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Usage of hourly-rate method for SPPI in labor-intensive sectors and quality considerations

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Content

1. Introduction

The growing importance of services in modern economies has created an increasing need for reliable measures of service price developments. Services constitute a major component of economic activity, employment and value added. Besides these, service industries are often characterised by customised products, heterogeneous outputs, rapidly changing technologies and complex pricing arrangements.

Services Producer Price Indices (SPPIs) provide an important statistical instrument for measuring these developments. They measure changes in the prices of services produced by enterprises and have an important role both as economic indicators and as deflators in national accounts. Eurostat metadata describes SPPIs as measures of changes in service producer prices and identifies their use in estimating GDP at constant prices and in economic analysis. Unlike many manufactured goods, services are often not standardised products that can be repeatedly observed every period. A legal consultation, engineering assignment, software development project or security service may differ substantially between customers and over time. Consequently, statistical offices have developed a range of pricing methods for services. These include direct use of prices of repeated services (transaction prices), contract pricing, unit-value pricing, model pricing, percentage-fee methods and time-based methods.

The hourly-rate method is particularly relevant for labour-intensive services. It is relatively straightforward to implement where firms can price and define services according to the time spent by employees with defined qualifications, experience or seniority. Eurostat metadata currently identifies hourly rates as one of the price concepts used in SPPI compilation and defines hourly list rates as rates that may vary according to employee category, expertise, education or seniority. The important issue here is that an hour of labour is an **input measure**, whereas an SPPI is fundamentally concerned with the price of **service output**.

This paper examines this methodological issue using the Turkish Services Producer Price Index (SPPI), focusing on six sectors:

- NACE 62 — Computer programming, consultancy and related activities;
- NACE 69 — Legal and accounting activities;
- NACE 71 — Architectural and engineering activities; technical testing and analysis;
- NACE 78 — Employment activities;
- NACE 80 — Security and investigation activities;
- NACE 81 — Services to buildings and landscape activities.

Although these sectors share the characteristic of significant labour input, their pricing structures and quality characteristics differ considerably.

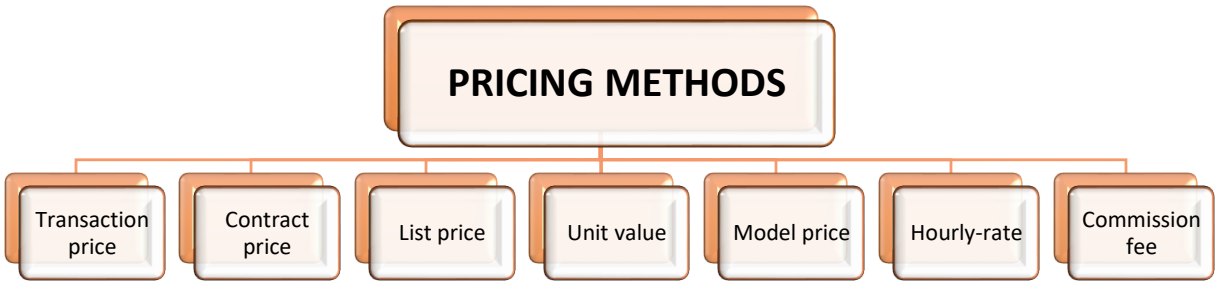
The paper therefore argues for a **sector-specific implementation of hourly-rate pricing**, supported by detailed service specifications, appropriate personnel categories, validation procedures and systematic monitoring of quality change.

The problems associated with the production of price indices for goods whose specification and quality change rapidly have long been recognised by statisticians and economists so that,

if quality improvements are inadequately captured, price indices will tend to overstate inflationary developments and understate quantity changes. While problems estimating an appropriate price index may arise in several manufacturing industries, there are reasons that measurement problems may be stronger in the service sector than in manufacturing.

2. Pricing Methods in SPPI

In Turkish SPPI, there are 7 pricing methods used and included in the data-entrance programme, shown on below figure.



Observed prices

- Prices of services repeated over time: Prices are collected from actual transactions or price lists.
- Unit value: When services are homogeneous, the total billing value of the service can be divided by the quantity of the service performed.
- Contract prices: Service providers select one or more specific service contracts that are recurring over time.

Estimated prices

- Component pricing: The service is divided into a number of key components and each is priced separately.
- Percentage-based pricing: The price is estimated by multiplying the percentage charged by the value of the service to which the percentage is applied.

Virtual prices

- Model prices**:** The price of a hypothetical model agreed upon by the statistical office and the company is collected.

Observed or estimated prices, when the service can not be clearly specified**:**

- Prices based on hourly costs**:** The price of a standard amount of work (e.g., one hour) for different labour categories within the company is collected. The hourly-rate method is used for this category, in SPPI.

3. The Hourly-Rate Method

The hourly-rate method (also called the realized hourly rate method or working-time pricing method) is one of the standard approaches used to compile SPPIs when services are primarily sold on the basis of labor time rather than as standardized outputs. It is described in the OECD/Eurostat methodological guidance for service PPIs.

The first conceptual distinction necessary for understanding hourly-rate pricing is the distinction between input prices and output prices.

An SPPI is intended to measure changes in the prices received by producers for their service output. It is therefore not equivalent to:

- a wage index;
- a labour-cost index;
- an employment-cost index; or
- an index of hours worked.

This distinction is particularly important because the hourly-rate method can superficially resemble a labour-cost measure.

Suppose that an accounting firm charges €100 per hour for a senior accountant. The €100 is not the accountant's wage. It is the amount charged to the customer for an hour of the service provided by that category of professional.

The difference between the charge-out rate and the employee's compensation may cover overheads, capital costs, administrative costs, profit margins and other components.

Therefore:

Hourly charge-out rate≠Hourly labour cost

The statistical office must focus on the price paid or charged for the service rather than on the cost of producing it.

Why is this method used?

Many professional services are not sold as identical products. Instead, clients pay for the time spent by different categories of employees. Examples include:

- Engineering
- Legal services
- Accounting
- Consulting
- Architecture

- IT consulting

Since the "product" changes from project to project, statisticians cannot always observe the price of exactly the same service over time. Instead, they observe the **price of one hour of labor**.

- ## Step-by-step calculation

Suppose an engineering firm reports:

Period	Revenue	Billable hours
Base period	€120,000	3,000
Current period	€150,000	3,000

Hourly rates are

- Base:
  €120,000 / 3,000 = **€40/hour**
- Current:
  €150,000 / 3,000 = **€50/hour**

The price index becomes

50/40*100=125

This indicates that service prices increased by **25%**.

- ## When there are different staff categories

Most firms have several grades of employees.

Example:

Staff grade	Base €/hour	Current €/hour
Junior engineer	45	48
Senior engineer	80	86
Project manager	110	118

An individual price index is calculated for each category:

- Junior: 48/45 = 106.7
- Senior: 86/80 = 107.5
- Manager: 118/110 = 107.3

These are then combined using appropriate weights (often based on revenue shares or hours worked) to obtain the overall SPPI.

- **Realized hourly rate vs. list hourly rate**

The OECD guide distinguishes two related methods.

1. Realized hourly rates (preferred)

Uses actual transaction data:

- Actual revenue earned
- Actual billable hours

This reflects discounts, negotiated prices, and client-specific contracts.

2. Hourly list rates

Uses published standard billing rates instead.

For example:

- Junior: €70/hour
- Senior: €120/hour

This method is easier to collect but may overstate actual prices if firms frequently give discounts or negotiate fees. Therefore, statistical agencies often adjust list-rate information to better reflect realized revenues when possible.

Advantages

- Practical for labor-intensive professional services.
- Data are often readily available from firms' accounting systems.
- Suitable when every project is unique.
- Easier than pricing an identical service repeatedly.

Limitations

The method assumes that **one billable hour represents a comparable unit of service over time**.

Potential issues include:

- Employees become more productive.
- Staff mix changes (more senior staff than before).
- Technology reduces time required for the same work.
- Quality of the service changes.

For example, if software allows an engineer to complete work in half the time while charging the same project fee, the realized hourly rate may increase even though the client's total project price has not changed proportionally. OECD notes that time-based pricing measures

labor input prices rather than perfectly isolating the price of the service output in such situations.

4. The Quality Changes

Quality adjustment is closely related to productivity but should not be treated as identical to it.

A quality change occurs when the characteristics of the service being purchased change in a way that affects its value or price.

Consider an engineering consultant.

Period 1

Senior engineer:

€100/hour

Period 2

Senior engineer:

€110/hour

The observed price increase is:

110/100*100-100=10/%

But suppose that the engineer has acquired an advanced professional qualification and is now capable of performing substantially more complex work.

The 10 percent difference may contain:

- pure price change; and
- quality change.

The statistical objective is to separate the two as far as possible.

Eurostat metadata explicitly identifies quality change as one of the main methodological challenges in producer price indices and notes the importance of methods such as overlap pricing when service characteristics change.

5. The Labor-Intensive NACE Sectors

The Turkish SPPI uses hourly-method mostly in six sectors, because hourly-rate pricing is relevant in such labour-intensive service sectors.

The six sectors examined in this paper are:

NACE	Sector
62	Computer programming, consultancy and related activities
69	Legal and accounting activities
71	Architectural and engineering activities; technical testing and analysis
78	Employment activities
80	Security and investigation activities
81	Services to buildings and landscape activities

Although labour input is important in all six sectors, the methodological risks are different.

This reinforces the argument that the same hourly-rate methodology should not necessarily be implemented in exactly the same way across all sectors.

5.1 NACE 62 — Computer programming and consultancy

Computer programming and consultancy services are particularly suitable for hourly-rate pricing because firms commonly maintain differentiated rates for different professional categories.

Examples include:

- junior developer;
- senior developer;
- software architect;
- project manager;
- cybersecurity specialist;
- data specialist; and
- IT consultant.

The major methodological issue is rapid technological change.

Software development tools, automation, artificial intelligence and development platforms can substantially alter the amount of work that can be completed in one hour.

This makes NACE 62 one of the sectors in which productivity concerns are particularly significant.

The Eurostat-OECD Guide specifically discusses computer consultancy and notes that productivity per consultancy hour is difficult to measure. It recommends close monitoring of the industry and dialogue with respondents to identify changes in the number of hours required to perform comparable services.

Consequently, for NACE 62, the following variables are particularly important:

- technology;
- software tools;
- professional specialisation;
- complexity;
- functionality;
- and productivity.

A further issue is that IT firms may increasingly move from hourly billing towards fixed-price or outcome-based contracts.

Such developments should be monitored because a change in the market's pricing mechanism may eventually reduce the suitability of a pure hourly-rate method.

5.2 NACE 69 — Legal and accounting activities

Legal and accounting firms often differentiate rates according to professional seniority.

A typical hierarchy may include:

- partner;
- manager;
- senior professional;
- junior professional.

The main methodological risk is staff composition fort his sector.

Suppose the average hourly rate increases from €80 to €90.

This could result from:

1. a 12.5 percent increase in all individual rates;
2. a greater proportion of senior professionals;
3. a change in the type of work performed; or
4. a combination of these factors.

If the statistical office collects rates for fixed professional categories, the composition effect can be controlled more effectively.

Another issue is the increasing use of fixed-fee arrangements.

If a legal service is sold for €5,000 regardless of the number of hours worked, the market is pricing an output rather than professional time.

In such cases, a model-price or contract-price approach may potentially be more representative.

5.3 NACE 71 — Architectural and engineering activities

Architectural and engineering services are often highly customised.

Two engineering projects may have similar descriptions but differ in:

- complexity;
- technical requirements;
- regulatory requirements;
- environmental standards;
- responsibility;
- project scale;
- and required professional expertise.

Hourly rates can provide a practical solution where direct repeated pricing is difficult.

However, the method can be affected by changes in project complexity.

Suppose a senior civil engineer's hourly rate increases from €110 to €118.

The observed increase is:

118/110*100-100=approx 7.3/%

The increase may represent pure price inflation.

But it could also reflect:

- increased professional responsibility;
- new qualifications;
- more sophisticated software;
- greater project complexity;
- or a change in the type of engineering service.

This makes NACE 71 a sector in which detailed service specifications are particularly important.

For highly unique outputs, model pricing may sometimes offer a more output-oriented alternative.

5.4 NACE 78 — Employment activities

Employment activities have a particularly interesting relationship with hourly pricing because the service often involves supplying labour to another enterprise.

The charge may depend on:

- occupation;
- qualification;
- experience;
- working conditions;
- duration;
- and type of assignment.

Suppose the charge increases from €24 to €26 per hour.

The observed increase is:

26/24*100-100= approx 8.3/%

However, the increase may be caused by an increase in the characteristics of the worker supplied rather than by pure inflation.

For example, the agency may have shifted from supplying relatively low-skilled workers to highly qualified specialists.

Therefore, staff characteristics should be treated as service-specification variables.

Another important issue is wage pass-through.

An employment agency may increase its charge because the wage paid to the supplied worker has increased.

This may be a genuine price change in the employment service, even though the underlying cause is a change in labour cost.

This illustrates again why an SPPI should not be interpreted as a wage index.

5.5 NACE 80 — Security and investigation activities

Security services are frequently priced by the hour. However, the characteristics of the hour are important.

Examples include:

- standard security;

- specialised security;
- daytime security;
- night-time security;
- mobile security;
- stationary security;
- weekend security;
- event security.

Suppose a standard security guard costs €18 per hour and the rate increases to €20.

The observed increase is approximately: 11.1%

But suppose that the service changes from daytime standard security to specialised night-time security. The difference is not pure inflation.

The customer is purchasing a different service.

Therefore, the specification should explicitly identify working conditions that materially affect the price.

5.6 NACE 81 — Services to buildings and landscape activities

Services to buildings and landscape activities include cleaning and facility-related services where hourly pricing can be relevant. However, the scope of the service can change substantially. For example, a contract may change from “standard cleaning” to “deep cleaning + specialised equipment + increased frequency.”

If the hourly rate increases, part of the difference may reflect a change in service scope.

Productivity is another issue. Improved cleaning equipment or automation may allow employees to cover a larger area during one hour. The hourly rate may remain unchanged while output per hour increases.

This does not automatically mean that the SPPI is biased, because the appropriate interpretation again depends on whether the market is buying an hour of labour or a defined cleaning output.

Nevertheless, it is a strong reason to monitor technological and organisational changes in the sector.

6. Quality Adjustment Strategies

For the changing specifications of the service product, quality adjustments are done and there are various methods used and each can be used for different conditions.

Implicit quality adjustments:

- Overlapping method (when prices are available at same periods)
- Imputation method (if prices are not available at same periods, then computation made by assumption)

a - In firm with the product group (CPA) change

b - In firm with the product group (CPA) change, excluding outlier

c - by the product group (CPA) change

d - by the product group (CPA) change, excluding outlier

- Explicit quality adjustments:
  - Information provided by experts

The last one which is explicit, depends on the subjective opinion of the expert, and is implemented when there are some updates mentioned by the firm, for the past periods. For this, calculations are made by the experts, comparing the current prices with the base prices (p0) which are the December prices of the last year.

The objective is to estimate the "pure price component" as accurately as possible.

7. Conclusions

The hourly-rate method is an important and practical approach for measuring producer prices in labour-intensive service industries. The Turkish experience across NACE 62, 69, 71, 78, 80 and 81 demonstrates that hourly pricing can provide a relatively transparent and operationally feasible approach where services are actually sold according to professional time.

Nevertheless, the method involves a fundamental conceptual challenge: The price of one hour of labour is not necessarily the price of one constant-quality unit of service output.

Productivity improvements, technological developments, staff composition, professional qualifications, service scope and working conditions can all influence the relationship between hourly rates and service output.

The solution is not necessarily to give up the hourly-rate method. Rather, statistical offices should:

- identify the actual market pricing mechanism;
- define the service carefully;
- maintain stable personnel categories;
- distinguish list from realised rates;
- monitor productivity and technological change;

- investigate quality changes;
- and reconsider the pricing method when market practices change.

For the six sectors examined in this paper, the principal risks are sector-specific.

NACE 62 requires particular attention to technology and productivity.

NACE 69 requires control of professional composition.

NACE 71 requires detailed consideration of project complexity.

NACE 78 requires attention to worker characteristics and wage pass-through.

NACE 80 requires specification of working conditions and service level.

NACE 81 requires attention to service scope, equipment and productivity.

The main methodological conclusion is therefore that; the hourly-rate method is most effective when the statistical specification captures not only who performs the service and how much an hour costs, but also what service is delivered during that hour and whether the characteristics of that service have changed over time.

The hourly-rate method is best viewed as a time-based pricing approach. Rather than pricing a complete service, it prices the "market value of one billable hour" of professional labor. It is especially appropriate for industries where services are customized and labor time is the primary basis for billing, making it one of the most widely used methods for compiling SPPIs in professional business services.

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