



BANK OF JAPAN

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



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Introduction

- ✓ Motivation of using PPI of other countries is;
 - i) Partially, we use “PPI/EPI * exchange rate” of the exporter as an alternative way to gathering **reported import price** from respondent for Import Price Index.
 - ⇒ A strong assumption that the 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.



Summary

- ✓ 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 =

$$\frac{\text{Unit price of product produced by the license}}{\text{(A)}} * \frac{\text{A rate of license usage}}{\text{(B)}}$$

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

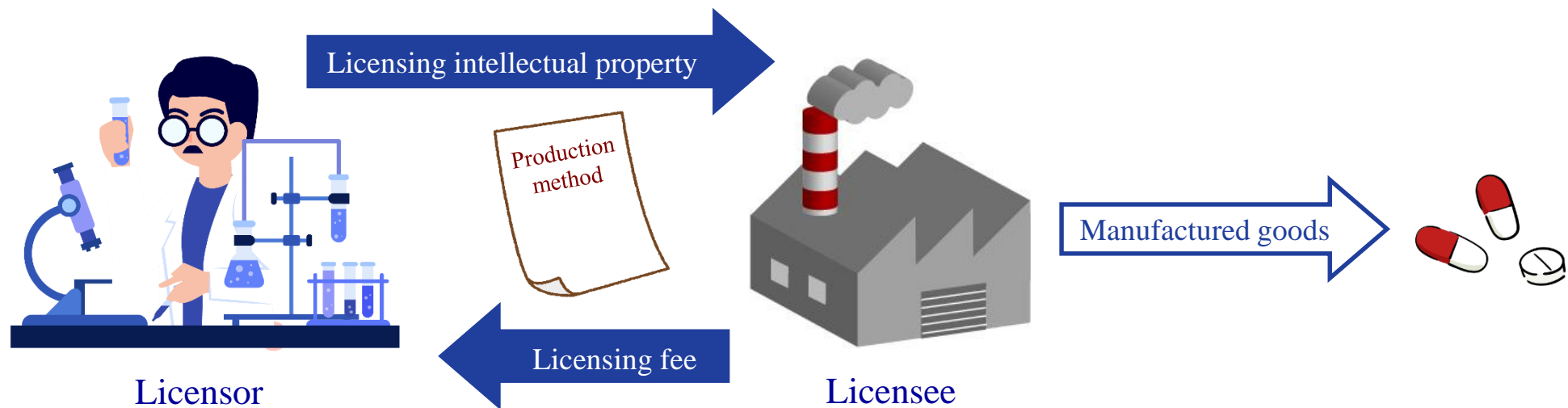


1. Intellectual Property



Definition - Patents

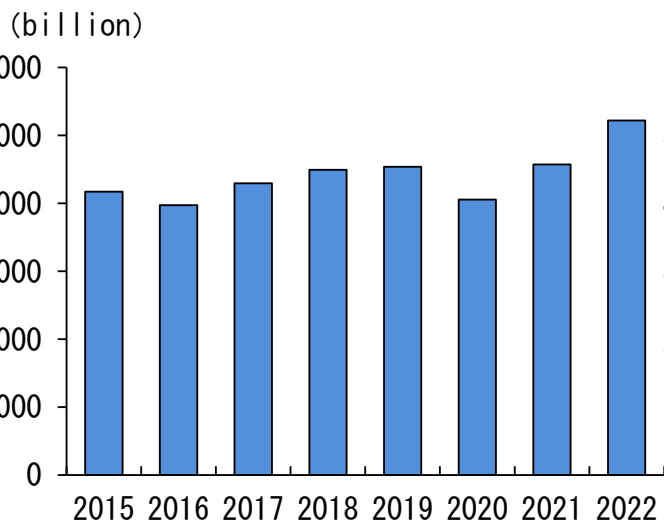
- ✓ "Patent licensing" is a service that provides other companies with permission to use the company's patent rights and know-how.
- ✓ In export price, we surveyed transaction price in which a domestic company licenses the use of its patent rights to an overseas company (including intercompany transaction). Imports are the opposite.



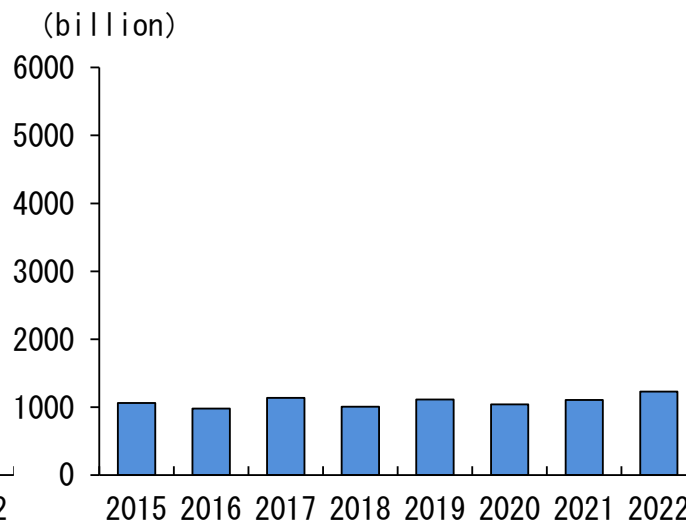
Market size of patent rights

- ✓ The market size of patent rights has increased against the expansion of global supply chains.
- ✓ Japan has a particularly large export value of patent rights.
 - ex) 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.

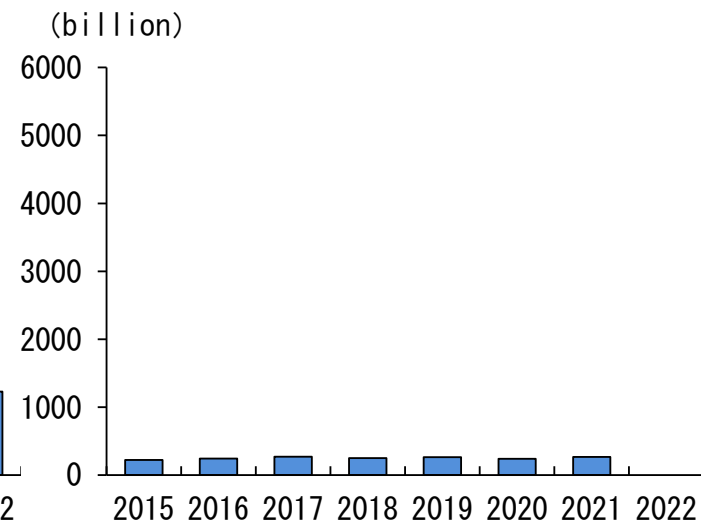
▽Export Trade



▽Import Trade



▽Domestic Trade

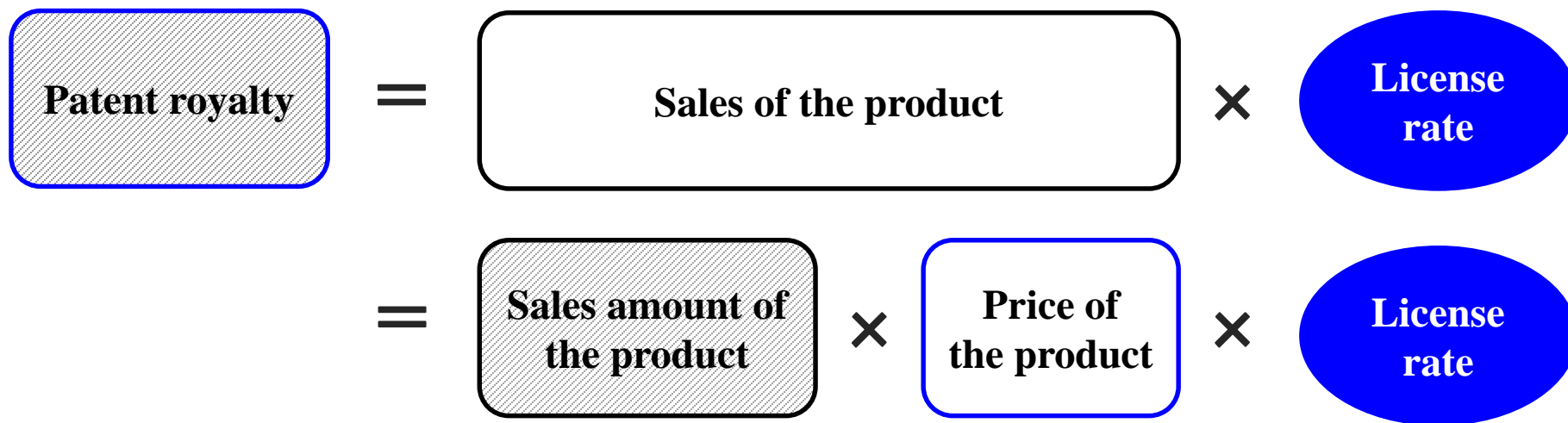


2. Price Mechanism



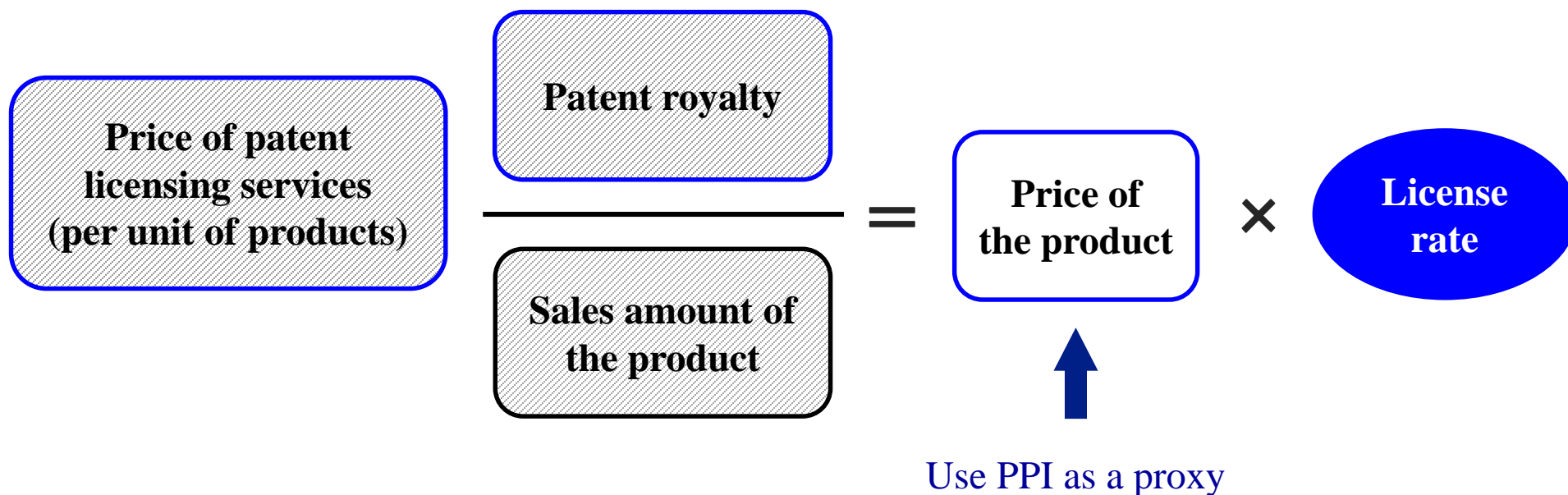
Price Mechanism

- ✓ Price of patent licensing services is defined as "a price of a licensing service 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.



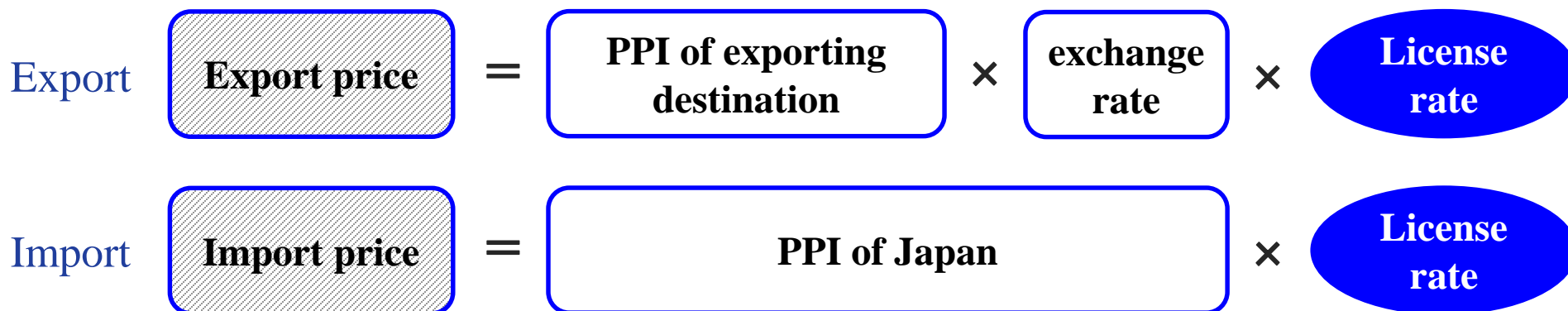
Price Calculation

- ✓ In practice, 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.



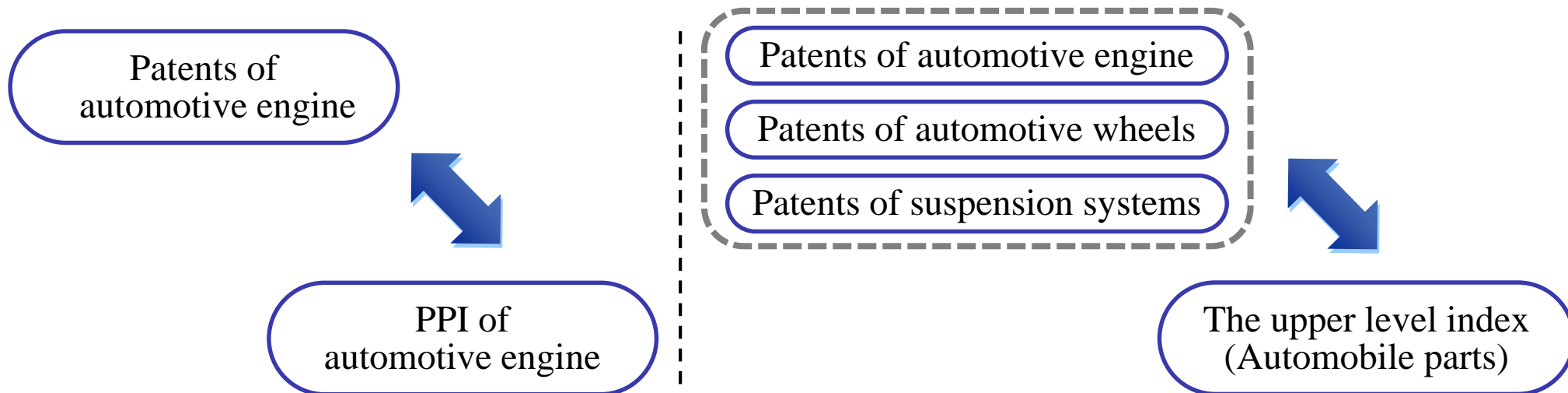
How to use Price Index as a proxy

- ✓ 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**



How to use Price Index as a proxy

- ✓ 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. As a result, price trends for products other than those produced using patents would also affect the Price. Therefore, the item should be selected carefully.



Quality Adjustment

- ✓ We need to survey not only license rate with constant quality but also price of the product with constant quality.
 ⇒ Necessity of quality adjustment for both license rate and product price.
- ✓ 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 \Rightarrow Patent price : +10%

b) Using adjusted PPI

Automobile price (adjusted) : unchanged & license rate : unchanged \Rightarrow Patent price : unchanged



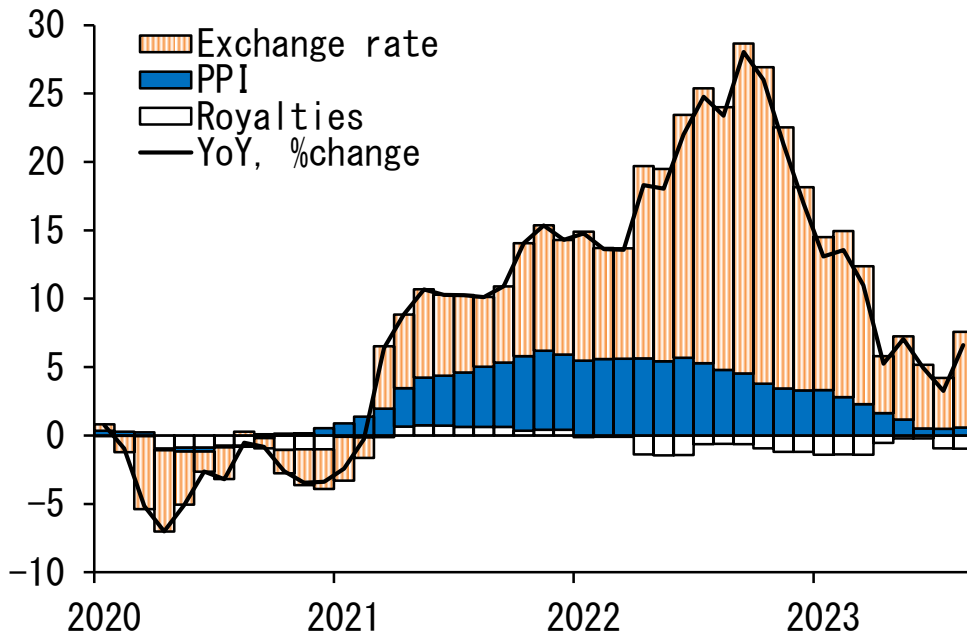
3. Price Trends



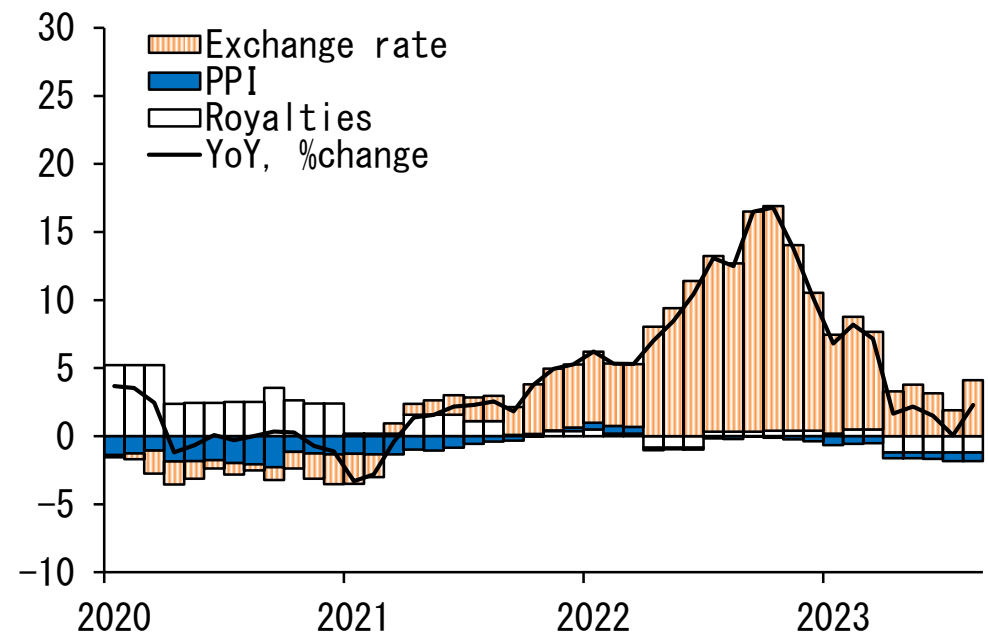
Price trend - Patent rights

- ✓ 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 license price surveys, such as copyrights.

