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QUARTERLY SERVICES SURVEY ANALYSIS OF RESPONSE

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ABSTRACT

The Quarterly Services Survey (QSS) is the first economic indicator to be introduced by the United States Census Bureau in forty years. Prior to the QSS, measures of service output were available only from the five year Economic Census and the Census Bureau's Service Annual Survey. The purpose of the QSS is to track current economic production in selected service industries. The survey currently covers Information (NAICS 51); Professional, Scientific, and Technical Services (NAICS 54); Administrative and Support and Waste Management and Remediation Services (NAICS 56); and Hospitals and Nursing and Residential Care Facilities (NAICS 622 and 623).

The Quarterly Services Survey has maintained comprehensive response data since the survey's inception. This information has been useful in projecting cost estimates, planning future expansion, and scheduling follow-up procedures as listed in this paper. In analyzing the data, we concentrate on three fundamental features of response: rate, timeliness, and quality. We examine these three components across multiple dimensions. We observe the effect associated with NAICS classification, company size and response mode.

In generating the majority of the tables and graphs that are included in the QSS Analysis of Response, we created programs using the SAS® language. For situations that required a more dynamic look at the data, we utilize SAS/Insight®.

KEY WORDS: economic indicator; service industry; SAS language

INTRODUCTION

The new Quarterly Services Survey (QSS) is the first economic indicator to be introduced by the United States Census Bureau in nearly forty years. It is the centerpiece of a multifaceted statistical initiative to address long-standing deficiencies in federal statistics covering the services sector. The services sector accounts for nearly 55 percent² of the U.S. gross domestic product (GDP), excluding retail and wholesale trade. Until now, no economic indicator had existed for the services sector despite its importance and increasing share of total economic activity; measures of service industry output previously were available only from the five-year economic census and the Service Annual Survey.

The information from the QSS provides timely information needed to assess current economic performance. These statistics also provide policy makers with current data on the performance of key information, communication, and technology-intensive service industries. A significant benefactor of the QSS is the Bureau of Economic Analysis (BEA). The QSS has helped to improve estimations of the U.S. GDP, as well as GDP by industry. The QSS has also helped provide better estimates of personal consumption expenditure and private fixed investments. It also provides the Federal Reserve Board and the Council of Economic Advisors, along with other government and private stakeholders a better understanding of important cyclical components of our economy.

Coverage

Initially, the QSS covered specific sectors defined by the North American Industry Classification System (NAICS): Information (Sector 51), Professional, Scientific and Technical Services (Sector 54) and Administrative and Support

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² Source: US Bureau of Economic Analysis, *Survey of Current Business*, June 2004. Includes utilities; transportation and warehousing; information; finance and insurance; real estate, rental and leasing; professional and business services; educational services; healthcare and social assistance; arts, entertainment, and recreation; accommodation and food services; and other services except government.

and Waste Management and Remediation Services (Sector 56). Examples of these industries include growth areas and industries sensitive to changes in the business cycle such as telecommunications, software publishing, computer systems design, advertising, broadcasting, and employment services. The QSS began collecting data in the first quarter of 2004 (March 2004) and the first press release was September 14, 2004. It published data for the second calendar quarter of 2004 and included information from the prior two quarters.

In March of 2005, the QSS expanded coverage to include Hospitals and Nursing and Residential Care Facilities (NAICS sub-sectors 622 and 623). The Census Bureau is currently planning to cover the remainder of health care and social assistance; transportation and warehousing; finance and insurance; real estate and rental and leasing; arts, entertainment and recreation services; and other services as funding permits.

Content

The QSS is mailed on the final business day of each calendar quarter. The form requests total operating revenue for the calendar quarter, and the percentage of revenue by class of customer (household, business, or government). Hospitals are asked to report discharges and inpatient days instead of percentage of revenue by class of customer. The form also requests operating expenses for industries that have a large not-for-profit component, such as hospitals and nursing and residential care facilities. It is a relatively short form that has an estimated burden time of 15 minutes. For additional information on the QSS, see www.census.gov/qss.

Currently there are four methods of reporting: mail, facsimile (FAX), on-line using Census Taker, the Internet reporting tool, or telephone.

ANALYSIS OF RESPONSE

The Census Bureau has the opportunity of studying response patterns for the QSS. The study currently examines the modes of reporting and covers the four quarters of 2004. The response rate of the QSS is analyzed in various areas, including characteristics of respondents, timeliness, and the quality of response.

To begin, we look at the distribution of non-mailed and mailed sample units for the fourth quarter of 2004.

Table 1: Distribution of Non-mailed Sample Units for Q4 2004

	Sample Units		Weighted Unadjusted Dollar Volume	
	Count	Percent	\$Millions	Percent
Small Parts of Large Companies ¹	891	58.5%	10,853	23.3%
Chronic Refusals (imputed)	342	22.5%	23,776	51.2%
Chronic Refusals (other source) ²	6	0.4%	3,064	6.6%
Out of Scope	93	6.1%	5,693	12.2%
Out of Business	190	12.5%	3,102	6.7%
Not Mailed	1,522	100%	46,488	100%

¹ Not mailed to reduce burden for companies receiving multiple forms.

² Supplement U.S. Security Exchange Commission (SEC) filings.

Table 1 examines the companies for which forms were not mailed in Q4 2004. The majority of these companies are small company parts. They are generally not mailed in order to reduce the response burden for cases that already receive multiple forms. Chronic refusals are also non-mailed. We are able to supplement U.S. Security Exchange Commission (SEC) data for a few of the larger refusals. While the non-mailed cases make up about 25% of the QSS sample, they account for only 8.2% of the weighted unadjusted dollar volume. Non-mailed forms are not included in the remainder of the response analysis.

Table 2: Distribution of Mailed Sample Units for Q4 2004

	Sample Units		Weighted Unadjusted Dollar Volume	
	Count	Percent	\$Millions	Percent
Failed to Respond	1,171	25.7%	82,440	15.8%
'Other Source' firms	83	1.8%	42,961	8.2%
Non-Response	1,254	27.5%	125,401	24.0%
Response with data	3,241	71.1%	388,731	74.6%
Response without data	66	1.4%	6,865	1.3%
Response	3,307	72.5%	395,596	75.9%
Mailed Sample	4,561	100%	520,997	100%

Table 2 examines the companies that were mailed in Q4 2004. Approximately 27.5% did not respond to the survey. For 1.8% of the cases that failed to respond, we acquired data from outside sources, such as the firm's 10-Q SEC filing. These cases account for 8.2% of our mailed dollar volume. Of the 72.5% of companies that did respond, only 1.4% of the forms did not include quarterly revenue data. The percent of dollar volume is determined by dividing the category's total dollar volume by the dollar volume for the mailed sample.

Table 3: Overall Response Rate vs. Response Rate with Data

	Q4	Q3	Q2	Q1
Mailed Cases	4,561	4,770	4,973	5,197
Responses with data	3,241	3,385	3,417	3,541
Responses without data	66	113	185	385
Response Rate with Data	71.1%	71.0%	68.7%	68.1%
Overall Response Rate	72.5%	73.3%	72.4%	74.5%

Table 3 examines the overall response rate for each quarter, as well as the response rate for only the cases with data. Overall response rate includes all responses (including those that did not include data) divided by mailed cases.

It appears that overall response has fallen slightly since Q1 2004, but the response rate with data has been increasing. This difference is most likely due to the high refusal and out of business rates that occurred following the first QSS mailing. In Q4 2004, 66 of the 4,561 cases that were mailed asked that they not be sent a form in the future. These cases will be added to the Distribution of Non-mailed Cases for Q1 2005. The same is true for out of business cases. This relationship is not perfect. We are able to convert some of our refusals to respondents. The total number of refusals does not equal the number of non-mailed refusals.

Table 4: Response Rates by NAICS Sectors for All Quarters

	Q4	Q3	Q2	Q1
NAICS 51	72.3%	72.2%	71.5%	75.3%
NAICS 54	74.0%	74.4%	74.2%	75.7%
NAICS 56	69.8%	72.0%	70.1%	71.1%
Total	72.5%	73.3%	72.4%	74.5%

Tables 4 and 5 examine the response rate by NAICS and company size. The quarterly response rates are slightly lower for NAICS 56 (Administrative Support and Waste Management) as compared with NAICS 51 (Information) and NAICS 54 (Professional, Scientific, and Technical Services). The company size is categorized into five groups using first quarter 2004 revenue: smallest (quarterly revenue less than \$108,127), small (quarterly revenue between \$108,127 and \$748,000), medium (quarterly revenue between \$748,000 and \$3,970,670), large (quarterly revenue between \$3,970,670 and \$27,949,867) and largest (quarterly revenue greater than \$27,949,867). These particular numbers were chosen because they represent the 20th, 40th, 60th, and 80th percentiles of the first quarter 2004 data. The smallest grouping had significantly lower response rate.

Table 5: Response Rate by Company Size for All Quarters

	Q4	Q3	Q2	Q1
Smallest Revenue < \$108,127	61.2%	61.1%	63.7%	65.8%
Small < \$748,000 > \$108,127	73.9%	72.2%	68.9%	73.2%
Medium < \$3,970,670 > \$748,000	78.0%	78.0%	75.7%	78.7%
Large < \$27,949,867 > \$3,970,670	75.2%	75.5%	75.2%	76.7%
Largest > \$27,949,867	74.4%	78.4%	77.4%	77.4%
Totals	72.5%	73.3%	72.4%	74.5%

Table 6: Imputation Rates by NAICS Sector for All Quarters

	Q4	Q3	Q2	Q1
NAICS 51	9.0%	9.7%	8.5%	7.9%
NAICS 54	25.5%	24.5%	21.9%	22.3%
NAICS 56	30.4%	28.4%	24.5%	26.7%
Totals	19.7%	19.2%	17.0%	17.3%

Table 7: Imputation Rate by Company Size for All Quarters

	Q4	Q3	Q2	Q1
Smallest Revenue < \$108127	47.0%	41.5%	34.8%	45.3%
Small < \$748000 > \$108127	35.5%	33.0%	35.0%	32.4%
Medium < \$3970670 > \$748000	25.6%	28.4%	25.6%	23.9%
Large < \$27949867 > \$3970670	33.8%	32.4%	28.5%	28.8%
Largest > \$27,949,867	9.5%	7.9%	7.3%	7.6%
Totals	19.7%	19.2%	17.0%	17.3%

Tables 6 and 7 examine imputation rates by NAICS sector and company size for all quarters. Imputation rates can also assist in determining the impact of the responses because imputation incorporates total reported dollar volume. The imputation rate for NAICS 51 is significantly lower than the other two sectors and the smallest grouping had the highest imputation rate.

Response Timeliness

The overall response over time and the distribution of response by mode were examined to determine the timeliness of each response. Responses were tracked by using the company's check-in date (the date the form is received via mail or fax, the data is collected via the Internet, or the data is collected by phone).

Figure 1: Timeliness of Response Across All Quarters

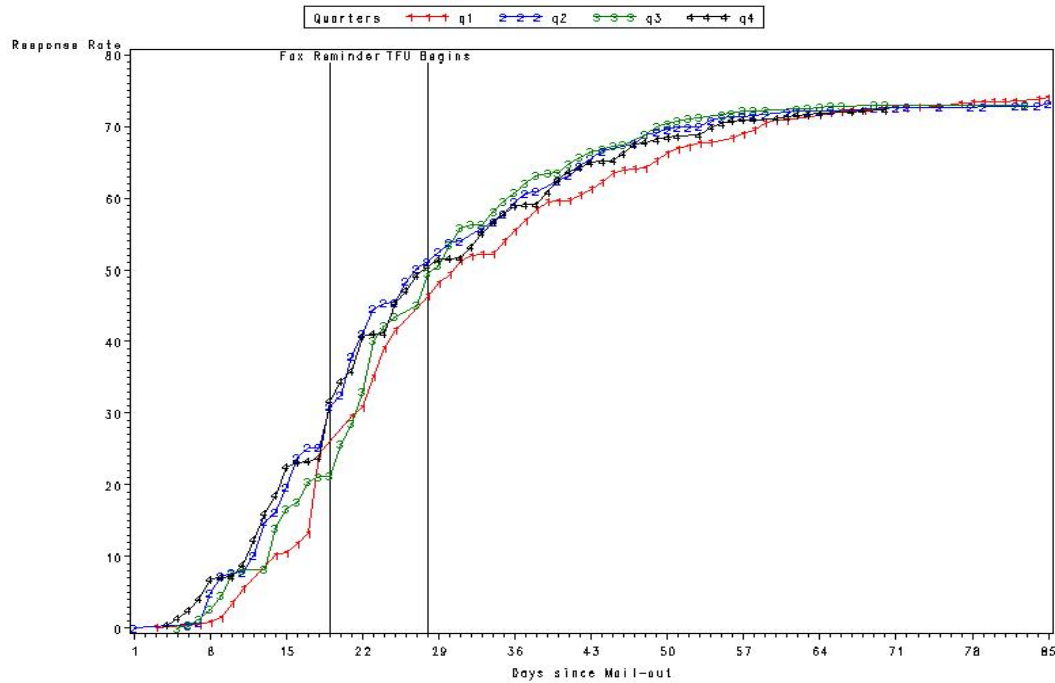


Figure 1 shows the overall response over time. To increase response, two follow-up procedures are used. Approximately eighteen calendar days following mail-out, a fax reminder is sent to delinquent respondents who received less than three forms. One week following the fax reminder, telephone follow-up (TFU) begins. Clerks contact companies over the telephone to remind the respondents to report and/or to collect data directly over the telephone. The follow up methods proceed with a significant increase in response.

Figure 2: Timeliness of Response

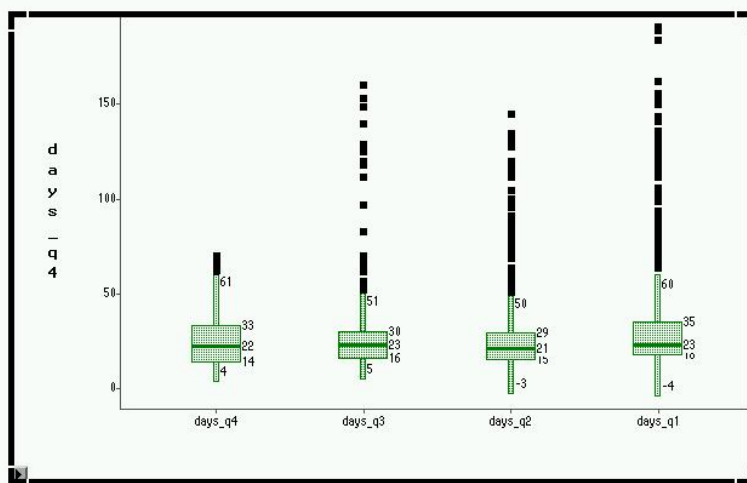


Figure 2 shows 4 box plots of the number of days from the initial mailing of the form until it is received. There are no significant differences in the median number of days across the four quarters. Cases beyond the 75 days limit are late reports that are not included in the preliminary estimate.

Table 8: Distribution of Response Mode for All Quarters

Mode of Response	Q4	Q3	Q2	Q1
Mail	36.3%	36.2%	42.5%	46.2%
Internet	32.1%	29.9%	27.0%	23.9%
Fax	24.3%	26.3%	22.0%	19.8%
Phone	7.3%	7.6%	8.5%	10.1%
Total	100%	100%	100%	100%

Table 8 examines the overall percentage of cases that reported for each response mode during the quarter. In all four quarters, response by mail and phone decreased while Internet and fax receipts increased. A possible reason for this could be encouragement from Census Bureau clerks requesting that respondents report on-line or by fax instead of collecting the data by phone during telephone follow-up data collection.

Distribution of response mode is further broken out by NAICS sectors and size in tables 9 and 10, below.

Table 9: Q4 2004 Distribution of Response Mode by NAICS Sector

	NAICS 51	NAICS 54	NAICS 56	Total
Mail	29.8%	39.9%	37.0%	36.3%
Internet	36.4%	31.5%	28.1%	32.1%
Fax	25.8%	23.6%	23.7%	24.3%
Phone	8.0%	5.0%	11.2%	7.3%
Total	100%	100%	100%	100%

Table 10: Q4 2004 Distribution of Response Mode by Company Size

	Smallest Revenue < \$108,127	Small < \$748,000 > \$108,127	Medium < \$3,970,670 > \$748,000	Large < \$27,949,867 > \$3,970,670	Largest > \$27,949,867	Totals
Mail	47.3%	44.7%	35.0%	32.5%	23.2%	36.3%
Internet	23.6%	24.6%	35.1%	35.2%	40.0%	32.1%
Fax	18.4%	24.6%	23.3%	26.6%	27.2%	24.3%
Phone	10.7%	6.1%	6.6%	5.7%	9.6%	7.3%
Total	100%	100%	100%	100%	100%	100%

Quality

When a form is checked in it is reviewed for remarks from the respondent. Any remark found is classified and referred to the survey analysts for further review.

Referrals include:

- Out of business
- Out of scope
- Change in structure (ie., the company sells or acquires branches of business)
- Explained differences in quarter-to-quarter changes in revenue
- Consolidated multiple parts on one form
- Refusal

Table 11: Referrals Received through each Response Mode

Fourth Quarter	Out-of-Business		Out-of-scope		Structural Change		Significant Change in Data		Consolidated Reporting		Refusals	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Mail	6	18.7%	23	60.5%	21	41.2%	20	22.7%	1	5.3%	4	6.1%
Internet	7	21.9%	3	7.9%	10	19.6%	36	40.9%	5	26.3%	1	1.5%
Fax	7	21.9%	12	31.6%	15	29.4%	25	28.4%	8	42.1%	7	10.6%
Phone	12	37.5%	0	0.0%	5	9.8%	7	8.0%	5	26.3%	54	81.8%
Total	32	100%	38	100%	51	100%	88	100%	19	100%	66	100%

Table 11 examines how the response mode effects referrals. It appears that phone respondents tend to refuse more often than respondents using other modes. However, when conducting telephone follow-up, clerks are calling companies that are already delinquent. It also appears that Internet respondents tend to report more significant changes in data. These respondents seem more likely to comment on why there was a difference in revenue between quarters.

Table 12: Data Flags for Reported Revenue Received Through Each Mode of Response

Fourth Quarter	Reported		Imputed		Analyst Impute		Other Source		Analyst Correction		Edit Failure		Total
	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	
Mail	1142	95.6%	9	0.8%	0	0.0%	1	0.1%	19	1.6%	24	2.0%	1195
Internet	1002	94.9%	0	0.0%	2	0.2%	0	0.0%	36	3.4%	16	1.5%	1056
Fax	740	92.6%	12	1.5%	0	0.0%	0	0.0%	32	4.0%	15	1.9%	799
Phone	180	75.0%	39	16.3%	1	0.4%	3	1.3%	13	5.4%	3	1.3%	240

Table 12 examines the data flag for quarterly revenue that is attributed to each checked-in case. It is broken out by response mode. The data flags are:

Reported- data provided by respondent

Imputed- data estimated using industry averages and/or administrative payroll data

Analyst impute- data estimated by Census QSS analyst

Other source- data from outside source (e.g. SEC 10-Q filing)

Analyst correction- reported data corrected based on company contact or keying error

Edit failure- reported data is replaced by imputed data

The frequency of the flag for a given response mode is divided by the total number of cases that used that response mode to determine the percentage associated with each data flag.

CONCLUSION

The decision to maintain comprehensive response data was motivated by the inception of the new voluntary Quarterly Services Survey. Relatively little is known about the potential impact of diverse mode data collection, especially web based collection. We were also interested in the effects of response rates over time with integration of the two follow up methods, fax reminder and telephone follow up. Finally, we investigated the response quality by mode, which we thought that Internet response would yield the best quality.

There are mixed results in concluding if quality was significantly better for any specific response mode. While all items were reported on the Internet form, analysts had to correct several more items than on mail or phone collection methods. Effects from keying errors are difficult to determine.

Response timeliness across all quarters appears to be very consistent. Both follow up methods are followed by an increase in response. The number of days until the company reports is also comparable across quarters. The overall

response rate is also examined across all quarters. There is minor response rate attrition from first quarter 2004 to fourth quarter 2004.

We will continue to track response for this survey. With the expansion plans, it will be interesting to see if future reporting patterns are the same as the four quarters of 2004.

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