Survey Response as Organisational Behaviour:
An Analysis of the Annual Enterprise Survey, 2003–2007

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Abstract

Non-response is a matter of great concern to national statistical offices and a key issue for
any survey because it can introduce bias to survey estimation. However, in this presentation,
we focus on a business's decision to participate in a survey as an example of organisational
behaviour and draw on basic organisational theory to explain why businesses may not
respond to surveys (eg Tomaskovic-Devey et al 1994). The data are drawn from the
Statistics New Zealand Respondent Management System, which links the response history
of individual businesses in all Statistics NZ surveys with information from the Statistics NZ
Business Frame.

We apply cross-sectional and longitudinal logistic regression random effects models to
investigate the ways that business characteristics, business dynamics, previous business
response behaviour, and Statistics NZ practices affect the likelihood of a business
responding. The Annual Enterprise Survey is used as a test case and the model is fitted
across the response history from 2003 to 2007. The analysis presented here is the first
phase of a larger scheduled project to assess the impact of non-response bias in Statistics
NZ business surveys.

Introduction

Achieving a good survey response rate is a key focus of any national statistics office. A high response rate is an important indicator of survey quality, while survey non-response is a source of bias and increased variance. Consequently, national statistics offices have devoted a great deal of research to identifying the factors that drive survey non-response. However, the primary focus of such research is identifying survey practices that will increase participation.

In the case of business surveys, a business's decision whether to participate in a survey is an aspect of organisational behaviour. Tomaskovic-Devey et al (1994) characterise the survey participation decision as dependent on the respondent's *authority*, *capacity* and *motive* to respond. As such, several characteristics of the business – for example, its relationship with its environment or its level of formalisation – may be important drivers of the response decision.

Another key predictor of organisational behaviour is past behaviour. In contrast to most household surveys, most government business surveys use a panel design, which enables a given business's response behaviour to be tracked over time. Moreover, because of the relatively small size of the New Zealand economy, many businesses are asked to participate in several different surveys and this allows their response behaviours to be tracked across surveys. However, we are not aware of any previous research that has taken this longitudinal perspective to survey response and only a few have investigated response over several surveys (Fisher et al, 2003; Petroni et al, 2004; Durrant and Steele, 2009; Atrostic et al 2001).

This paper is part of a broader project at Statistics New Zealand to investigate non-response and possible bias in its business surveys. While the focus of that broader project is on identifying effective survey practices for reducing non-response, this paper treats a business's survey response decision as an example of organisational behaviour and focuses on business factors that affect that decision. For this paper, we focus on participation in the Annual Enterprise Survey (AES) and track response behaviour over the period 2003–2007.

It is important to stress that the definition of 'non-response' used in this paper is different to the definition used to calculate response rates for the AES. Response rates reported in this paper may differ from those published by Statistics NZ and should not be considered 'official' response rates. We chose the definition of non-response used in this paper to match our specific research questions.

The importance of high survey response

The importance of a high response rate for survey quality has long been recognized. The key risk arising from poor response is non-response bias.[1] For example, using the Horvitz-Thompson (1952) estimator of the population mean of a variable *Y*, the bias resulting from non-response is approximately:

$$\frac{1}{N\bar{\phi}} \sum_{i=1}^{N} (Y_i - \bar{Y})(\phi_i - \bar{\phi})$$

where N is the population size, Y_i is the observed value of f *Y* for the *i*th unit, $\bar{Y}$ is the population mean of Y, ϕ_i represents the probability that observation *i* responds and $\bar{\phi}$ is the mean response rate. If ϕ is uncorrelated with *Y* then the approximate bias is zero. Further, if

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[1] Non-response bias can be thought of as a special case of sample selection bias.

ϕ is uncorrelated with *Y*, conditional on a set of exogenous variables *Z*, then the selection weights can be adjusted so that the approximate bias is zero.

National statistics offices generally try to reduce non-response bias in three ways. The primary tool is achieving a high response rate, which implies that the variance of ϕ has been minimised. Statistics NZ employs several methods to increase the response rate for our business surveys and we will discuss these briefly below. The second way is to adjust the selection weights based on a set of exogenous variables believed to be related to unit non-response. The third tool for reducing item non-response is to impute values for missing cases.

The focus of this paper is on understanding the factors that influence survey participation with a particular emphasis on business-specific factors. This paper is part of a larger Statistics NZ project to understand the drivers of survey non-response and the extent of non-response bias that may be present in our surveys. However, this paper focuses on business characteristics that may drive a decision to respond to a survey rather than on the impact of Statistics NZ's practices or methodologies.

In this paper, we use a very basic measure of non-response: whether an organisation returned the survey form or not. In business surveys, the concern is generally not so much with this raw response rate (or its selection-weighted equivalent), but with the response rate that is weighted by a business's expected contribution to a total. In other words, missing a handful of large organisations is usually more damaging to the quality of survey outputs than missing the same number of small organisations. Consequently, the response rates reported in this paper will not match those reported elsewhere and are not official survey response rates.

An organisational theory of survey response

A survey organisation, especially a national statistics office, is an element of a business's environment. In New Zealand, businesses have a statutory requirement under the Statistics Act (1975) to respond to Statistics NZ surveys, so in that sense, our surveys can be considered a small element of the regulatory environment that a business encounters.

Consequently, most of the limited work on the survey response decision from the business perspective (Tomaskovic-Devey et al, 1994; Willimack et al, 2002) has been based on theories of how businesses relate to the their environment, most specifically theories of resource dependence (Pfeffer and Salancik, 1978) and transaction costs (Williamson, 1971).

For business surveys, Tomaskovic-Devey et al (1994) hypothesize that the participation decision of a sampled respondent (be it the business as a whole or the specific individual receiving a survey form) varies as a function of that respondent's *authority*, *capacity* and *motivation* to respond. While the authority to respond surely resides in some role(s) within a business, it may not be clear to the individual respondent, or almost anybody else within a company, where that authority resides. When authority does not reside with the individual recipient (or hasn't been clarified as company policy), response is less likely. At a minimum, the compliance costs of completing the survey will increase if the individual respondent has to search for the authority to respond.

A business's capacity to respond is largely under the control of the survey organisation. First, it often depends on the survey itself – the length of the survey, whether it asks for a small, focused set of information or for a broad range of information that is likely to require several sections of a business to provide input, etc. Other related factors are the quality of

the questionnaire design and whether the correct person/role to receive the survey forms
has been identified or not.

However, several business characteristics can also affect the capacity to respond. Highly
differentiated organisations – whether differentiated horizontally, vertically or geographically
– may find it difficult to gather all the information needed to respond or to acquire the
authority to respond.[2] For an establishment survey such as the AES, the relevant
information and authority may reside in a centralised office of a multi-establishment firm.
Similarly, practices such as outsourcing may mean the business itself does not have the
relevant information on hand (for example, if accounting is outsourced). In contrast,
businesses that regularly interact with their environment (for example, highly regulated
businesses, publicly traded businesses, and businesses in diversified industries) will
generally have *boundary-spanning units* (Thompson, 1967) within the business meaning that
they are better equipped to deal with requests for information.

The costs to an business of responding increases if permission to respond is hard to acquire
and the business (or the targeted respondent) has a low capacity to respond. The
transaction costs themselves can be seen as primarily residing in the motivation to respond
– that is, is the survey organisation 'giving back' enough to make it worthwhile for the
business to respond? Clearly one motivation for businesses to respond is their statutory
requirement to do so. It is also clear from the literature (Hidiroglou et al, 1993; Willimack et
al, 2002; Dillman, 2000; Lynn & Sala, 2004) that the relevance of the survey topic to the
business and its ability to make use of the resulting data provide additional motivations to
respond. The primary motivation is quite likely to be a sense of civic duty.

Consequently, survey organisations focus on increasing a business's motivation to respond
by increasing the actual and perceived benefits of participation. However, even when the
survey organisation does a good job of this, the business may perceive the costs as
outweighing the benefits of participation. Unfortunately, motivation is extremely hard to
measure. Therefore, rather than focusing on the transaction costs themselves, most
research focuses on business characteristics that are likely to affect the participation cost for
the business.

Willimack et al (2002) present a similar conceptual model of business survey non-response.
They distinguish between factors under control of the survey organisation (for example,
sample design, instrument design, and confidentiality) and those outside the control of the
survey organisation. The latter are separated into *external environment*, *business
characteristics* and *individual respondent characteristics*. All of these feed into *response
burden* and *business goals,* which drive the ultimate participation decision.

This paper is primarily an application of the theory of Tomaskovic-Devey et al (1994) to New
Zealand data.[3] However, we add three broad factors to the transaction costs framework.
The first is the concept of *organisational stress*. At particular times in a business's life cycle,
changes within the business will leave it less able to respond to its environment or cause it to
focus on key elements of its environment while ignoring others. Participation in a survey is
not likely to be of high priority to a business under stress.

The second and third factors arise from the availability of a longitudinal database detailing
business's responses to Statistics NZ's business surveys from 2002–2007. We propose the
common hypothesis that past business response behaviour is a good predictor of future
response behaviour. Additionally, we expect *organisational learning* to play a role in the

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[2] It also makes it more difficult for the survey organisation to identify the best respondent.

[3] The analysis also fits under the framework of Willimack et al (2002).

participation decision. As businesses remain in the AES sample, questions about authority become clarified and the gathering of the required information becomes routine.
One difficulty in applying the models developed by Tomaskovic-Devey et al (1994) and Willimack et al (2002) is that they were developed for application to United States data. New Zealand is, of course, a much smaller economy and many of the arguments regarding business size (for example, not many New Zealand businesses would qualify under Tomaskovic-Devey et al's definition of 'large') and diversification may not apply as strongly.

Data

Analysis of survey response is always challenging due to the limited amount of information available about survey non-respondents. The Integrated Data Collection unit of Statistics NZ provided data for this paper. The data includes information about all respondents and non-respondents to the majority of Statistics NZ business surveys fielded from 2002 to 2007. The database brings together survey collection information (for example, the respondent management system and data from survey forms) and business demography data from the Statistics NZ Business Frame. The long-term intent is to analyse the full extent of these data to better understand the dynamics of survey response, the effectiveness of current Statistics NZ practices in data collection, and hopefully, to point toward improved methods of collection.

The business characteristics used in this analysis originate from the Statistics NZ Business Frame. The Business Frame is a listing of economically significant businesses[4] and includes information on industrial activity, institutional sector, goods and services tax (GST), employment levels, and the degree of overseas ownership (Statistics New Zealand, 2003).

We have chosen to begin with a focus on response for the Annual Enterprise Survey (AES). The AES is a key survey in the Statistics NZ business collection, contributes to national accounting variables, and underpins several other surveys. The AES provides data on the financial performance and financial position of New Zealand businesses.

The eligible population is any *economically significant* business that trades for at least six months within a given year, excluding a handful of industries.[5] The AES population is estimated to cover approximately 90 percent of the Gross Domestic Product. The sample is drawn using a design stratified by industry, type of entity, and size (based on a combination of employment and sales) with higher sampling fractions for larger enterprises and many full-coverage strata. The sample size is approximately 22,500 businesses representing around 225,000 businesses.[6] The sample changes little from year to year to maintain stability in the time series, with the original sample updated for births and deaths. The AES was last redesigned in 1999, the design was modified for 2007 to account for the shift to the Australia New Zealand Standard Industrial Classification 2007[7] (ANZSIC07) and there is a current work programme underway for a new design. For more technical information about the AES,

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[4] Economic significance is defined as any business with $30,000 or more annual GST expenses or sales; or with more than two employees in the last year; or that is in a GST-exempt industry other than residential property renting and leasing; or that is part of a group of enterprises; or is involved in agriculture or forestry and has greater than $0 annual GST activity (Statistics New Zealand 2003).

[5] The excluded industries (and their ANZSIC96 codes) are Residential property operators (L6711), Foreign government representation (O7552), Religious services (S9540), and Private households employing staff and undifferentiated goods- and service-producing activities of households for own use (S9601-3).

[6] Administrative tax data is used for sole proprietorships, partnerships and the agricultural industries and therefore these are not surveyed in AES.
[7] For consistency, we will use ANZSIC96 classifications for all years in the analysis.

see the 'Technical notes' section of the *Annual Enterprise Survey: 2007 financial year (provisional)* on the Statistics NZ (2008) website.

The AES consists of two components: one collects information on financial position and one collects information on financial performance and assets. To limit respondent load, some companies receive just the financial position component, some just the financial performance component, and some receive both. Because companies that receive both may have different selection weights for each component, we have chosen to limit our analysis to the businesses that receive both components (which is a slightly larger sample).

The unit of analysis for the AES is a *kind-of-activity unit* (KAU), which is a unit (usually a physical establishment) within a firm that is 'engaged in predominantly one activity for which a single set of accounting records is available' (Statistics New Zealand, 2008). However, for some multi-KAU firms, the targeted respondent may reside in a central office and have the responsibility to report for all KAUs within the firm. (To avoid the use of technical jargon, we will generally refer to KAUs as 'establishments' or 'businesses'. There is usually only one KAU per geographic establishment.)

The AES is a postal survey. Enterprises are sent the survey forms on (usually) two possible dates (in August and October) depending on the company's financial year. Statistics NZ asks businesses to return the form within 30 days. Postal reminders are generally sent out in two batches about one and two months after the survey start date. Some businesses are also telephoned to remind them and, occasionally, to collect the data over the phone. There are two groups of businesses designated as *key enterprises*. One group is considered key for nearly all business surveys and is handled by the Provider Relations Unit (PRU) in Statistics NZ (we will refer to these as *PRU firms*). The second group, which we define as mutually exclusive of the PRU firms, are identified as key firms for the AES itself (we will refer to these as *key AES firms*).

For this study, we have designated an establishment as non-responding if they have not returned the survey form within 240 days. After 240 days, the data for some businesses are obtained from independent administrative data, but the respondent management system does not track whether a response is of this type or from a returned form.

Because Statistics NZ is able to link survey response information to its Business Frame, we do have access to fairly detailed data about non-responding businesses. While these variables are not sufficient to provide a robust specification of the theoretical models described in the previous section, they are sufficient to act as rough proxies for the processes described earlier. By linking these data with survey response histories, we are able to build a dynamic, longitudinal model of survey response. The variables included in the analysis are listed in table 1 on the following page.

Table 1

Factors Affecting Survey Response

Industry division	Top code from the ANZSIC 2006 industrial classification.
Rolling mean employment (RME) change	Denoted as growing, stable or declining. Growth and decline indicators are defined as a change of 15 percent or greater in magnitude.
Business size	Size of business based on rolling mean employment and annual GST.
Response to Annual Enterprise Survey 2006	Response / non-response to the AES 2006
Respondent load for 2006	Total hours taken to complete all surveys for 2006.
Status as key firm	An enterprise can be assigned to Statistics NZ's Provider Relations Unit (PRU) or be designated as a 'key firm' for the AES. These are defined as mutually exclusive categories for this analysis.
Years in sample	Number of years (starting in 2002) this business has been in the AES sample

Industry division, business size, and the indicator of a multi-establishment firm are factors which are expected to impact on a respondent's authority and capacity to respond. Industry is included as a fixed effect to control for industry-level differences in the level of regulation, the economic concentration of the industry, and any stable environmental effects which operate at the industry level. Since we have no specific hypotheses regarding specific industries, these are treated as control variables.

We expect larger businesses, controlling for multi-establishment firms and key enterprise status, to have higher response rates than smaller ones. Previous research finds mixed patterns here, but we hypothesize a positive impact for three key reasons. Firstly, larger businesses tend to be more formalised and specialized and so are more likely to have clear lines of authority and the capacity to respond. Secondly, larger businesses are more likely to have boundary-spanning units that interact with the environment. Thirdly, Statistics NZ focuses on achieving response among larger enterprises. However, the second and third reasons overlap with the expected effect of key enterprise status.

Controlling for business size, we expect multi-establishment firms to have lower response rates. Tomaskovic-Devey et al (1994) argue that diversified firms will have difficulty establishing lines of authority and gathering all the necessary information. However, given the information requested in the AES survey is quite focused, it's possible these arguments will not hold.

While key enterprises are designated by Statistics NZ, these are included here as a measure of boundary-spanning and we expect key enterprises to have higher response rates. Statistics NZ formed the Provider Relations Unit precisely to 'span the boundary' to the most important businesses in New Zealand for all its business surveys. Moreover, most business

surveys identify an additional set of key respondents and extra effort is made to facilitate responses from these businesses.

Many businesses are asked to particpate in several Statistics NZ surveys in a given year. This *respondent load* is often measured by the total number of surveys, but here it is measured by the total amount of time taken, which includes imputed values for businesses that did not complete a survey. In the models, we use the natural log of total time taken per ten employees for all surveys in 2006. Perhaps surprisingly, much prior research has found that respondent load measures have little impact. We are using respondent load as a proxy for higher compliance costs and expect a higher respondent load in 2006 to decrease the probability of response to the AES 2007.

Organisational stress is operationalised by designating establishments as growing, stable, or declining establishments based on changes in their rolling mean employment[8] (RME) from the previous year. We expect organisations under stress, perhaps especially those which are declining, to have lower response rates as they focus their efforts in areas which are higher priority than participating in a survey.

Previous response behaviour is measured by whether an establishment responded to the previous year's AES.

Organisational learning is operationalised by the number of years in the AES sample (only measured since 2002 rather than the 1999 design due to data limitations). Noting that previous response behaviour is controlled, we expect businesses which have been in the sample longer will have learned how to respond to the survey more efficiently, reducing their compliance costs and increasing their propensity to participate.

We will be presenting two models. The first models survey response to the AES 2007 and the second is a longitudinal model of AES response for the period 2003 to 2007. To conserve space, we preset some descriptive statistics for only the AES 2007sample which is highly similar to other years.

Table 2 on the following page presents sample-weighted response rates for the AES 2007 and sample-design-adjusted chi-square results for the variables of interest (industry not included). We again remind the reader that the definition of response rate used in this paper differs from that used in reporting on the AES because of the different goals of this research. Therefore, the response rates will not agree with published AES survey response rates and should not be considered quality indicators of the AES survey.

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[8] Rolling mean employment is defined as the twelve month moving average of the monthly employment count, derived from employer monthly schedule data provided by Inland Revenue.

Table 2

Weighted Response Rates by Model Variables
2007 Annual Enterprise Survey (AES)

|	Weighed response rate (%)	Percent of sample (%)
Business size		
Small	64.9	
Medium	71.7	
Large	83.1	
Extra large	96.0	
Multi-establishment		
No	66.5	
Yes	82.7	
Key firm status		
Provider Relations Unit (PRU)	96.4	
Annual Enterprise Survey (AES)	100.0	
Non-key firm	68.0	
Time taken, all surveys, 2006		
Lower quartile	91.6	
Middle half	69.1	
Upper quartile	64.9	
Change in Rolling Mean Employment (RME)		
Growing (RME up by 15% or more)	64.8	
Stable	70.7	
Declining (RME down by 15% or more)	60.9	
AES 2006 response		
No	32.5	
Yes	85.5	
Years in AES sample before 2007		
1	65.0	
2	65.5	
3	64.3	
4	63.6	
5	72.0	

Note: All associations are significant at the .05 level using the Rao-Scott (1984) design-adjusted chi-square test.

In these bivariate relationships, the association between the 2007 response rate and business size, 'key' firm status, the organisational stress measures, and a AES 2006 response are all in the expected direction and, with the exception of organisational stress, quite strong. We had no strong directional expectations for the effect of time taken for previous surveys but the results display a much higher response rate for less-burdened businesses. Our directional hypothesis regarding establishments which are parts of multi-establishment firms was conditional on organisational size, which is not controlled here, but the bivariate frequencies show a much higher response rate for multi-establishment firms, which would be counter to our hypothesis if it holds up after controlling for other variables. Any relationship between years in the survey and the 2007 response rate is weak but significant, and likely due to the spike in response rate among businesses that have been in the AES sample since at least 2002.

Another approach to presenting such information is to investigate the survival curves for response/non-response (where survey response is the event meaning, we would like to see steeply declining survival curves). Figure 1 comprises four graphs which present the survival curves for the AES 2007 sample by business size, change in RME, whether the business responded in the AES 2006, and whether the business is either a key firm for the AES or is handled by Statistics NZ's Provider Relations Unit (PRU).
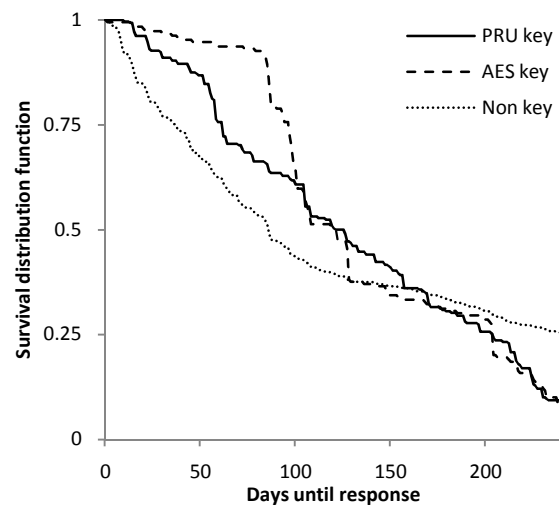
Figure 1

Survival Distribution Functions of Annual Enterprise Survey (AES) 2007 Response
By business size, change in rolling mean employment (RME),
AES 2006 response, and key firm status

By *business size*   By *change in rolling mean employment (RME)*
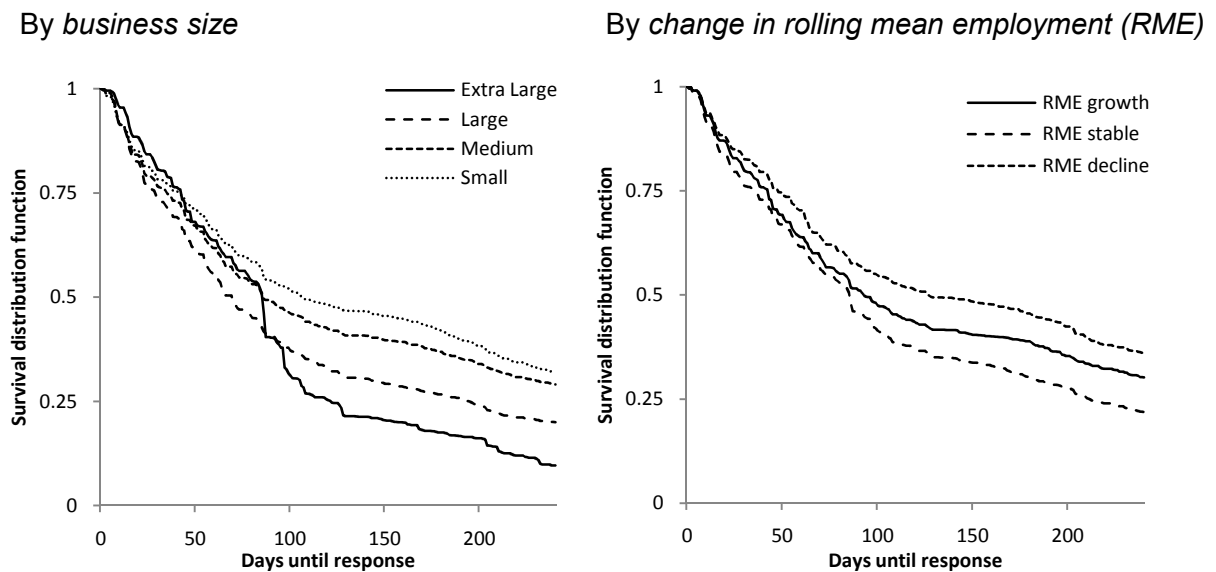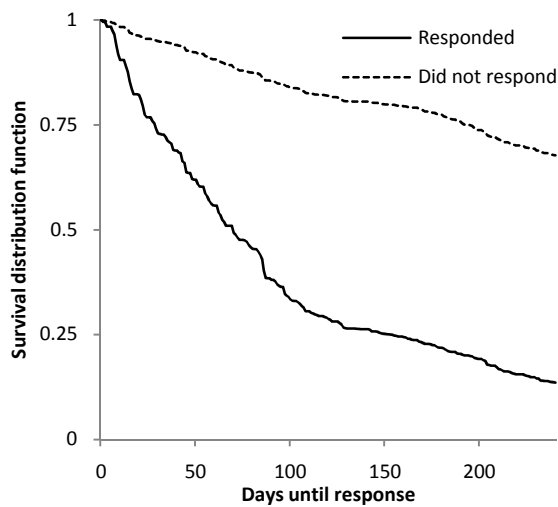
By *AES 2006 response*   By *key form status*

All four graphs show the expected relationship. The differences among businesses of different sizes is evident very early in the survey period and remains throughout the observation period, meaning that larger organisations respond more quickly and at an overall higher rate. We see the same small differences among growing, declining, and stable organisations as seen in Table 2. The tremendous persistence of non-response is clearly evident in the survival curve for AES 2006 respondents versus non-respondents. In fact, this impact is so strong that we decided to remove that variable from the later models. Finally, the survival curve for the two types of key firms compared with the non-key firms is quite interesting. These key firms were initially quite slow to respond, but they began to respond at a rapid rate approximately two to three months after receiving the survey. This may be evidence of a training effect, since these businesses know that Statistics NZ will eventually contact them by phone. It is also possible this is a data artifact as most key firms are multi-establishment firms and there may be a central office responding for several establishments simultaneously.

Model and results

We present two models. The first model is a logistic regression of the AES 2007 response (yes/no) as a function of the variables described above. The sample for this model is all AES 2007 sampled businesses that were also sampled in 2006 (15,214 businesses). Fitting this model posed several challenges. First, as mentioned above, response/non-response to the AES 2006 was such a strong predictor that it dominated the model and provided results that simply weren't useful, so this variable was removed. Similarly, in 2007, all key AES firms responded, which makes it impossible to include them in the model.

A third complication is that our data are a sample from a finite population and the sample was drawn from a stratified single-stage design with unequal sampling probabilities and high sampling fractions. Consequently, the model needed to be estimated with adjustments for the complex design. Without these adjustments, it's likely that the coefficient and standard error estimators would be badly biased.[9] The adjustments were done using SAS (2008) version 9.13 proc surveylogistic. The model uses a Taylor series approximation for the

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[9] Logistic regression results without adjustments for the complex design are indeed quite different. This is likely to be a sign of model misspecification (Lohr 1999). Complex survey analysis methods are generally less sensitive to model misspecification than methods which do not adjust for the complex design.

variance estimator of the coefficients. See Table 3 on the following page for the results from this model.

Table 3

Logistic Regression for Response to the Annual Enterprise Survey (AES) 2007
(N=15,214)

	Coefficient	Standard error	Odds ratio
Business size			
Medium	.215[†]	.09	1.24
Large	.662[†]	.14	1.94
Extra large	1.816[†]	.17	6.15
Multi-establishment	.458	.11	1.58
Provider Relations Unit (PRU)	1.654[†]	.20	5.23
In(**Time taken per 10 employees, all surveys, 2006**)	-.096[†]	.04	.91
Change in Rolling Mean Employment (RME)			
Growing (RME up by 15% or more)	-.296[†]	.09	.89
Declining (RME down by 15% or more)	-.357[†]	.09	.83
Years in AES sample before 2007	.033	.02	1.08

[†] Significant at the .05 level and in the hypothesized direction (if any)
Notes:
(1) The model is adjusted for stratified sampling, unequal selection probabilities, and the finite population using SAS version 9.13 proc surveylogistic (SAS 2008).
(2) The model also contained fixed effects for industrial division and a constant term, not reported here.
(3) The likelihood ratio test of overall model significance is 5,615 with 18 degrees of freedom, significant at the .05 level. Akaike's Information Criterion for the null model is 180,429 and for the fitted model is 174,850.
(4) Multi-establishment has a highly significant effect but it is not in the hypothesized direction.

The model is generally consistent with the hypotheses. We find that larger businesses are significantly more likely to respond than smaller ones and the magnitude of the effect increases with size. Firms that are handled by our Provider Relations Unit are much more likely to respond than those that are not – the odds ratio is over 5. We also find that the higher the respondent load in 2006, the lower the probability of responding to the AES 2007, although, this effect is not large in magnitude. Finally, both growing and declining firms are less likely to respond.

However, the results for establishments in multi-establishment firms did not conform to predictions. The effect is large and highly significant, but in the opposite direction of that hypothesized. We must note that this is true, even after controlling for establishment size and whether or not an establishment is part of a key firm. It is possible that such multi-establishment firms are more likely to have boundary-spanning divisions, clear lines of authority, and centralised record keeping. Also, there was no evidence in support of organisational learning as the number of years in the AES sample was not a significant predictor.

The second model is a longitudinal logistic regression of AES response in each sample from 2003 to 2007 as a function of the same set of variables (measured each year) and a random

effect for each sampled unit. The sample for this model is all businesses that were in both the 2002 and 2003 AES samples and were followed in each subsequent sample they were a part of through to 2007. This sample is of 16,548 businesses producing 63,574 yearly records (an average of 3.84 years of participation per business).

This model posed roughly the same set of challenges as the model for 2007 alone. Again, we had to exclude the previous year's response/non-response because of its overly strong effect; however, there was sufficient variability in response to include an indicator for key AES firms.

The modelling itself posed a greater challenge. Unfortunately, complex survey models for longitudinal data are underdeveloped and there isn't much software for estimating fixed or random effects models for such data. We have approximated such a model here. Again, we control for the stratified design, unequal probability of selection, and high sampling fractions as we did in the earlier model. However, we have treated each KAU as a *cluster,* which allows us to adjust the standard error estimator for the covariance among observations from the same KAU. However, there is no means for allowing an error covariance structure other than exchangeable errors (equal covariances between any two time points).

The results of the longitudinal model, presented in Table 4, are strikingly similar to the model for 2007 alone. The business size indicators are each significant and again we see the magnitude of the relative effect increase with size. Moreover, the magnitude of the coefficients for medium and large businesses are nearly exactly the same as the 2007 model, but the effect for extra large businesses is much smaller. We see the expected effect for establishments in firms handled by the PRU and the effect is again substantial.

Establishments in key AES firms behave in a similar fashion. The impact of respondent load is again significant and of equivalent magnitude. Declining firms also show nearly the same magnitude of effect, but over the longer time period. Growing establishments are only slightly less likely to respond than stable ones.[10] Finally, there is no evidence of organisational learning.

Discussion

Survey non-response poses a serious risk to the quality of any survey and is of great concern to national statistics offices. A better understanding of the drivers of business survey non-response will help national statistics offices and other survey organisations to better design their business surveys and work with businesses to increase participation.

Beyond that however, a business's decision whether to participate in a survey is an example of organisational decision-making and is therefore of interest to those in the field of organisational behaviour. This paper placed business survey participation within a framework of organisational behaviour. Following Tomaskovic-Devey et al (1994) and Willimack et al (2002), the primary focus was on a transaction-costs approach, seeking to identify measurable factors that would affect the authority, capacity and motivation of a business to respond. Given the difficulty of acquiring data on survey non-respondents, the measures were not as robust as desired; still, the findings of Tomaskovic-Devey et al are supported.

We introduced three additional concepts to the previous research. We hypothesised that businesses in a state of stress (those that have grown or declined substantially within the past year) would have lower response rates, most likely due to focusing on higher priority issues than survey participation. This hypothesis was strongly supported, especially in the

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[10] This effect is of borderline significance with a p-value of roughly .03 in a one-tailed test.

case of declining firms. This may be a valuable piece of information for survey organisations in that they may be able to identify these businesses before fielding the survey and implement procedures to encourage and assist such businesses to participate.

We also hypothesised that a process of organisational learning might take place – businesses which had been in the AES for several years would have learned how to gather the necessary information and otherwise reduce their compliance costs. However, we found no evidence to support this hypothesis.

Our third hypothesis was that, as with people, past behaviour is a good predictor of future behaviour. If anything, the support for this hypothesis was too strong – whether a business decides to participate in a given year can be reliably predicted by their decision in the previous year. The lesson here for survey organisations is rather obvious – identify potential non-responders early and try to get to them before the first non-response decision. The challenge is how to best incorporate this knowledge into this substantive model.

Table 4

**Longitudinal Logistic Regression for Response to the
Annual Enterprise Survey (AES) 2007**
With kind-of-activity unit (KAU) random effects (N=63,574)

	Coefficient	Standard error	Odds ratio
Business size			
Medium	.243[†]	.06	1.28
Large	.665[†]	.07	1.94
Extra large	1.224[†]	.09	3.40
Provider Relations Unit (PRU)	1.870[†]	.09	6.49
Key AES firm	1.886[†]	.16	6.59
*In***(Time taken per 10 employees, all surveys, 2006)**	-.095[†]	.02	.91
Change in Rolling Mean Employment (RME)			
Growing (RME up by 15% or more)	-.086[†]	.04	.92
Declining (RME down by 15% or more)	-.354[†]	.04	.70
Years in AES sample before 2007	.000	.01	1.00

[†] Significant at the .05 level and in the hypothesized direction (if any)
Notes:
  (1) The model is adjusted for stratified sampling, unequal selection probabilities and the finite population using SAS version 9.13 proc surveylogistic (SAS 2008). Random effects for KAU are approximated by specifying KAU as the sampled cluster.
  (2) The model also contained fixed effects for industrial division and a constant term, not reported here.
  (3) The likelihood ratio test of overall model significance is 15,279 with 24 degrees of freedom, significant at the .05 level. Akaike's Information Criterion for the null model is 548,147 and for the fitted model is 532,916.

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