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# Price indices for road haulage

Summary of a report on a pilot survey in the Netherlands

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## 1. Introduction

This paper reports on a feasibility study of constructing price indices for an important [1] group of services, namely freight transport (road haulage). It is a short version of a report with the same title [2]. The study was conducted at the request of the European Commission.

In the services sector describing and valuing a service and its quality aspects is not the same everywhere. Generally, we can distinguish commodity-related services on the one hand and "person-related" services on the other. The first category is regarded to be less troublesome because goods themselves are easier to describe and value than pure services. Products like food sold in restaurants, leasing and freight transport consist partly of the commodities involved.

There are several approaches for measuring prices and their development in the services sector. Four are mentioned here:

1. Observing transaction prices. To cope with the heterogeneity of the contents or the quality of the services, hedonic methods are sometimes used. In other cases price movements are calculated based only on the prices of services that have not changed in the period under consideration.
2. Model pricing. For example a house painter is asked regularly to quote a price for a specific job.
3. Tariffs per hour. These may be quite different from output prices and are usually revised only once a year. Therefore, this method should only be used if there is no change or only a minimal change in the time needed to produce the service, and if there are no changes or only minimal short-term changes in real output prices during one year.
4. Prices may be connected to objects like real estate. By following the price developments of real estate in the Netherlands the fees of e.g. estate agents [3] and some architects can be calculated and monitored.

Not all the methods described above can be used to measure the prices of transport services by road.
For example the price of a transport performance is never directly linked to the value of the goods, not even in the case of transportation of gold and securities.
The method of tariffs per hour is another option. However, changes in the time needed for a specific trip are in our view not negligible in road haulage, so tariffs per hour do not reflect the real output prices of the transport service.
Two options remain: the methods of model pricing and transaction prices. The feasibility of the latter depends on whether or not and how many comparable trips can be found. Because the transport service is made up of several elements - distance, commodity, weight - the trips may differ in many ways. Moreover, contracts with clients in this sector contain many conditions. Changes in one or more conditions were considered probable, so we preferred the model pricing method. The construction of hedonic price indices using

1) See Flottum, 1989. Flottum also gives an overview of the country practices of constant-price estimation in the services part of the National Accounts.
2) Sevat and Van der Werf, 1994.
3) The system of calculating estate agents' fees changed recently.

transaction prices is disregarded in this study, also in view of experiences in the past. See Schalen en Hoven (1989).

## 2. Description of the project

### *2.1. Objective of the project*

As mentioned above, the object of our project is to test the feasibility of a specific method to construct price indices of road haulage.

The method tested is the model pricing method. Quotations of specific (fixed) services of a panel of hauliers are used to compile price index numbers. During the realization of the project it became clear that in reality there is no sharp distinction between the model pricing method and the transaction prices method. See section 3. Other methods, like the indirect computation of price indices as the quotient of value indices and volume indices, are disregarded in this report. The Inland Transport Committee of the UN Economic Commission for Europe suggests the construction of a volume *and* a price index using a direct method for both indices, as price and volume indices in the transport sector both have their merits and drawbacks. Volume index numbers may be used to check price index numbers and vise versa. See UN, 1986.

The budget for the pilot survey allowed no more than about 200 reporting units to be visited. We had to choose whether to survey (or try to) the entire road transportation sector, or to survey only a part of this sector. The first option would result in less reliable indices for the whole sector; the second would give more reliable price indices for only a part of the sector. After lengthy discussions we decided to survey the whole road haulage sector; this way we are sure that the tested method is applicable for all kinds of transport services.

### *2.2. Initial design of the project*

A provisional design of the pilot project has been discussed with a number of large hauliers and their associations. Taking into account the comments of the branch the final design has been made.
The inconvenience of the lack of information about actual trips can be removed by a survey on freight prices using model prices. The main advantage of model pricing is the possibility to control for all elements influencing the freight price.

For the time being, the frequency of observation was set at four times a year.

#### 2.2.1 Classification

At the start of the project the concept of the survey was strongly influenced by some other projects in the services sector. Periodically reporting units are asked to state model prices for representative services. In some cases a general specification is used. For example, car lease companies calculate the lease price of a selection of about 15 popular lease cars. In

other cases, e.g. architectural and engineering services, a custom made selection of services rendered is used.
For road transport companies a general specification seemed inappropriate because of the specialization of most firms. Usually, hauliers are not only specialized in one or a few types of vehicle, but also in the products transported, countries of destination and type of transport. The classification used in Dutch statistics on the production and financial results of road haulage was to be the starting point for the distinction between transport services. This classification was combined with the difference between inland and international trips, as Eurostat requested indices on haulage between member states. This Dutch classification distinguishes several types of lorry:
- with open or closed box (non specialized) (CPC 71235; 71239p)
- container lorries (CPC 71233)
- remover lorries (CPC 71234p)
- tippers (CPC 71239p)
- freezers/coolers (temperature controlled box) (CPC 71231; 71239p)
- tankers (incl. dry bulk tankers) (CPC 71232; 71239p)
- lorries not elsewhere specified (n.e.s.) (CPC 71234p; 71239p)
This makes seven classes regarding type of lorry.

2.2.2. Selection of reporting units and weighting factors

The previous paragraph began with the reporting units, the firms, and ended with the lorries. However, we are interested in the services rendered by these lorries. The transport sector consists of a collection of hauliers. The transport market consists of a collection of services rendered by these hauliers. We want to describe one facet, viz. price movements, of the transport market. Ideally, we would want to sample the services. As this is not possible, we sample hauliers. To do this, the firms are classified by size and in some cases by specialty. The groups of firms (with the same size and sometimes the same specialty) thus formed are called strata. Collections of "similar" services are called markets or submarkets.

The information obtained from the hauliers is used to compile index numbers. To do this weighting factors are used. Weighting factors might be based on data from both functional and institutional statistics, because the functional statistics provide much more details on trips than the production ones. Up to now only data from the production statistics [4] and information from hauliers are used. As for other industries the price indices will be constructed according to Laspeyres.

All the large firms were selected, and smaller firms were sampled. The very small ones were considered to be rather unimportant, despite their great number. Together the very small firms account for about 10-15% of the total turnover of road haulage. Only firms with two or more employees were visited to introduce the price statistics and to request cooperation.

4) The production statistics describe production, consumption and value added of companies.

2.2.3. Selection of representative trips

Intensive discussions were held about the distribution of the limited number of trips across all characteristics, which represent submarkets with potentially different price developments. The following order of priority resulted:
- type of lorry,
- inland trips ⟷ border-crossing trips,
- country of destination or origin,
- type of customer (regular ⟷ incidental),
- type of goods transported,
- other (direction of border-crossing trip, region per country of destination).

*2.3. Final design*

The construction of the sample is discussed in chapter 4. To summarize the main aspects of the survey design the key characteristics are described here.

In the case of regular customers, transaction prices are used. In the case of incidental customers model prices are requested. Sometimes a mixture of these methods is necessary.

As stated above, companies were sampled, the probability of inclusion depending on the number of employees. Large firms (100 employees or more) were all included in the survey. Small firms (fewer than 10 employees) were selected from the population of all road haulage firms, as they are excluded from the production statistics. Such small firms were divided in two groups. The first group (2 - 9 employees) was sampled with a higher probability of inclusion than the very small companies. Medium-sized firms (10 - 99 employees) are classified into 14 strata, using the turnover data of the production statistics to determine the main activity regarding the type of lorry used and destination/origin (inland or abroad). Firms with two or more employees were visited by field representatives to introduce the price statistics and to request cooperation. The other (very small) firms were approached only by sending a questionnaire including an example Initially these firms were excluded from the survey, but later it was decided to include them, as they may show a very specific price development. In the follow-up of the survey most firms are sent or faxed a questionnaire. The remaining companies are contacted by phone. In the conversation a similar questionnaire is used to collect the price data.

*2.4. The calculation of the indices*

The Laspeyres indices will be calculated as follows. The price $p_i^t$ in the period t of a specific fixed service i of a specific haulier is divided by the price $p_i^0$ of exactly the same service of the same haulier in the base period 0. The weighted average of these quotients for $i\epsilon$submarket j provides the desired index number $I_j^t$ for the (sub)market j

The weight $w_i$ is the turnover in the base period of the haulier for services which are represented by i. In formula:

$$I_j^t = \frac{\Sigma_h (N_h/n_h) \quad \Sigma_{i=1}^{m_{hj}} w_i p_i^t / p_i^0}{\Sigma_h (N_h/n_h) \Sigma_{i=1}^{m_{hj}} w_i}$$

where $N_h$ is the number of hauliers in stratum h
$n_h$ is the number of responding hauliers in stratum h
$m_{hj}$ is the number of quotations in stratum h that lie in submarket j

The index numbers of these submarkets will be used to compute index numbers of higher aggregates of submarkets, like the index number of total national haulage or even total haulage. The weights used are the turnovers of the submarkets.

As the base period turnovers of the market and submarkets are not available in time, the turnovers of an earlier period had to be used. In this pilot project 1991 figures were used to estimate the weights used to produce indices with base 1994.

## 3. Concepts and problems of implementation

Before and during the pilot survey some more or less theoretic problems were encountered again and again. Therefore some fundamental decisions on the nature of the prices, the units to measure prices, etc. were needed. In the following such problems and their solutions are described.

### *3.1. Transaction prices*

As the term 'regular client' already expresses, there can be a longstanding relationship between the transport firm and the shipper. Some contracts are extended by only renegotiating the tariffs. In such cases transaction prices are ideal instruments to measure the price developments. This kind of price is a genuine one. The problem with model pricing is its partly fictitious nature and the resulting interpretation difficulties. For the respondent it easier to supply the freight prices of real contracts or agreements.
Unfortunately, in many other cases some conditions of the contract are changed after some time. Finding out whether the contents of the transport service have changed is a great problem. This is aggravated because the explanatory notes to a questionnaire are known to be poorly read. Therefore on the questionnaire itself a short but noticeable instruction was included to check and supplement the descriptions of the trips. If trips are no longer carried out the description must be deleted. In all cases of a reported change we will call the reporting unit to select a new trip and to find out what the price of the trip would have been if the contract remained unchanged. In fact a model price is asked for.
Another difficulty is judging the significance of the changes in the transport performance. This is solved pragmatically by moving the decision about this to the reporting unit. If they regard the change as negligible, not influencing the performance, then they will include no indication of a change on the returned questionnaire.

As the original intention was to use only model prices, the description of trips is insufficiently detailed for the firms reporting transaction prices. Notable, the yearly total number of trips carried out for regular clients and the question of whether or not there had to be a delivery in time are lacking. These two items were not specified on the questionnaires in the first quarter, but will be included in future. If appropriate, the specification will contain a description of the total quantity of transport services involved.

### *3.2. The service rendered*

In the preparatory phase of the study the question arose as to how exactly to define the service rendered. Only trips made by the haulier himself were included. Subcontracting was excluded.
Clients have a different view than producers of the transport service. The duration of the trip in particular can be seen from different angles. For the transport firm a trip over a certain distance might take X hours on average at the moment but Y hours on average a year later. In his view the costs of the transport service are different, so the two trips are not the same. He states that there is no change in his output price if the price per hour is not changed. On the other hand, the buyer of the transport service may not care how long a trip takes. In this view a cargo must just be moved from one place to another. He is only interested in the costs of moving the cargo.
As in other cases, in our view the client decides what the service contains. And in a competitive industry, producers are forced to go along with the client on this issue. If clients demand to know what a certain trip will cost in advance, the transport firm is obliged to state a price per trip instead of a price per hour.
The same goes for freights that must be delivered in time. The customer might demand a certain deadline for the delivery and is usually prepared to pay for this. Although this may not involve additional effort for a certain transport firm, this transport service is still different from other transport services because of the client's perception or this issue.

### *3.3. Units of measurement*

Many units are used by transport firms to state their tariffs to clients. For example:
- price per hour,
- price per kilometer,
- price per kg or per ton,
- price per pallet,
- price per $m^3$,
- price per liter,
- price per item (e.g. parcel, car, low loader cargo).

To guarantee comparability of the services by measuring the same transport performance and the quality of the service it is wrong to use any of the above mentioned units or combinations of them as such. The price per individual service should be used to measure freight prices.

### *3.4. The data of the production statistics*

As explained in section 2.2.2 the population of the production statistics on road transport was used to sample reporting units with 10 employees or more. The turnover figures gathered for this purpose were used to form strata. The firms with 10-99 employees were divided into about 14 strata according to their main activity. The 14 strata were formed by using the distinction between inland trips and border- crossing trips in combination with the distinction between 7 classes of lorries.

This stratification was discussed extensively. The haulage market is extremely heterogeneous. All kinds of criteria can be used to classify the hauliers. Two main aspects must be taken into account: first, to construct a reliable price index, it is desirable to construct homogeneous strata so that there is only small variation in changes of prices. Secondly, it may be desirable to aim at a minimum number of observations in each submarket [5], to be able to compute reliable figures for these submarkets.

Unfortunately, the distinction between national and international haulage is biased. The question on this subject in the production statistics was apparently interpreted differently by hauliers. Some specified the part of their turnover related to frontier-crossing haulage, others specified the turnover paid by foreign customers. Nevertheless this information had to be used to classify the companies, because this problem was discovered only after the selection of reporting units. Moreover, the production figures for 1991 had to be used. Since then considerable changes have occurred within the reporting units, e.g. with respect to primary activity or size of the firm.

### *3.5. Secondary activities of road haulage firms*

During the introductory visits the type of activities carried out by the firms were asked for. In many cases the transport firms carried out one or more types of related services. Forwarding is the most common secondary activity carried out in combination with transportation. However, there is usually a separate business unit for the forwarding activity. During the visits it became clear that it was wise to check when making an appointment that the right business unit was being visited.
Other problems were:

- charter activities: renting of lorry and driver.
  This service is characteristic for this industry. However, the main subject of the pilot survey is in our view the real transport activity, so the prices of charter services were only collected if a large portion of the turnover of a firm was accountable to this kind of service. A price index for the total of road haulage activities should be feasible.
- the combination of road transport with warehousing, transshipment, etc.
  Such services are regarded as "usual combinations" and were therefore included
- door to door trips.
  If such trips also included transport by air or over water, the cost structure of the trip was asked for. If the part of road transport was more important than the remainder of the transport service the trips were accepted, otherwise they were excluded.

5) For the difference between strata and submarkets, see section 2.2.2.

### *3.6. Escalation of freight prices*

Many transport firms make a provision for the freight prices in long- term agreements to incorporate the possibility of tax increases. However, the firms stated regularly that they normally would not use this option because of the high level of competition in their market. For the time being most firms with fixed tariffs for long-term agreements will be surveyed four times a year to ascertain that the prices do not change, but also that all conditions of the trips remain unchanged.

### *3.7. Description of trips*

The problem of clearly describing what kind of trip is meant has not been solved completely. In most cases the freight prices agreed on with respondents are for just the outward trip. The cargo transported on the way back is usually for another client, but occasionally for the same client. Some confusion is possible because transport firms may or may not take the chance of a homeward cargo for another client into account when quoting a freight price.

Only in cases of physical distribution is there mentioning of homeward cargo, because the lorry visits unloading places until it is empty. If another cargo is then loaded, a new trips starts.

## 4. Sample construction

The phenomenon to be quantified is the change of freight prices over time. This is done using model prices and transaction prices. As explained in section 2.2.2, as prices cannot be sampled, hauliers must be sampled.

The funds available for the pilot project made it possible to visit about 200 hauliers. Each was asked to cooperate and to provide model prices for freights. The number of prices varied with the size of the company.

It was decided to include all the larger hauliers, i.e. those with 100 or more employees. This group consists of about 80 companies. The remaining 120 participating companies are randomly chosen and representative for the submarkets to be described. In addition to the 200 firms that were visited, 100 very small hauliers were approached by letter.

The companies were divided into 17 strata: the large companies, the medium sized companies divided in 14 strata (main market × main specialization), small companies and very small companies. In a modest way the quotations per haulier were 'directed' to ensure sufficient coverage of submarkets. The sample design is summed up in scheme 5.1, together with the response.

## 5. Results on response

Feasibility can be measured in several ways. The willingness to cooperate is illustrated in scheme 5.1.

Scheme 5.1. The strata and the response rate.

| Size of company | Main market | Main specialization | Population size | Sample size | % resp |
|---|---|---|---|---|---|
| large, ≥ 100 employees | | | 83 | 79 | 80 |
| medium 10-99 empl. | national | 1 open/closed | 649 | 10 | 100 |
| | | 2 container | 75 | 5 | 60 |
| | | 3 remover | 78 | 5 | 100 |
| | | 4 tipper | 72 | 5 | 100 |
| | | 5 freezer/cooler | 67 | 5 | 100 |
| | | 6 tanker | 35 | 5 | 80 |
| | | 7 n.e.s. | 81 | 5 | 100 |
| | inter-national | 1 open/closed | 429 | 14 | 86 |
| | | 2 container | 20 | 5 | 80 |
| | | 3 remover | 14 | 3 | 67 |
| | | 4 tipper | 14 | 3 | 100 |
| | | 5 freezer/cooler | 84 | 5 | 100 |
| | | 6 tanker | 64 | 5 | 100 |
| | | 7 n.e.s. | 41 | 5 | 80 |
| medium, total | | | 1723 | 80 | 90 |
| small, 2-9 employees | | | 2366 | 40 | 70 |
| small, 0-1 employees | | | 5103 | 100 | 45 |
| Total | | | 9273 | 303 | 70 |

* 1991, estimated

The results given here are to a certain extension provisional. The date of closure for this report was August 15, 1994. 2% of the reporting units is still to be visited.
The general willingness to cooperate was surprisingly high: one respondent turned out to be a *shipping* company instead of a road haulier, but was willing to cooperate anyway. Perhaps we should also consider compiling an index for transport services by boat.

## 6. Conclusions and prospects

The results presented in scheme 5.1 reflect the willingness and ability of the reporting units to comply with the observation method. The results vary depending on the size of the firms and the type of lorries they use, but the conclusion that the response is good holds for all sizes and kind of specializations. The relatively low figure for very small firms (45%) should be viewed in the light of the fact that they have not been visited like other firms
In the future the pilot survey will probably be transformed into a regular price survey, depending on the results an evaluation. Not only will the number of transport firms be increased, the number of trips per reporting unit will also be extended. When the reporting units in road haulage are accustomed to price surveys it is likely that some kind of follow up visit will take place. Larger firms in particular might be better observed by selecting more trips.

Index numbers resulting from this pilot project will be published in 1995.

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