BANK OF JAPAN

Use of PPI time series of countries from which we import products/services as a proxy

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Introduction

✓ Motivations of using PPI of other countries are;

I) Partially, we use "PPI/EPI * exchange rate" of the exporter as an
    alternative way to gather reported import price from respondent for
    Import Price Index.
⇒A strong assumption that a product is traded at the same price for the
    domestic, foreign, and Japanese market

ii) We use PPI of the importer for Price Index of patent licensing services.
 ⇒Appropriate and efficient price index compilation

✓ Today, we introduce (ii) with case studies.

✓ We use our or other country's PPI as a proxy to compile the index of patent licensing services.

✓ A typical example of patent royalty formula is;
(a fixed amount plus) a percentage of sales achieved by the patent.

Price of patent licensing services =
*Unit price of product produced by the license * A rate of license usage*
(A) (B)

✓ We ask respondents to report only (B) and use PPI as a proxy for (A).
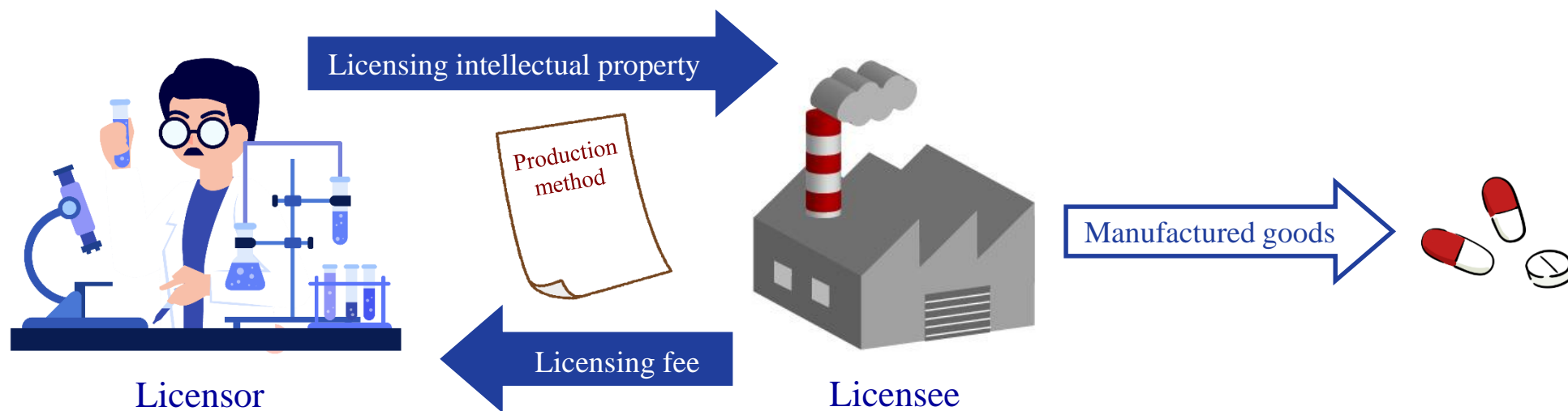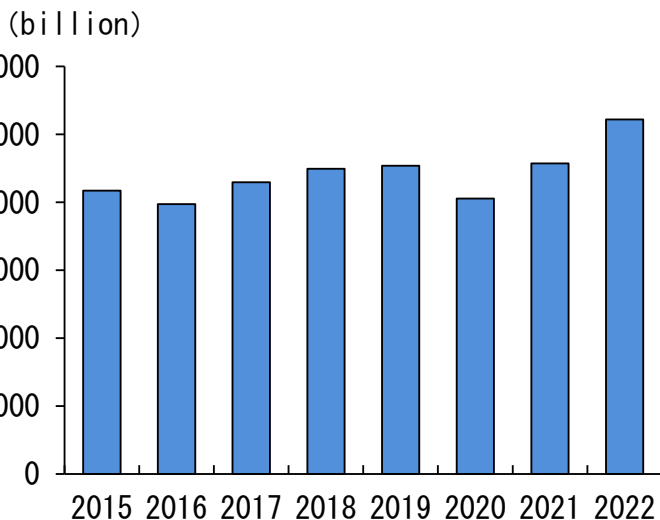
1. Intellectual Property

Definition - Patents

✓ "Patent licensing" is a service that permits other companies to use the company's patent rights and know-how.

✓ In export price, we surveyed transaction price in which a domestic company licenses the use of its patent rights to a foreign company (including intercompany transaction). Imports are the opposite.

Licensing intellectual property

Production method

Manufactured goods
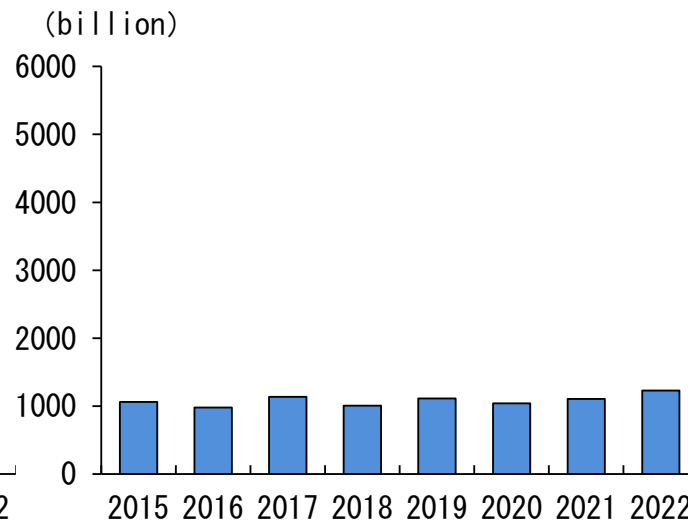
Licensing fee

Licensor

Licensee

Market size of patent rights

- ✓ Market size of patent rights has increased due to the expansion of global supply chains.
- ✓ Japan has a particularly large export value of patent rights.
  e.g.) Licensing of patents by automakers to their own overseas plants
- ✓ In 2015, BOJ started the survey of import/export price index of patent rights ahead of domestic price index.
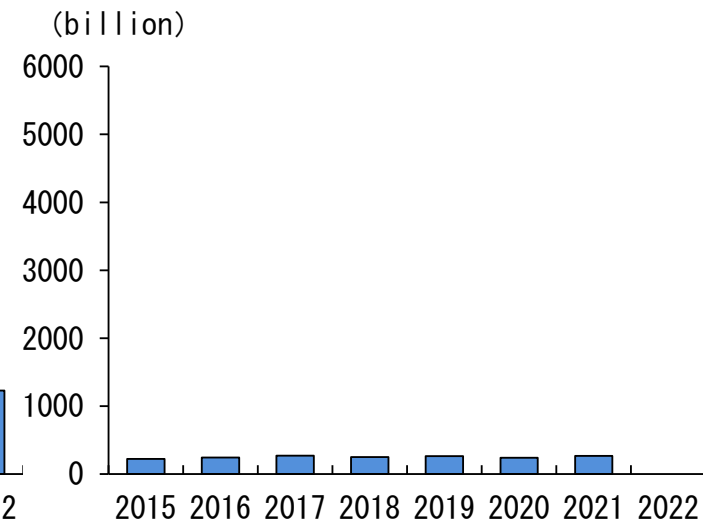
▽Export Trade

(billion)

▽Import Trade
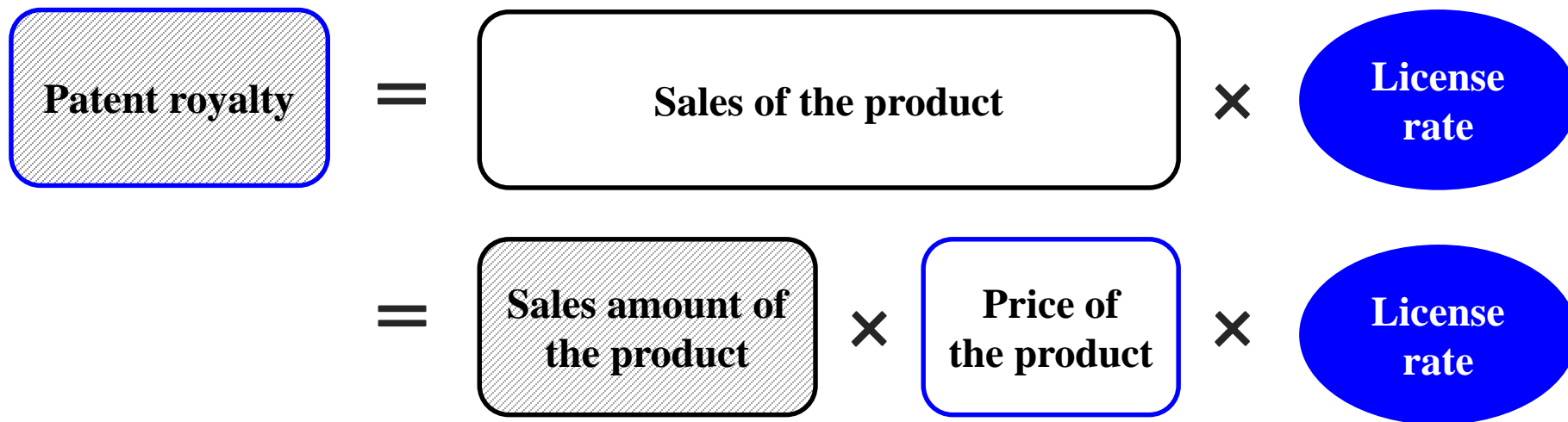
(billion)

▽Domestic Trade
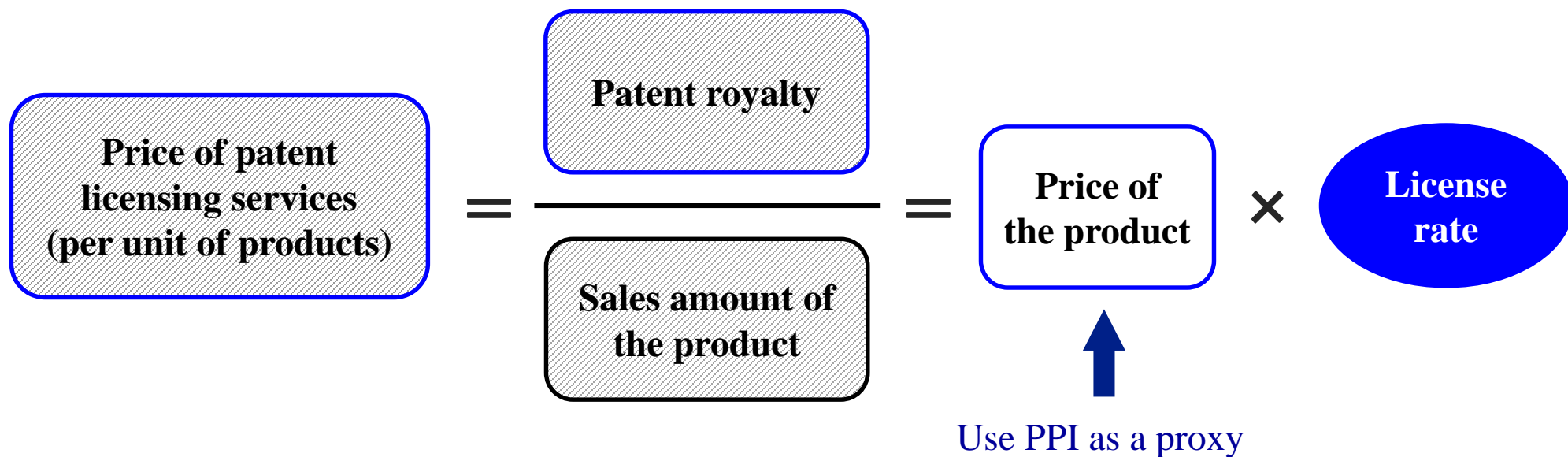
(billion)

2. Price Mechanism

Price Mechanism

✓ A price of patent licensing services is defined as "a price of licensing services per unit of products produced using the licensed patent rights".
⇒In principle, the real value of patent licensing services is proportional to the real supply of products produced using patent rights.
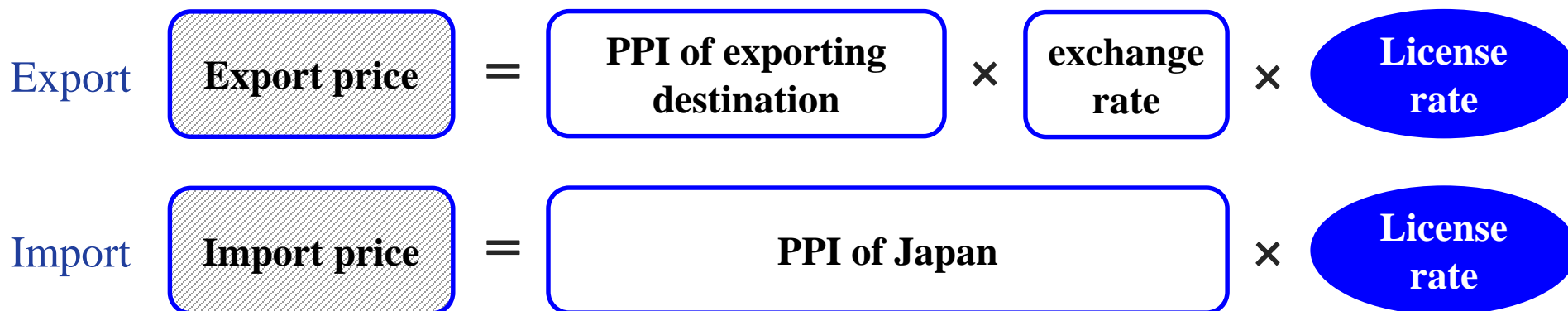
| Patent royalty | = | Sales of the product | × | License rate |

| | = | Sales amount of the product | × | Price of the product | × | License rate |

✓ In practice, a price of patent licensing services is calculated by multiplying the license rate (reported from respondents) by PPI corresponding to the product produced using patent rights.

Price of patent licensing services (per unit of products) = $\dfrac{\text{Patent royalty}}{\text{Sales amount of the product}}$ = Price of the product × License rate
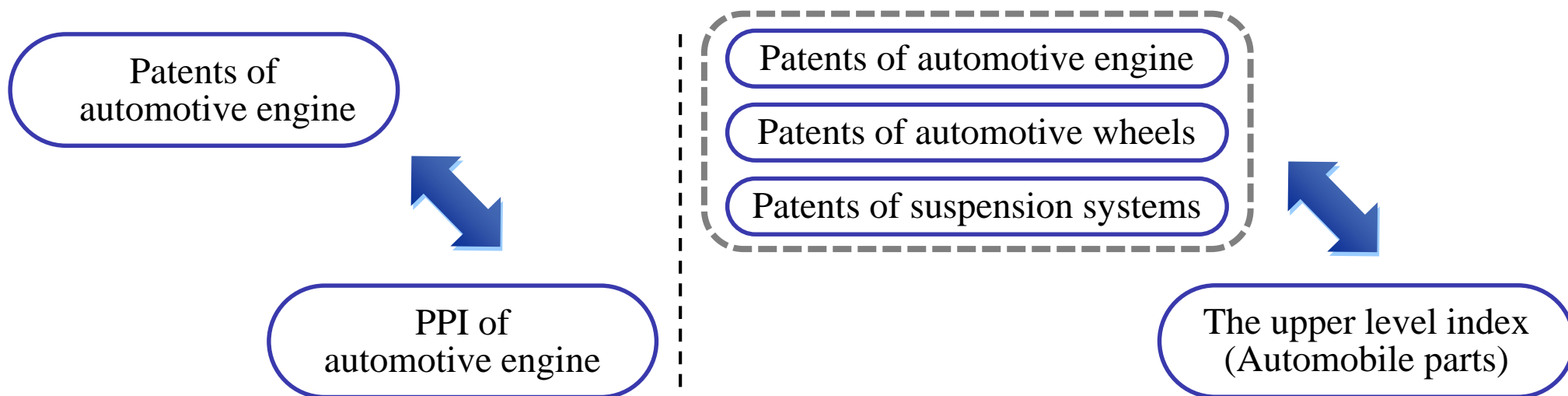
Use PPI as a proxy

How to use Price Index as a proxy

✓ In export transaction, we assume that overseas companies produce locally using patent rights owned by Japanese companies.

⇒　Proxy : PPI of exporting destination

✓ In import transaction, we assume that Japanese companies produce in Japan using patent rights owned by overseas companies.

⇒　Proxy : PPI of Japan

Export | **Export price** | = | **PPI of exporting destination** | × | **exchange rate** | × | **License rate**

Import | **Import price** | = | **PPI of Japan** | × | **License rate**

✓ When using PPI as a Proxy, it is important to select an appropriate item in PPI. Ideally, we should select PPI that is perfectly corresponding to the product produced using patent rights.

✓ In reality, there is not always an appropriate item in PPI. In such cases, the upper level indexes should be selected. Price trends for products other than those produced using patents would also affect the Price. Therefore, the item should be selected carefully.

Patents of automotive engine

PPI of automotive engine

Patents of automotive engine
Patents of automotive wheels
Patents of suspension systems

The upper level index (Automobile parts)

Quality Adjustment

✓ We need to survey not only a license rate with constant quality but also a price of the product with constant quality.
⇒ Quality adjustment for both license rate and product price is necessary.

✓ The use of the quality-adjusted price index as a proxy for product prices is appropriate.

Ex) Patents of automotive engine

Patent price for engine functions = **Automobile price** × **License rate**

- Automobile price +10%, reflecting the improvement of engine performance (+10%)
- License rate +10%, reflecting the improvement in patent rights for engine functions (+10%)

a) Using unadjusted PPI & unadjusted license rate
Automobile price（unadjusted）：+10% & license rate：+10% ⇒ Patent price：+20%

b) Using adjusted PPI & adjusted license rate
Automobile price（adjusted）：unchanged & license rate：unchanged ⇒ Patent price：unchanged

Quality Adjustment

✓ Is it really appropriate to use "Quality-adjusted price index" that reflects quality changes unrelated to the patent?

Ex) Patents of automotive engine

| Patent price for engine functions | = | Automobile price | × | License rate |

- Automobile price +10%, reflecting the improvement of suspension systems performance (+10%)
- License rate (engine function) is unchanged

a) Using unadjusted PPI
   Automobile price（unadjusted）：+10% & license rate： unchanged ⇒ Patent price：+10%

b) Using adjusted PPI
   Automobile price（adjusted）：unchanged & license rate： unchanged ⇒ Patent price：unchanged
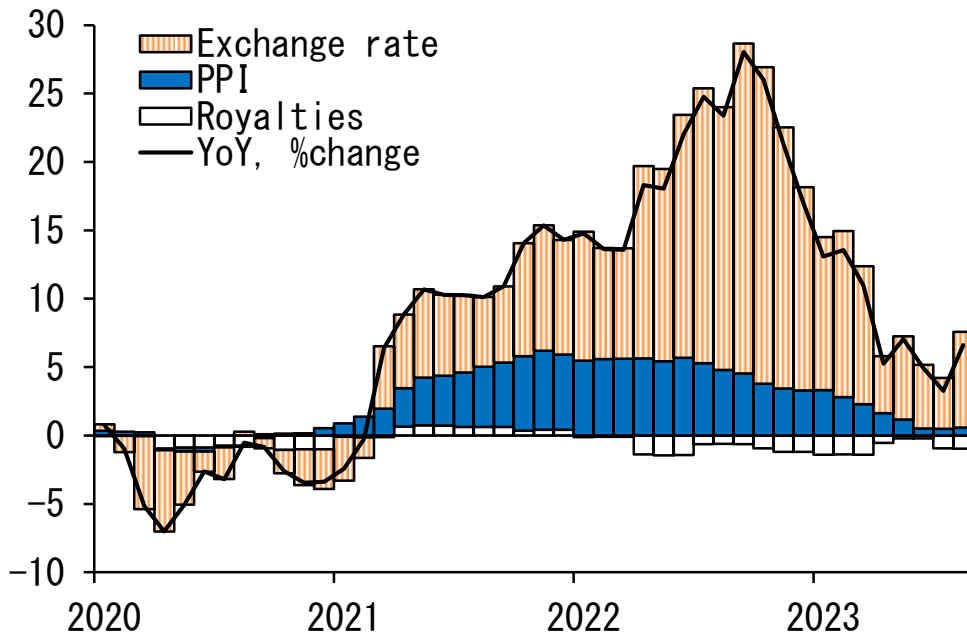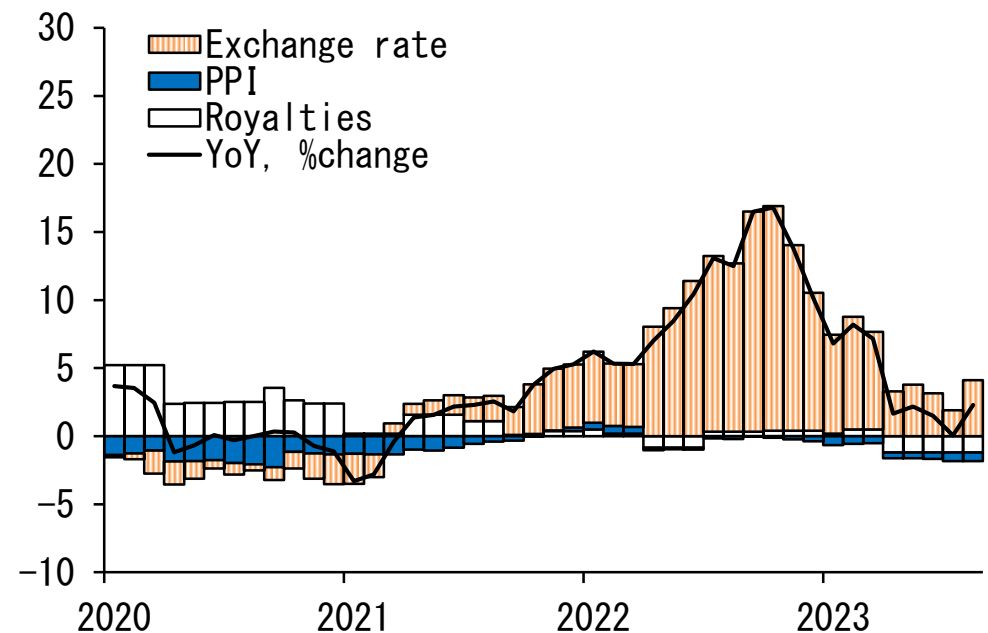
3. Price Trends

Price trend - Patent rights

✓ Looking at the price of patent licensing services, the price index has fluctuated due to exchange rates and PPIs, while license rates have generally remained almost flat.

⇒ Changes in license rate seldom occur, and price of patent licensing services is largely affected by changes in the prices of products produced using patent rights.

▽**Export Price**

▽**Import Price**

4. Conclusion

Conclusion

- ✓ When compiling the price index of patent licensing services, we ask respondents to report only a rate of license usage and use PPI as a proxy for the product price.

- ✓ In particular, in export prices, the product price of exporting destination is used. Therefore, we use the (quality-adjusted) price index of another country as a proxy.

- ✓ Changes in license rate seldom occur, and price of patent licensing services is largely affected by changes in the prices of products produced using patent rights.

- ✓ Such an approach can be used not only for patent rights services, but also for other intellectual property, such as copyrights.