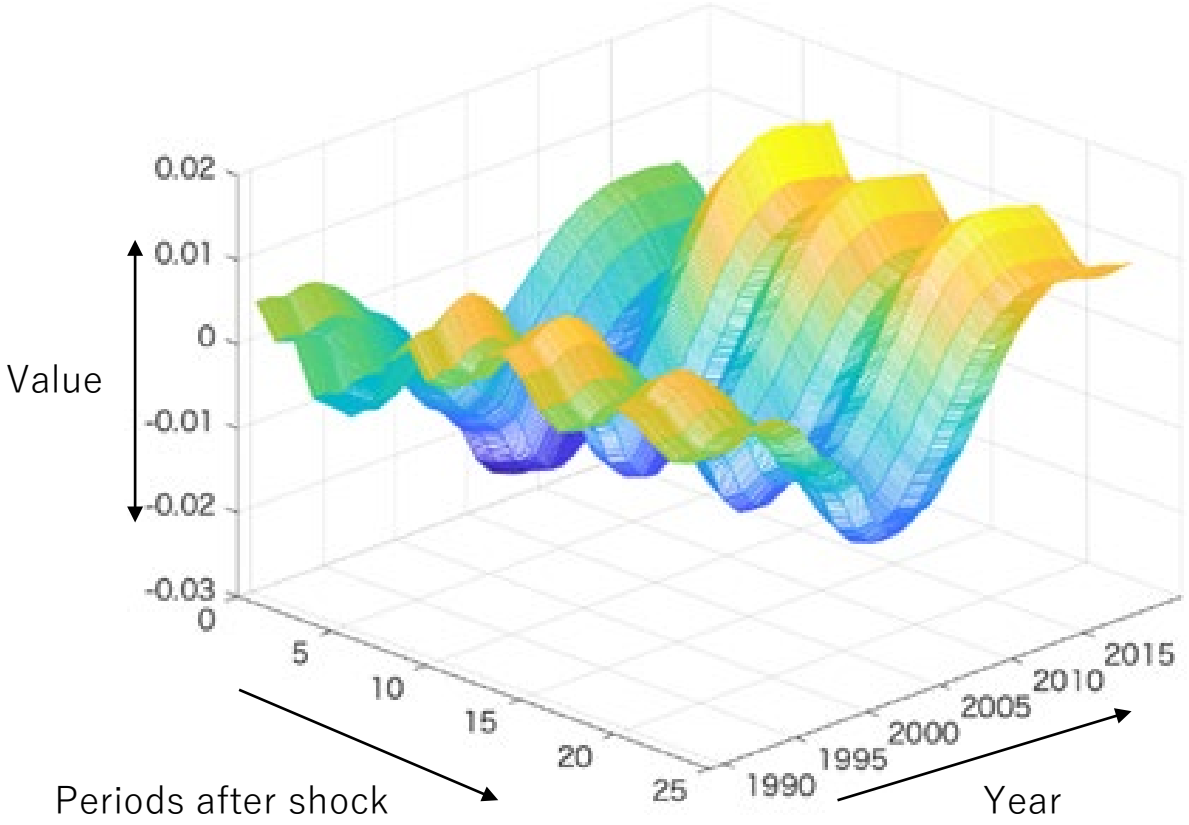
Imported final goods>domestic goods

- The factors that affect the degree of the exchange rate Pass through are…
  -
  - Competitors' import price
  - Share of import intermediate goods
  - Ratio of domestic added value

TVP-VAR (IPI⇒ PPI)

Industry: Textile

Evolution of the pass-through rate from IPI to PPI



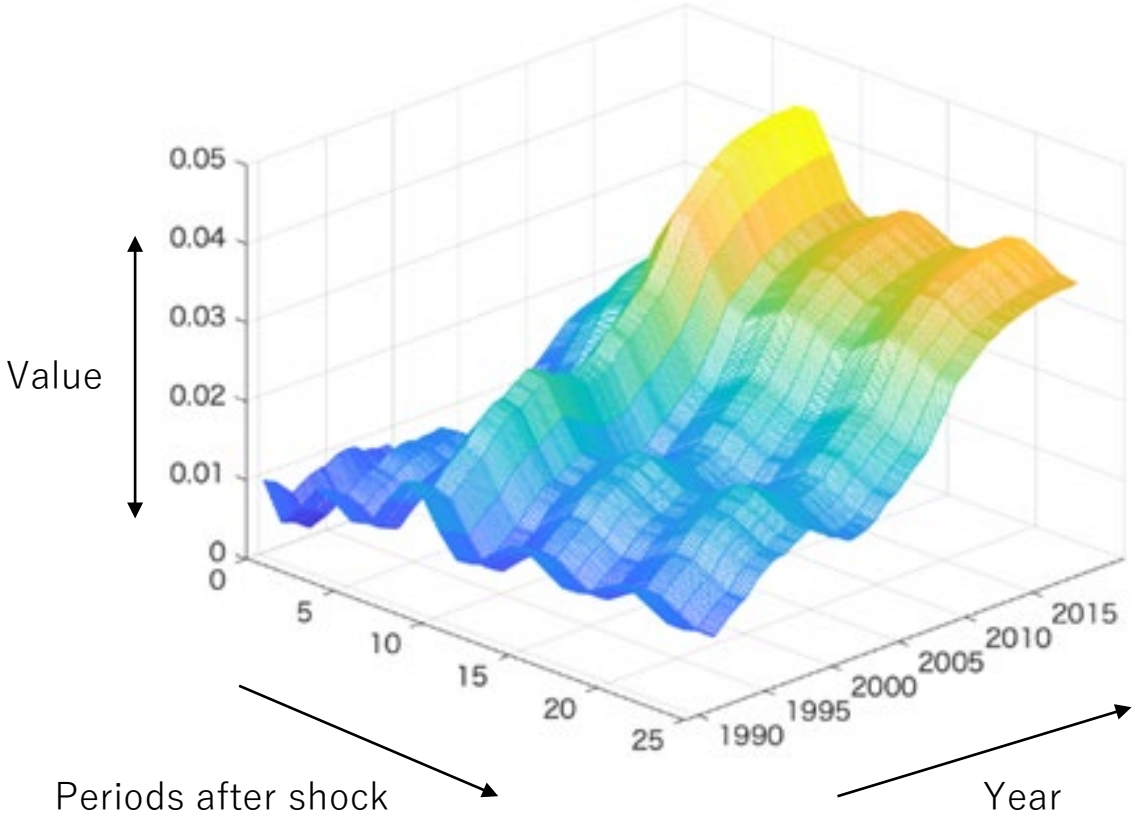
Pass-through from IPI to PPI:

0.00 – 0.02

TVP-VAR (IPI⇒ PPI)

Woods, Woods products

Evolution of the pass-through rate from IPI to PPI



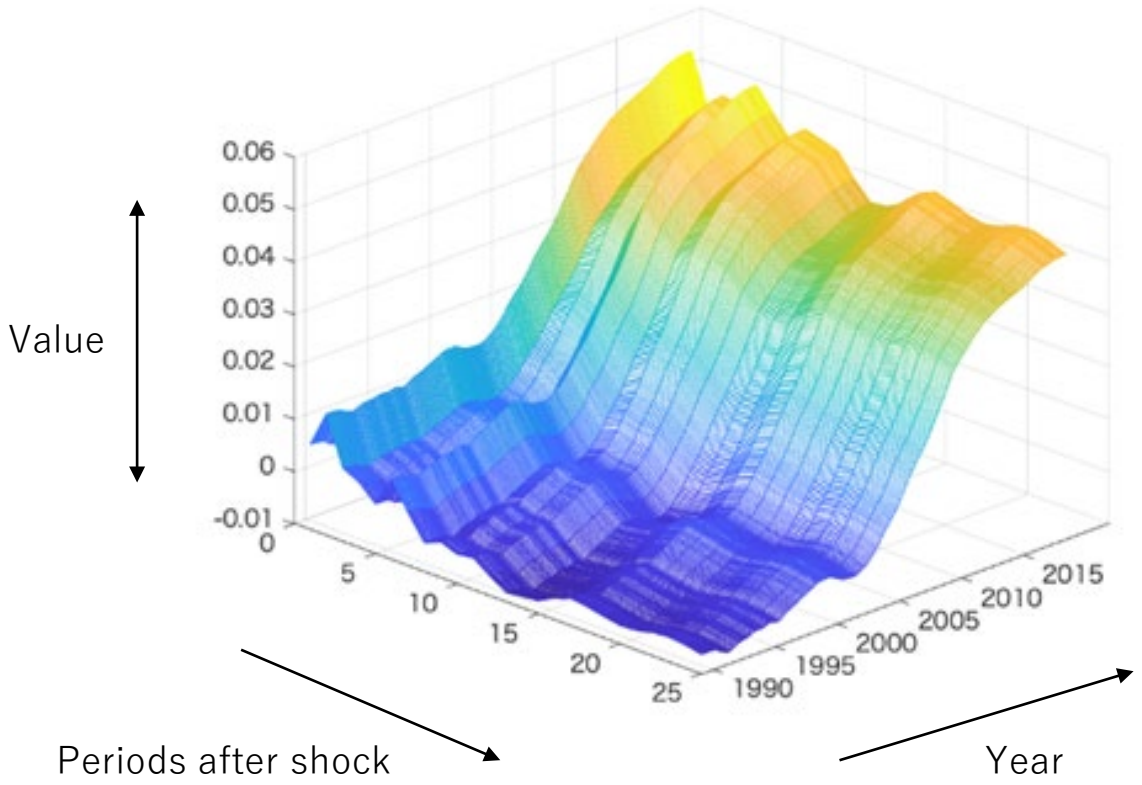
Pass-through from IPI to PPI:

0.01 – 0.04

TVP-VAR (IPI⇒ PPI)

Chemical Products

Evolution of the pass-through rate from the exchange rate to PPI



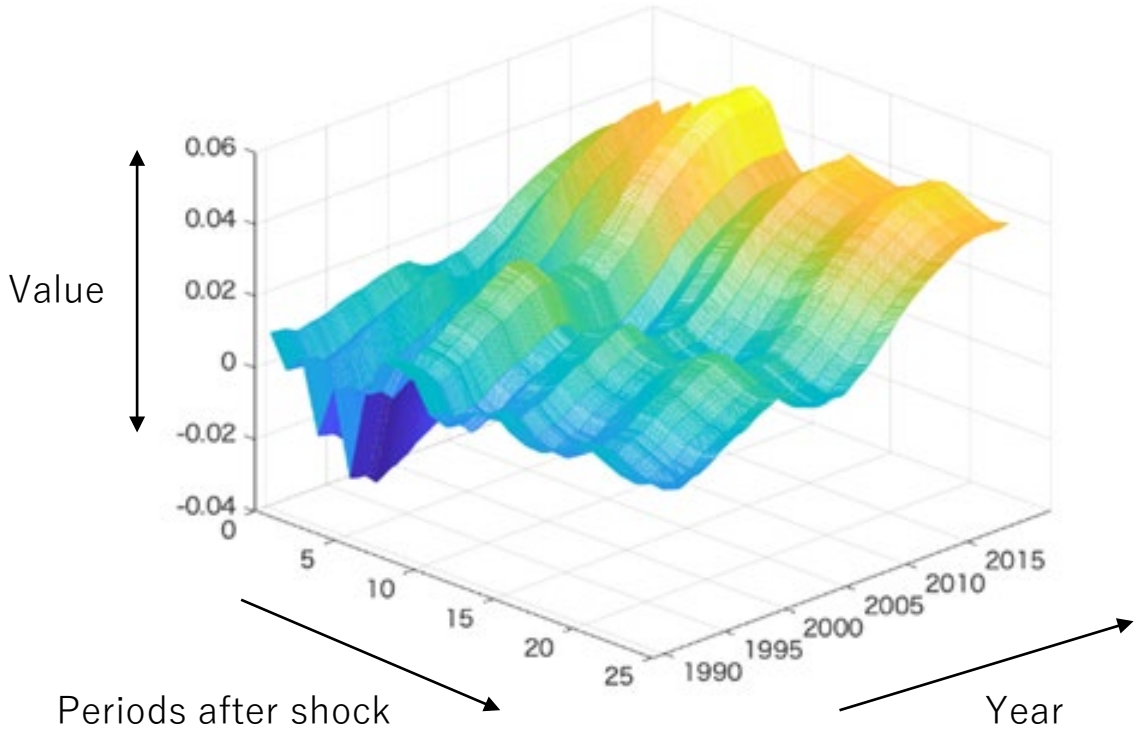
Pass-through from IPI to PPI:

0.00 – 0.06

TVP-VAR (IPI⇒ PPI)

Industry: Electronics Electronic products

Evolution of the pass-through rate from IPI to PPI



Pass-through from IPI to PPI:

-0.02 – 0.04

Industry level analysis (II)

Industry ER,
Industry IPI,
Industry PPI,
Core CPI

Data (January 1988 – December 2017)

- **Industry level nominal effective exchange rate** (we made):
- **Industry Level Import Price Index (yen basis, from BOJ)**:
- **Industry Level Producer Price Index (from BOJ)**
  Textiles, Lumber & wood products and forest products
  Chemicals & related products, Electric & electronic products
- CPI (all items, less fresh food, from MIC)

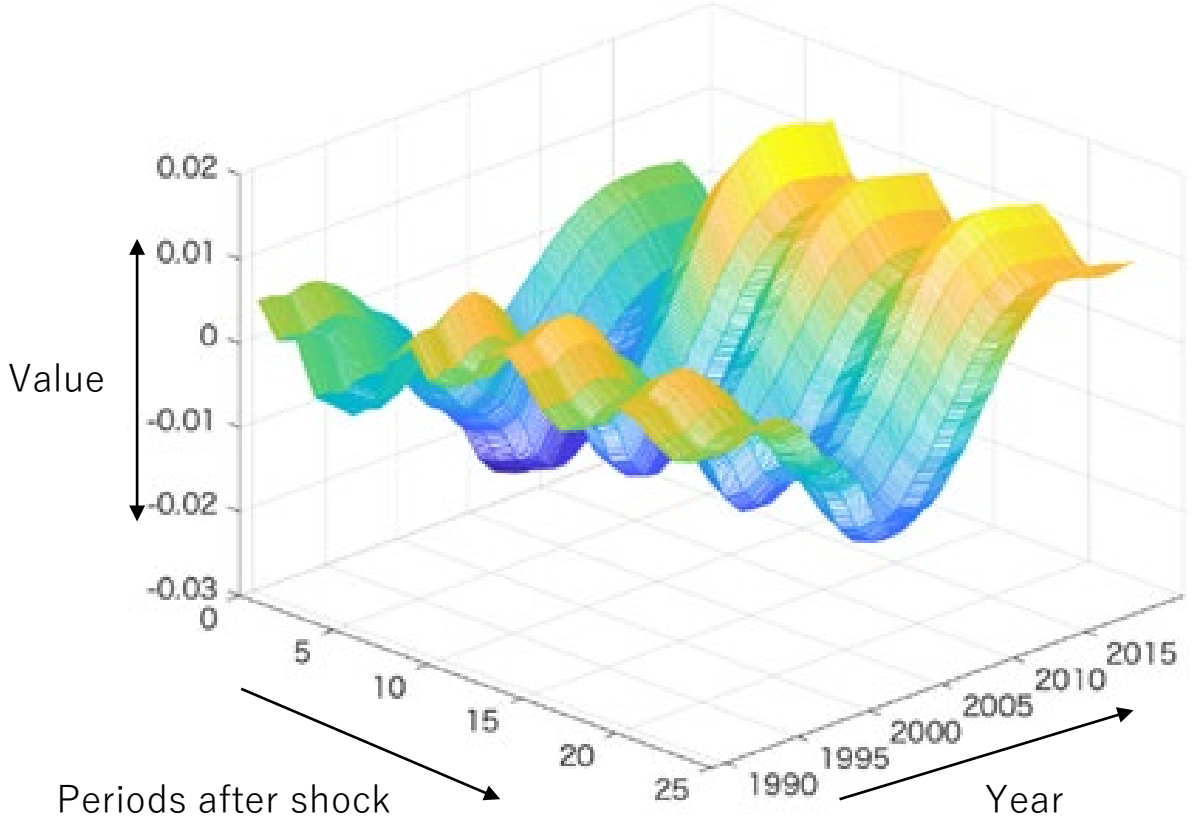
TVP-VAR (Industrial IPI⇒ Industrial PPI)

Industry: Texitile

Evolution of the pass-through rate from IPI to PPI

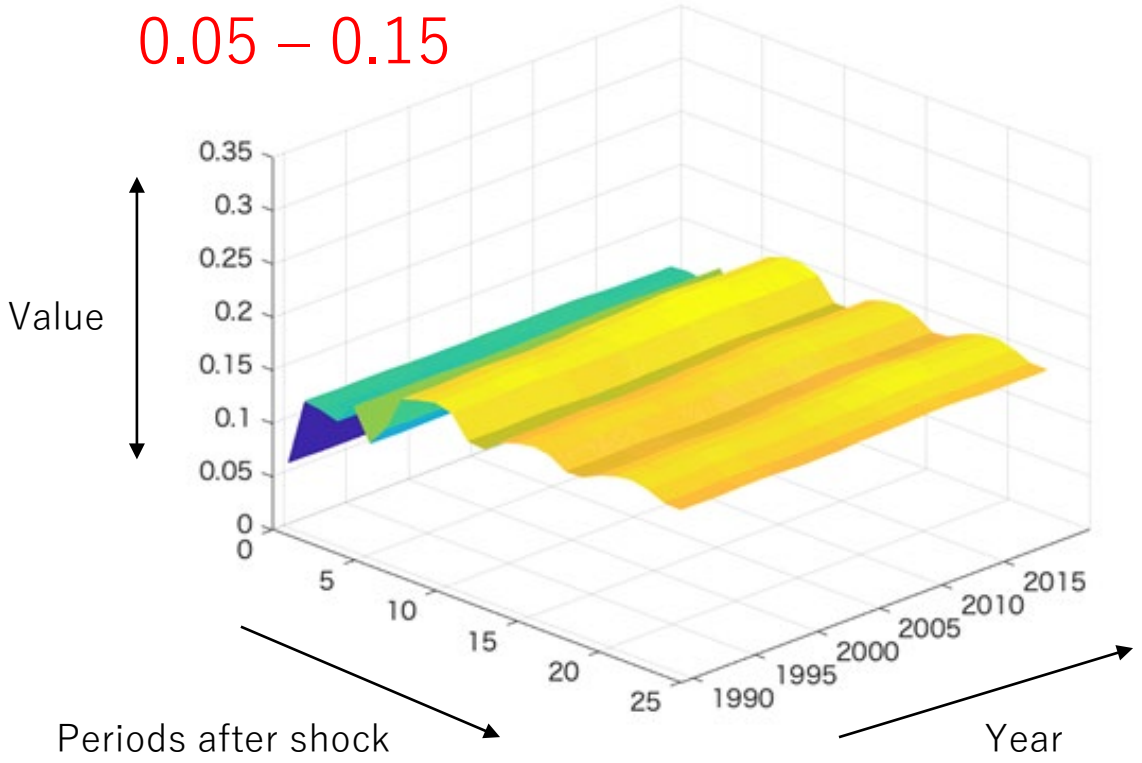
Pass through: Industry別IPI ⇒ 総平均 PPI

0.00 – 0.02



Pass through: Industry別IPI ⇒ Industry別PPI

0.05 – 0.15

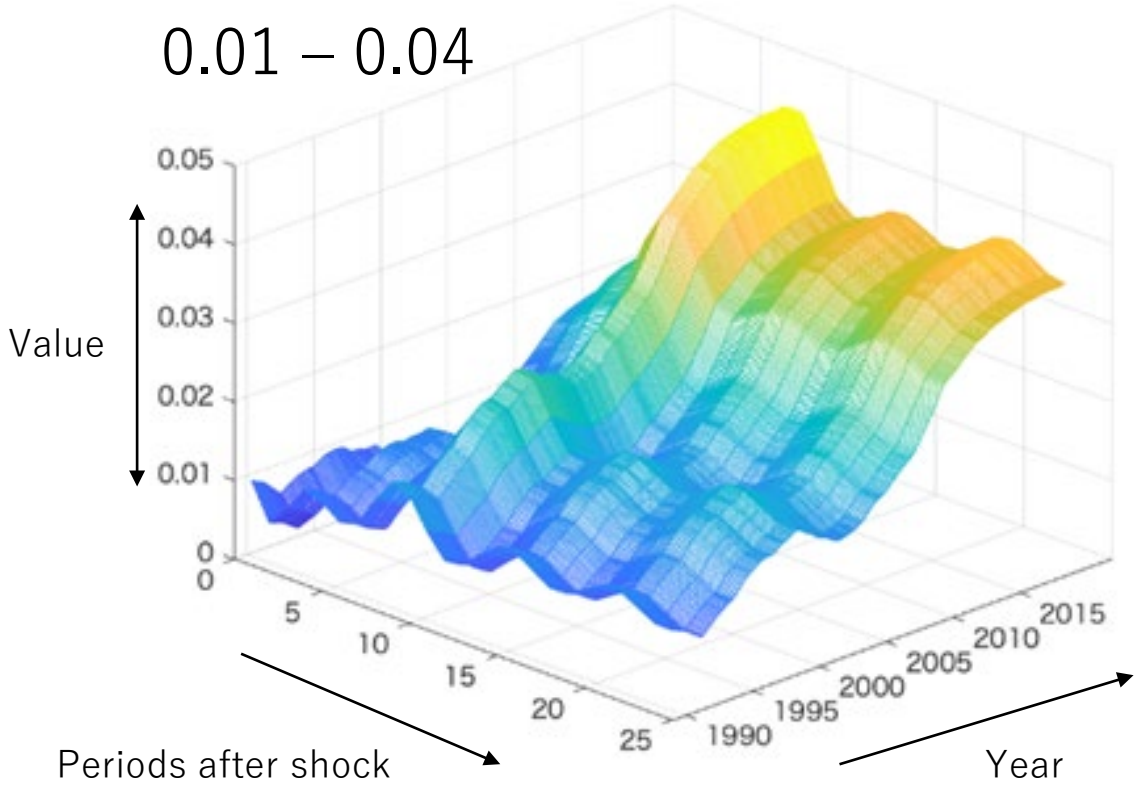


TVP-VAR (Industry別 IPI⇒ Industry別 PPI)

Industry:Woods, Wood products Evolution of the pass-through rate from IPI to PPI

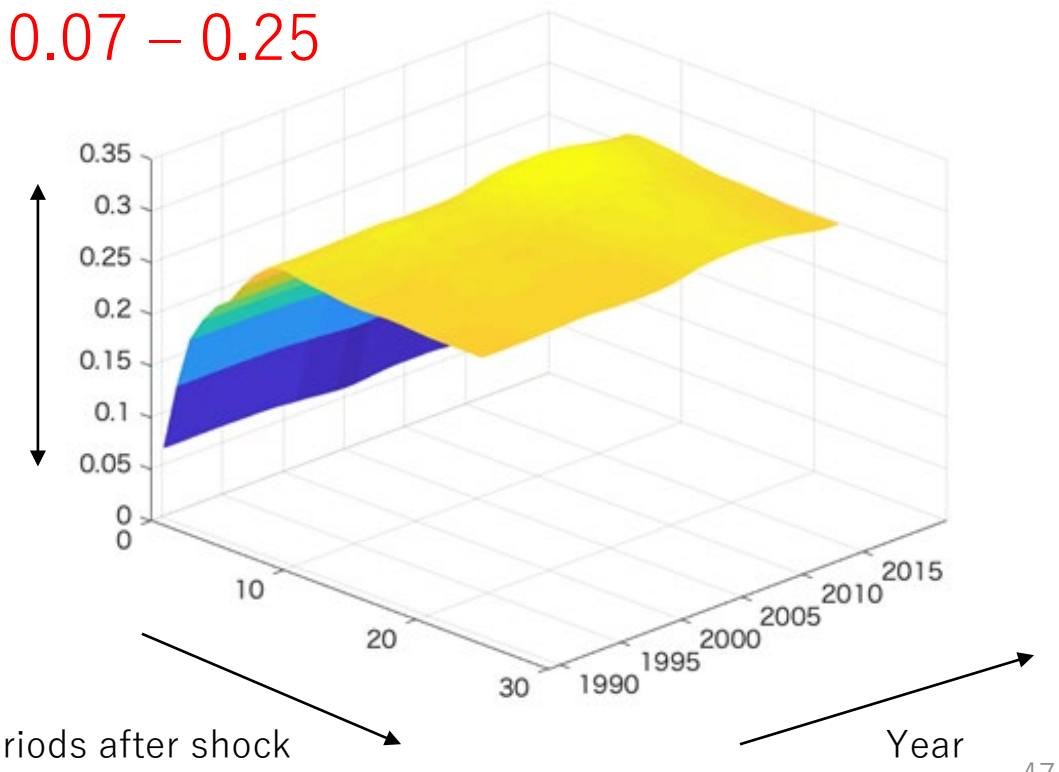
Pass through: Industry別IPI ⇒ 総平均 PPI

0.01 – 0.04



Pass through: Industry別IPI ⇒ Industry別 PPI

0.07 – 0.25

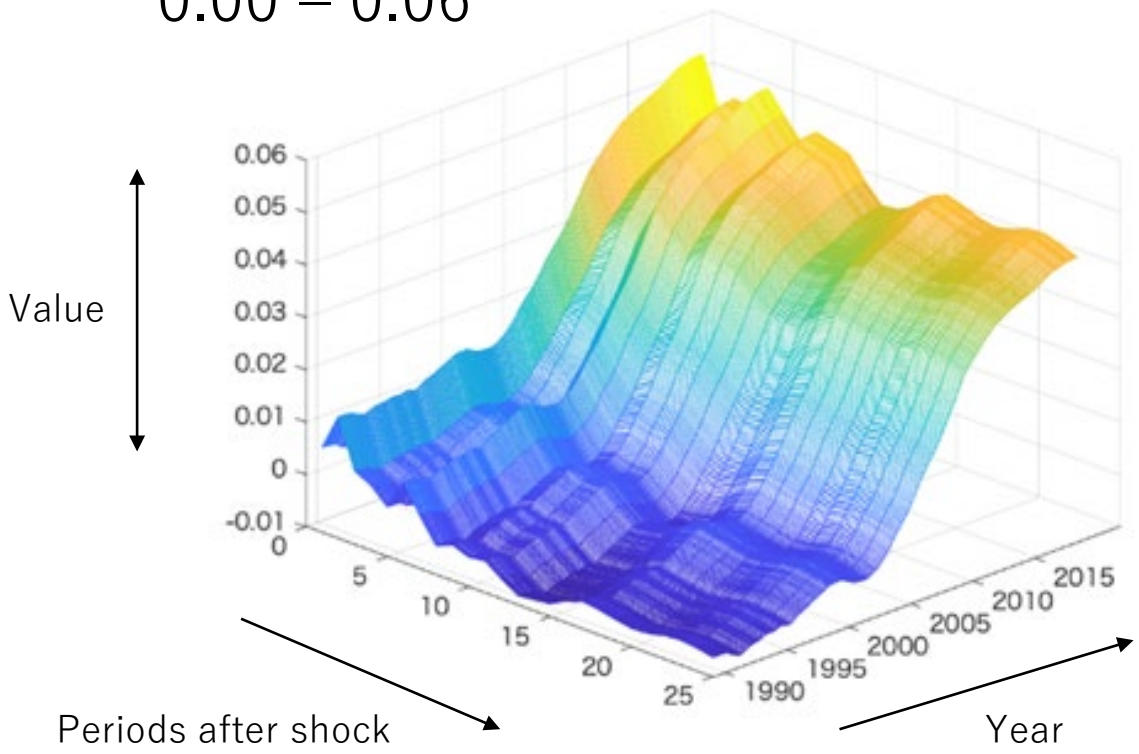


TVP-VAR (Industry別 IPI⇒ Industry別 PPI)

Industry:化学製品

Pass through: Industry別IPI ⇒ 総平均 PPI

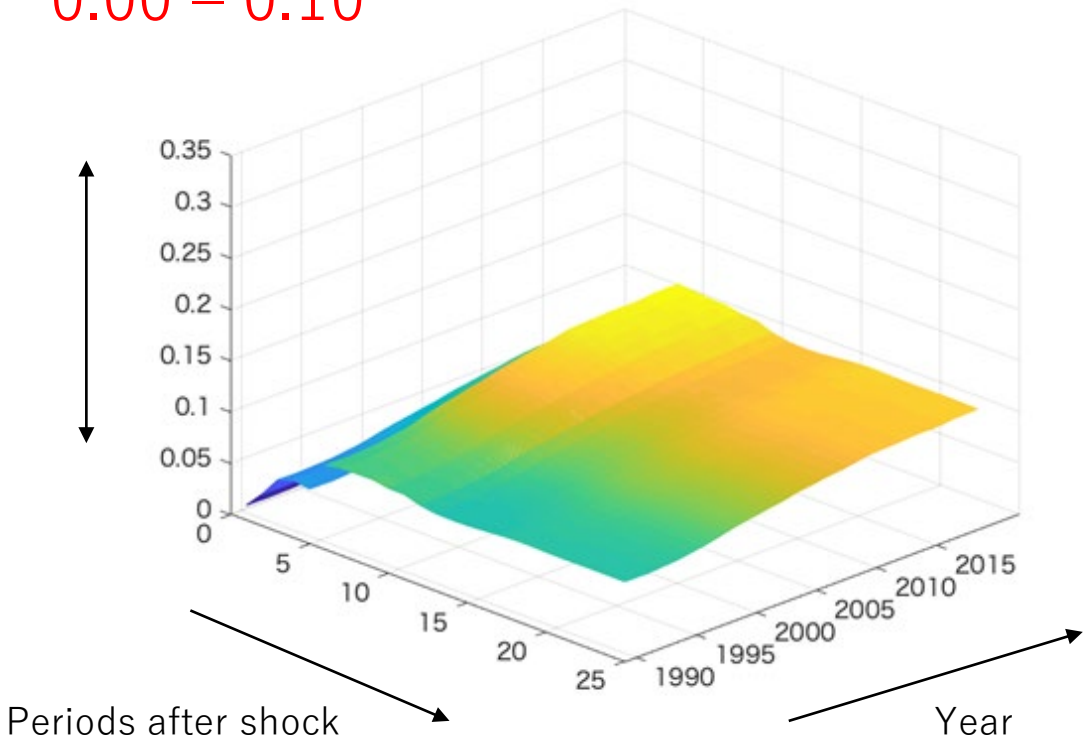
0.00 – 0.06



Evolution of the pass-through rate from IPI to PPI

Pass through: Industry別IPI ⇒ Industry別 PPI

0.00 – 0.10



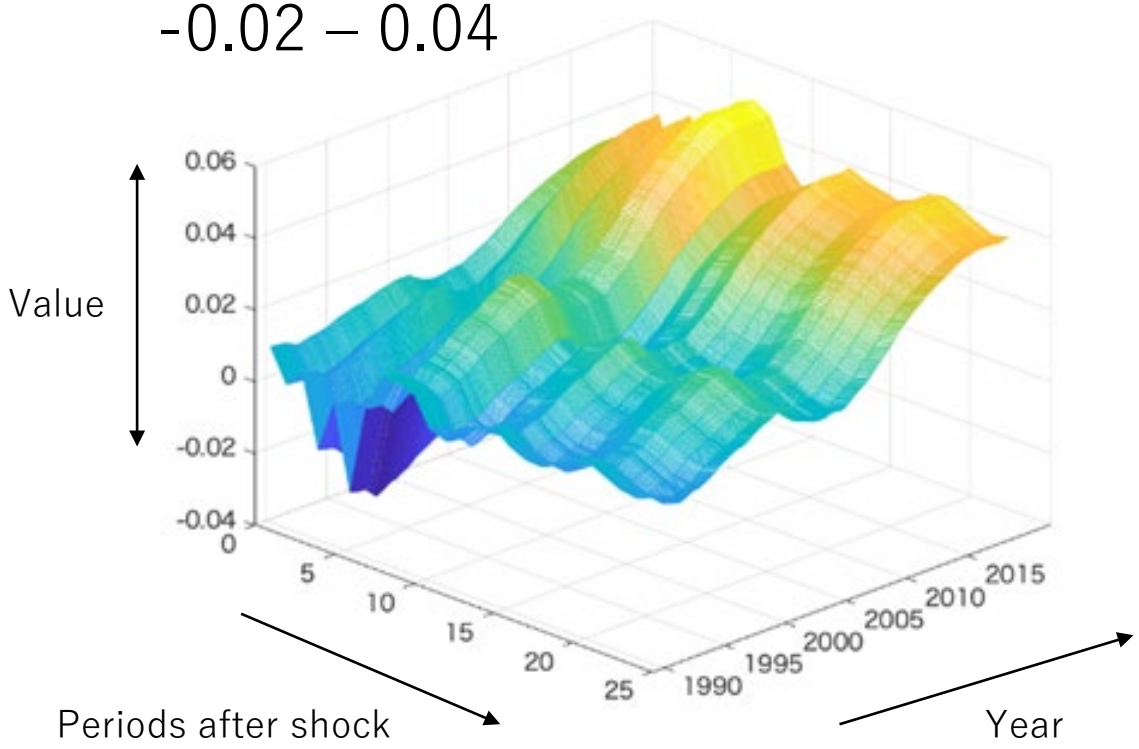
TVP-VAR (Industry別 IPI⇒ Industry別 PPI)

Industry: Electronics

Evolution of the pass-through rate from IPI to PPI

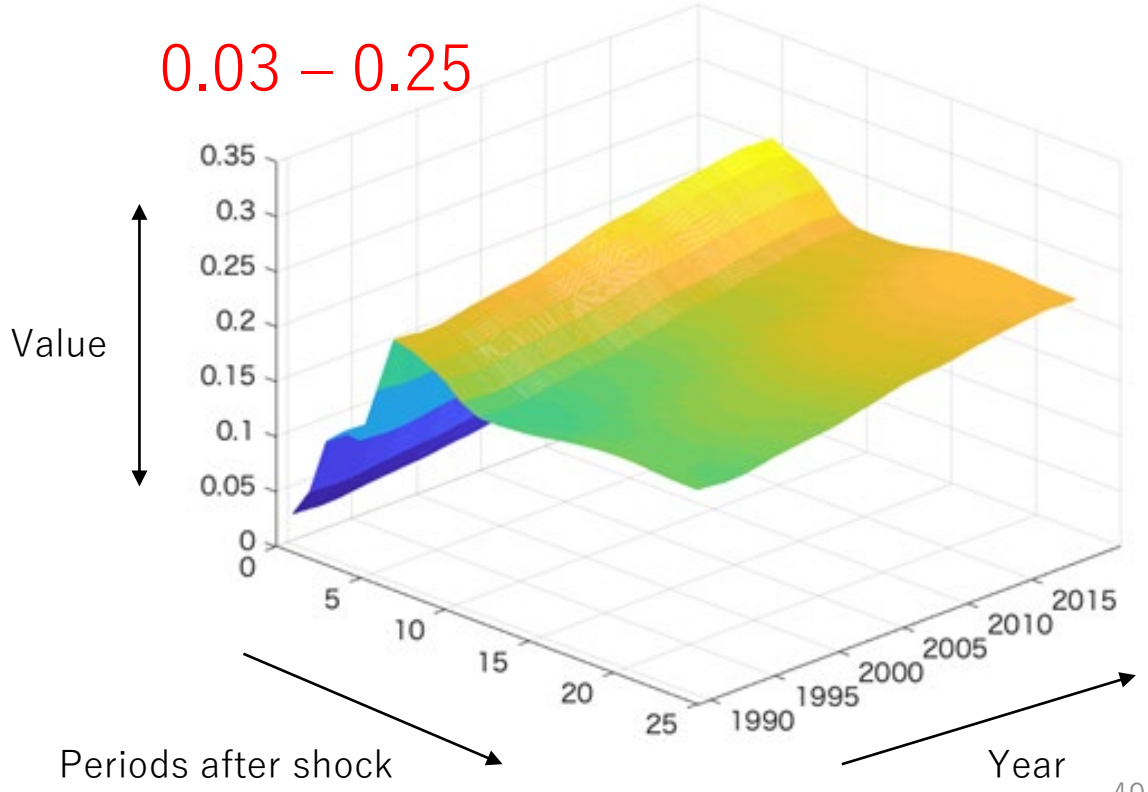
Pass through: Industry別IPI ⇒ 総平均 PPI

-0.02 – 0.04



Pass through: Industry別IPI ⇒ Industry別 PPI

0.03 – 0.25



Conclusion

- The effect of yen depreciation on core CPI started to go up since around 2010 and became significant.
- The degree of the shock effect is very low, like 0.02 at most. However, the rate of yen huge depreciation from 2012 was over 50%. It should have raised inflation rate more than 1% (=0.02*50%.) It is not so small impact.
- Our results confirm the claim of Mishkin (2008) that exchange rate fluctuations matter, but we also find that the effect is a little.

Conclusion

- We find that the weakest link lies between import prices and domestic producer prices. However, the impact within each industry is not negligible; the small spillover effect to other industries at the producer price stage prevents consumer prices from increasing after the Japanese yen depreciates.

Implication

- We can't use depreciation of yen for the inflation target policy

  because

  - the exchange rate impact was significant and became bigger, but that was only one time effect and didn't last.
  - 50% depreciation raises inflation rate about 1%, but such depreciation rarely happens.
  - the most part of core CPI depends on domestic factors.
  - Importers often absorb depreciation shocks.