VOORBURG GROUP ON STATISTICS

THIRTEENTH MEETING

Rome, 21-24 September 1998

Session 7

THE DEVELOPMENT OF A CORPORATE SERVICES PRICE INDEX FOR COMPUTER AND RELATED SERVICES

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Abstract

The creation of a price index for the Computer and Related Services Industry is complex and difficult. The paper describes some of the issues faced in the UK during the development work for an experimental index for the industry. Two main issues are highlighted. The current classification does not readily lend itself to the creation of price indices and defining prices for products and services in the industry requires a range of pricing formats to be devised. As far as possible these need to allow for quality adjustment to be identified and recorded.

Introduction

1. This paper describes the work being undertaken by the United Kingdom Office for National Statistics (ONS) to develop a price index for Computer and Related Activities (CRA) ISIC 721-726 (SIC92 Section K Division 72). The index has not yet been completed. However, the diverse nature of the division, and the complexities of the pricing of the services produced, does generate a wide range of issues which merit discussion.

2. The division itself has an estimated total turnover in the UK of £10.6 billion or 1.2% of GDP. The index is being developed as one of many being produced in the UK to contribute to an overall Corporate Services Price Index. The CRA index generates a great deal of interest from potential users. The Year 2000 ("Millennium Bug") issue, the introduction of the EURO, the development of IT Outsourcing, as well as the continuous upgrading of software products has led to an increased demand for computer and related services at a time when costs of computer hardware are shown to be continually falling. Recruitment agencies as well as service managers are keen to monitor the market prices for computer and related services, particularly those with a high proportion of staffing costs.

A definition of Computer and Related Services

3. Table 1 shows the breakdown of the sector into its component parts as identified in the CPC, ISIC and SIC92 (the UK Standard Classification).

TABLE 1 THE CLASSIFICATION OF COMPUTER AND RELATED SERVICES

ISIC Revision 3			CPC Version 1.0
Code	**Groups**	**Code**	**Classes**
721	Hardware consultancy	83141	Hardware consultancy services
722	Software consultancy and supply	83142 83149 83150 83160	Software consultancy services Other computer consultancy services Computer facilities management services Systems maintenance services
723	Data processing	85960	Computer processing services
724	Data base activities	84210 84290	On-line access services Other information retrieval and supply n.e.c.
725	Maintenance and repair of office, accounting & computing machinery	87130	Computer hardware servicing, repair and maintenance
726	Other computer related activities		

4. The table shows the consistency between ISIC and the CPC. However, this disaggregation has not been found to be particularly useful. In some areas, particularly in the classes of hardware consultancy and software consultancy and supply, the definitions have been found to be unclear, this has led to the UK adopting an amended set of product headings.

The UK Service Price Index Research Approach

5. The ONS follows a clear research based approach to developing service price indices. The UK has selected a range of classes and subclasses and is developing new Corporate Sector Price Indices for each. The selection of indices was described in a paper by Jonathan Price put to the Voorburg Group in 1996. Basically the ONS has concentrated on sectors where there is an urgent need for a more suitable deflator `in the calculation of GDP(O). A second criterion used for the selection of indices has been the 'degree of difficulty'. The ONS has gained some experience in producing the relatively straightforward price indices such as Courier Services and Office Cleaning and is now moving to more complex areas, one of which is Computer and Related Services (CRA).

6. The starting point for research is the nomenclature and although in many service industries this is insufficiently disaggregated to be meaningful, in others the disaggregation itself is unhelpful. The Service Price Index inquiry team then reviews the ONS' Inter-Departmental Business Register (IDBR) which holds details of all businesses in the UK classified to SIC(92) which corresponds to NACE. This register is analysed to establish the size, number and turnover of businesses classified to the industry, and to provide a picture of the industry.

7. The research team then visit Trade Associations, Other Government Departments and informed sources to establish what 'products' are produced by the industry and to relate them to the nomenclature (in the absence of a detailed SERVCOM list which applies in the production area for the Producer Price Index (PRODCOM)). Companies in the industry are then contacted so that they can provide their views on industry product breakdown and pricing methodologies which are most suitable for individual product groups. A form is then developed for product recruitment and product pricing.

8. This enables a pilot phase to commence in which contributors are required to provide product details/specifications and prices. The index is then run 'experimentally', during which time price movements are analysed.

Research into the Computer and Related Services Industry

9. At present the calculation of the Computer Services Component of the Output measure of the Gross Domestic Product in the UK National Accounts (GDP(O)) is based on an aggregation of the 3-digit NACE classification. (Please see annex 2 for a further breakdown). An estimate of turnover is derived for three groups within CRA.

- 7210, 7230, 7240, 7260 - Hardware Consultancy
  Data Processing
  Database Activity
  Other Activities

- 7220 - Software consultancy and supply

- 7250 - Maintenance of office/computer machinery

However the research into computer activity has found that it is difficult to price these activities together to form a deflator. At present the Retail Price Index and Average Earnings Index are used to deflate the value figure.

10. Discussions with the computer industry have revealed a number of problems with the existing nomenclature. The main problem is that the computer companies and industry associations interviewed did not recognise the existing functions in the nomenclature but prefer a different split which allows for 'outsourcing' to be separately identified. Further consultation is taking place with Trade Associations.

11. Some of the difficult areas mentioned by the industry included defining a price for 'database activities'. 'Hardware consultancy' as distinct from 'software consultancy' would also not be easy for computer companies in the Computer and Related Services Sector to price as they are now more likely to produce a contract for a system (hardware and software) or to provide entire facilities on an outsourced basis. Thus table 2 shows a new breakdown currently being discussed with computer companies. This is being used to test whether companies acknowledge this structure and to test whether they can price products/services on the basis of this. The relationship between this split and the existing nomenclature is shown in table 3.

12. Table 3 relates the current split of the CSPI for Computer Services to the SIC 92 (ISIC) nomenclature. While it can be seen that there is a direct read-across for some processing services, no prices are collected for 'Hardware Consultancy' as such. However, under the heading of 'Software Consultancy' there are a range of priceable products. The percentages shown in the table are the estimated breakdown of turnover provided by UK companies in the CRA sector.

TABLE 2: DIAGRAMMATIC REPRESENTATIONS OF UK PRICE INDEX FOR COMPUTER AND RELATED SERVICES

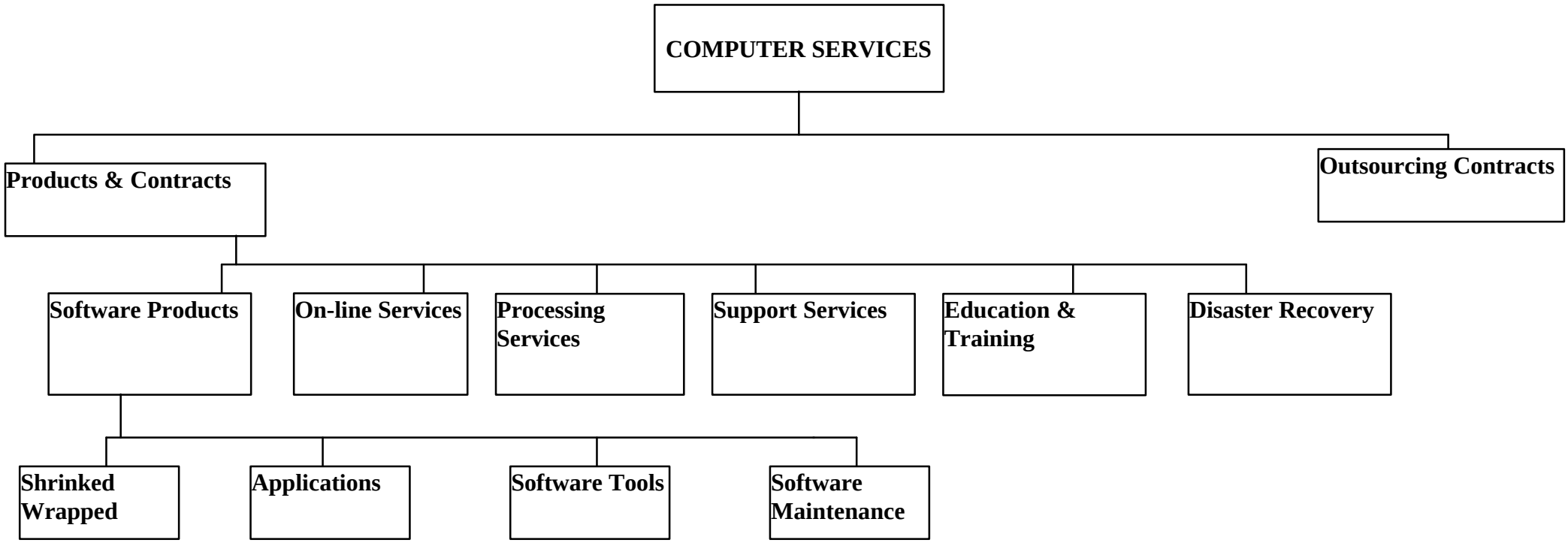


TABLE 3: COMPUTER AND RELATED SERVICES - DISAGGREGATED PRODUCTS

ISIC/SIC92	ESTIMATED % OF TURNOVER	UK CSPI PRODUCTS
72.2 Software Consultancy		(Software products
	7.6	(- shrink wrapped software
	25.1	(- software applications
	8.1	(- software tools
	4.3	(- software maintenance
73.3 Data Processing	1.4	Processing Services
	2.5	On-line Processing
72.4 Database Activities		
72.1 Hardware Consultancy		
72.5 Maintenance and repair of computers	31.5	(Support Services (software & hardware)
	1.4	(Disaster Recovery
72.6 Other computer related activities	15.0	Outsourcing Contracts
	3.1	Education & Training
	100.0	

The CSPI products are shown against the most logical heading, the dotted line ———— shows where a proportion of the product activity could also be attributed to sub-classes in the nomenclature.

13. The products and contracts are broken down as follows:-

- Processing Services

  - relates to computer processing services on which companies may rent time or have their work carried out. For example a payroll of specified size, or the price of processing financial applications.

- Education & Training

  - the provision of education, training related to information systems.

- Disaster Recovery

  - provision of back-up. A typical service would be a 'hot start' or 'cold start' system for an IS system which has failed. For example a charge for particular configuration and service level might be used.

- Software Products

- Support Services

  - A whole range of support service contracts are now available including hardware support such as technical support for a large mini/mainframe computer or a computer network. These would include a contract for telephone support.

- On-Line Services

  - these services enable access to remote mainframes or for example an Internet address which could be specified in terms of the number of pages, perhaps the number of users per year.

14. The remaining key area of operation for companies in the CRA sector is outsourcing. This is defined as follows:-

- Outsourcing

  - A relatively large proportion of the businesses classified to SIC(92) 72.00 are involved with outsourcing contracts. Outsourcing can be defined as the provision and management of a client's complete on-site data processing needs. This can include the provision of hardware, software and computer staff or the use of the client's own resources. Outsourcing contracts tend to be relatively large and complex covering a number of market sectors and including a range of staff. Outsourcing contracts also tend to last for between 5 to 10 years.

Price Specification/Collection Methodology

15. A number of price models were considered for the 'product areas' defined in table 1.

Model Pricing

16. This involves re-pricing a relatively simple typical (model) contract which may be either notional or relate to an actual assignment and which is representative of the work load both then and now. For many computing services it would be time consuming and costly to re-price contracts accurately. One of the problems of developing price specifications for the computer industry is the rapidly changing nature of the industry. This makes the use of a model price approach difficult to use. There is also considerable doubt about whether adequate records are held. More subjective estimates would hold little value. However, this approach is being tried on outsourcing contracts and may be of use in the pricing of some software maintenance work. Contributors are asked to consider quality improvements in such model contracts although no research has yet been conducted to see how successful the system is in recording quality changes.

Contract Prices

17. Monitoring the periodic payments under a continuing contract is thought to be a better way forward for some business sectors for example, repair and maintenance services. However, there are drawbacks with this approach. It is more difficult to disentangle volume changes from pure price effects. This problem would be particularly acute for computing services. As with all long term contracts, there is difficulty in monitoring price change through the period when contracts pass from one supplier to another. However the Contract Price approach does have benefits, it is simple to use and is understood by contributors. It is being trialled in several areas of the CRA index particularly where some kind of maintenance contract is involved. Clearly defined contracts have been identified for disaster recovery work, some software maintenance and support services (software and hardware). When contracts are renewed the specification for the product price is changed and at this stage the inquiry team aim to ensure that any quality changes are recorded.

Fee Determinants

19. This involves measuring the determinants of price: salary, mark-up and labour productivity. There would be three elements to this inquiry: total salary costs by principal grade or for a representative basket of grades, mark-up realised and in the longer term a productivity assessment (eg an assessment of time taken).

Most contracts are priced by calculating:

hours * salaries of chargeable staff * mark-up

There are drawbacks with this approach. There is no clearly defined employment structure in the computer services industry. This causes difficulties in measuring changes in the skills mix of staff and in determining whether changes in fee income are the result of price changes or staff skill changes. However it could be used as a proxy for the price index in a sector where consultancy is important. Although this is being offered to companies as a way of constructing a price it is presently not being applied in the CRA index in this form. However some companies do provide an hourly rate with mark up. This is very much a least favoured option because it does require further investigation into quality and productivity change.

Actual Transactions

20. For a number of services (eg processing services) the charge per transaction could be measured directly and this is the preferred approach. So, for example, a price per payroll item is being quoted by companies providing a processing service for pay. This has the advantage of yielding information on productivity of more general application. By comparing movements in charges per transaction and charges per period we may be able to determine changes in productivity. ONS may then use productivity movements in processing services to proxy productivity movements in other areas of computer services. This is being used in the index although there are only a limited number of areas where it can be applied. Another advantage of this approach is that quality adjustments are more easily identified when a price changes. ONS staff engage contributors in a discussion about the product specification and are able to ascertain what proportion of the price change is due to quality improvements.

The Recruitment Exercise

21. A recruitment exercise for computer services was started at the end of 1996. The ONS has collected prices on products and contracts since Q4 1996. In total ONS has recruited 17 contributors and 140 price quotes. The sample is therefore very limited and to date only 5 of the sub-indices have been created. Recruitment takes place on a quarterly basis. The Producer Price Index for manufacturing which collects price quotes for over 9,000 items usually monitors new price quotes for 4 months before data are fed into the 'live' index. Thus the CRA data are still very provisional.

The Experimental Index on Computer and Related Services

22. A limited amount of price information has now been collected against the various sub-indices. Some, like outsourcing, still have insufficient price quotes to enable a realistic sub-index to be produced. A number of potential contributors who have been approached continue to stress the difficulties in producing a meaningful price for what are 'one-off' contracts in many areas, and quality adjustment is difficult to apply.

23. The provisional results of experimental indices are shown in figures 1 to 6. The fact that only a limited number of price quotes are collected does create greater volatility than would be expected when the index is fully operational. The data remains 'provisional' and continues to be examined.

24. Notwithstanding the above, some interesting results can be observed. Support Services (fig 5) show a recent increase in price possibly because of the shortage of supply of computer staff leading up to the millennium. Education and Training prices have also risen recently. Meanwhile no increases in on-line services have been observed since 1997. The high level Computer Services Index is still incomplete (it does not, for example, include outsourcing). Nevertheless it has shown an increase of around 1% since the start of 1997.

Figure 1

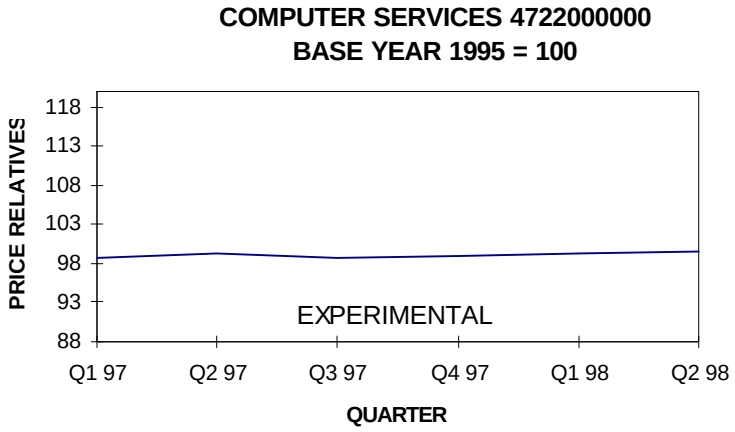


Figure 2

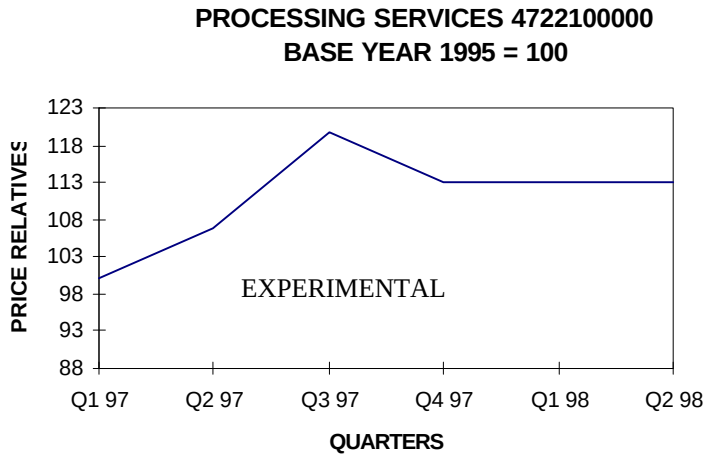


Figure 3

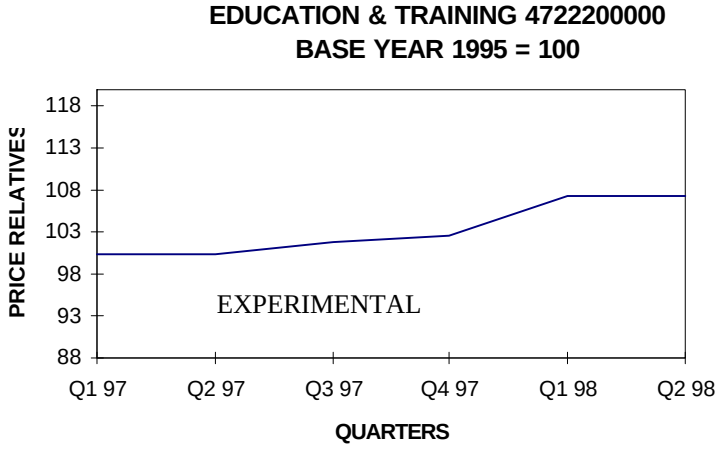


Figure 4

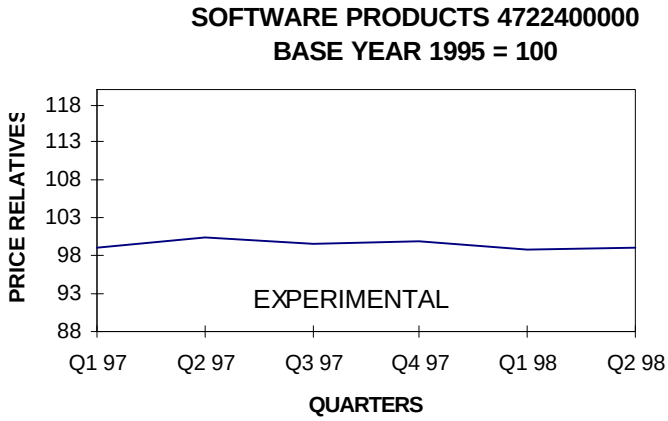


Figure 5

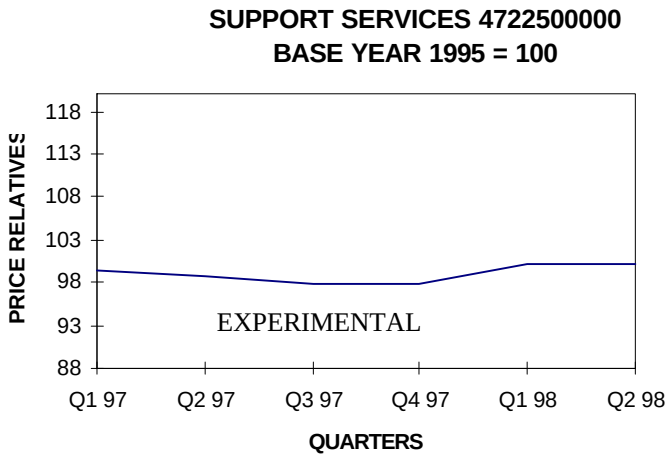
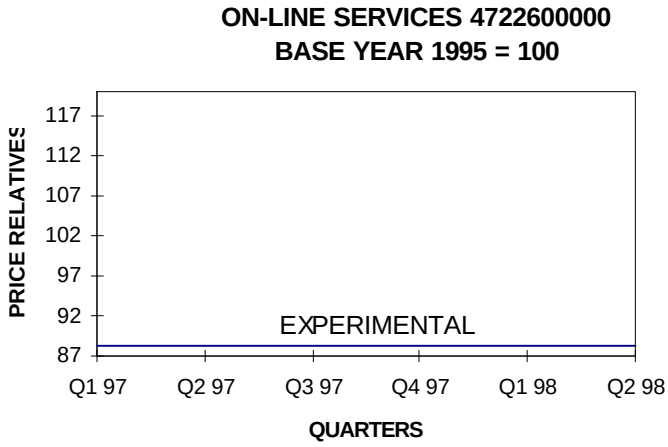


Figure 6



Conclusion and Future Issues

25. The UK ONS will continue to develop the index for Computer and Related Activities. however it is already apparent that some conclusions can be drawn:-

- The current disaggregation of Sector 72 (Computer and Related Activities) is inadequate and requires examination. It is a fast moving, changing industry which demands that the nomenclature keeps pace with the change.

- In the UK the Trade Associations have provided the basis for an alternative structure which computer companies generally accept, work in this area is continuing.

- A whole range of pricing options exist but only relatively few can be based on a simple transaction price.

- Contract prices are likely to feature strongly in the industry index.

- Quality adjustments are therefore difficult and need to be addressed by having very clear specifications for contracts which can be amended when prices change.

- Many contracts in the industry are 'one-off' and are difficult to specify. The concept of a fees approach has not been successfully applied as an alternative.

- Future developments will concentrate on testing product and service pricing alternatives with special attention being paid to one-off contracts and quality adjustment.

References

J Price - Development of an Index of Producer Prices for Services in the UK Voorburg Paper - 1997

J Price - "Producer Prices for Services : Development of a new Price Index" July 1996

72 COMPUTER AND RELATED ACTIVITIES

72.1 Hardware consultancy

72.10 Hardware consultancy

This class includes:

- consultancy on type and configuration of hardware and associated software application:
- analysing the users' needs and problems and presenting the best solution.

This class excludes:

- *hardware consultancy carried out by computer producing or selling units cf. 30.02, 51.64, 52.48/2*

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SECTION K REAL ESTATE, RENTING AND BUSINESS ACTIVITIES

72 COMPUTER AND RELATED ACTIVITIES

72.2 Software consultancy and supply

72.20 Software consultancy and supply

This class includes:

- analysis, design and programming of systems ready to use:
- analysis of the user's needs and problems, consultancy on the best solution
- development, production, supply and documentation of order-make software based on orders from specific users
- development, production, supply and documentation of ready-made (non-customised) software
- writing of programs following directives of the user

This class excludes:

- *reproduction of non-customised software cf. 22.33*
- *software consultancy related to hardware consultancy cf. 72.10*

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72 COMPUTER AND RELATED ACTIVITIES

72.3 Data processing

72.30 Data processing

This class includes:

- processing of data employing either the customer's or a proprietary program:
- complete processing of data
- data entry services
- management and operation on a continuing basis of data processing facilities belonging to others

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72 COMPUTER AND RELATED ACTIVITIES

72.4 Database activities

72.40 Database activities

This class includes database related activities:

- database development: assembly of data from one or more sources
- data storage: preparation of a computer record for such information in a predetermined format
- database availability: provision of data in a certain order or sequence, by on-line data retrieval or accessibility (computerised management) to everybody or to limited users, sorted on demand.

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72 COMPUTER AND RELATED ACTIVITIES

72.5 Maintenance and repair of office, accounting and computing machinery

72.50 Maintenance and repair of office, accounting and computing machinery

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72 COMPUTER AND RELATED ACTIVITIES

72.6 Other computer related activities

72.60 Other computer related activities

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ANNEX 2

SECTION 72 COMPUTER AND RELATED ACTIVITIES

SIC SECTOR/DESCRIPTION		INDICATOR	WEIGHT (GDP=1000)	DEFLATOR
7210 & Hardware consultancy 7230 & Data Processing 7240 & Database activities 7260 Other computer related activities	MT1	Deflated gross turnover (£million)	4.5	1. Average earnings (GB) index: Real estate, renting and business activity - adjusted for changes in productivity