An Update on Developing Response Metrics for the Economic Census

FedCASIC 2015

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Outline

- Motivation for Developing Response Metrics
- Where We Left Off
- Economic Census Overview
- Response Metrics
- Examples
- Discussion

Reasons for Developing New Response Metrics

- Comply with Census Bureau and Office of Management and Budget standards and guidelines
- Produce response metrics similar to those used by other economic survey programs
- Produce more meaningful information about the "quality" of Economic Census (EC) data
- Improved (near) real-time measures of data collection performance

Where We Left Off

- Last time we presented, we had introduced the standard response metrics we intended to produce for the 2017 EC. (We knew a lot about the 2007 EC, not much about the 2012 EC, and nothing about the 2017 EC.)

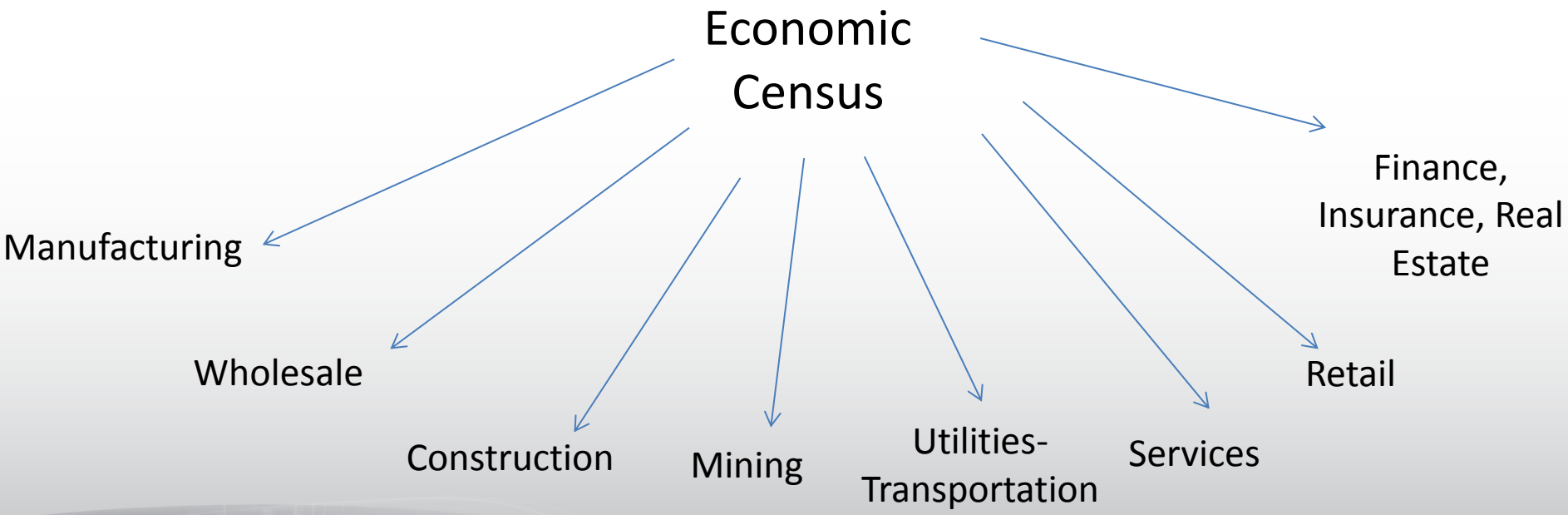
- We also discussed the need to produce metrics in “real time” to assist in targeted nonresponse follow-up.

Economic Census Overview

- Conducted every 5 years for reference years ending in 2 and 7
- Response required by law
- Data collected from business establishments in the 50 states and the District of Columbia
- In 2012, data were collected through self-administered paper and electronic questionnaires. In 2017, data will be collected electronically.
- Provides the most detailed benchmark data available about the U.S. economy with statistics down to the ZIP code level
- Supports the estimation of Gross Domestic Product
- Data users include policymakers, industry analysts, economic development commissions, academic researchers, businesses and other survey programs (e.g., as a benchmark)

Economic Census Overview, contd.

- Key data items (receipts, payroll, no. of employees, no. of establishments)
- Key subgroups (e.g., geography, NAICS, legal form of organization)



Sampling Methodology

- Sampling frame derived from the U.S. Business Register (BR)
- Neither a census, nor a single sample survey; sampling component to some trade areas
- For sampling purposes, distinguish between multi-establishment companies and single-establishment companies
- Some trades fill small, single-unit cases with administrative data in lieu of mailing a form
- Approximately 3.9 million out of 6.5 million establishments received a 2012 Economic Census form

2012 Economic Census Sampling Scheme By Trade Area*

Wholesale	Manufacturing and Mining	Retail, Services, and Utilities-Transportation	Finance, Insurance, Real Estate	Construction
Take all units with certainty	Take all units with certainty. Based on payroll cutoffs, unit receives a long form, short form, or no form. Impute units that receive no form with administrative data	Take those with the largest payroll with certainty Sort remaining cases on 8-digit NAICS code and payroll and take a systematic sample. Fill key items** of non-selected units with administrative data. Adjust other items using an expansion method	In select industries, take all units with certainty In all other industries: •Take those with largest payroll with certainty Sort remaining cases on 8-digit NAICS code and payroll and take a systematic sample. Fill key items** of non-selected units with administrative data. Adjust other items using an expansion method	Take all multi-unit businesses with certainty For single-unit businesses with complete 6-digit NAICS, stratify by state and NAICS. Take small strata with certainty. Within remaining strata, take a probability-proportional-to-size (payroll) sample For single-unit businesses with incomplete 6-digit NAICS, take those with largest payroll with certainty. Take a simple random sample of remaining cases

* MU's are taken with certainty across all trade areas

**Key items include receipts, payroll, and number of employees

Nonresponse Methodology

- Nonresponse follow-up
  - As many as four mailings, plus phone calls for large establishments.
- Secondary data source/administrative data substitution
  - Where possible, missing data were imputed using administrative data.
- For some trade areas, a factor adjustment was used to adjust for missing product lines data

Response Metrics and the Economic Census

- Historically, Economic Census has used check-in rate as its only metric for response. We have been developing response rates that meet quality standards or can be used as additional "real-time" performance metric.
  - Standard measures – to be computed at the end of collection.
  - Proxy measures – to be computed during data collection.

- As the Economic Census covers eight major trade areas, with different designs, and over 500 different forms, this has been a several year process. (e.g., database updates to accommodate response rates)

- We are currently testing these metrics using 2012 Economic Census data. They will go into production for the 2017 Economic Census.

Standard Response Metrics

- Check-in rate
  - The check-in rate represents the percentage of mailed forms that were returned and undeliverable as addressed.
- Unit response rate
  - The *URR* represents the percentage of reporting units eligible for data collection or of unknown eligibility that provided a valid survey response.
- Total quantity response rate
  - For a data item *t*, the *TQRR* is the percentage of the estimated total obtained from directly reported and secondary source data.

Standard Response Metrics (contd.)

- Quantity response rate
  - For data item *t*, the *QRR* is the percentage of the estimated total obtained from directly reported data.
- Administrative data rate
  - For data item *t*, the *ADR* is the percentage of the estimated total obtained from administrative data.
- Imputation rate
  - For a data item *t*, the *IR* is the percentage of the estimated total that is not obtained from directly reported or secondary source data.

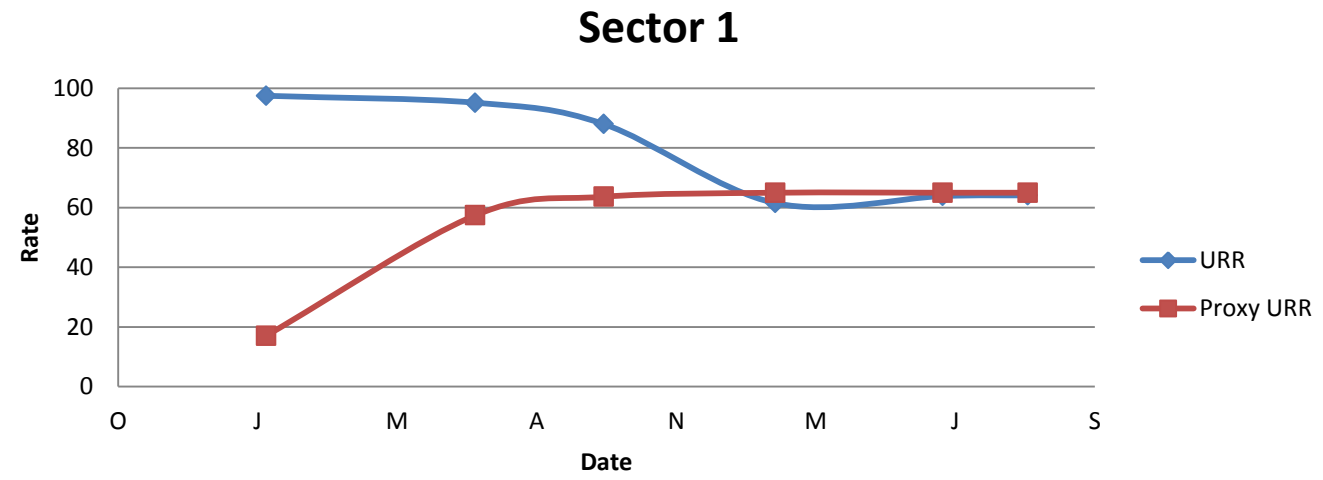
Plans for Economic Census "Real-Time" Response Metrics

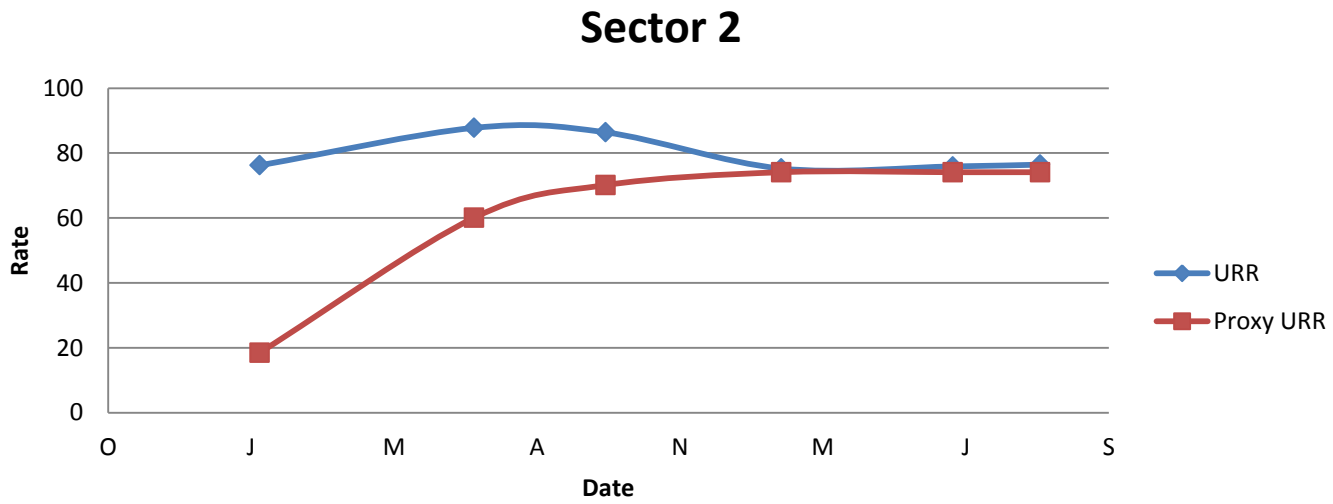
- Will allow survey managers to monitor data collection performance in real-time.
- The proxy URR differs from the standard URR in that we make some simplifying assumptions about eligibility and response (use mail and check-in status as proxies).
- Proxy item-level response rates differ from their standard counterparts in that they use administrative data (use mail status, check-in status and administrative payroll, which is highly correlated with all the key items of primary interest).

Real-Time Rates

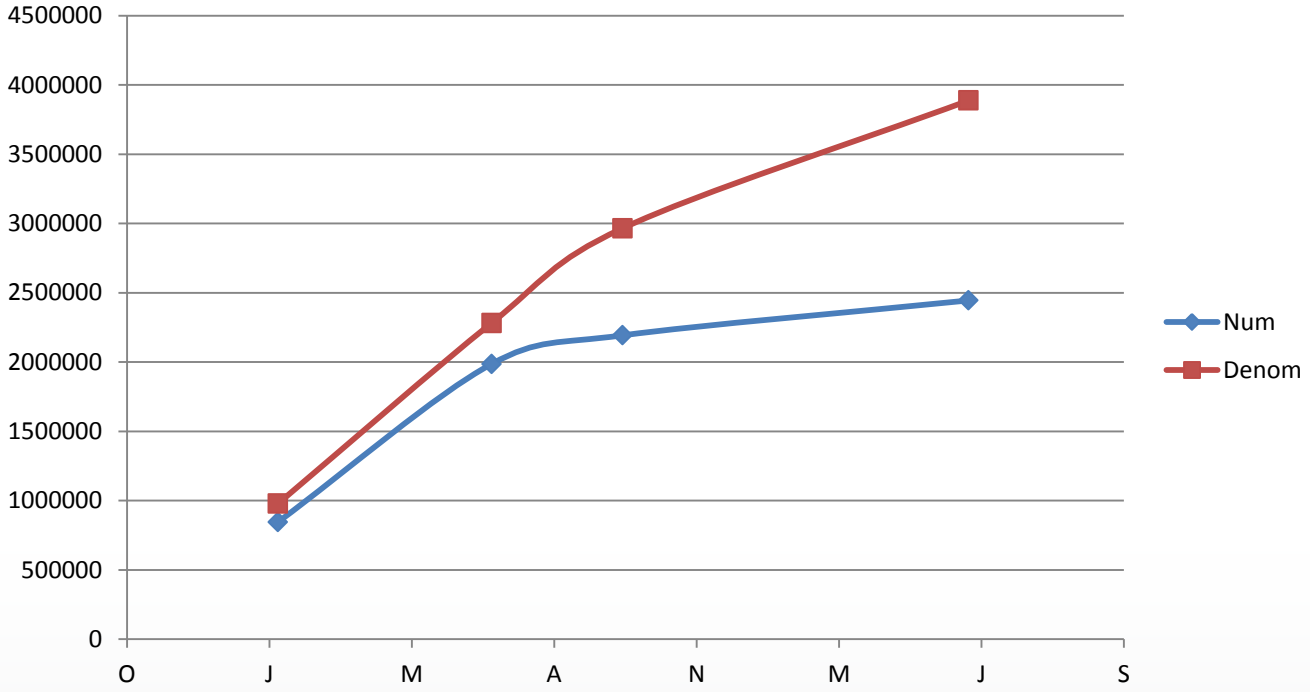
- Check-in rate
- Proxy URR
- Proxy TQRR (payroll)
- Proxy QRR (payroll)
- Proxy Administrative Date Rate (payroll)
- Proxy Imputation Rate (payroll)

Why We Need Proxy Response Rates



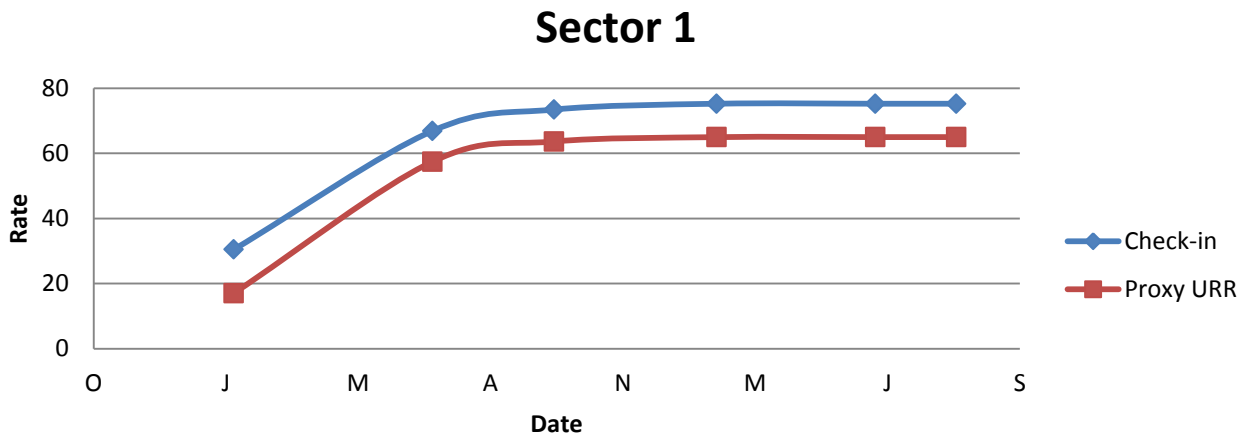


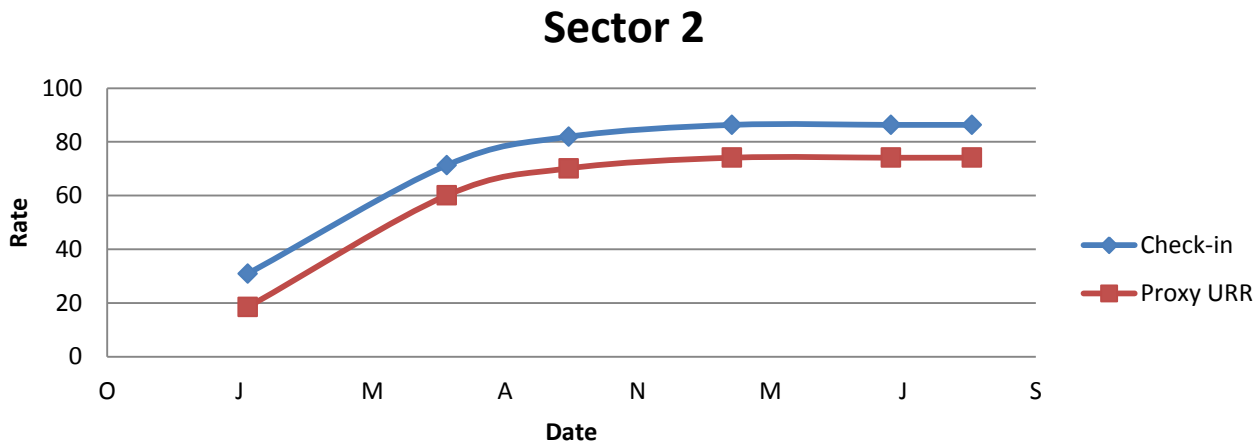
Numerator and Denominator For URR



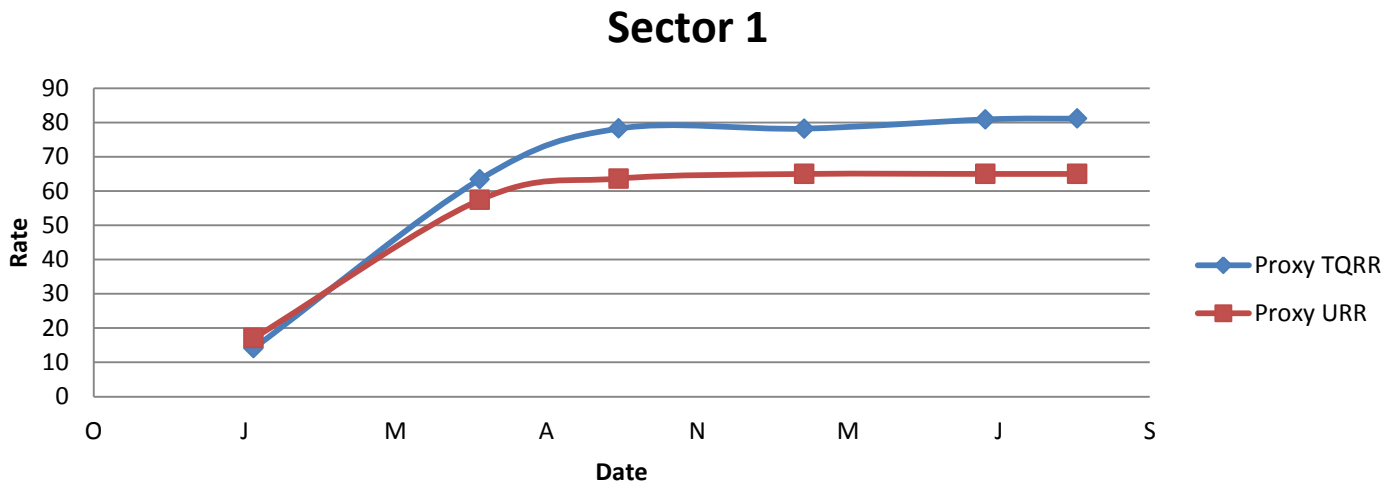
- Initially there were a “small” number of cases defined as eligible, and many of those were flagged as respondents.
- As processing continued, our pool of eligible cases expanded, but not as many eligible units actually reported.

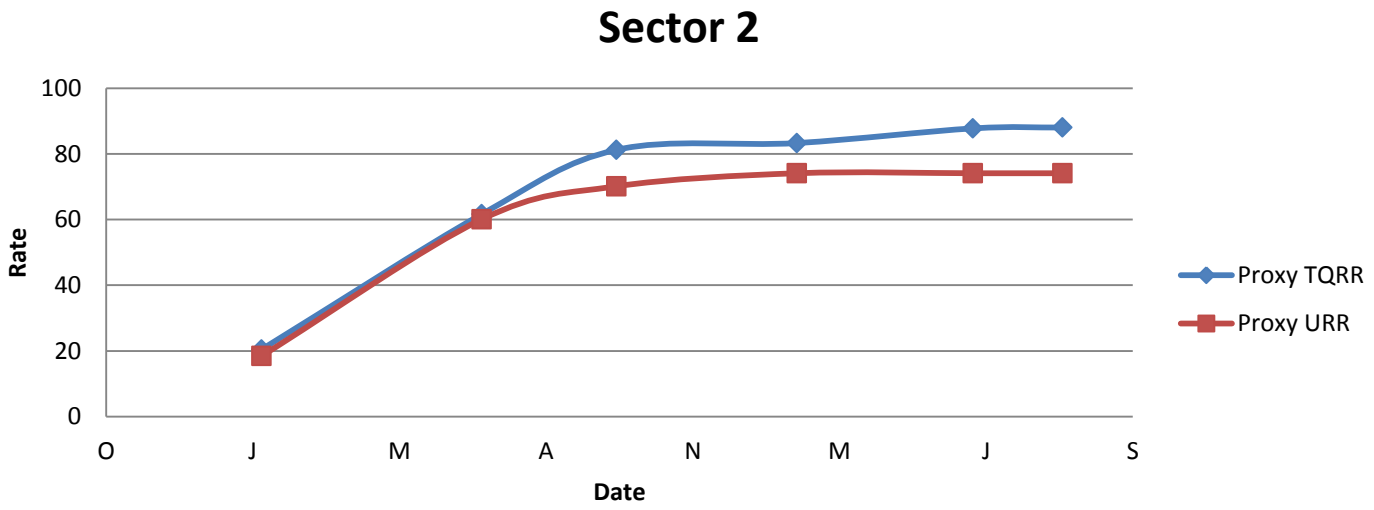
Example: Check-in Rate vs. Proxy URR





Example: Proxy URR vs. Proxy TQRR





Real-Time Response Metrics Table

		Response Metrics																	
		By Sector by Unit Type																	
		Check-in Rate			Proxy Unit Response Rate			Proxy Total Quantity Response Rate*			Proxy Quantity Response Rate			Proxy Administrative Data Rate			Proxy Imputation Rate		
		Num	Den	Rate (%)	Num	Den	Rate (%)	Num	Den	Rate (%)	Num	Den	Rate (%)	Num	Den	Rate (%)	Num	Den	Rate (%)
Sector 21	Overall																		
	Multi-unit																		
	Single-unit																		
22	Overall																		
	Multi-unit																		
	Single-unit																		
23	Overall																		
	Multi-unit																		
	Single-unit																		
31-33	Overall																		
	Multi-unit																		
	Single-unit																		

*Proxy rates based on 20xx Business Register payroll data

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Post-Processing Item Response Metrics

		Item Response Metrics for Payroll												
		By Sector by Unit Type												
			Total Quantity Response Rate			Quantity Response Rate			Administrative Data Rate			Imputation Rate		
		N	Num	Den	Rate (%)	Num	Den	Rate (%)	Num	Den	Rate (%)	Num	Den	Rate (%)
Sector 21	Overall													
	Multi-unit													
	Single-unit													
22	Overall													
	Multi-unit													
	Single-unit													
23	Overall													
	Multi-unit													
	Single-unit													
31-33	Overall													
	Multi-unit													
	Single-unit													

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Future Plans

- In addition to response rate efforts, current 2017 EC plans include:
  - Variance estimation
  - Better use of survey process data (paradata)
  - “Adaptive design” strategies

- To prepare for using these in production in 2017, we hope to test them earlier (hopefully in the 2016 ASM because of the similarities).

- In the future, we will investigate the use of additional quality metrics.

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