Article

The impact of the Business Register and Employment Survey on the Inter-Departmental Business Register: 2022

Response rates and business structure changes in the Business Register and Employment Survey and impacts on the Inter-Departmental Business Register.

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1 . Main points

- In October 2020, the Office for Statistics Regulation (OSR) assessed Office for National Statistics (ONS) business demography statistics and reviewed their compliance against each of the pillars in the Code of Practice for Statistics.

- The OSR focused on quality assurance of Inter-Departmental Business Register (IDBR) data and highlighted business structure as one of their areas of concern; the primary source of updating the IDBR for multi-site businesses is ONS's Business Register and Employment Survey (BRES).

- We have analysed the processes and methods used on BRES, along with the outcomes of the survey and the changes implemented on the IDBR.

- Across the range of business types surveyed, we find that BRES successfully captures changes to business structure.

- We also observe significantly greater rates of structural change in critical demographics such as high employment and complex businesses, validating the design decision to fully enumerate these strata.

2 . Overview of the Business Register and Employment Survey

Survey design

The Business Register and Employment Survey (BRES), first established in 2009, is a sample-based survey that runs annually.

BRES serves two primary purposes: to collect data on the number of employees across the economy in Great Britain and to update local unit information and business structure information on the Inter-Departmental Business Register (IDBR). The number of employees in Great Britain are measured across the public or private sector and on a full-time and part-time basis. When a business is selected for BRES, all constituent local units are also selected, and data are requested for each local unit individually. The Department of Finance and Personnel Northern Ireland (DFPNI) collects the same BRES information independently in Northern Ireland and both sources are then combined to provide estimates on a UK basis. You can find further information in our BRES QMI.

BRES samples approximately 80,000 businesses annually across Great Britain's economy. It uses the IDBR as the sampling frame and draws its sample using stratified random sampling. The sample design broadly splits the population into homogenous groups (strata), by country (England, Wales, and Scotland), by two-digit Standard Industrial Classification (SIC), and by employment size of the business (0 to 20, 20 to 100 and over 100). Random sampling then takes place independently within each stratum, and the sample is optimised to minimise the standard error for estimates of employment. Throughout this article, we use the term "employment" to mean the equivalent number of full-time employees a business has, with part-time workers counting for half.

Some businesses are placed into take-all strata to ensure that they are selected on the survey each year. These are large businesses (over 100 employment), complex businesses or those that are in Wales and Scotland with 20 to 100 employment. In addition to this, we force in unusual businesses and some with special arrangements. All these businesses are typically key to estimates of employment or to updating the IDBR. Criteria for complex or unusual businesses are:

- businesses that have two or more local units across different regions or industries

- businesses where the Office for National Statistics (ONS) have identified a disparity between IDBR employment and Pay As You Earn (PAYE) jobs information received from HMRC – these businesses are identified using an outlier detection process called the Hidiroglou-Berthelot (HB) method

- businesses with "special arrangements" to complete the survey using a spreadsheet instead of a paper questionnaire – these include, but are not exclusively, the largest businesses in Great Britain, for which it may be impractical to complete by paper because of the number of local units

Business structures on the Inter-Departmental Business Register

An enterprise, which we refer to as a business in this article, is generally created on the IDBR when we receive information about a company from Companies House and link it to a Value Added Tax (VAT) unit and/or a PAYE unit from Her Majesty's Revenue and Customs (HMRC).

The structure of a business on the IDBR is further defined by its local units, each of which represents a physical location at which the business operates. These units have an address, a Standard Industrial Classification (SIC), and their own employment figures. When a business is created on the IDBR, the ONS has no information on the number of local units. Local unit structures are only created for a business on the IDBR if it has been selected for BRES or one of the ONS short-term employer surveys. Beyond this point, a business can only be recorded as having multiple local units if it is sampled for BRES. This makes BRES vital to the quality of the data held on the IDBR, particularly in relation to the production of regional economic statistics.

Table 1 shows the average number of businesses on the IDBR in 2020, broken down by the number of local units that they hold. Most businesses on the IDBR have no local unit information and have therefore never been selected for one of these surveys.

Table 1: The number of local units associated with businesses on the Inter-Departmental Business Register, 2020

Number of Local Units	Businesses on IDBR	Percentage on IDBR
0	2,134,009	76.8
1	583,128	21.0
2+	59,876	2.2
Total	2,777,014	100.0

Source: Office for National Statistics - Inter-Departmental Business Register

3 . Survey response rates

Survey responses

The response rates for the Business Register and Employment Survey (BRES) are generally high. Rates for 2019 can be seen in Table 2. In 2019, the overall response rate was 83.3% with strong levels of response in the medium to large employment size bands. The response rate for businesses with 20 to 100 employment was the highest at 93%; this category typically includes those businesses in the take-all strata in Wales and Scotland, along with the complex and unusual businesses.

Table 2: Response rates for the Business Register and Employment Survey 2019

Employment Band	Businesses Sampled	Responders	Response Rate
0-20	23,522	16,675	70.9%
20-100	35,673	33,185	93.0%
100+	22,388	18,489	82.6%
Total	81,583	68,349	83.8%

Source: Office for National Statistics - Business Register and Employment Survey

Large, complex, or unusual businesses are selected in take-all strata or are forced into the sample. These businesses are considered very important to the effectiveness of the survey. The response rates for businesses in these categories are shown in Tables 3 to 6.

Table 3 gives a summary of the sample size, number of responders and the corresponding response rate for complex businesses (two or more local units across different regions or industries). We can see that response rates are good for this category of business across all employment bands.

Table 3: Sample size and response rates for complex businesses, 2019

Employment Band	Sampled	Responded	Response Rate
10-49	6,000	5,163	86.1%
50-99	5,162	4,339	84.1%
100-999	9,228	7,553	81.8%
1,000+	1,452	1,451	99.9%
Total	21,842	18,506	84.7%

Source: Office for National Statistics - Business Register and Employment Survey

Table 4 shows the sample size, number of responders, and corresponding response rate for large businesses (over 100 employment). Response rates are high, particularly for the largest businesses.

Table 4: Sample size and response rates for large businesses (over 100 employment), 2019

Employment Band	Business Sampled	Responders	Response Rate
100-999	10,624	8,428	79.3%
1,000-9,999	390	374	95.9%
10,000-99,999	8	8	100.0%
Total	11,022	8,810	79.9%

Source: Office for National Statistics - Business Register and Employment

Table 5 shows the sample size, number of responders, and corresponding response rate for businesses that we have detected as having an employment disparity. More detail on this detection method is given in Section 5. Response rates are high for medium-sized businesses but significantly lower for the smallest and largest businesses in this category.

Table 5: Sample size and response rates for businesses with an employment disparity, 2019

Employment Band	Businesses selected	Businesses Responding	Response Rate
0-9	1,593	872	54.7%
10-49	2,578	2,356	91.4%
50-99	32	2	6.3%
Total	4,203	3,230	76.8%

Source: Office for National Statistics - Business Register and Employment Survey

Table 6 shows the sample size, number of responders, and corresponding response rate for businesses with special arrangements. Response rates are extremely high, as we would hope for businesses with which we have built a relationship.

Table 6: Sample size and response rates for businesses with special arrangements, 2019

Employment Band	Businesses in Universe	Businesses Responding	Response Rate
<1000	95	84	88.4%
1,000-9,999	481	480	99.8%
10,000+	112	112	100.0%
Total	687	676	98.4%

Source: Office for National Statistics - Business Register and Employment Survey

Table 7 shows the sample size, number of responders, and corresponding response rate for all other businesses sampled in BRES 2019. This includes randomly sampled businesses and those from the take-all strata in Scotland and Wales.

Table 7: Sample size and response rates for all other businesses, 2019

Employment Band	Businesses Sampled	Businesses Responding	Response Rate
0-20	19,555	13,624	69.7%
20-100	24,273	23,503	96.8%
Total	43,828	37,127	84.7%

Source: Office for National Statistics - Business Register and Employment Survey

Patterns of non-response

One way in which we can investigate data quality issues on the Inter-Departmental Business Register (IDBR) is to consider those that do not respond to BRES. This failure to respond would likely lead to outdated local unit data for these businesses on the IDBR.

In 2019, 13,234 businesses (16.2%) did not respond to the survey. Although a large proportion of these businesses are randomly selected each year, some fall into take-all strata or are forced into the sample. For these businesses, we can track their response or non-response over time. Several types of businesses and patterns of non-response have been examined.

To begin with, persistent non-responders were identified – these businesses are consistently selected for BRES but have failed to respond for several consecutive years. Persistent non-responders have been defined as those with three consecutive years of non-response – this broadly aligns with the definition used by our response validation team, who use this definition to identify businesses that should be more actively chased for a response.

Businesses in take-all strata or those that were forced into the sample were used for this analysis, namely those that are large, complex, and have special arrangements, for the period between 2015 and 2019.

Table 8 shows the results of this analysis. Across all the relevant businesses, slightly less than 5% could be classed as a persistent non-responder in the five-year period. Almost all of these have less than 1,000 employment. It appears that the arrangements that the Office for National Statistics (ONS) has with the very largest businesses are ensuring that these are very rarely persistent non-responders. However, there is certainly room for improvement in the smaller employment bands, where the rate of persistent non-response is higher.

Table 8: Persistent non-responders from fully enumerated strata, 2015 to 2019

Employment Band	Population Count	Persistent Non-Responders	Rate
0-99	14,573	751	5.2%
100-999	23,706	1,124	4.7%
1,000-9,999	2,511	6	0.2%
10,000+	183	0	0.0%
Total	40,973	1,881	4.6%

Source: Office for National Statistics - Business Register and Employment Survey

Secondly, we analysed businesses that were sampled every year in the period between 2015 and 2019 but never responded. This scenario represents the worst possible outcome, where many of these businesses would not have had their local unit structures updated or confirmed in over five years.

Table 9 shows the results of this analysis. The population counts are lower because many businesses were not sampled every year – they may have entered the sample later than 2015, left it before 2019, or dropped in and out as their employment fluctuated. Of those that were selected every year, a small proportion have never responded. As with the persistent non-responders, these are concentrated in the less than 1,000 employment range.

Table 9: Complete non-responders from fully enumerated strata, 2015 to 2019

Employment Band	Population Count	Complete Non-Responders	Rate
0-99	7,538	397	5.3%
100-999	15,534	426	2.7%
1,000-9,999	2,076	0	0.0%
10,000+	159	0	0.0%
Total	25,307	823	3.3%

Source: Office for National Statistics - Business Register and Employment Survey

Finally, we considered patterns of intermittent response. Many businesses are not persistent or complete non-responders but may still respond irregularly. For this group of businesses, we first investigated the rate at which these patterns occurred and then looked at the effect this had on any structural changes reported on the 2019 survey.

For businesses who responded to BRES in 2019, we compared the business structures reported on the survey with the business structures reported on their previous survey response. Table 10 shows the results from this comparison. A large proportion of businesses report structural changes, and this proportion grows for businesses that have not responded as recently – from 32.3% for consecutive years to 45% for a two-year gap. However, the average scale of the change to business structures is noticeably smaller where businesses have not responded for a longer time period. This is likely because the largest businesses (which have the most local units and thus greatest scale of change) are our most reliable responders, and their previous response was in 2018.

Table 10: Structural change reported by intermittent responders who responded in 2019

Year of most recent response	Responders	Businesses Reporting Structural Change	Percentage Reporting Structural change	Average scale of structural changes reported
2016	271	122	45.0	4.5
2017	973	395	40.5	5.8
2018	25,627	8,285	32.3	8.1
Total	26,871	8,802	32.8	8

Source: Office for National Statistics - Business Register and Employment Survey

Findings

From this analysis, we find that in general response rates and patterns for BRES are as we would hope for a major survey. Overall response rates are at about 80% each year, and most key groups (such as large or complex businesses) have response rates that match or even exceed this. The extremely high response rates for businesses with special arrangements are evidence that our work to build relationships with these key responders is effective.

However, there are still some areas in which response rates could improve. Across the board, response rates from smaller businesses are lower than for medium or large ones. This difference is more pronounced when looking at businesses with an employment discrepancy (Table 5). The largest businesses in this category (50 to 99 employment) also have a very low response rate.

Finally, when examining patterns of non-response, we find that some businesses have a record of persistent poor response to BRES. A review of these businesses, and the approaches we might use to capture more regular responses, may be useful in improving the overall quality of demography data on the IDBR.

4 . Changes to business structure

To further asses the effectiveness of the survey, we have also examined the changes reported by those businesses that respond. The design of the survey and its strata are partially dependent on the assumption that businesses in the take-all strata will report changes to their structure at a greater rate than randomly sampled businesses. Our analysis has consequently focused mainly on these strata and sought to evaluate to what extent this assumption is true.

Multi-site businesses spanning more than one region or industry

A business is defined to be complex if it has two or more local units that span multiple distinct Standard Industrial Classifications (SICs) and/or regions. In 2019, 18,506 businesses were selected in a take-all stratum. For these businesses, we have considered the rates at which they change their business structure.

Table 11 gives a breakdown of the structural changes reported for these businesses in 2019. The scale of structural change refers to the number of local units being created, ceasing to exist, or changing industry or region. These results show that in 2019 very few businesses reported a change in structure, and where there was a change, most did not involve many local units. The most significant changes occurred in businesses with both large employment and more than five local units.

Table 11: Rates and average scale of reported structural changes for complex businesses, 2019

Employment band	Number of local units	Responders	Businesses reporting structural change	Percentage reporting structural change	Average scale of structural changes reported
10-49	1-2	2,376	7	0.3	1
	3-5	2,059	9	0.4	2.1
	6-10	583	5	0.9	1.4
	11-20	125	0	0.0	0
	21-50	19	0	0.0	0
	51+	1	0	0.0	0
50-99	1-2	1,465	4	0.3	1
	3-5	1,790	11	0.6	1.3
	6-10	716	11	1.5	1.8
	11-20	278	3	1.1	2
	21-50	85	1	1.2	1
	51+	5	0	0.0	0
100+	1-2	1,514	8	0.5	1
	3-5	2,637	27	1.0	1.6
	6-10	1,762	32	1.8	1.5
	11-20	1,427	37	2.6	2.5
	21-50	1,063	30	2.8	3.4
	51+	601	9	1.5	15.2
Total		18,506	194	1.0	2.6

Source: Office for National Statistics - Business Register and Employment Survey

These finding have mostly been consistent for each year analysed. The results for 2018, shown in Table 12, show similar rates of structural change, with a slightly higher average scale of change.

Table 12: Rates and average scale of reported structural changes for complex businesses, 2018

Employment band	Number of local units	Businesses Responding	Businesses reporting structural change	Percentage reporting structural change	Average scale of structural changes reported
10-49	**1-2**	2398	7	0.3	1.0
	3-5	114	1	0.9	14.0
	6-10	18	0	0.0	0.0
	11-20	2142	14	0.7	1.8
	21-50	1	0	0.0	0.0
	51+	575	0	0.0	0.0
50-99	**1-2**	1529	8	0.5	2.0
	3-5	1437	42	2.9	4.2
	6-10	1078	40	3.7	4.1
	11-20	2662	36	1.4	1.6
	21-50	617	31	5.0	4.9
	51+	1839	40	2.2	2.1
100+	**1-2**	1449	7	0.5	1.0
	3-5	287	3	1.0	1.0
	6-10	86	2	2.3	10.5
	11-20	1771	10	0.6	1.7
	21-50	2	0	0.0	0.0
	51+	723	7	1.0	1.7
Total		18,728	248	1.3	3.0

Source: Office for National Statistics - Business Register and Employment Survey

Initial analysis of data from 2018 suggested a significantly elevated rate of structural change. However, further investigation showed that these additional changes were attributable to updates to the regions of many local units because of a change in boundaries. The results in Table 12 exclude the effects of this one-off event.

Businesses with over 100 employment

The Business Register and Employment Survey (BRES) selects all businesses in the population with over 100 employment. In 2019, 8,810 businesses were selected in this take-all stratum.

Table 13 shows that these businesses generally do not see high rates of structural change. The figure for the businesses with larger counts of local units is higher, though for the largest bands this is a very small sample.

Table 13: Reported structural changes to large employment businesses, 2019

Number of Local Units	Businesses Responding	Businesses reporting structural change	Percentage reporting structural change	Average scale of structural changes reported
1	5,619	14	0.2	3.5
2	1,229	14	1.1	5.4
3-5	1,120	32	2.9	1.5
6-10	493	32	6.5	1.8
11-20	235	25	10.6	1.9
21-50	84	4	4.8	2.0
51+	30	1	3.3	49.0
Total	8,810	122	1.4	2.7

Source: Office for National Statistics - Business Register and Employment Survey

Businesses with disparities between IDBR employment and PAYE jobs

Businesses with discrepancies between Inter-Departmental Business Register (IDBR) employment and Pay As You Earn (PAYE) jobs are selected in the BRES using the Hidiroglou-Berthelot (HB) rule. This is an outlier detection method, which we apply to the differences between the two measures of employment at the time of sample creation. The method selects those businesses with the most significant discrepancies, which accounts for both the magnitude of the difference and the size of the business. Discrepancies in businesses with larger employment counts are given a greater weight because they are more impactful on employment estimates.

To be eligible for selection under this rule, a business must:

- have at least one local unit

- have at most 100 employment

- be non-"complex"

Table 14 shows the 2019 responses from these businesses, grouped by employment. We analysed these responses in terms of structural change and to determine whether the response indicated a significant change in employment – reporting a new employment figure more closely aligned with their PAYE figure than the IDBR value. The precise method used to identify these changes is discussed in Section 5.

The proportion of responders reporting structural change is very low – only 17 in total. However, businesses reporting a significant change in employment is much higher at just under 50%. This seems to indicate that the Hidiroglou-Berthelot (HB) rule is effective in identifying businesses where employment should be updated, but this has little correlation with whether business structure has changed.

Table 14: Reported changes to businesses with an employment discrepancy, grouped by employment, 2019

Employment Band	Total Responders	Responders Reporting Structural Change	Percentage Reporting Structural Change	Responders Reporting Significant Employment Change	Percentage Reporting Significant Employment Change
0-9	872	4	0.5	420	48.2
10-99	2,358	13	0.6	992	42.1
Total	3,230	17	0.5	1,412	43.7

Source: Office for National Statistics - Business Register and Employment Survey

We also examined the correlation between businesses reporting a significant employment change and a structural change. Table 15 shows the results of this analysis. We can see that those businesses reporting a significant change to employment are also significantly more likely to report a structural change. This aligns with what we might expect, since some of these employment changes will be a result of rapid change to the business.

Table 15: Reported structural changes to businesses with an employment discrepancy, grouped by reported employment change, 2019

Employment Outcome	Total Responders	Responders reporting structural change	Percentage reporting structural change
Significant Employment Change	1,412	14	1.0
No significant Employment Change	1,818	3	0.2
Total	3,230	17	0.5

Source: Office for National Statistics - Business Register and Employment Survey

To further this analysis, responses were also broken down by the magnitude of the discrepancy between PAYE and IDBR employment figures. Table 15 breaks the responses into deciles, where 90 to 100 represents those businesses with the largest discrepancies, and 0 to 10 represents those with the smallest discrepancies. There is no significant difference in the rates of structural change between these groups; this suggests that reported structural change is independent of how significant our outliers are. Similarly, reported changes to employment are also broadly consistent, although businesses in the lowest deciles appear to report these changes at a slightly higher rate than those in the highest deciles.

Table 16: Reported changes to businesses with an employment discrepancy, grouped by the significance of discrepancy, 2019

Decile	Total Responders	Responders Reporting Structural Change	Percentage Reporting Structural Change	Responders Reporting Significant Employment Change	Percentage Reporting Significant Employment Change
90-100	322	3	0.9	115	35.7
80-90	323	1	0.3	130	40.2
70-80	324	2	0.6	145	44.8
60-70	323	1	0.3	155	48.0
50-60	323	1	0.3	122	37.8
40-50	322	1	0.3	114	35.4
30-40	332	0	0.0	127	38.3
20-30	317	2	0.6	152	47.9
10-20	323	2	0.6	170	52.6
0-10	321	4	1.2	182	56.7
Total	3230	17	0.5	1412	43.7

Source: Office for National Statistics - Business Register and Employment Survey

One possible explanation for this difference is the influence of certain types of business known to have large discrepancies between the IDBR and PAYE. Businesses such as employment agencies (SIC 78109 and 78200), umbrella companies (SIC 69201) and those with ad-hoc or seasonal employees (for example, elections staff, exam invigilators, and ushers at sporting events) often have differing PAYE and IDBR employment. This is either because their employment genuinely fluctuates over the year, or in some cases because they are not clear whether to count their employees in employment counts, leading to incorrect survey responses. There are many businesses with these SICs present in the top decile of the 2019 BRES sample, and they return an updated employment matching their PAYE count at a lower rate than other groups. This concentration in the upper deciles could influence the rate of significant employment change in these groups.

Large businesses with special arrangements

Businesses that have requested special arrangements are selected separately to ensure they receive an excel spreadsheet to help them complete the survey. These are typically, but not always, larger businesses. The majority of these businesses would otherwise be selected in a take-all stratum because of their complexity or their employment size. For this group of businesses, we were interested to know whether they differed from similar businesses in other strata, in terms of their structural changes or employment change.

There is a large spread of employment among these businesses. Employment bands with a larger count show rates of structural change of around 10%, while very large and smaller businesses do not report any structural change. In other years, these rates of change are similar, with small and very large businesses very occasionally reporting change.

Table 17: Reported structural changes to businesses with special arrangements, 2019

Employment Band	Businesses Responding	Structural Changes	Structural Change Rate	Average Scale of Structural Changes Reported
<1000	84	0	0.0%	0
1,000-9,999	480	45	9.4%	3.4
10,000+	112	11	9.8%	3
Total	675	56	8.3%	3.3

Source: Office for National Statistics - Business Register and Employment Survey

All other businesses

All remaining businesses are either selected for BRES randomly or part of take-all strata for businesses with 20 to 100 employment in Wales and Scotland. For the purposes of our analysis, these strata were all combined. They provide a useful background with which we can compare the more curated businesses.

Table 18 shows that these businesses very rarely report changes to their structure. Their average scale of change increases with the size of the businesses.

Table 18: Reported structural changes for all other businesses, 2019

Employment Band	Businesses Responding	Structural Changes	Structural Change Rate	Average Scale of Structural Changes Reported
0-9	12,398	9	0.1%	1
10-49	19,417	21	0.1%	1.3
50-99	5,312	22	0.4%	1.8
Total	37,127	52	0.1%	1.5

Source: Office for National Statistics - Business Register and Employment Survey

Another point of interest to us when considering these responders was the number of local units they have. We typically expect that businesses selected in these general categories will have a small number of local units and are unlikely to see a significant change in this respect.

Table 19 shows the total count of businesses grouped by the number of units before and after response. We can see that these results broadly agree with our assumptions: the majority of businesses maintain a single local unit, and those with multiple units typically remain in the same band.

Of particular interest is the businesses with zero local units. BRES is one of the primary mechanisms by which local units are created for businesses (as discussed in Section 2). We can see this process at work in the results: almost half of the responders had zero local units at selection, but after the survey is complete, they all have at least one.

Table 19: Local unit changes for all other businesses, 2019

Local units at selection	Local Units at Response				
	0	1	2-4	5-9	10+
0	0	13,547	819	71	15
1	0	17,971	9	1	0
2-4	0	7	4,039	4	1
5-9	0	0	0	551	0
10+	0	0	0	0	92

Source: Office for National Statistics - Business Register and Employment Survey

Effective capture of structural changes

The results on reported structural changes discussed previously suggest that, in general, BRES is successfully capturing structural changes across a broad range of businesses. The notable disparity between reported rates of change in large employment (1.4%) and complex (1%) businesses, compared with the more general strata (0.1%), validates the design choice to include these as fully enumerated strata. Similarly, the results for the businesses with special arrangements confirms that these businesses are key responders and that these relationships assure us valuable responses from large and highly changeable businesses.

The results from businesses with an employment discrepancy tell a less straightforward story. Their rates of reported structural change (0.5%) are still higher that the general strata, but it is clear that the major function of the strata is in capturing changes to employment rather than structure. The results on correlation between employment and structural changes suggest that any changes to the selection process that improved the rates of reported employment changes might also help to capture more structural shifts, but this would likely be a marginal change rather than a primary goal of selection.

5 . Classifying changes to employment as a result of BRES response

We use a formula to determine whether the new employment reported by businesses with a significant employment discrepancy constitutes a "significant change".

The outcomes discussed in Section 4 were determined using a formula with dependence on . This value always falls between the two (aside from at zero, as we will explain further) and is biased toward the smaller value.

In the case <, is used directly as the boundary for our classification. This means that a value greater than this, but possibly still linearly closer to the Inter-Departmental Business Register (IDBR) figure, can be registered as a significant change.

In the case >, the boundary point used is +. This point is as far (linearly) from the greater value as is from the lesser. We can see this more clearly by writing it as (). In this way, we still bias toward the IDBR figure, allowing us to capture similar significant changes.

To check that the final decision on this formula was not affecting the outcomes or recommendations of this report, a comparison was done between the above formulae and a straightforward linear approach. To see the difference between the two, consider a business with an IDBR employment of five and a Pay As You Earn (PAYE) count of 100. If this respondent reports an employment of 45, a fifty-fifty linear approach would not consider this significant (the boundary is 52.5), but the more complex formula would (the boundary is about 22.4).

Our comparison found that, although the linear approach found (by definition) fewer significant responses, the difference was limited, suggesting most responses are not "near the middle". All trends identified in Section 4 also remained consistent between the two approaches. We should also note that, for the chosen formula, in the case that one of these values is zero, the square root also evaluates to zero. This might pose issues since it makes any change (in the right direction) significant. To prevent this, PAYE is treated as one in our formulae where it would otherwise be zero. This treatment is not applied to IDBR values because the change from zero to non-zero employees is always significant and represents a change to the activity or structure of the business.

6 . Future developments

Response rates

As discussed in Section 3, response rates for the survey are generally high, but certain segments of the sample (smaller businesses and some businesses with employment discrepancies) have notably lower response rates than the average for the survey. Although these could certainly be improved, there is no evidence that higher response rates from these groups are critical to the production of quality employment statistics or businesses demography data.

In the case of businesses with employment discrepancies, the low percentage response rates in some employment bands may obscure the fact that this represents a very small total count of non-responders. Unlike those selected randomly, the businesses in this group are not selected as representatives for other similarly sized businesses. As a result, these low response rates are unlikely to have a significant negative effect on the quality of employment statistics, particularly as the rate remains high. Nonetheless, the rates for businesses with 0 to 9 employment (54.7%) and 50 to 99 employment are much lower than we see for equivalently sized businesses across the survey. We recommend that further analysis and a review of the response process be completed to identify potential explanations for this difference and changes that could be made to improve response rates in these areas.

Patterns of non-response

The non-response patterns analysed and discussed in Section 4 provide a consistent picture of non-response to the Business Register and Employment Survey (BRES). In both the persistent and complete cases, a small (approximately 5%) but notable minority of businesses were found to show patterns of non-response. These businesses, which are selected for BRES every year because their responses are valuable to the production of quality statistics, are not responding with the regularity we might hope to see.

The analysis of intermittent non-response in Table 10 demonstrates the value of regular responses from these businesses; a business that had gone even one year without responding had a greater chance of reporting structural changes (40.5% versus 32.3%), and this effect increases over time. This suggests that businesses showing patterns of non-response have likely undergone significant structural changes that remain uncaptured by our current demography statistics.

We recommend that the processes by which persistent non-responders are identified and contacted be reviewed with the aim of reducing the number of businesses in the population with this status. This will improve the accuracy of demography data and any estimates derived from this. We also note that, in this case, a simple measure of response rate can be deceptive, since the response rate for these strata are high, but non-response can be concentrated in a few businesses. To mitigate this, we suggest that the creation of a measure tracking persistent non-response might allow for ongoing assessment of the survey in this area.

7 . Related links

Detecting outliers in the Monthly Retail Trade Survey using the Hidiroglou-Berthelot Method (PDF, 352KB)
Article | Released 1999
An article from the US Census Bureau that explains the advantages of the Hidiroglou-Berthelot method and compares it with traditional methods.