Measuring the Real Output of Services Activities: An Audit of Services Producer Price Indexes.

Mary O'Mahony
King's College London

Lea Samek
NIESR

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Preliminary

Abstract
Complementing previous methodological guidelines in measuring services producer price indexes, this report is an audit of actual prices based on data for up to 31 individual service activities and 16 countries. Using a combination of descriptive statistics, panel regressions and more detailed sectoral comparisons, we conclude that it is unlikely that errors in measuring services prices are especially large in the UK than in other countries. However, this preliminary analysis points to the possibility that measurement methods might have an impact that affects many services and countries, with time based measures showing greater price rises than model pricing methods.

Introduction and Context

Measuring the real output of services sectors requires not only accurate measures of the nominal output but also good measures of prices to construct volume measures. This is a priority area for ONS. Thomas (2016a) suggested that one of the key requirements with regard to price data is for improvements to the Services Producer Price Indexes (SPPIs) which are used to deflate domestic output of services.

There are a number of National and International initiatives to improve both our understanding of measurement methods and provide better estimates of SPPIs. ONS carried out a recent quality review of SPPIs, summarised in Thomas (2016b). This recommended improvements in the quality and coverage of existing SPPIs, including "the introduction of rotational sampling in the SPPI survey to establish the SPPIs on a sustainable, methodologically-robust foundation" as well as the development of new SPPIs. In the recently updated guide for developing statistics on SPPIs, OECD/Eurostat (2014) provides a detailed guide on methodology on mechanisms that services providers use to price their outputs, possible data sources and a review of practice for a number of countries. The Voorburg Group[1] group reports contain more details of the discussions among National Statistical Institutes (NSI) on ways to measure prices of services activities.

Since there is considerable effort currently devoted to reviewing and improving methodologies and data sources, we do not attempt to duplicate this but instead undertake a systematic attempt to compare the resulting SPPIs. This parallel exercise should help inform the discussions of NSIs and International bodies. Therefore, this preliminary audit concentrates on international comparisons of producer prices for services activities, using data that is in the public domain and easily downloadable from NSI websites.

[1] The Voorburg Group on Services Statistics was established in 1986 in response to a request from the United Nations Statistical Office to help in the development and production of services statistics. Its objective is the design of an internationally comparable methodology for measuring the constant dollar outputs of the service industries. Available at: http://voorburggroup.org/

The audit starts with the SPPIs produced by ONS, and reviews them against similar prices in other countries. This takes the form of calculating annual average price changes, relative to GDP deflators, for specific services and describing these across a number of dimensions, such as country, time and measurement method. The main aim is to gain some idea of the extent to which the UK prices deviate from the average across countries. Unlike for traded goods, there are no market mechanisms that would lead to common price levels across countries for the same service. At the same time, we should not expect very large deviations in relative price growth, and any such deviations might indicate measurement issues that need addressing.

In total we included data for 16 countries and 31 separate SPPIs. The choice of SPPIs was driven by those available for the UK and the choice of countries was dictated by the availability of readily downloadable SPPI series. OECD/Eurostat (2014) reviews the mechanisms that services providers use to price their outputs. They divide these into three broad groups: explicit output charged mechanisms where a fee/price is charged for a service based on the output provided; time-spent mechanisms where an explicit fee/price for the service is charged and payable as a function of time spent delivering the services; and margin-pricing where no explicit fee is identifiable but instead is bundled within the price of another good or services. This review concentrates on the first two mechanisms. Therefore, we excluded Wholesale and Retail Trade and Financial services from the analysis as these services employ margin pricing; these services will be covered in more detail in future ESCoE reports.

The main conclusion we derive from this analysis is that UK services prices tend on average to have either lower or equal price growth than in other countries, suggesting that an underestimate of services output growth is not likely to be an explanation of why productivity growth slowed more in the UK than in other countries after the financial crisis. We also find evidence that time based measurement methods tend to have higher annual growth than other methods, in particular than model pricing. This might affect real output growth and productivity in sectors that intensively use the former, such as professional services. The impact of this on aggregate productivity growth is likely to be relatively small, given the size of these sectors.

The analysis in this report, however, is purely descriptive. Some reasons why we might observe systematic differences in price growth across countries are the regulatory environment in which services firms operate and the extent to which firms adopt new technologies. In a later report we will consider the extent to which these variables explain some of the observed services prices growth.

This report first outlines the methods and coverage for comparing SPPIs. We then provide some general descriptive analysis, based on summary statistics and panel regressions. This is followed by a more detailed examination of specific sectors. Finally we conclude with some general observations and suggestions for future research.

Method

The starting point for the choice of price series was the UK SPPIs. We then checked availability of series for other countries and excluded a number where no comparable data were available. We extracted data from 2001 to 2016, although for many countries/services the series start much later than 2001.

We extracted data for 284 separate SPPI series, mostly by industry but sometimes by commodity to fill gaps. All the SPPIs are business to business. Table 1 lists the countries and shows the number of price series available for each. By design the UK has the highest number of SPPIs, closely followed by France, the US and Australia. A significant number of SPPIs on the UK list were also available for Finland and Sweden and more than half were available for Austria, Germany, the Netherlands and Norway. The availability was much lower for other countries. However it is important to emphasise that this exercise was based on series that were downloadable from public databases. In many cases the prices could not be compared as the level of industry aggregation was too high, e.g. many countries reported series for advertising and market research combined. In the next stage we hope to obtain more disaggregated SPPIs directly from NSIs.

Table 1. Coverage of SPPIs by Country

Country	***No. of SPPIs***	***Country***	***No. of SPPIs***
UK	31	France	28
US	26	Germany	19
Australia	25	Italy	12
Austria	16	Netherlands	18
Belgium	8	New Zealand	8
Canada	11	Norway	17
Denmark	8	Spain	12
Finland	22	Sweden	23
		Total	**284**

Table 2 shows the list of SPPIs compared and the number of countries for which these data were available. A number of services had almost complete coverage, including freight transport by road, courier services, storage and warehousing, computer services and industrial cleaning services. Others have very few entries, for example bus and coach hire, vehicle ferries, sound recording and secretarial services. Nevertheless the sample represents a reasonable cross section by type of service and is not overly concentrated in any one sector.

Table 2. Coverage of SPPIs by type of service.

Title	No. of SPPIs
4921: COMMERCIAL RAIL FREIGHT	5
4939: BUS AND COACH HIRE	3
4941: FREIGHT TRANSPORT BY ROAD	15
5011: VEHICLE FERRIES - COMMERCIAL TRAFFIC	3
5020: SEA & COASTAL WATER FREIGHT TRANSPORTATION SERVICES	12
5210: STORAGE AND WAREHOUSING	14
5224: CARGO HANDLING	11
5229: FREIGHT FORWARDING.	5
5310: NATIONAL POST/PARCELFORCE	8
5320: COURIER SERVICES	15
5510: LICENSED HOTELS AND MOTELS WITH RESTAURANTS. BUSINESS CUSTOMER	7
5620: CANTEENS AND CATERING	5
5810: BOOK PUBLISHING SERVICES	5
5920: SOUND RECORDING AND MUSIC PUBLISHING SERVICES	2
6110: BUSINESS TELECOMS	11
6200: COMPUTER SERVICES	15
6820: PROPERTY RENTALS	8
6830: REAL ESTATE AGENCY	8
6910: LEGAL SERVICES	10
6920: ACCOUNTANCY	11
7022: BUSINESS AND MANAGEMENT CONSULTANCY	12
7111: ARCHITECTURAL SERVICES	10
7112: ENGINEERING SERVICES & RELATED SERVICES	10
7120: TECHNICAL TESTING AND ANALYSIS	9
7312: ADVERTISING SERVICES	10
7320: MARKET RESEARCH	8
7732: RENTING SERVICES OF CIVIL ENGINEERING MACHINES AND EQUIPMENT	8
7800: RECRUITMENT AND PERSONNEL SERVICES	13
8011: SECURITY SERVICES	13
8122: INDUSTRIAL CLEANING	14
8210: SECRETARIAL ACTIVITIES	4
TOTAL	**284**

OECD/Eurostat (2014) lists various sources of data that can be used in constructing SPPIs. These include: Real transaction price (the price of a service actually paid in the market, inclusive of any discounts, surcharges or rebates); List prices; Unit values calculated as the ratio of revenues to amounts sold; Percentage fees, Expert estimate; and Input data. Given these sources they distinguish pricing mechanisms used by national statistical offices. We

attempted to classify SPPIs by type of measurement method, using information from national sources, OECD/Eurostat (2014) and reports by the Voorburg Group. However we could only readily find information on the measurement method for 155 or 55% of the 284 SPPIs in our sample. So the analysis by measurement method is more limited.

The division by measurement method includes:

Direct use of prices of repeated services (RP) - this uses either real transaction prices, or sometimes list prices, of the same service product in successive survey periods.

Contract pricing (CP) – this relies on prices in long term contracts for the repeated delivery of similar services.

Percentage fee (PF) – this method calculates the price of the service as the product of the percentage fee and value of the product to which the fee relates.

Unit value (UV) – this constructs prices as the ratio of revenue to quantities.

Model pricing (MP) – this is based on the hypothetical price of a (representative) standardised service.

Time based (TB) – this is where the price of a service is specified in terms of the time spent in its provision.

To this we added a further category, **Mixed Methods (MX)**, where the method was identifiable but involved a mix of the above methods and there was no clear reason to allocate to one of these.

The descriptive analysis using method of measurement was only applied to those SPPIs where the readily available documentation allowed us to identify the method.

Table 3 shows the coverage of SPPIs by measurement method. The highest concentration is in MX – in an extension we hope to divide this into more groups, e.g. one group where RP and CP are only used. RP and CP are most heavily employed in transport services whereas MP and TB are most used in professional services. Again, there are exceptions so that the measurement method does not map entirely into sectors. PF on its own was a relatively rare occurrence but featured more frequently as one of the methods in the MX group.

Table 3. Coverage of SPPIs by measurement method.

	RP	**CP**	**PF**	**UV**	**TB**	**MP**	**MX**	**Total**
No. of SPPIs	38	18	4	11	28	15	41	**155**

Summary Descriptions

SPPIs: International Comparisons.

We begin with reporting summary statistics by country. We calculate the annual (log) growth in services prices relative to the annual growth in the GDP deflator for each country, to abstract from country specific macroeconomic factors that might affect prices. We then removed a very small number of outliers where price change was more than 20% per annum. This yielded just under 3000 observations on annual price growth. The first column of Table 4 shows the number of observations by country. This largely reflects the availability of SPPIs in Table 1, but the countries where only a few SPPIs were available also reported these for shorter periods of time. The negative mean value overall says that services prices on average grew by 0.36 percentage points per annum less than prices in general as measured by the GDP deflators. For most countries the mean is negative, the exceptions being the US and Sweden. The average relative price declines were greater than or equal to the UK in only three countries - Italy, New Zealand and Spain - all of whom have small numbers of observations. Relative to the larger countries, there appears to be, on average, a greater relative services price decline in the UK. However, it is obvious from the values for the standard deviation and the range between Max and Min that there is very large variation in all countries.

A similar picture emerges if we restrict attention to the period from 2006, which is the starting year for a greater number of countries. If we restrict further to 2010 onwards, then on average prices decline marginally in the US and the difference between the UK and France and the Netherlands is much smaller. Nevertheless average relative price declines remain greater in the UK than other countries.

Table 4. Summary Statistics, all periods

	No. obs	Mean	Stdev	Max	Min
All countries	2952	-0.35	3.09	19.01	-18.64
UK	388	-0.69	3.11	11.08	-16.23
US	324	0.06	3.12	15.88	-9.73
Australia	375	-0.31	2.96	9.16	-10.65
Austria	141	-0.22	2.48	6.92	-17.65
Belgium	77	-0.15	2.63	10.50	-10.26
Canada	90	-0.11	3.25	8.03	-15.48
Denmark	80	-0.08	1.80	5.20	-3.68
Finland	151	-0.41	4.30	11.05	-18.64
France	245	-0.49	2.30	7.86	-14.34
Germany	194	-0.40	2.87	19.01	-15.08
Italy	84	-1.70	3.48	7.78	-16.10
Netherlands	183	-0.32	2.53	5.25	-18.30
New Zealand	120	-0.67	2.75	7.56	-10.03
Norway	165	-0.10	4.72	10.50	-12.98
Spain	106	-0.69	3.14	8.83	-15.06
Sweden	229	0.13	2.82	11.77	-16.96

Given the very large standard deviations relative to the mean in Table 4 it is worth looking at the results from panel regressions to get an idea of the significance of these differences across countries. First we regressed the growth in relative prices on country dummies with the UK as the excluded country, then added year dummy variables to abstract from period specific effects and finally included dummy variables for the 31 SPPI service type codes. The results are shown in Table 5.

The coefficients in the first column are all positive, with the exception of Italy, with sizeable coefficients for the US, Australia, Norway and Sweden. These results are similar when we control for time in column (2) and time and service type in column (3). When we include prices only from 2006 onwards, shown in column 4, a greater number of countries show

significant positive coefficients. The availability of price indexes before 2006 are confined to a few countries and mostly in the transport sectors.

Table 5. Regressions results: Dependent variables is growth in relative SPPIs

	2001-2016			**2006 - 2016**
	(1)	**(2)**	**(3)**	**(4)**
US	0.76***	0.75***	0.64***	0.71***
	(3.24)	(3.21)	(2.85)	(2.75)
Australia	0.38*	0.40*	0.12	0.49*
	(1.70)	(1.79)	(0.54)	(1.89)
Austria	0.47	0.49	0.50*	0.66**
	(1.56)	(1.58)	(1.68)	(2.12)
Belgium	0.55	0.53	0.18	0.33
	(1.42)	(1.35)	(0.47)	(0.84)
Canada	0.58	0.57	0.53	0.84**
	(1.60)	(1.57)	(1.52)	(2.12)
Denmark	0.61	0.59	0.21	0.33
	(1.62)	(1.54)	(0.55)	(0.86)
Finland	0.28	0.26	0.25	0.44
	(0.94)	(0.85)	(0.88)	(1.45)
France	0.18	0.12	0.08	0.23
	(0.71)	(0.48)	(0.34)	(0.89)
Germany	0.29	0.26	0.21	0.40
	(1.05)	(0.93)	(0.78)	(1.38)
Italy	-1.00***	-1.08***	-0.77**	-0.64*
	(2.69)	(2.87)	(2.14)	(1.70)
Netherlands	0.37	0.35	0.35	0.24
	(1.34)	(1.23)	(1.23)	(0.82)
New Zealand	0.03	0.05	0.05	0.64*
	(0.08)	(0.14)	(0.11)	(1.66)
Norway	0.59 **	0.57 **	0.43	0.81***
	(2.05)	(1.97)	(1.52)	(2.70)
Spain	0.01	0.02	0.23	0.37
	(0.02)	(0.05)	(0.70)	(1.08)
Sweden	0.83***	0.80***	0.62**	0.62**
	(3.20)	(3.08)	(2.49)	(2.25)
Year Dummies	NO	YES	YES	YES
Code Dummies	NO	NO	YES	YES
Adjusted R^2	0.008	0.012	0.13	0.14
No. Observations	2952	2952	2952	2533

Overall these results show equal or lower price changes in the UK than other countries. In turn this suggests that there is little evidence that the explanation of the UK's relative poor

productivity performance is due to measurement issues in the services activities covered in this audit.

SPPIs: Measurement Methods

The previous finding should not be taken as implying that the SPPIs do not require improvement but rather that the UK SPPIs do not show any significant upward bias relative to other countries. It is well known that of the methods outlined above, those using time based do not allow for any productivity improvements in providing the services. In many professional services, the ONS SPPIs use time based methods. Therefore it is useful to examine the change in prices in this method relative to others, especially model pricing which is commonly used for professional services. Table 6 shows panel regressions when we include method of measurement as additional dummy variables. In this case TB is the excluded category.

Table 6. Regressions results: Dependent variables is growth in relative SPPIs

	(1)	(2)	(3)	(4)
RP	-0.27 (1.13)	-0.25 (1.00)	0.05 (0.02)	-0.56 (1.62)
CP	-0.26 (0.85)	-0.24 (0.78)	-0.25 (0.82)	-0.84* (1.89)
PF	0.59 (1.16)	0.60 (1.19)	0.99* (1.87)	1.14 (1.59)
UV	-2.42*** (6.79)	-2.38*** (6.69)	-2.45*** (6.64)	-0.74 (1.51)
MP	-0.37 (1.15)	-0.38 (1.18)	-0.75** (2.06)	-0.93** (2.40)
MX	-0.11 (0.44)	-0.09 (0.36)	-0.10 (0.36)	-0.27 (0.89)
Year Dummies	NO	YES	YES	YES
Country Dummies	NO	NO	YES	YES
Code Dummies	NO	NO	NO	YES
Adjusted R^2	0.03	0.04	0.05	0.15
No. Observations	1698	1698	1698	1698

Perhaps the most striking finding in the first three columns is the very high numbers for UV. This largely reflects trends in the Business Telecommunications sector, and is reduced significantly when a dummy variable is included for SPPI type. In column 4 we see that the

growth in prices measured using model pricing is about 1% lower per annum than that using time based methods. Using the UK as an example, and data on value added and hours worked we can calculate how much faster labour productivity would have grown in the UK if prices in NACE group M, Professional, Scientific and Technical, grew by 0.93 percent less per annum. This raises labour productivity in that group from 0.8% per annum from 2006 to 2016 to 1.7%. Multiplying this by the sector's share in aggregate GDP, about 7%, would imply increasing aggregate economy labour productivity growth by 0.07 percentage points, which is not negligible given that the aggregate growth was only 0.24% over this period. Similar adjustments might apply to other countries. This very rough calculation is likely to be an overestimate as some of the services included in section M use methods other than time based. However, it does indicate that measurement issues in constructing deflators for services activities might still play a role in explaining the downturn in labour productivity growth since the financial crisis in many mature economies.

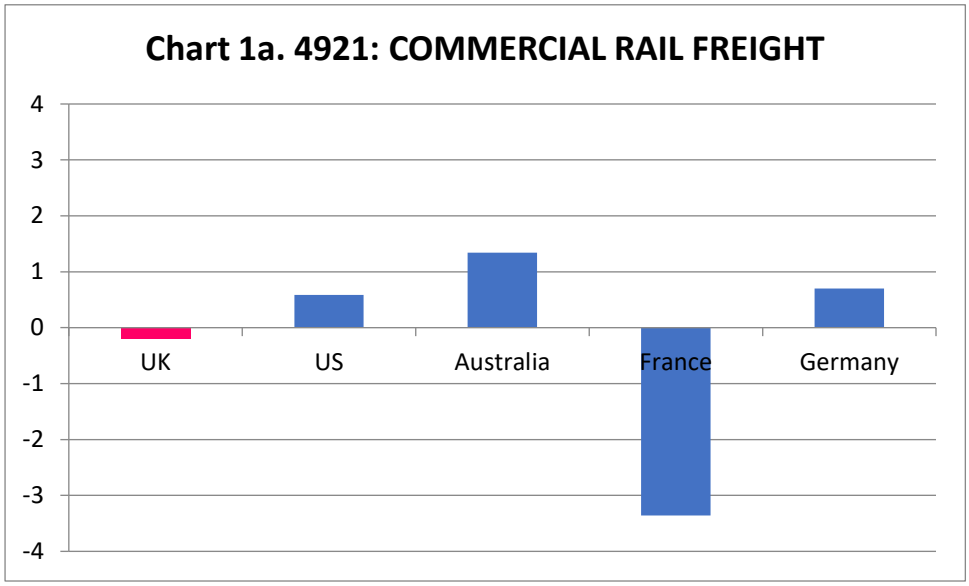
Detailed International Comparisons of SPPIs

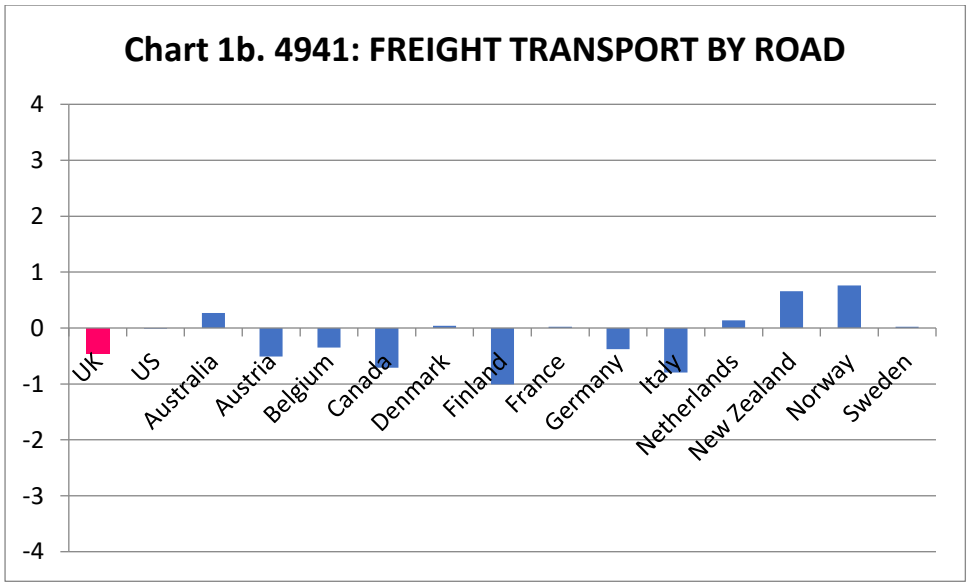
This section illustrates the growth in UK SPPIs for those where a substantial number of countries reported data. We set the cut-off point of at least 5 comparisons and look at growth rates only over the period 2006-2016 as many countries did not report data over a longer period. We also exclude countries where the number of years included within this period is small. We divide this section into discussions by broad sector. The charts below are generally scaled to between plus and minus 4% annual average growth relative to the GDP deflator, to aid comparisons, except for a few sectors where the negative scale is increased. We include a brief discussion comparing the UK and other countries and highlight the main measurement methods.

Transportation and Storage

Charts 1a to 1e show average annual relative price growth for six services within the transport sector. For commercial rail freight, freight transport by road and storage and warehousing the UK price growth is about at the mid-range across the countries. In sea and coastal water freight transportation the UK price decline is lower than for most other

countries apart from Sweden, although both the US and Germany show positive growth in relative prices in this sector. The UK shows the highest price rise in cargo handling and the lowest decline in freight forwarding. Taken as a whole, the transportation and storage sector is one where the UK relative prices appear to have slightly higher growth than other countries.





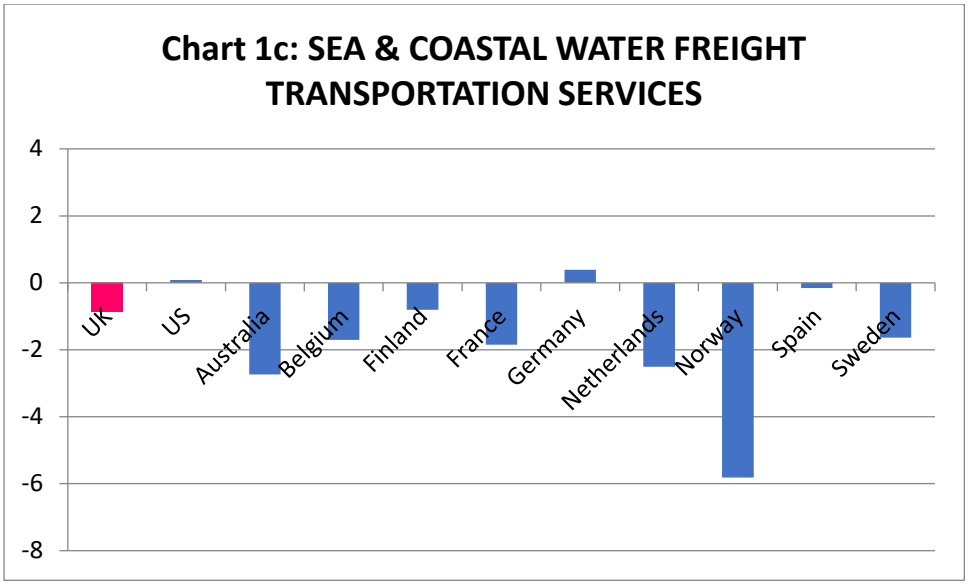


Chart 1c: SEA & COASTAL WATER FREIGHT TRANSPORTATION SERVICES
4
2
0
-2
-4
-6
-8
UK
US
Australia
Belgium
Finland
France
Germany
Netherlands
Norway
Spain
Sweden

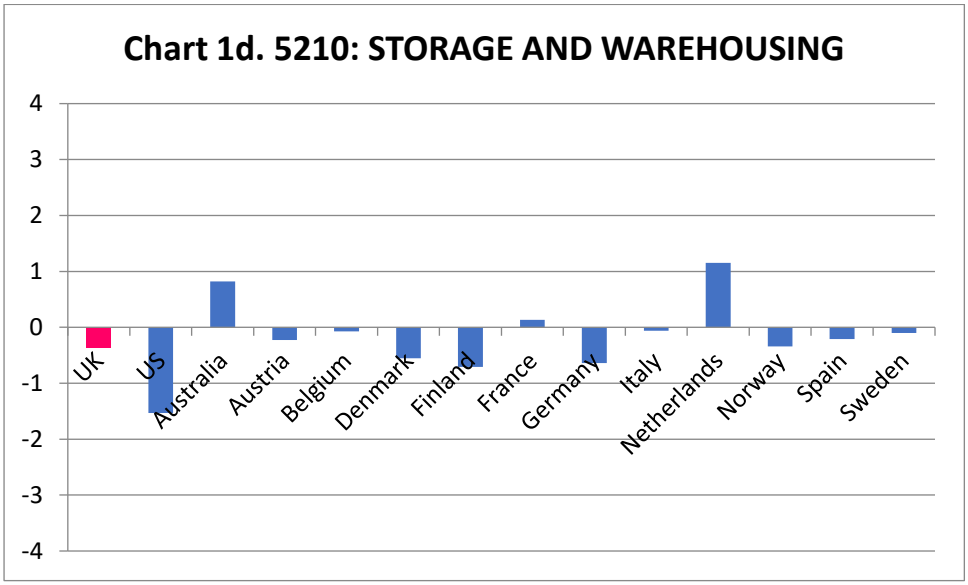


Chart 1d. 5210: STORAGE AND WAREHOUSING
4
3
2
1
0
-1
-2
-3
-4
UK
US
Australia
Austria
Belgium
Denmark
Finland
France
Germany
Italy
Netherlands
Norway
Spain
Sweden

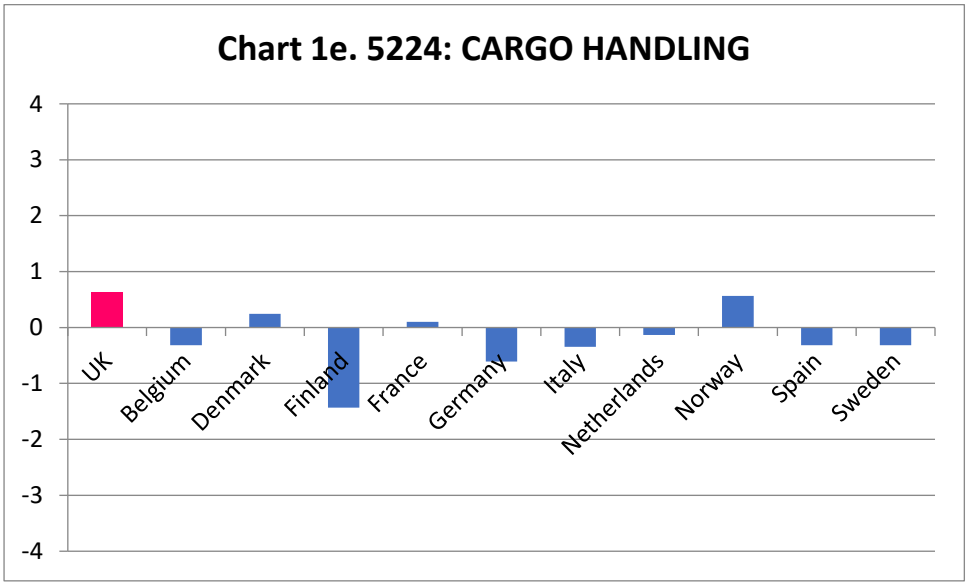
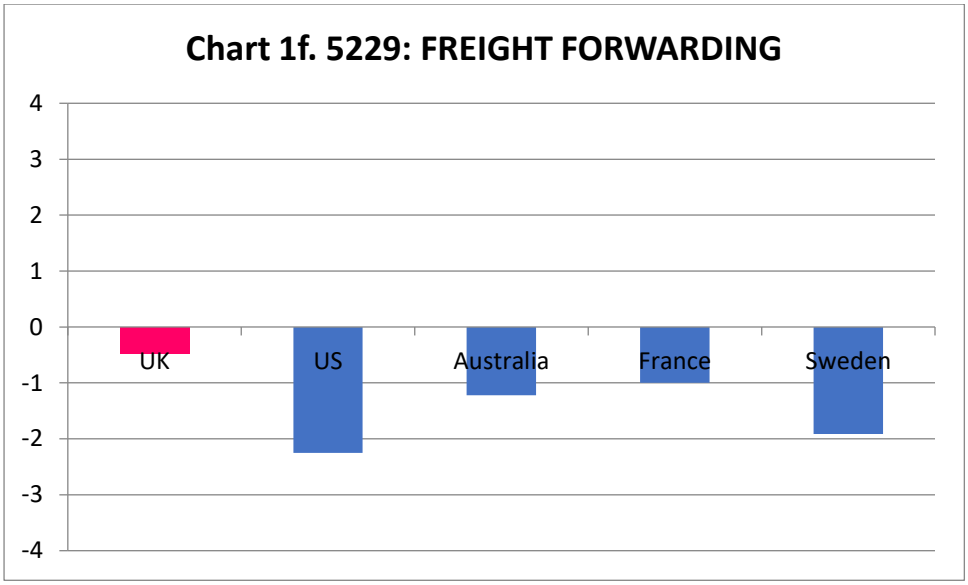


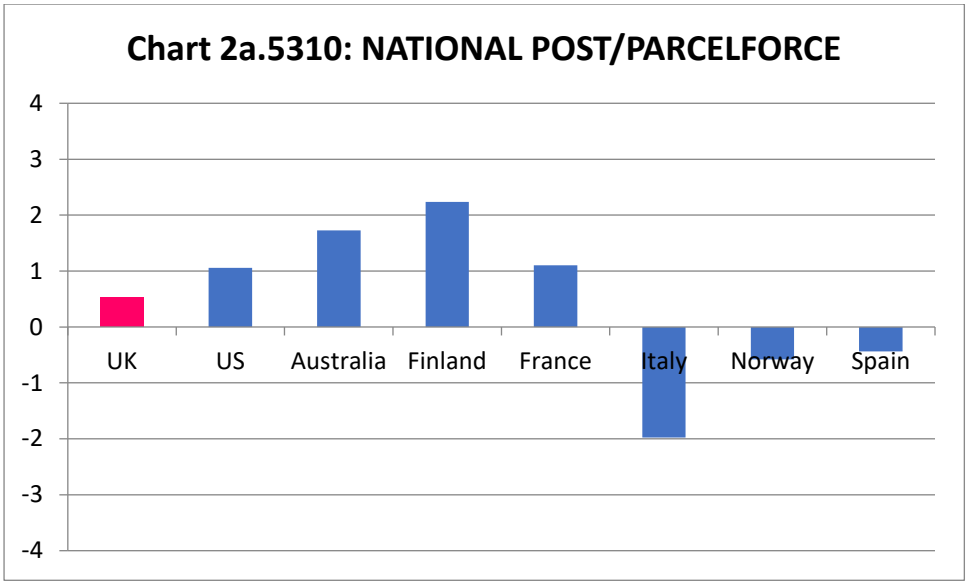
Chart 1e. 5224: CARGO HANDLING
4
3
2
1
0
-1
-2
-3
-4
UK
Belgium
Denmark
Finland
France
Germany
Italy
Netherlands
Norway
Spain
Sweden

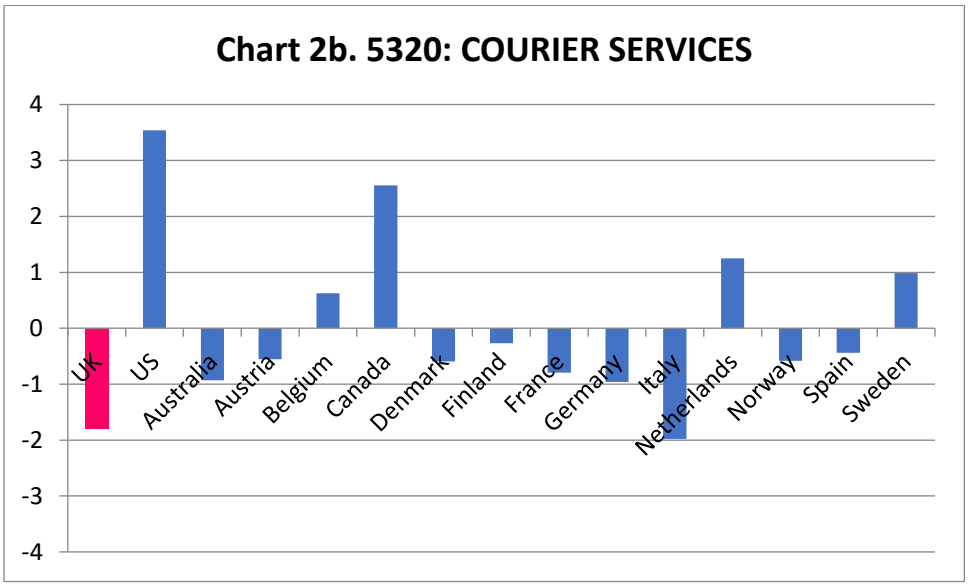


The most commonly used measurement method in this sector is RP but CP, UV and MP are used occasionally.

Postal and Courier

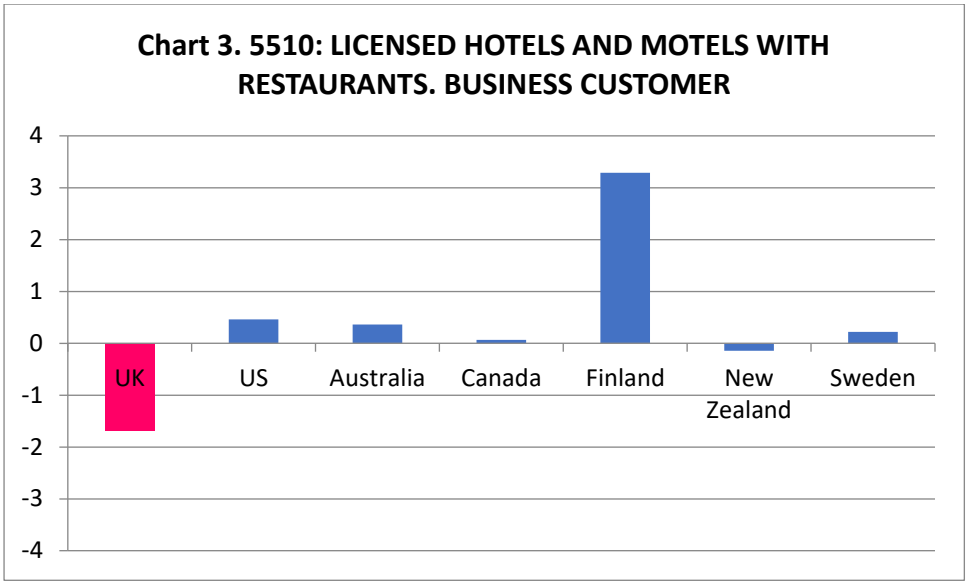
This consists of two groups, national post which often has only one public supplier, and courier services, which is generally supplied by private providers. The UK shows a small relative price rise for national post but at rates much lower than in Finland, Australia, the US and France. However, three of the countries for which comparisons could be made show declining prices, with very pronounced declines in Italy. RP is the most common measurement method with CP also used in some countries for national post. There is a greater mix of measurement methods employed in courier services, including RP, CP UV and MP. In this sector the UK shows the second highest average price decline, after the Netherlands.





Accommodation

We could only compare the UK with a few countries in the hotel services for Business. Here the UK appears to be an outlier with relative prices declining by nearly 2 percent per annum, while other countries show rising or static relative prices. RP and UV are the main pricing methods in this sector. We also collected data for canteens and catering but these were only available for a few countries and short time periods. Here the UK price rises appeared to be on a par with those in other countries.



Information and Communications

Three comparisons of SPPIs are included in this sector, book publishing, business telecommunications and computer services. Only a handful of countries report SPPIs for book publishing. Here the UK has higher relative price growth than in any of the comparators with the US also showing high growth. Prices were static in France and Sweden and falling in Australia. It was also possible to compare relative price growth between the UK and France in sound recording, but only from 2010. Both countries showed declining relative prices of more than 2% per annum, with slightly greater declines in the UK.

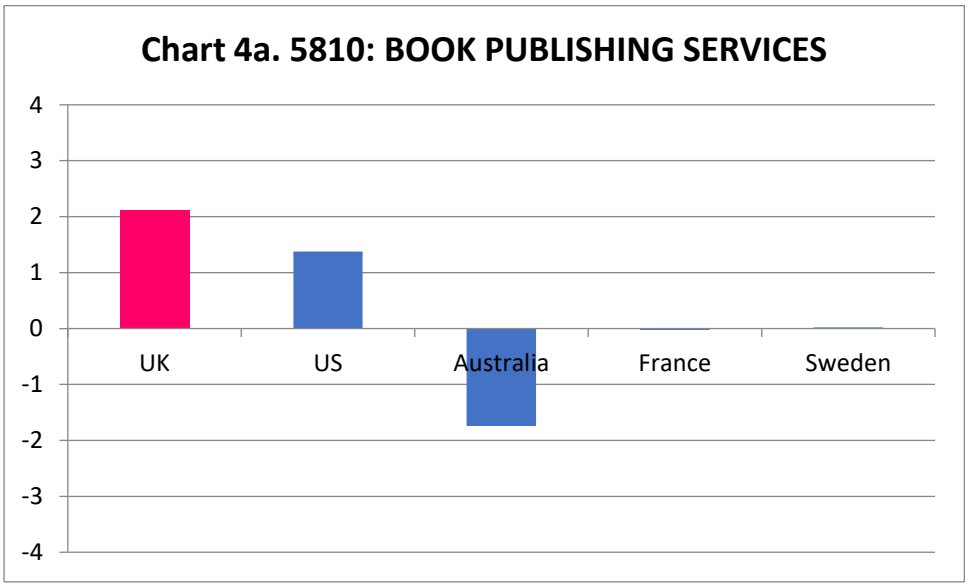
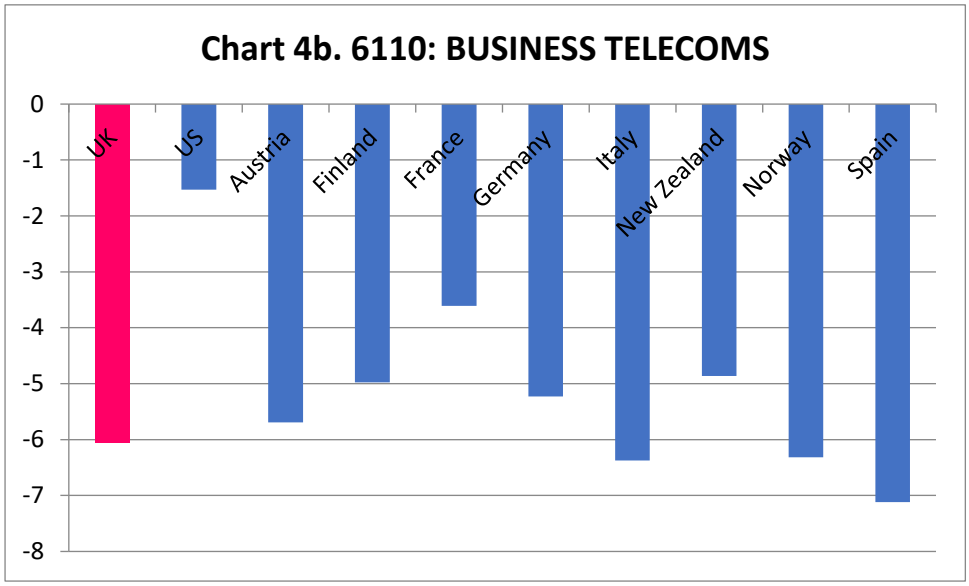
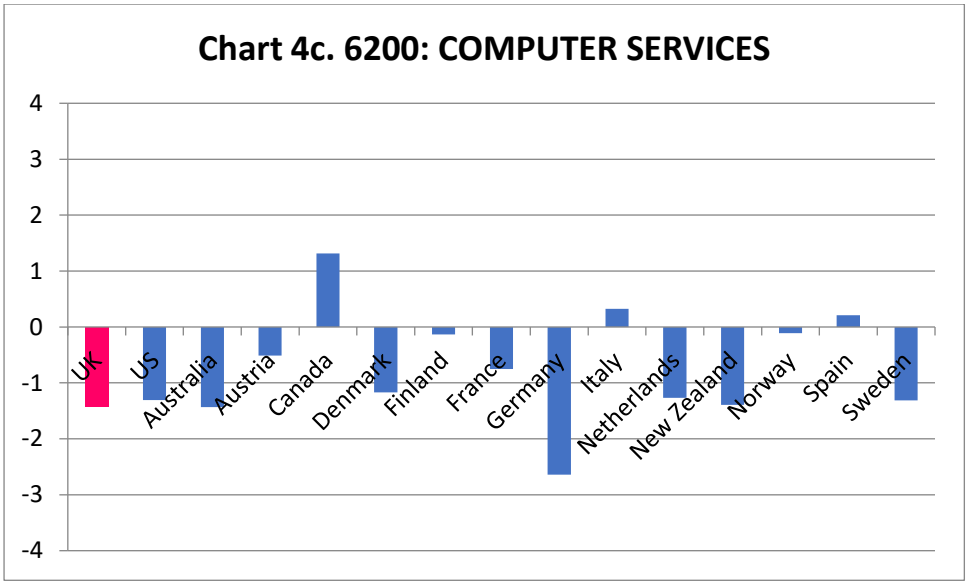


Chart 4b shows that relative prices decline in all countries in business telecoms with the UK price changes comparable to those in many other countries. Most countries use the UV method to measure prices, although a few also combine this with CP or RP. This is a sector where it is known that quality has improved over time and where the methods are likely to understate the price declines, especially in recent years – see Abdirahman et al. (2017) for details.

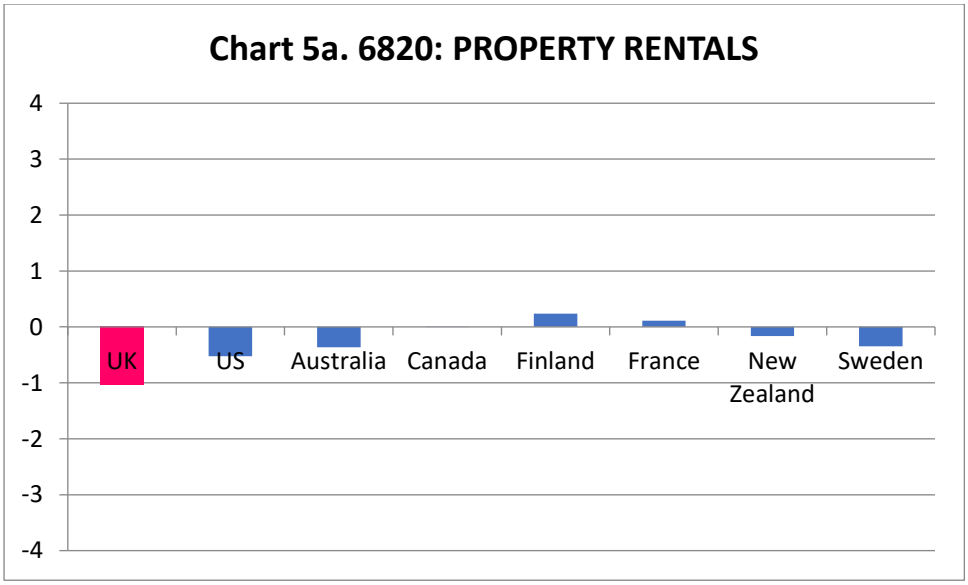


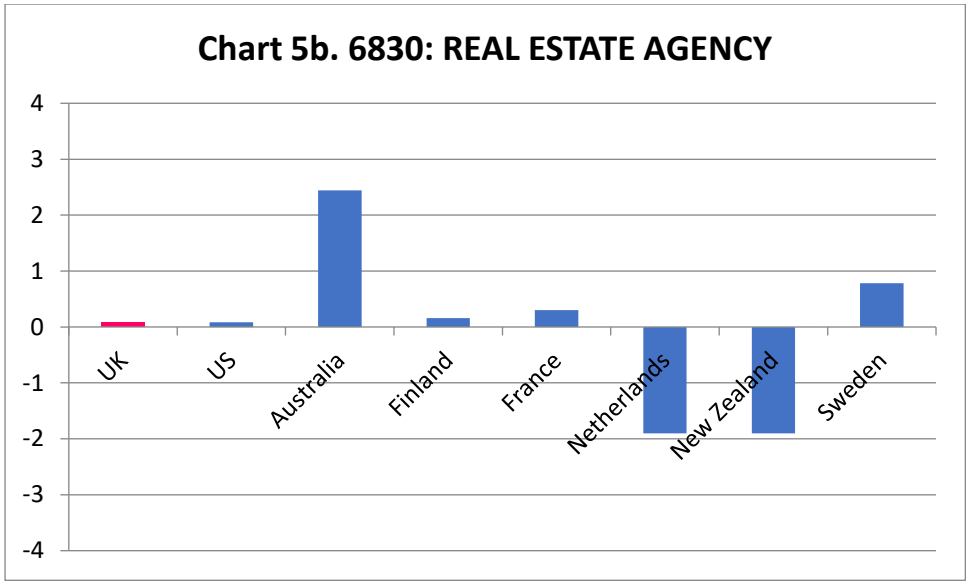
The third service type in this sector is computer services. Thomas (2016b) states that this product was identified by the Deflator Improvement Project Board as a high priority for SPPI improvement, especially as it feeds into the deflation of GFCF in Software. The price changes shown in Chart 4c suggests declining relative prices in most countries, with Canada the main exception. The UK price declines were very similar to those experienced by many countries. Here there is quite a range of measurement methods employed, with a few countries relying on time based methods while other use combinations of RP, CP, MP and TB.



Real Estate Activities

Charts 5a and 5b show relative prices for two services provided in real estate activities. In the case of property rentals, the UK relative price decline of about 1% p.a. is larger than in other countries. Relative prices generally increased in real estate agency, but the UK was in the lower range of countries that experienced price rises. Both the Netherlands and New Zealand show substantial price declines for this service. Apart from the UK, it was difficult to find any information on measurement methods for both of these services.





Professional, Scientific and Technical Activities

Charts 6a-6d show relative prices for a number of professional services. Taken as a whole, the UK price changes tend to be about equal to the average across other countries. Most countries use TB to measure prices in these services, but there are quite a few cases of using MP on its own or in combination with TB, and some countries also use percentage fees. Similar remarks apply to scientific and technical services in Charts 7a and 7b, although the UK's relative position is more to the lower end of price increases than for professional services, and there is more use of MP as measurement methods. Finally charts 8a and 8b show relative price changes for advertising and market research. Stable or declining prices are the norm in these services, with the UK declines again about average. TB is the most frequently used measurement method. Overall in the Professional, Scientific and Technical Activities sector, the UK experience is similar to other countries. As for business telecoms, there is probably scope for adjustments in the methods used, in this case to take account of productivity improvements in the provision of the services, given the prevalence of TB as a method of measurement.

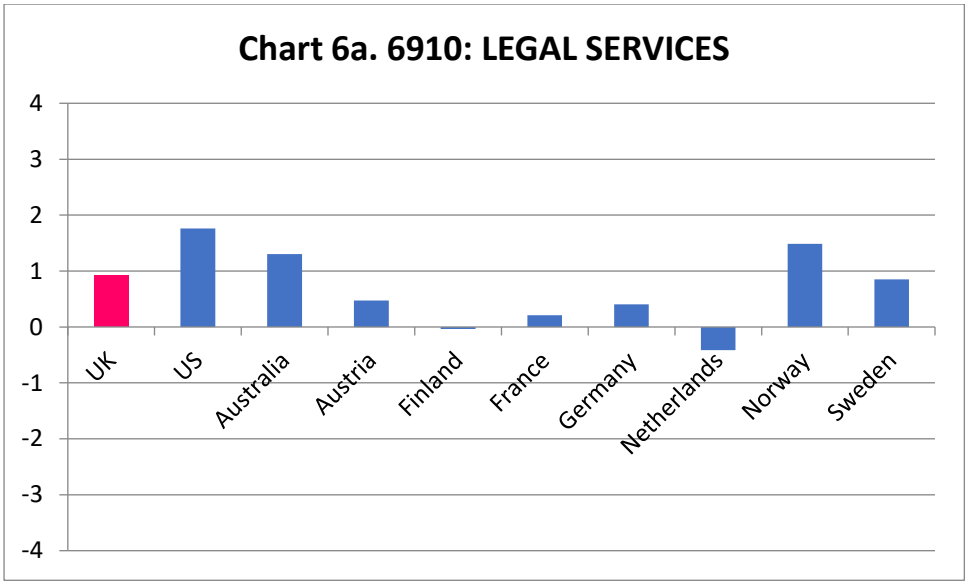


Chart 6a. 6910: LEGAL SERVICES
4
3
2
1
0
-1
-2
-3
-4
UK
US
Australia
Austria
Finland
France
Germany
Netherlands
Norway
Sweden

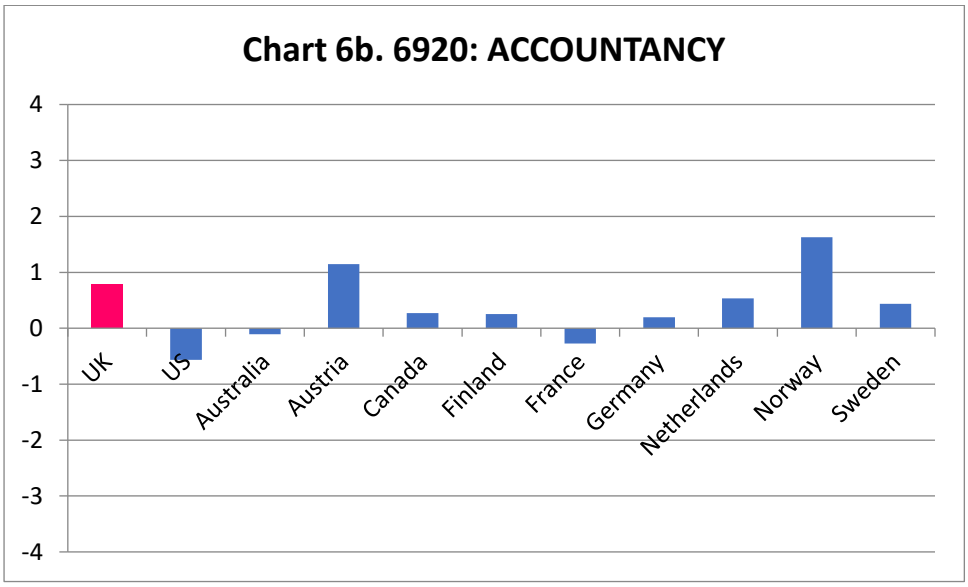


Chart 6b. 6920: ACCOUNTANCY
4
3
2
1
0
-1
-2
-3
-4
UK
US
Australia
Austria
Canada
Finland
France
Germany
Netherlands
Norway
Sweden

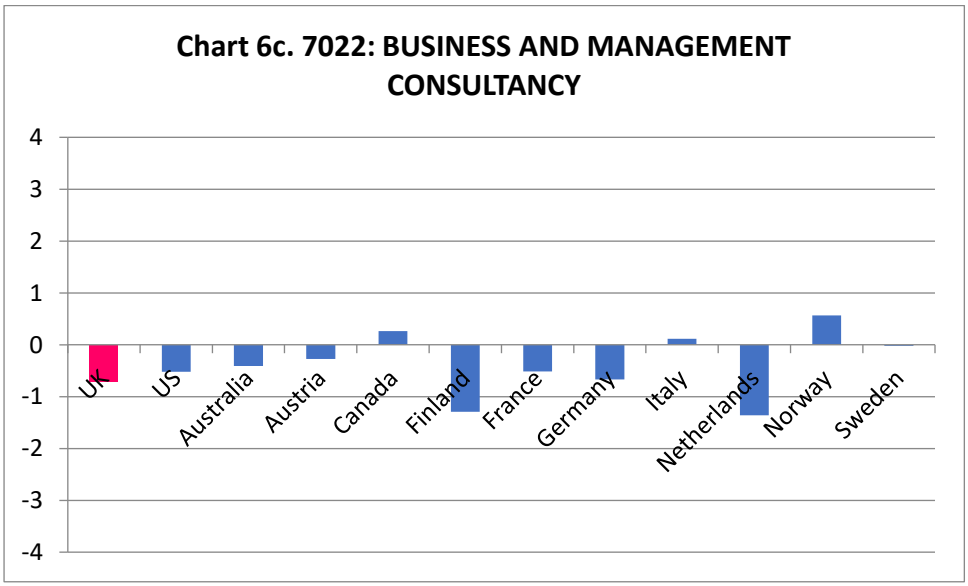


Chart 6c. 7022: BUSINESS AND MANAGEMENT CONSULTANCY
4
3
2
1
0
-1
-2
-3
-4
UK
US
Australia
Austria
Canada
Finland
France
Germany
Italy
Netherlands
Norway
Sweden

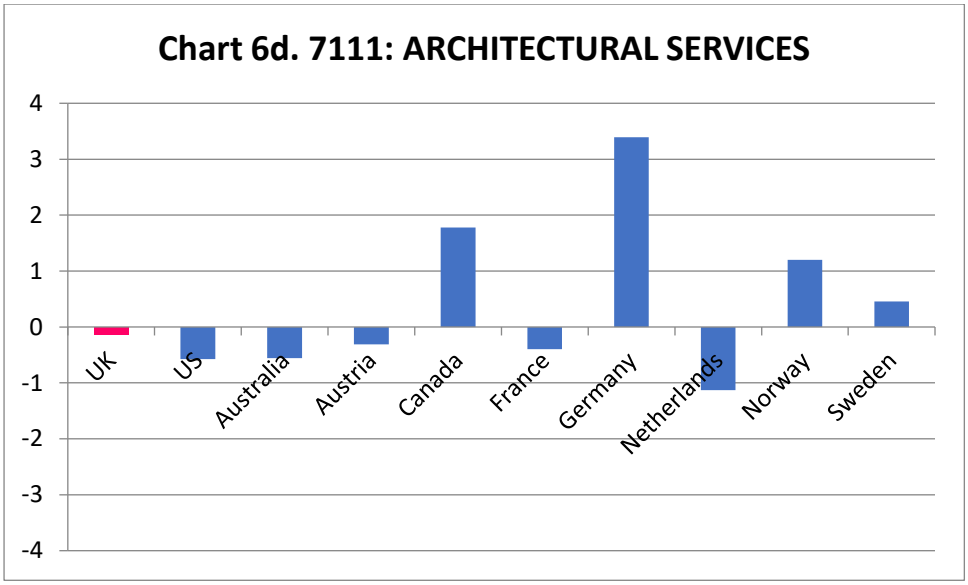


Chart 6d. 7111: ARCHITECTURAL SERVICES
4
3
2
1
0
-1
-2
-3
-4
UK
US
Australia
Austria
Canada
France
Germany
Netherlands
Norway
Sweden

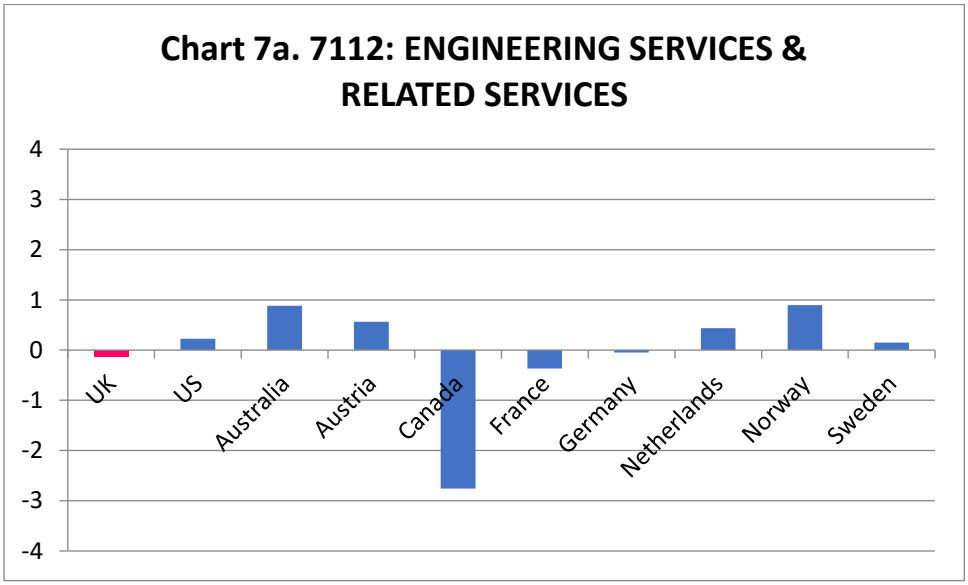


Chart 7a. 7112: ENGINEERING SERVICES & RELATED SERVICES
4
3
2
1
0
-1
-2
-3
-4
UK
US
Australia
Austria
Canada
France
Germany
Netherlands
Norway
Sweden

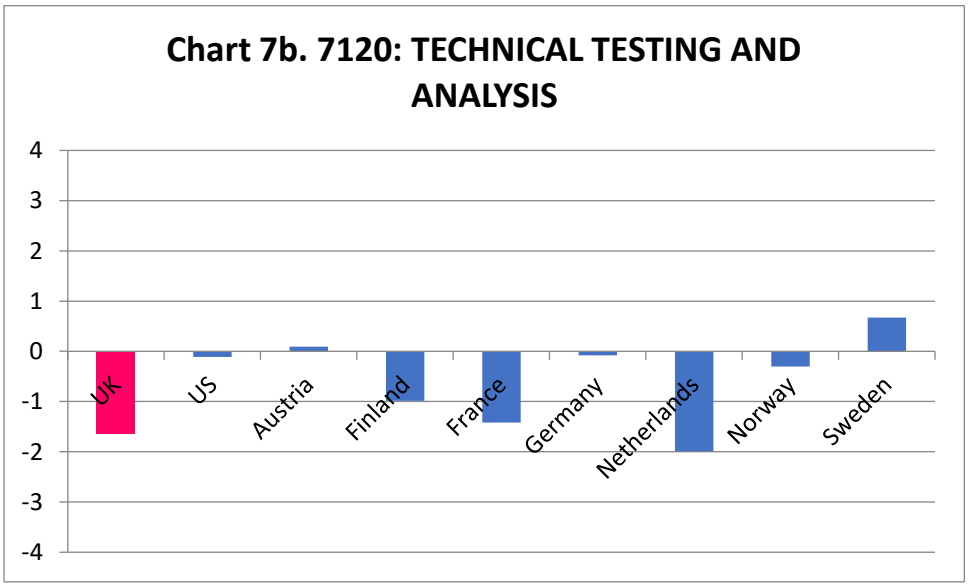
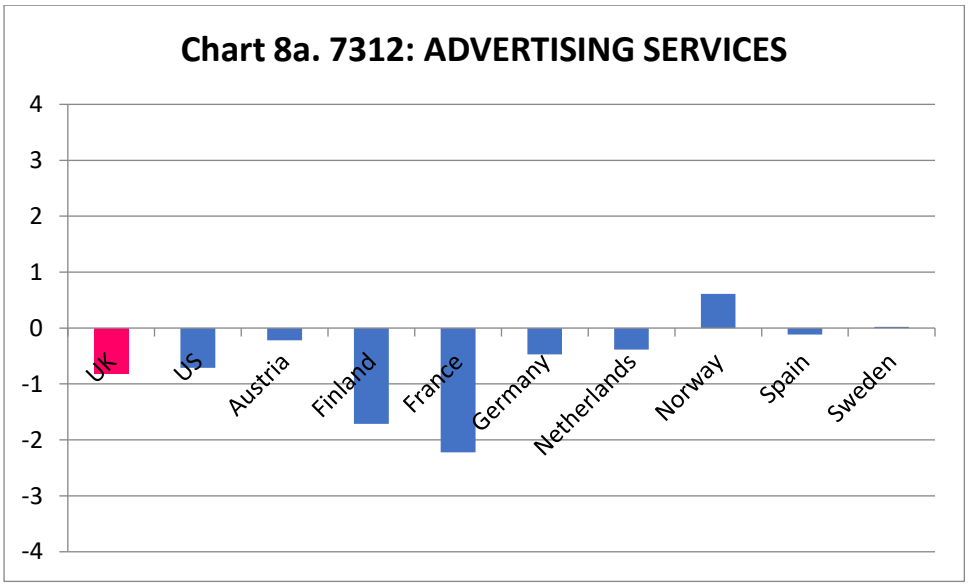
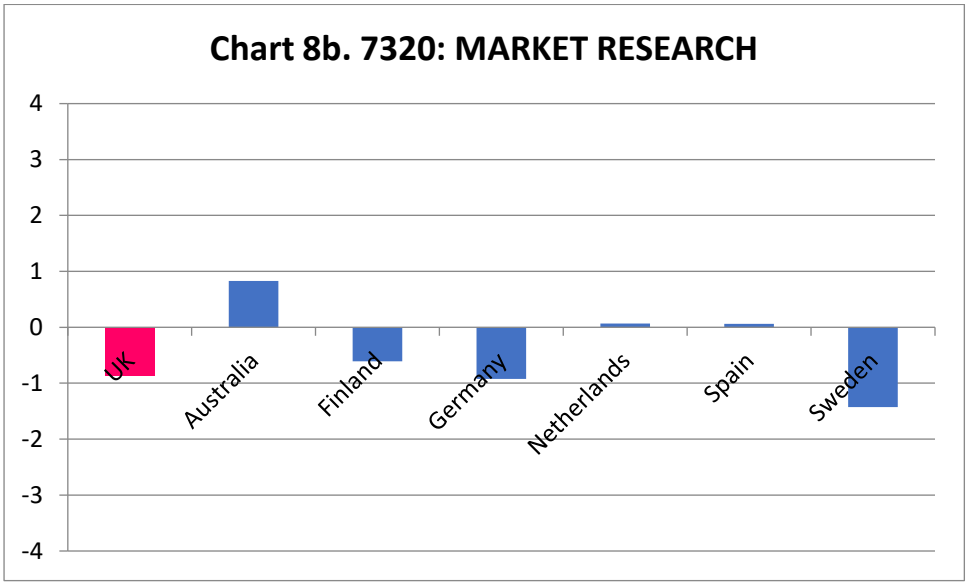


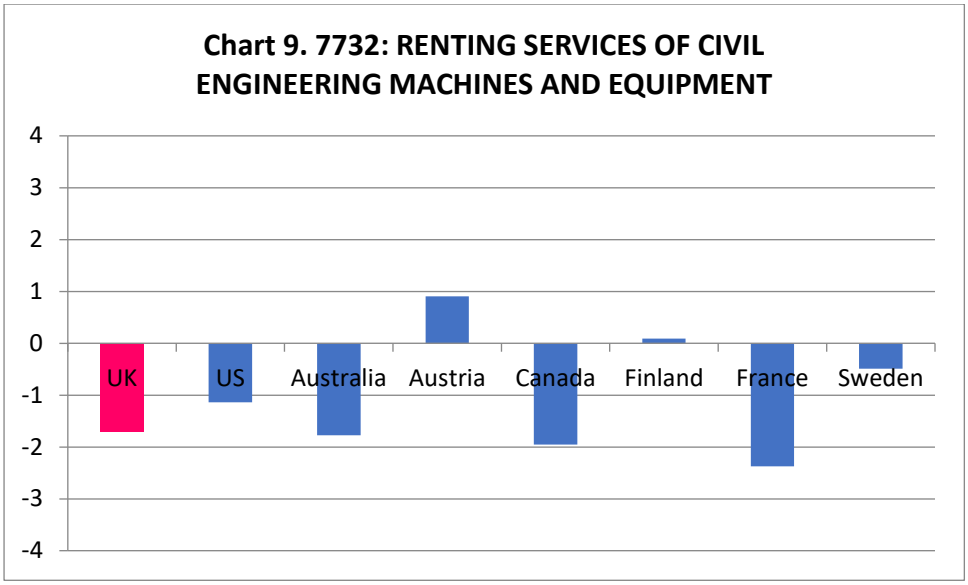
Chart 7b. 7120: TECHNICAL TESTING AND ANALYSIS
4
3
2
1
0
-1
-2
-3
-4
UK
US
Austria
Finland
France
Germany
Netherlands
Norway
Sweden





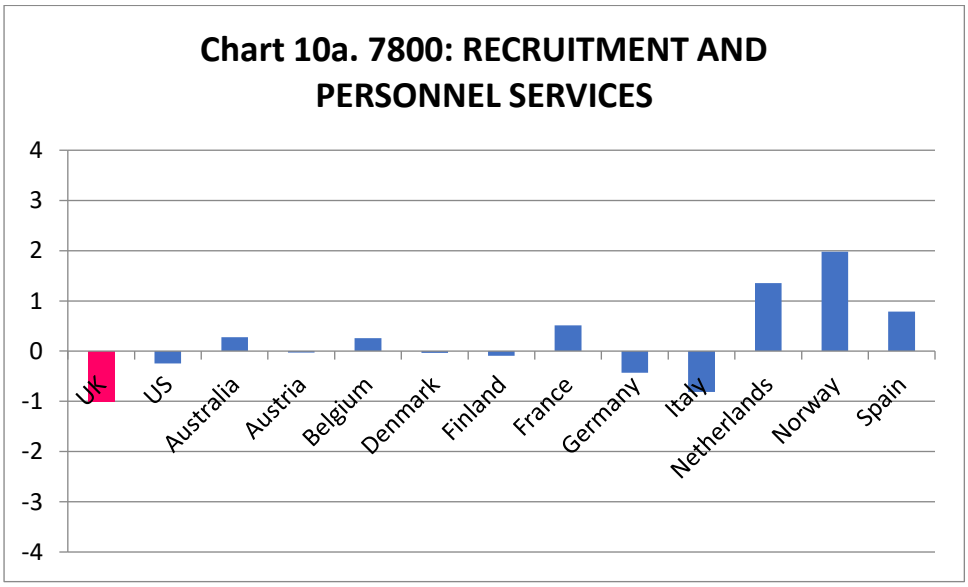
Rental and Leasing Activities

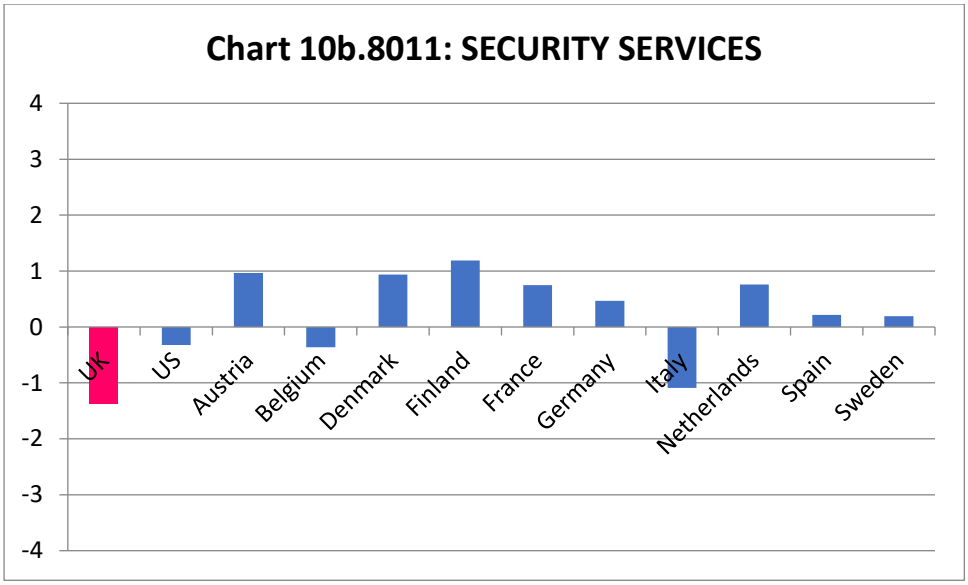
Only one SPPI was available in this sector, shown in Chart 9. The UK price decline was similar to that in Australia and Canada but lower than in France. Austria is an outlier in this case, being the only country showing relative price increases. Both RP and CP are used to measure price change in this sector.

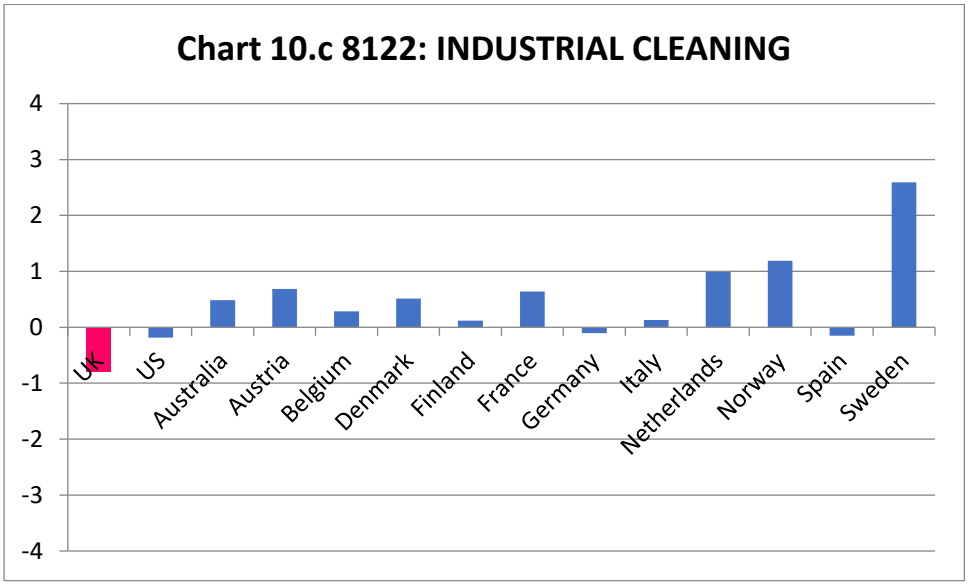


Other Administrative and Support Service activities

In the case of all three services in this sector, the UK shows declining relative prices whereas most other countries show no change or rising prices. CP is the dominant measurement method in these sectors although RP, MP and TB are also used.







Conclusions and Future Research

This initial review of services producer price indexes describes their growth in terms of a number of dimensions including time, country and method of measurement. The focus has been both on the price changes in the UK relative to other countries to uncover if there is any evidence of a systematic UK bias and to see if the measurement method employed influences prices. The analysis uses descriptive statistics and panel regressions as well as more detailed summaries by sector. The UK prices for 31 types of services were compared to those for 15 other mature economics.

The analysis suggests that price changes in the UK tend to be, on average, lower than or equal to price changes in most other countries across a broad range of services. The sectoral detail suggests that, relative to other countries, the UK price changes tend to be a little higher in transportation and storage services, about equal in professional services including computer services and lower in administrative and support services and real estate activities. High relative price changes could be a signal that their measurement might not be capturing quality change and productivity growth in areas where the measurement methods assume this is zero. Although we cannot at this stage exclude other explanations, such as the possibility that more competitive market structures in the UK lead to lower prices, we conclude that it is unlikely that errors in measuring services prices are especially large in the UK than in other countries. Therefore, this aspect of measurement is an improbable explanation of the observed relatively poor UK performance in real output growth and hence labour productivity growth.

However, this does not imply that measurement is not an issue but merely that it is not more of an issue in the UK. The analysis of price changes by measurement method points to a significant difference between time based and model pricing, of the order of just under 1% lower growth per annum in the latter. The business services most affected by the use of time based methods are important and increasing inputs into other sectors such as manufacturing and so having accurate measures of price deflators for these inputs is important.

The analysis undertaken in this report using dummy variables is rather crude and requires refining. In the next stage of this work we plan to try to relate the services price changes to other variables such as the regulatory environment, market structure and adoption of information technology. This will enable us to investigate if the impact of measurement methods reported here are robust to including other explanations for cross country differences in services prices.

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