

New question on capacity utilisation in the services sector – state of play and analysis of results from July 2011 to October 2013

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Summary

Capacity utilisation is a key indicator of slack in the economy, allowing statisticians and economists to quantify the extent to which the available resources are used. As part of its Business and Consumer Survey (BCS) programme, DG ECFIN of the European Commission has been collecting a time series of capacity utilisation in the manufacturing industry on a quarterly basis, dating back to 1985. Given the important share of services activities in the economy, a quarterly question on capacity utilisation has been added to the survey in the services sector on an experimental basis in July 2011.

The concept of capacity utilisation has a strong connotation with a production process involving mainly equipment and material and necessitates a fairly clear notion of a company's full capacity. To make the question understandable and relevant for enterprises in the services sector, where know-how and human resources are typically more important than capital endowments, capacity utilisation is surveyed indirectly. The question inquires the additional output that firms can generate with the currently available resources. The rate of capacity utilisation can then easily be inferred.

Following a brief summary of the discussions that led to the introduction of the new series in its current formulation, the paper presents a preliminary analysis of the first ten quarterly waves of the new question in the survey of the services sector. The results are encouraging. The difference in level between capacity utilisation in services and manufacturing at the aggregate EU/euro area level appears to adequately reflect the specific features of the two sectors in terms of input factors. Also cross-country differences appear reasonable when taking into account the results from the manufacturing survey as a benchmark. Moreover, the series seems to adequately trace short-term cyclical developments in the services sector and is subject to less short-term-volatility than the established series inquiring capacity utilisation in the manufacturing sector. This suggests that the question is relevant and understandable to managers in the services sector. An important caveat is that the presented preliminary analysis is based on non-seasonally adjusted series. Before publishing results for the services sector, the data need to be seasonally adjusted, which requires a time series of at least three years.

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1. The new question on capacity utilisation in services

Capacity utilisation plays a central role in business cycle analysis. It is a key indicator of slack in the economy, allowing statisticians and economists to quantify the extent to which the available productive resources are used. As part of its Joint Harmonised EU Programme of Business and Consumer Surveys (BCS), DG ECFIN has been collecting a quarterly data series of capacity utilisation in the manufacturing industry going back to 1985. Given the important share of services activity in the economy², a quarterly question on capacity utilisation was added to the survey in the services sector on an experimental basis in July 2011. With the ultimate aim being an economy-wide proxy of capacity utilisation through the integration of the results for manufacturing and services, the specificities of the production process in services as compared to manufacturing necessitated a different approach to assessing the rate of capacity utilisation. The next section gives a brief overview of the discussions that led to the inclusion of the question in the harmonised programme of the services survey. Section 3 presents a preliminary analysis of the results collected so far, with a view to the cyclical tracking performance and the short-term volatility of the series. Section 4 summarises and concludes.

2. A common approach to surveying capacity utilisation in the services sector – a stony path

The introduction of a question on capacity utilisation in the harmonised EU-wide services survey was preceded by a long discussion and reflection phase, which started with the 'EU workshop on recent developments in business and consumer surveys' (BCS Workshop) in November 2008. At the outset, there were doubts as to whether the concept of capacity utilisation was relevant and understandable for companies in the services sector. In concrete terms, the issue was whether the question asked in the manufacturing survey (*'at what capacity is your company currently operating (as a percentage of full capacity)'*) could usefully be addressed to services companies, or whether it would need to be adapted. A second, related issue was whether individual branches of the services sector would need to be excluded from surveying capacity utilisation. The perception was that while e.g. hotels and restaurants could usefully reply to the question, branches like consultancy were difficult to associate with the concept.

To address these questions, a task force was launched with a view to investigating the feasibility and terms of a new question on capacity utilisation in the services survey. Three distinct strands of work were identified: 1) the choice of the potential target sectors/branches in which the question on capacity utilisation could usefully be asked (headed by NIER, Sweden), 2) the identification of the relevant questions (headed by CSO, Poland), 3) the testing of different formulations of questions (headed by IOBE, Greece and INSEE, France). Following test runs of several alternative formulations in several branches, the results of the task force were eventually presented at the October 2009 BCS Workshop.³

The task force concluded that i) a question on capacity utilisation would be relevant for the service sector, ii) the question should be addressed to all the sub-sectors (branches)

² Gross Value Added (GVA) in services accounts for over 70% of total GVA in both the EU and the euro area. However, it has to be noted that the EU-wide survey of the services sector excludes retail and wholesale activities and (in many countries) financial services activities.

³ Presentations available at http://ec.europa.eu/economy_finance/db_indicators/surveys/workshops_doc/index_en.htm

regularly surveyed in the services survey, iii) the formulation of the question used in the manufacturing sector needed to be adapted to important specificities of the services sector.

The findings of the taskforce suggested that all services branches seem to be able to answer a question on resource utilisation. In other words, firms have an idea of what may be defined as a capacity measure in their own business activities, even if that concept may differ across activities, such as occupancy rate for hotels, invoiced hours compared with potential hours for consultants etc. On the basis of these results, none of the service branches was disqualified to report on 'capacity utilisation'.

Clearly, the concept of capacity utilisation has a strong connotation with a production process involving mainly equipment and material and necessitates a rather clear notion of a company's full capacity. The testing of a 'direct' question for capacity utilisation as in the manufacturing sector resulted in relatively low response rates, with respondents often stating that the question did not apply to their business. To make the question understandable and relevant for enterprises in the services sector, where know-how and human resources are typically more important than capital endowments, the task force concluded that capacity utilisation had to be surveyed indirectly. The formulation of the question is in terms of "marginal increase of activity" that can be generated with the currently available resources:

“If the demand addressed to your firm expanded, could you increase your volume of activity with your present resources? Yes – No⁴

If so, by how much? ...%”

The capacity utilisation rate (CU) can then easily be inferred with the formula:

$$CU \text{ (in \%)} = 100 / (1 + \text{percentage of increase} / 100)$$

Given the large spectrum of service subsectors that are surveyed (services rendered to both companies and households, from transportation to research and development), asking the question in terms of demand and present resources and applying the formula turned out as the best strategy to approximate the rate of capacity utilisation in services. The formulation assumes that the expansion of demand is enough to lead the firms to operate at full capacity. Indeed, it aims to know the maximum increase in demand the firms could satisfy with their present resources.

The question has been added to the standard questionnaire of the Harmonised EU wide survey in the services sector in Spring 2011 and is asked on a quarterly basis. First results were collected with the July 2011 wave. A first preliminary analysis at the 2011 BCS Workshop based on the first two waves pointed to some problems in the correct encoding and sending of the results to DG ECFIN but was otherwise encouraging. A presentation by ISTAT, which had started data collection already in January 2010, concluded that the new question on capacity utilisation in the services sector seemed to work quite well, with high response rates and providing pertinent information on the cyclical situation of the sector, which seemed complementary to the information contained in the sector's confidence indicator.⁵

⁴ The question is filtered, i.e. a 'No' response implies a capacity utilisation equal to 100%. This is also correctly delivered by the formula: a reported 0% increase of the volume of activity results in a CU of 100%.

⁵ The presentation is available at:
http://ec.europa.eu/economy_finance/db_indicators/surveys/documents/workshops/2011/ec_meeting/04_istat_malgarini_capacity_utilisation_results_ppt.pdf

Experts present at the 2011 BCS workshop raised some doubts (mostly on theoretical grounds) about respondents' answering practices, especially with regard to a possible confusion of percentages and percentage points. The latter could be relevant for service activities like hotels or transport, where respondents arguably have a comparably clear idea of their full capacity (e.g. number of booked hotel rooms, vehicles in use, etc.). At a present CU of, say 50%, this could lead them to answer to the agreed question ("*If the demand addressed to your firm expanded, could you increase your volume of activity with your present resources?*") with "*Yes - by 50%*", i.e. the 50 percentage points that are missing to reach 100% capacity utilisation. The formula to compute the CU would thus deliver $100/(1+50/100) = 67\%$. What the respondents had in mind with their answer would however need to be computed using a different formula, namely $100 - 50 = 50\%$. Another point of discussion was the human capital dimension of the question, i.e. whether present human resources are included in respondents' consideration of their 'current resources'.⁶

At the 2012 BCS Workshop the CBI gave a presentation of the results of the 'answering practices survey' in the UK services sector, which addressed these questions.⁷ The answering practices survey showed that 68% of respondents reply to the new capacity utilisation question on a possible increase of their activity in terms of percentage changes (i.e. the 'correct' interpretation) and only 22% answer in terms of percentage points (missing to reach 'full capacity'). This pattern was broadly valid also at the sub-sector level, with the exception of 'hotels, bars and restaurants', where a high number of managers (46%) replied in terms of percentage points. Secondly, the survey concluded that the majority (57%) of respondents thinks of their company's own resources of space, equipment *and staff* when considering their "current resources".

The observation that a non-negligible share of managers, particularly in the hotels, bars and restaurants (HBR) branch, answers in percentage points could arguably lead to an overestimation of capacity utilisation in the services sector. At the same time, the effect of the partially 'inadequate' answering behaviour in the HBR branch on the total services sector results should be limited in weighted terms. Some variation in the degree of understanding of survey questions by respondents is a pervasive feature of all surveys, and not confined to the question on capacity utilisation. While clearer instructions on the questionnaire about the concepts at hand might guide respondents to give a 'more precise' answer, the usual trade-off in terms of response load (time to fill in the survey), and, possibly, non-reply applies.

Building on results summarised in DG ECFIN's 'European Business Climate Indicators' publication of June 2012,⁸ DG ECFIN also presented an updated empirical analysis of the performance of the surveyed measure of capacity utilisation in services (based on six observations). While previous concerns vis-à-vis the adequacy of the chosen approach were based mainly on theoretical grounds, the empirical evidence pointed to the plausibility of the results. Also in the light of CBI's findings on UK managers'

⁶ It was also discussed whether to formulate the question in terms of a (qualitative) comparison with a previous period rather than asking for a specific value. However, given that the ultimate aim is to get a quantitative indicator of capacity utilisation in services, comparable to the established one in manufacturing, this would fall short of the initial ambition. Other proposals concerned the use of brackets/range values for answering the question. However, while this could make replying easier for firms, it would entail a loss of information and complicate the analysis and interpretation of the results.

⁷ Available at: http://ec.europa.eu/economy_finance/db_indicators/surveys/documents/workshops/2012/workshop_nov_15_16_b_russels_wood.ppt

⁸ Available at http://ec.europa.eu/economy_finance/publications/cycle_indicators/2012/pdf/2_en.pdf

answering practices it was concluded to continue with the current approach and, after another evaluation at the occasion of the 2013 BCS Workshop, to envisage publishing the data (both seasonally and non-seasonally adjusted series) as from July 2014 (i.e. based on a data-set spanning three full years).

3. Empirical analysis of results from July 2011 to October 2013

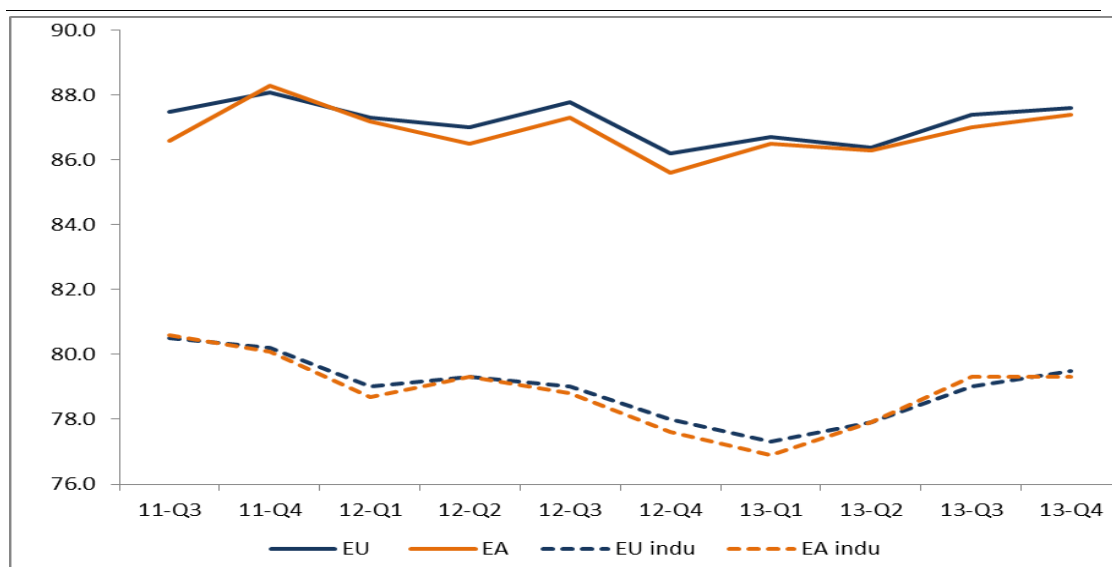
This section updates the analysis of the survey results collected so far (ten waves from July 2011 to October 2013), with a view to the level, trend and volatility of the data. The long-established series of capacity utilisation in industry and other questions from the services survey will be used as benchmarks.

3.1 Differences in levels between capacity utilisation in services and industry

A priori, the capacity utilisation in services can be expected to be above that in industry in a long-term perspective. This is due to the fact that the higher need for physical capital endowments, which are difficult to adjust in the short-term, requires some capacity buffer in industry compared to services.

This a priori assumption is correctly mirrored in the survey results. As shown in Graph 1, capacity utilisation in services was on average some 8 percentage points above the respective rate in manufacturing industry. In the EU the positive gap ranged from 7 points in July 2011 (the first survey wave including the new question) to 9.4 points in January 2013.⁹

Graph 1: Capacity utilisation in services and industry in the EU and the euro-area



Note: The data are non-seasonally adjusted

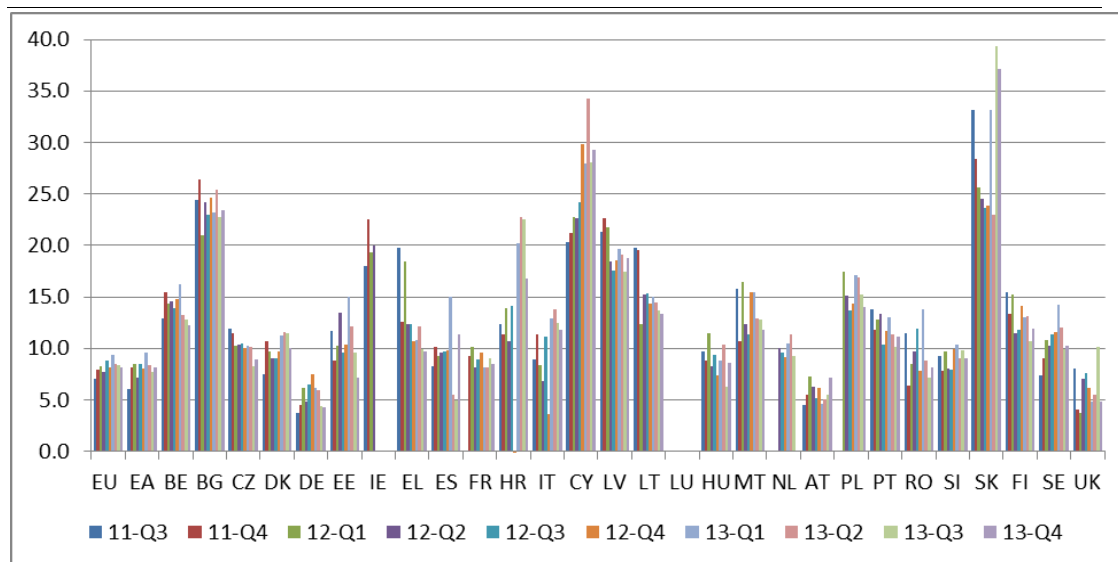
Source: Commission services.

The observed pattern of structurally higher capacity utilisation in services compared to industry also holds at the country level. As shown by Graph 2, the gap has been positive

⁹ The analysis is confined to EU-28 Member States. There are missing data for FR (July 2011), PL (July and October 2011), NL (July 2011 to January 2012), IE (from July 2012 onwards) and for LU (no services survey). For the calculation of EU and euro area aggregates missing values were imputed. Since the services series is still too short for seasonal adjustment, the analysis, including that of capacity utilisation in the manufacturing sector, is based on non-seasonally adjusted figures.

in all Member States and in all survey waves. The gap is relatively low at around 5% in Germany, Austria and the UK. It is slightly higher at 8-10 percentage points in France and Spain and around 10 points in Italy. Extreme cases are Bulgaria, Slovakia and Cyprus, where the gap reaches more than 25 percentage points in some quarters. The gap is relatively high also in Ireland, Croatia, Latvia, Lithuania and Poland.

Graph 2: Differences between utilisation rates in services and industry

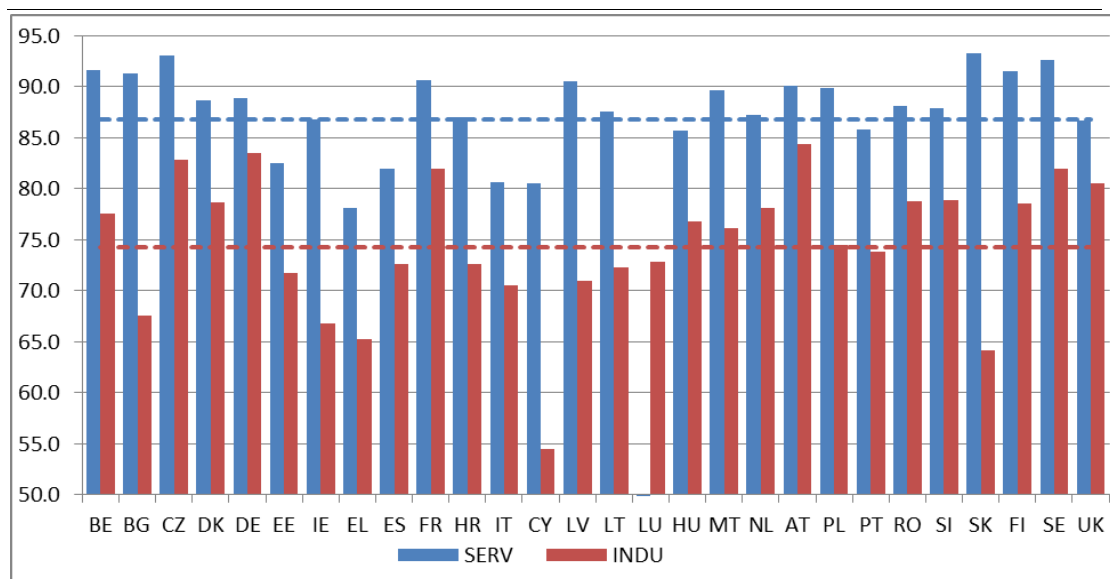


Note: The data are non-seasonally adjusted

Source: Commission services.

In fact the rates of capacity utilisation in the German and Austrian manufacturing industries have been the highest across Member States over the considered sample, roughly 5 pps above the EU average, while the rates in services are only around 2½ pps above the EU average. On the other side, Bulgaria and Slovakia are among the countries with the lowest utilisation rate in manufacturing industry, while the utilisation rate in services is among the highest (above 90% on average). In Cyprus, the utilisation rate in services is around 7 pps below the average across EU countries, while the rate in industry is 20 pps below the respective average. The observation of extreme gaps between utilisation rates in industry and services is thus not necessarily due to extreme cross-country variation in the services series. On the contrary, while the variation coefficient of utilisation rates across EU countries is 0.83 for manufacturing industry, it is only 0.54 for services (Graph 3).

Graph 3: Capacity utilisation in services and industry in EU countries



Note: The data are non-seasonally adjusted. Dotted lines: averages across countries

Source: Commission services.

3.2 Satisfactory correlation between services and industry series

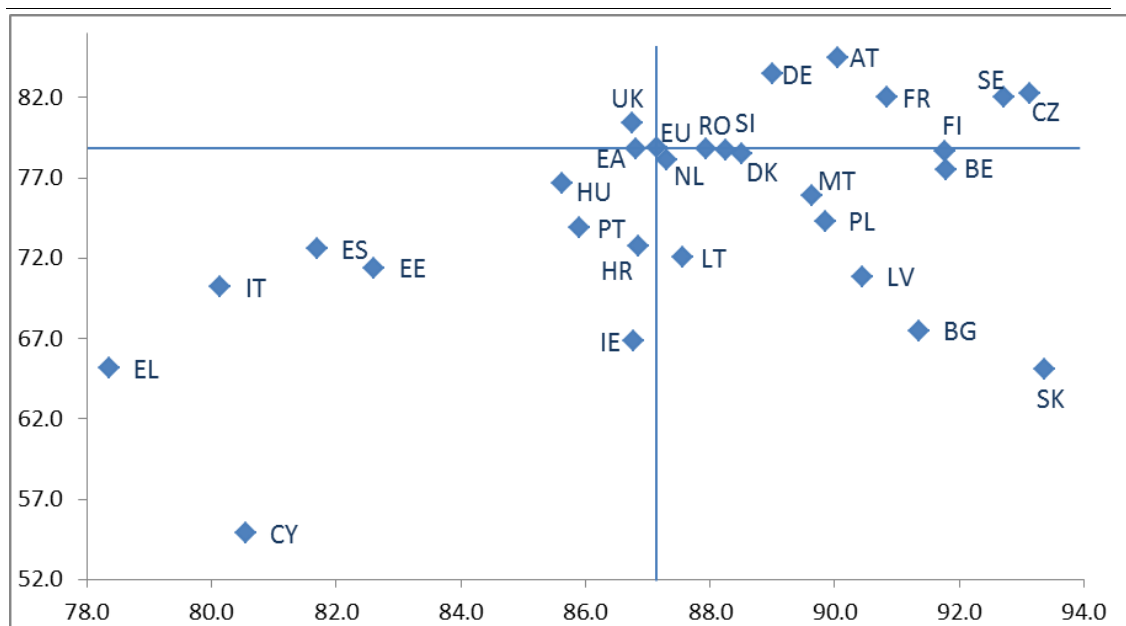
Given the strong linkages between the industry and services sectors in B2B transactions, one would expect a certain degree of co-movement in the capacity utilisation rates of the two sectors. Due to the low number of observations available so far, it is too early to quantitatively assess the temporal correlation between the two series. However, in terms of the (cyclical) profile over the short common data sample, the services series broadly followed developments in the manufacturing industry (Graph 1). In July 2011, the rate of capacity utilisation in services was 87½ % in the EU and 86½ % in the euro area. In industry, capacity utilisation had just declined again from its post-crisis peak and stood at around 80½ % in both the EU and the euro area. After a small temporary recovery in April 2012, capacity utilisation in manufacturing continued to decline until January 2013. Following increases over the past two quarters, the rate stood at 79½ % in October 2013 (EU). The services series shows a similar pattern, with the temporary recovery occurring one quarter later (July 2012) and the sub-sequent through being reached one quarter earlier (October 2012). Since then, capacity utilisation in services has increased by 1½ percentage points, and was back to 87½ % in October 2013 (EU). Leaving the first survey observation aside, capacity utilisation in services is still slightly lower now than it was in late 2011, in line with the situation in manufacturing industry.

While the temporal correlation cannot yet be quantitatively assessed, in a cross-country perspective the correlation between the capacity utilisation rates for services and manufacturing has been relatively stable over time, reaching 0.5 on average across the available sample.

As shown in Graph 4, most of the individual values are distributed homogenously around the EU aggregate, i.e. either both rates are below the respective EU values or both are above. The most noticeable exceptions from this pattern are Latvia, Bulgaria and Slovakia with a-typically high rates in services compared to the rates in industry (see above). Among the large Member States, Italy and Spain on the one hand and

Germany and France on the other are extreme typical cases in the sense that capacity utilisation in both industry and services is low for the first two, while high for the latter two countries.

Graph 4: Capacity utilisation in services and industry – averages 2011-2013



Note: The data are non-seasonally adjusted

Source: Commission services.

3.3 Short-term volatility of capacity utilisation lower than in manufacturing

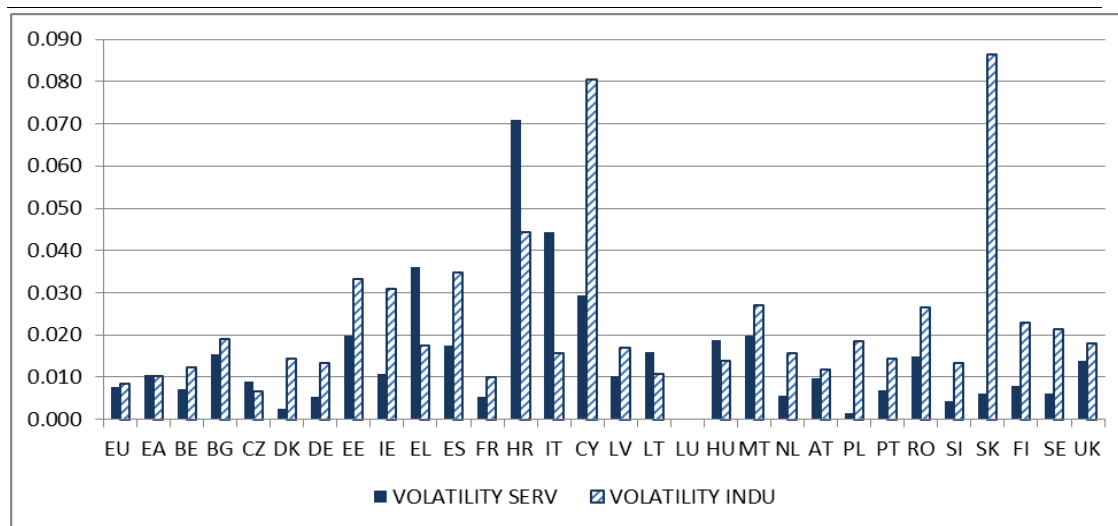
In order to assess the reliability of the new data series on capacity utilisation in services, a volatility indicator has been computed. This volatility indicator is defined as the average absolute q-o-q change in capacity utilisation divided by the average level of capacity utilisation in a given country. While there is no reference value for such a volatility indicator (by construction it is a positive figure) it makes sense to compare its value for the two sectors, given the long track record of the widely established and used capacity utilisation rate in industry (Graph 5).

For the great majority of the member states the volatility of the capacity utilisation in services is comparable to or lower than that in manufacturing. It has to be noted, of course, that this assessment is based on the ten available quarterly changes only. For the period July 2011 – October 2013 the volatility on average across countries is 0.024 for manufacturing industry but only 0.015 for services. The interpretation of the latter figure is that the typical q-o-q change in the series in absolute terms is 1.5% of their mean value.

As can be seen from Graph 5, there is quite some variation in terms of 'typical' q-o-q changes across countries (in both manufacturing and services). While it is hard to define a reference value for this, it is clear that the rate of resource utilisation in an economy should typically not show erratic behaviour from quarter to quarter. The extreme values in Graph 5 mostly stem from 'outliers' in the utilisation rate in certain quarters, which have a strong impact on the average changes for the countries

concerned. Abstracting from these extreme values due to outliers,¹⁰ the measure of q-o-q volatility goes down to 0.013 (services) and 0.019 (manufacturing). A firm interpretation of the significance and possible driving factors of the gap between normal q-o-q changes in utilisation rates in services and manufacturing would clearly require more work and longer data series. For the time being, the results do in any case not point to particular difficulties in answering the question on capacity utilisation in the services sector as compared to the manufacturing industry, which should otherwise lead to higher q-o-q volatility.

Graph 5: Volatility in capacity utilisation in services and industry



Note: The data are non-seasonally adjusted

Source: Commission services.

3.4 Capacity utilisation in the light of other survey results

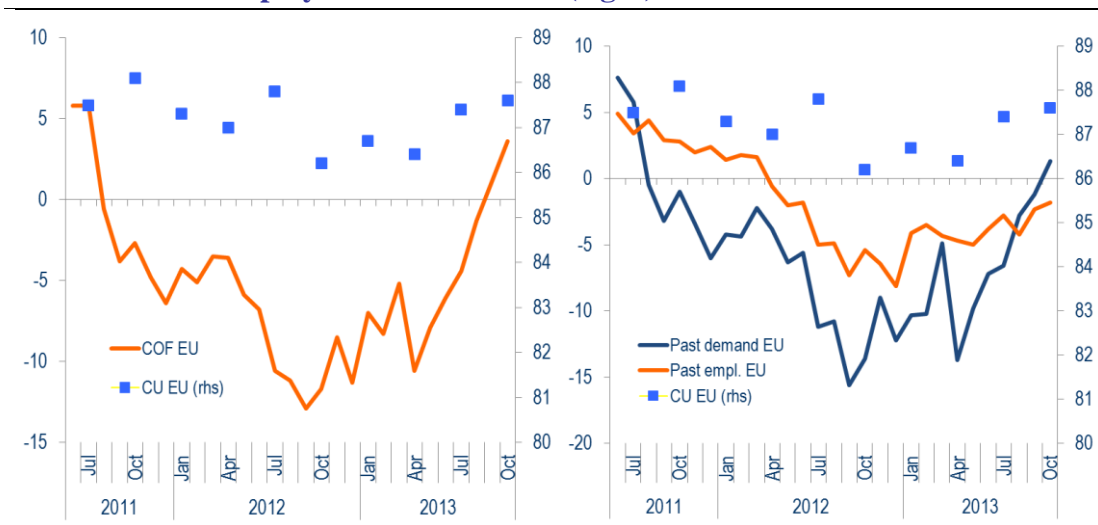
The evolution of capacity utilisation at the EU and euro area levels is broadly consistent with other results from the services survey. The left-hand panel of Graph 6 shows capacity utilisation along with the services confidence indicator. While the surveyed utilisation rate slightly lagged the evolution of the confidence indicator until autumn 2012, the set-back in confidence in April 2013 and the sub-sequent steep recovery is coincidentally reflected by changes in capacity utilisation.

The right hand panel shows the quarterly estimates along with the monthly assessments of demand and employment over the past 3 months. With unchanged employment, capacity utilisation should go down with declining demand, as managers will see wider scope for increasing their volume of activity. This is broadly reflected in the period from October 2011 to January 2012, when employment was rather stable, while demand decreased. When the assessment of employment then deteriorated while demand stabilised for a while, the reported rate of capacity utilisation bounced back. However, with the then sharply worsening demand since mid-2012 the utilisation rate fell back again markedly in October 2012. The subsequent recovery of demand, interrupted by a transitory relapse in Spring of 2013 and intensifying since May, has been accompanied by a broadly stabilising assessment of employment since the

¹⁰ Outliers were defined as q-o-q changes of more than 6 percentage points that were reversed again in the subsequent quarter. The so-defined outliers were then replaced by linearly interpolated values.

beginning of the year. Accordingly capacity utilisation has been showing an up-down-up movement in 2013.

Graph 6: Capacity utilisation in services vs. confidence indicator (left) and vs. demand/employment assessments (right) in the EU



Note: CU data are non-seasonally adjusted
Source: Commission services.

4. Summary and conclusion

Overall, this preliminary analysis of the first ten quarterly results of the new question on capacity utilisation in services delivers encouraging results. The difference in level between capacity utilisation in services and industry at the aggregate EU/euro area level appears to adequately reflect the specific features of the two sectors in terms of input factors. Also cross-country differences appear reasonable when taking into account the results from the manufacturing survey as a benchmark. Somewhat surprisingly (on the positive side) for a newly introduced question, the results for capacity utilisation in the services sector appear to be subject to less quarter-on-quarter volatility than utilisation rates in manufacturing industry. While this observation could partly be due to an intrinsically lower cyclical of services as compared to manufacturing, it is encouraging that firms' answering behaviour to the question appears to be rather smooth over time. Higher volatility from survey to survey might have pointed to difficulties of services firms in understanding and answering the question. This does not seem to be the case.

At the same time the series does display short-term (cyclical) developments which are in line with developments in other hard and soft data (utilisation rate in manufacturing, services confidence, assessment of demand and employment). Overall, the series on capacity utilisation collected through the new question on the 'marginal increase of activity' in the services sector appears to be of sufficiently high quality in terms of both cyclical tracking performance and smoothness. More data points will be instrumental in firmly establishing that the question delivers reliable and useful results in the long term for the analysis of cyclical developments in the services sector. An important caveat is that the presented preliminary analysis is based on non-seasonally adjusted series. Before publishing any results for the services sector, the data need to be seasonally adjusted, which requires a time series of at least three years.