Miller, Sarah; Amirault, David; Martin, Laurent

Working Paper

What's up with unit non-response in the Bank of Canada's business outlook survey? The effect of staff tenure

Bank of Canada Staff Discussion Paper, No. 2017-11

Provided in Cooperation with:
Bank of Canada, Ottawa

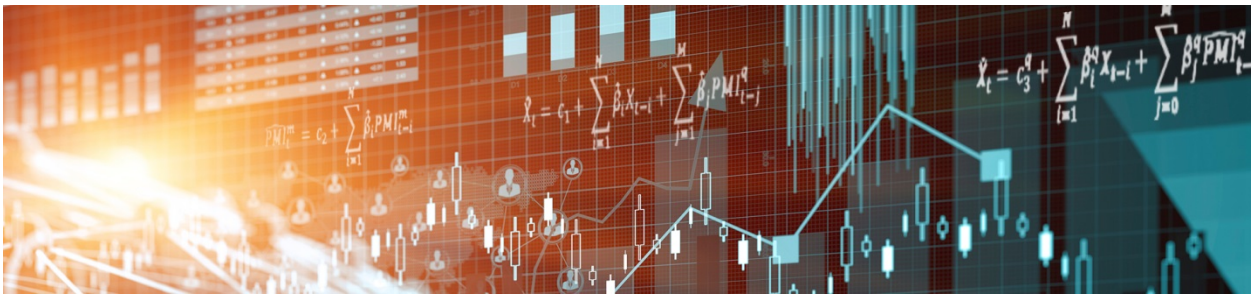
Suggested Citation: Miller, Sarah; Amirault, David; Martin, Laurent (2017) : What's up with unit non-response in the Bank of Canada's business outlook survey? The effect of staff tenure, Bank of Canada Staff Discussion Paper, No. 2017-11, Bank of Canada, Ottawa, https://doi.org/10.34989/sdp-2017-11

This Version is available at:
https://hdl.handle.net/10419/200481

BANK OF CANADA
BANQUE DU CANADA

Staff Discussion Paper/Document d'analyse du personnel 2017-11

What's Up with Unit Non-Response in the Bank of Canada's *Business Outlook Survey*? The Effect of Staff Tenure



by Sarah Miller, David Amirault and Laurent Martin

www.bank-banque-canada.ca

Bank of Canada Staff Discussion Paper 2017-11

September 2017

What's Up with Unit Non-Response in the Bank of Canada's *Business Outlook Survey*? The Effect of Staff Tenure

by

Sarah Miller, David Amirault and Laurent Martin

Canadian Economic Analysis Department
Bank of Canada
Ottawa, Ontario, Canada K1A 0G9
smiller@bankofcanada.ca
damirault@bankofcanada.ca
lmartin@bankofcanada.ca

ISSN 1914-0568

Acknowledgements

The authors wish to thank members of the Regional Analysis Division and the Canadian Economics Department at the Bank of Canada for their comments and support, and in particular Eric Santor, Lori Rennison, Harriet Jackson, Daniel de Munnik, Matthieu Verstraete and Farrukh Suvankulov. We would also like to thank Tara Ainsworth, Kathleen Jack, Sarah Burns and the regional Executive Assistants for their assistance creating the data set.

Abstract

Since 1997, the Bank of Canada's regional offices have been conducting the *Business Outlook Survey* (BOS), a quarterly survey of business conditions. Survey responses are gathered through face-to-face, confidential consultations with a sample of private sector firms representative of the various sectors, firm sizes and regions across Canada. Participation is voluntary and although efforts are made to encourage participation, some firms either do not respond to the Bank's contact attempts or refuse to or cannot participate for various reasons, resulting in unit non-response. Using data for all firms contacted between 2009 and 2016, this paper analyzes the determinants of unit non-response including the impact of the tenure of the Bank's survey booking teams. Difference-in-differences estimates suggest that new survey booking teams increase the probability of unit non-response. Building on previous findings, regression results also provide further support that some firm characteristics are associated with non-response, including firm size, ownership status, sector and participation history. There is little evidence to conclude that the effect linked to new booking teams differs significantly for new versus repeat firms. Finally, we find no statistically significant relationship between firms' credit scores and unit non-response, and no obvious upward trend in the BOS non-response rate once other relevant factors have been taken into account.

Bank topics: Firm dynamics; Econometric and statistical methods; Regional economic developments
JEL codes: C81, D22, C21

Résumé

Depuis 1997, les bureaux régionaux de la Banque du Canada mènent une enquête trimestrielle de conjoncture dont les résultats sont publiés dans le bulletin *Enquête sur les perspectives des entreprises*. Les réponses sont recueillies par voie d'entretiens confidentiels auprès d'un échantillon d'entreprises représentatif du secteur privé au Canada du fait de leur secteur d'activité, de leur taille ou de la région où elles sont établies. La participation à l'enquête est volontaire, et bien que des efforts importants aient été consentis pour encourager les entreprises à y prendre part, certaines ne donnent pas suite aux tentatives de prises de contact de la Banque, refusent d'y participer ou disent ne pas pouvoir le faire pour diverses raisons, ce qui se traduit par des non-réponses. À partir des données recueillies sur les entreprises approchées entre 2009 et 2016, nous analysons les déterminants des non-réponses, dont les mois d'expérience des équipes de la Banque chargées de la prise de rendez-vous avec les répondants. Les estimations obtenues par la méthode des différences de différences donnent à penser que l'arrivée de nouvelles équipes accroît la probabilité de non-réponse. Dans le prolongement d'études antérieures, les résultats des régressions tendent aussi à valider l'hypothèse du lien entre certaines caractéristiques de l'entreprise et les non-réponses, notamment la taille, la forme juridique, le secteur d'activité et la participation passée. Rien ne laisse supposer que l'effet lié aux nouvelles équipes diffère sensiblement selon que les

entreprises participent pour la première fois à l'enquête ou non. Enfin, nous n'observons pas de relation statistique significative entre les pointages de crédit des entreprises et les non-réponses, ni de tendance à la hausse évidente du taux de non-réponse à l'enquête, une fois que les autres facteurs pertinents ont été pris en compte.

Sujets : Dynamique des entreprises; Méthodes économétriques et statistiques; Évolution économique régionale
Codes JEL : C81, D22, C21

1 Introduction

Since 1997, the Bank of Canada has been conducting its own survey of business conditions, the *Business Outlook Survey* (BOS).[1] The BOS is a quarterly survey of economic conditions, conducted through confidential face-to-face consultations with senior business representatives from 100 private sector firms across Canada. The BOS provides timely information on four broad themes: business activity, capacity pressures, prices and inflation, and credit conditions. Because of the early availability of BOS data relative to official data and the detailed firm-level insights the data provide, the BOS is an important part of the Bank's monetary policy decision-making process. An overview of the quarterly BOS results published on the Bank's website also attracts attention from financial market participants and other economic and policy analysts.

Each quarter, the five Bank of Canada regional offices contact Canadian firms to participate in the survey in order to achieve a representative quota sample of 100 firms. Participation in the BOS is voluntary and despite staff efforts, there are firms that do not respond to attempts to contact them or actively refuse to or cannot participate in the survey, resulting in unit non-response.[2,3] In the BOS context, non-response is undesirable for two main reasons. First, to the extent that unit non-response is not random, non-response decreases the representativeness of the sample and is a source of bias in the BOS results (Bethlehem, Cobben and Schouten 2011; Tomaskovic-Devey, Leiter and Thompson 1995). Second, non-response decreases the productivity of staff, and specifically survey booking teams, as they spend more time planning, scheduling and attempting to contact firms. Fortunately, recent analysis by de Munnik, Illing and Dupuis (2013) examining the accuracy of the BOS results using Monte Carlo simulations finds little bias from unit non-response. While these results are reassuring, good practice is to minimize non-response when possible. In recent years, the BOS non-response rate increased. During this period, there was also some staff turnover. The purpose of this analysis is to investigate the factors driving firms' participation in the BOS, including the tenure of survey booking teams and firm demographics, using data collected by the regional offices.[4] Identifying a relationship between booking team tenure and non-

[1] For detailed overviews of the *Business Outlook Survey*, see, for example, Martin and Papile (2004) and other BOS references on the Bank of Canada's website.

[2] The terms "unit non-response" and "non-response" are used interchangeably throughout this paper. "Non-response" in this paper is not referring to "item non-response," which occurs when a respondent does not answer one or more survey questions.

[3] Since 2009, the various reasons for non-response have also been recorded. The two most common are: (i) never returned calls or messages, and (ii) management of the firm is too busy. More details on the sample selection and survey booking processes are provided in section 2.

[4] The regional offices began recording some information on non-response in 2002 but did not start recording names of non-participating firms until the first quarter of 2009 (see section 3.3 for more details).

response could have an important management implication: it would provide empirical support to emphasize the benefits of transition management, staff retention and training for new booking team staff. Furthermore, such findings would contribute to the growing literature on managing non-response in business surveys, including ongoing discussions among central banks aimed at determining best practices in conducting business surveys (Federal Reserve of Atlanta 2017; Bank for International Settlements 2009). Other results regarding associations between non-response and firm characteristics would provide useful insights for business survey design and implementation and, more specifically, for the BOS going forward.

Using firm-level data for all firms that the regional offices attempted to contact between the first quarter of 2009 and the fourth quarter of 2016, we investigate several questions related to the controllable and uncontrollable factors that may influence BOS participation. First, does the tenure of survey booking teams—more specifically, if both the regional director (RD) and the executive assistant (EA) have been in the position less than 18 months[5]—influence the non-response rate of Canadian firms? Each regional office has one RD whose main role in the booking process is to network with firms, with the objective of finding and retaining those willing participate in the BOS. Each office also has an EA who is responsible for contacting firms to participate in the survey. Since teams with both a new RD and a new EA likely have fewer networks and/or less experience than others, the probability of non-response among their contacted firms may be higher. Second, we ask: Are certain firms more vulnerable to booking team tenure? In particular, are firms that have already completed a BOS interview more or less impacted by the tenure of staff? Finally, we ask: Is the participation of certain types of firms in the BOS more or less difficult to obtain? For example, smaller firms may be systematically more difficult to reach for several reasons (e.g., smaller management teams, less awareness of the Bank of Canada's mandate and role in the broader economy). In addition to firm size, we also examine whether a firm's sector, ownership status, age and performance matter.

We make two main contributions to the literature. To our knowledge, this is the first study to examine the effect of staff tenure on business survey unit non-response. Much of the previous research on the influences of interviewers and initial contact on non-response is based in the household survey literature (Blom, de Leeuw and Hox 2011; Durrant et al. 2010; Groves and Couper 1998; Loosveldt, Carton and Pickery 1998). Among business surveys, Janik and Kohaut (2012) have examined how a

[5] A discussion on the time horizon of less than 18 months is presented in section 3.1.

change in the interviewer, rather than tenure, is associated with the probability of participation. Second, we are using a data set with pooled cross-sections that allows for a difference-in-differences (DD) estimation strategy. Using a DD set-up, we compare: (i) differences in non-response between groups of firms contacted in a given quarter where some firms are exposed to a new survey booking team ("treated") but firms in other regions are not ("untreated"), with (ii) differences in non-response between booking teams during quarters where the treated booking team has gained experience. The assumption is that the differences in participation of the firms exposed to new booking teams and those not exposed would be the same in periods with and without treatment if the treatment was not present. This approach has the advantage of reducing bias from sample selection. In addition, as we have longitudinal data for a large number of firms, we can estimate firm fixed-effects DD models, which can help reduce potential omitted variable bias.

Our DD estimates suggest that new booking teams increase the probability of BOS unit non-response. Fortunately, given that this influence on non-response is unrelated to firms, it is unlikely it will impact the accuracy of the main BOS results. Surprisingly, there is little evidence that the effect differs significantly for new versus repeat firms. The results also provide further support that several firm characteristics matter for non-response. New firms and firms of international subsidiaries are associated with a higher likelihood of non-response relative to their counterparts. Conversely, firms that are large, publicly traded or in the finance, insurance and real estate (FIRE) sector are related with lower probabilities of non-response. Finally, estimates from these regressions suggest there is no statistically significant relationship between firms' credit scores and BOS participation, and no obvious upward trend in BOS non-response.

The paper is organized as follows. Section 2 provides a short description of how the sample of the Bank of Canada's *Business Outlook Survey* is selected, the survey booking process and the non-response rate during the 2009Q1–2016Q4 period. Section 3 presents descriptions of the factors considered in explaining the business survey participation as well as the main data sources. Section 4 describes the basic research method and variables used. Section 5 presents and describes regression results. In Section 6, extensions are discussed. Section 7 concludes.

2 BOS Sample Selection, Survey Booking Process and Non-Response, 2009–16

2.1 Sample selection

The theoretical population from which firms are selected to participate in the BOS includes all Canadian head offices and all Canadian subsidiaries of foreign companies. Within the quota sample of 100 firms each quarter, each of the Bank's five regional offices is assigned a fixed number of firms to visit. This allows the survey burden to be shared across regions and the sample to reflect some of the regional diversity of the Canadian economy. Then, given the fixed number of firms by region, the sample is selected in proportion to industry shares of gross domestic product (GDP) in Canada to ensure the sample is representative of the industrial composition of the Canadian economy.[6] Efforts are also made to balance the sample by size of firm—measured by number of employees—with roughly one-third being: (i) small—fewer than 100 employees, (ii) medium—100 to 500 employees and (iii) large—more than 500 employees. While many sources are canvassed to find potential firms, the regional offices largely use Dun & Bradstreet Hoovers Business Directory, a private business registry, as a population frame to select firms by sector, size and region in order to achieve the quota sample of 100 firms surveyed each quarter.

2.2 Survey booking team roles and process

Each regional office has a survey booking team, made up of an RD and an EA. One of the roles of the RDs is to build and maintain a network of business contacts from which potential BOS firms can be selected. RDs, with their EAs, work to identify targeted firms each quarter for their region for each quota category and the geographic locations to be visited. Finally, RDs provide guidance to EAs to optimize the response rate given time and other constraints.

The EAs are responsible for several steps in the booking process. First, roughly four to six weeks before the survey period, after RDs and EAs agree on firm targets, EAs gather contact information from in-house records, Hoovers, firm websites and other online resources. Senior managers at the firm are always targeted for the interview.[7] For large firms, this is often the chief financial officer, vice-president finance, controller, accountant or chief administrative officer. For smaller firms, the chief executive officer or president is contacted most often. Then, depending on the EA, first contact to request survey participation and to schedule an appointment is made by email, phone or both, where mode of contact

[6] These shares are re-evaluated every two years and are adjusted if the industry composition of Canadian GDP has changed.
[7] Approximately 80 per cent of total respondents are in positions of president, CFO/CAO, vice-president finance or accountant.

by EA is consistent over time. Participation is voluntary, and agreements or refusals to participate are recorded when obtained. If no response is obtained, EAs follow up by phone or email for a maximum of three attempts, with at least one attempt by email and one by phone. If there is no response after three attempts or the firm actively refuses or is unavailable to participate, the firm is recorded as a unit non-response. To achieve predetermined industrial, regional and size quotas, when a contacted firm does not participate, the RD and EA work to substitute that firm with another having similar characteristics.

2.3 New booking teams and BOS non-response, 2009–16

In this analysis, we define new booking teams as those where both the RD and the EA have been in their positions for less than 18 months. Figure 1 presents the overall non-response rate over the 32 quarters in the sample period of 2009Q1–2016Q4. Of the 5,371 firm contact observations in our sample, on average, 46 per cent did not participate in the BOS. The rate varies from a low of 29 per cent in 2009Q1 to a high of 59 per cent in 2014Q2. During this period, there were 24 different booking teams. Of these, 14 were considered new for at least one quarter. Figure 1 shades a quarter light or dark grey if one or two regions, respectively, have new booking teams. The figure shows that many of the new teams are concentrated in the last three years, when the non-response rate was elevated. Average non-response rates are 62 per cent and 43 per cent for new and experienced booking teams, respectively.

3 Influences of Business Survey Participation and Data Sources

Willimack, Nichols and Sudman (2002) propose a framework for business survey non-response that divides driving factors into two main groups: (i) *controllable influences* such as staff and survey characteristics, and (ii) *uncontrollable influences* including firm and respondent characteristics, and those related to the firm's external environment. In this section, we describe both the controllable and uncontrollable factors that may influence BOS unit non-response, and how they can be taken into account in our analysis.

3.1 Controllable influences

3.1.1 Booking team tenure

The skills, strategies, techniques and contacts of the booking teams (both RDs and EAs) develop over time. Groves and Couper (1998) stress the importance of the experience of the person requesting survey participation on the decision to participate. Those with experience contacting respondents are able to identify the type of respondent based on past experiences and then draw on the appropriate

behaviours, often found through trial and error, that are effective in encouraging participation for a given type. In addition, new RDs are less familiar with firms and have a smaller network than those who have been in the position for many quarters, a factor that may increase the probability of non-response among their contacted firms.

As suggested by Groves and Couper (1998), we expect that experience booking survey visits helps increase the probability of BOS participation but then plateaus. While Groves and Couper (1998) suggest the greatest gains are in the first few months, in the BOS context the learning curve is much longer. BOS survey requests are not made on a regular basis over time but are largely lumped within several weeks each quarter, and where the maximum number of participating firms for a team in a quarter is 25. Given this, it likely takes numerous quarters to learn from trial and error and other on-the job experiences.[8] Eighteen months is also the expected period of time after which the booking team can rebook survey visits with firms they have already connected with in the past. For these reasons, we have chosen to define new booking teams as those where both the RD and EA have been in their positions for less than 18 months.

3.1.2 Survey design and characteristics

In addition to survey booking team tenure, other controllable factors relate to survey design and processes. However, no additional variables are added because many important characteristics are already taken into account through booking team fixed effects described in the DD estimation strategy, or are roughly constant over time and across all contacted firms:

- Method of contact: will vary by EA and be accounted for by booking team controls;
- Timing: first contact is made four to six weeks before the potential date of the visit, specific dates have not been collected, at most three contact attempts are made;
- Survey format, title and length of external questionnaire: same across all firms over time;[9]
- Data collection: survey is carried out in face-to-face interviews;[10]
- Incentives: not offered;

[8] Estimation results for different tenure time horizons and alternative scenarios are described in section 5.2.

[9] However, the length of the actual questionnaire and consequently the time burden of the survey have increased over the sample period, which could influence future participation. To capture this influence, a variable for the number of pages of the actual questionnaire used during the last survey visit is included in the regressions described in section 6.2. Estimates when firm fixed effects are added are positive and statistically significant, providing some evidence that the time cost of the last survey visit influences future participation.

[10] In extraordinary circumstance (e.g., travel cancelled due to weather), interviews may be conducted by telephone.

- Announcement letters: no official letters are sent by the Bank announcing the survey.

3.2 Non-controllable influences

Non-controllable influences are grouped into those that relate to the firm and its respondent, and those tied to the firm's external environment. The household non-response literature shows that those who are more educated, more affluent, female, younger and white are more likely to participate than their counterparts (Curtin, Presser and Singer 2000; Moore and Tarnai 2002). Unfortunately, demographic data has not been collected for respondents and information for non-respondents, by definition, is difficult to gather.[11] However, in Tomaskovic-Devey, Leiter and Thompson's (1994) theory of non-response, they suggest that there are three factors that influence a respondent's decision to participate in a business survey: (i) authority to respond, (ii) capacity to respond and (iii) motive to respond. We argue that, to a certain degree, firm characteristics can also be tied to these factors, and use them to motivate the inclusion of several firm-level variables.

3.2.1 Firm characteristics

New firms: The capacity-to-respond argument would suggest that costs are higher for firms that aren't already familiar with the survey. Using data on firms visited from 2006 onward, we create an indicator variable identifying firm contact observations with no history of a recent survey visit—roughly 58 per cent of all observations.

Performance: To capture differences in non-response by firms' performance, we use Dun & Bradstreet's (2016) pre-screen credit risk score to identify firms that are estimated to be at medium or high risk of being delinquent on payments (*motive and capacity to respond*).[12]

Age: Very young firms are in early growth stages and may be too busy to respond (*capacity to respond*). Conversely, they may want to participate if they are hoping to expand their network (*motive to respond*). To control for any influences, an indicator variable for firms that have been in business for five or fewer years is included.

[11] Relative to those contacted for household surveys, however, potential respondents for the BOS are roughly homogenous among several characteristics: often prime-aged males who are well educated and employed in well-paid senior manager positions, and speak either English or French.

[12] Dun & Bradstreet's pre-screen credit score predicts the likelihood "of a firm paying in a severely delinquent manner (90+ days past terms) over the next 12 months" (Dun & Bradstreet 2016).

Size: To account for the impact of firm size, indicator variables are included: (i) small—fewer than 100 employees, (ii) medium—100 to 500 employees (base case) and (iii) large—more than 500 employees (*capacity and authority to respond*).[13, 14]

Sector: A firm's sector may influence survey refusal due to business cycle effects including: (i) availability because of workload, (ii) interest or discomfort disclosing performance, layoffs, etc. and (iii) period of major decisions or uncertainty. Topic salience (*motive to respond*) has also been identified in the household and business survey literature as having an influence on survey participation (Groves et al. 2004; Cycyota and Harrison 2006).[15] In the BOS context, firms in sectors for which interest rates are important, such as FIRE, may benefit more from meeting with Bank of Canada staff than those in other sectors. As well, firms in banking and finance are likely more aware of the Bank of Canada and its mandate. Finally, there may be differences in attitudes or responsibilities around privacy/confidentiality or sensitivity of information that vary by sector. Using North American Industry Classification System (NAICS) codes, firms are categorized into six aggregate sectors.[16]

Exporter: As senior management of exporting firms may travel more frequently for business and may therefore be less likely to be available to participate (capacity to respond), an indicator variable is included that equals one for firms that export.

Ownership: An indicator variable identifies publicly traded firms. Such firms may be less likely to refuse survey participation since information is already available to the public because of publication obligations. Also, as public firms are typically held more accountable for their actions, they may feel a greater responsibility to undertake activities such as establishment surveys (*motive to respond*). Public as well as large firms are also more likely to have public or government relations departments, increasing their capacity to respond.

[13] In the cases where the number of employees is not available from the usual data sources, RDs estimate the size of the firm into one of these three categories.
[14] Head offices are always the target as branches often do not have the resources or access to the necessary information to complete the questionnaire (*capacity to respond*).
[15] Despite the hypothesized importance of topic salience, no data other than sector are available to capture its impact.
[16] The six sectors are: (i) manufacturing (base case), (ii) construction, information, transportation and utilities (CITU), (iii) trade, (iv) commercial, personal and business (CPBS), (v) finance, insurance and real estate/leasing FIRE(L) and (vi) primary.

International subsidiaries: As international subsidiaries may feel they do not have the authority to complete surveys, an indicator variable is included.[17,18]

Corporate policy: Some firms have a corporate policy on survey participation (*authority to respond*). Unfortunately, we do not collect data on the presence of such policies.

3.2.3 Firms' external environment

Time: To capture any influences that may apply to all groups and firms at the same time, a set of 32 quarter dummy variables have been included. Among other things, this would include any changes in national economic or political factors (e.g., oil price shock, interest rate changes).

Quarter/season: Dummy variables are added to control for any systematic variations across the four seasons in firms' willingness or availability to participate (base is Q1).

Regional growth: Some evidence suggests that non-response is more frequent in "economic good times" (Seiler 2014), consistent with the capacity-to-respond argument. Alternatively, firms may be motivated to participate in weak economic times if they are aware of the Bank of Canada's monetary policy mandate. To capture such factors, we use quarterly estimates for each region from the dynamic factor model used by the Bank to nowcast Canadian provincial GDP growth (Chernis, Cheung and Velasco 2017).

3.3 Data

The non-response data are generated by the EAs at the Bank of Canada's regional offices. While data on firm size, sector and region for non-respondents were recorded starting in 2002 (Figure 2[19]), it wasn't until 2009 that all regional offices systematically recorded the names of non-responding firms.[20,21,22] For

[17] The relationship does not apply for subsidiaries of Canadian parent companies since we would only intentionally contact them if they were run independently of their parent (e.g., the parent is a holding company), otherwise we would contact the parent company.

[18] The indicator variables identifying large firms, public firms and international subsidiaries are slightly correlated (less than 0.40), not enough to make increases in standard errors a concern.

[19] CRM stands for customer relationship management, and in the BOS context is the technologies and systems used to record, organize and analyze firm contact information and our interactions with firms.

[20] Starting in 2009, the reasons for non-response have also been recorded. The two most common are: (i) never returned calls or messages, and (ii) management of the firm is too busy.

[21] In this analysis, we group together the two main types of non-response distinguished in the literature (Janik and Kohaut 2012): (i) noncontacts—where it not possible to contact firm (e.g., out of business, incorrect contact info, etc.) and (ii)

some variables for survey participants, the primary source of data is BOS data. Otherwise, the data largely come from Dun & Bradstreet Hoovers Business Directory. Data for several variables not earlier collected were added from Hoovers in 2016 for firm observations from 2009–16, including whether the firm exports, its ownership status (publicly traded, international subsidiary), the year founded and its credit risk score. Other data sources include firms' websites and Innovation, Science and Economic Development Canada.

Our sample is a pooled cross-section where roughly 1,224 firms have been contacted more than once (giving roughly 3,217 observations).[23] Although it varies, the proportion of new firms is roughly 58 per cent each quarter. The non-response rate for such firms is 52 per cent versus 37 per cent for firms that have already participated in past surveys. These rates are comparable but less bifurcated than those in the IAB (Institute for Employment Research) Establishment Panel survey (Janik and Kohaut 2012), where the non-response rates for new firms and previous participants are 64 per cent and 20 per cent, respectively.

4 Basic Research Methods

To estimate the effect of new booking teams, we use a DD design where we exploit tenure variation across teams. In particular, we compare: (i) differences in non-response between groups of firms contacted in a given quarter, where firms are exposed to a new booking team in a region ("treated") but not elsewhere ("untreated"), with (ii) differences in non-response between booking teams during quarters where the treated booking team has gained experience. The central assumption of the DD strategy is that the responses of firms exposed to a new booking team (treated) and firms not exposed to the treated booking team would stay on their roughly parallel paths if it was not for the effect of the treatment. Or in other words, we assume that if there is no new booking team treatment effect, the differences in non-response between the firms exposed to the treated booking team and firms exposed to untreated booking teams would be roughly the same in all quarters.[24] Figure 3 illustrates these ideas. The treated booking team, Team 1, is considered new from 2014Q4–2015Q2, and has an average non-response rate higher than the periods when not treated. Note that the average non-response rates for

refusals—firms actively refuse to participate (e.g., too busy, not interested, etc.). An idea for future research is to examine if determinants vary by type or reason for non-response.

[22] In 2012Q3, no data on non-participants were recorded in the Prairies region. To avoid bias, the participants for the Prairies region for that quarter are excluded from the analysis.

[23] Firms are not visited more often than every 18 months except in special circumstances.

[24] See Wooldridge (2010) for a comprehensive description of the DD strategy.

teams 2 and 3 over the entire period run roughly parallel, with Team 2 having a slightly higher non-response rate than Team 3. Although Team 1 has a higher non-response rate than the other two teams in general, we are assuming that if being new had no effect on Team 1's non-response rate, it would have been lower and remained parallel with the other teams.

For the DD set-up in this analysis, there are many time periods and booking teams. To estimate, we use a linear probability model at the individual firm level:

$$P(Y_{fgt} = 1 \mid NewTeam,\ Z) = \beta NewTeam_{bt} + \delta_b + \lambda_t + \gamma X_{ft} + \theta v_{rt} + \varepsilon_{fgt,} \qquad (1)$$

where Y_{fgt} is a dummy variable equal to 1 if a firm does not participate in the BOS, and where f indexes individual firms, b indexes survey booking teams and t indexes time. We are interested in β, the coefficient estimate for $NewTeam_{bt}$ (the treatment variable), which is a dummy variable indicating that the firms in that period are contacted by a new booking team—that is, both the RD and EA have been in their positions for less than 18 months. As part of a standard DD specification, also included are a set of 24 booking teams effects, δ_b, and a set of 32 quarter time effects, λ_t.

Unlike the simple set-up described above, booking teams do not contact the same firms each quarter. For the DD estimator to be unbiased, new booking teams must not be systematically related to other factors that affect non-response (Wooldridge 2010). For example, the results would be biased if new—rather than experienced—booking teams are more likely to contact new firms, which traditionally have a higher probability of non-response. To reduce possible bias, variables related to the controllable and uncontrollable factors outlined in Section 3 are added to equation (1) to capture firm characteristics that have may have changed the composition of the firms contacted by booking teams over time that may be correlated with new booking teams and non-response. These firm-specific variables (X_{ft}) include: credit risk score, firm age (i.e., five years or younger), firm size, international subsidiary status, ownership status (public versus other), whether the firm exports, sectors (manufacturing is the base), and indicator variables for each of the four seasons (base is Q1). An external environment variable v_{rt} is also included to control for estimated contemporaneous growth in region r in time t.

As noted above, DD estimation assumes that participation of the firms exposed to new booking teams and those that are not would remain parallel in all periods if there was no effect from the treatment.

Random assignment of the treatment (here, being a new team) is not necessary for this assumption to hold. It is only a concern if the assignment was based on some characteristics of the booking teams. While turnover in RD and EA positions may be related to team characteristics, it is not relevant, since we are concerned with comparing the outcomes of booking teams when new versus when experienced against outcomes of other teams in the same time periods, and where being new ("treatment" based on tenure) is not a function of team characteristics themselves.

We also estimate a firm fixed-effects version of the DD model in equation (1):

$$P(Y_{fbt} = 1 \mid NewTeam, Z) = \beta NewTeam_{bt} + \delta_b + \lambda_t + \gamma X_{ft} + \theta v_{rt} + \rho_f + \varepsilon_{fgt}, \quad (2)$$

where X_{ft} now includes only whether the firm is young, since all other firm characteristics stay the same over time, and ρ_f is a firm fixed effect. This specification controls for time-invariant differences across firms (e.g., presence of firm policy on survey participation over the time period).

5 Estimation Results

5.1 Main results

Table 1 reports DD estimates of the effect of new booking teams on BOS unit non-response. The first column of results uses a set of 24 team effects, as in equation (1), while the second column uses a set of 48 effects for each RD and EA. In both models, we find that firms contacted by new booking teams are roughly 13 per cent more likely to not participate in the BOS than firms in other time periods that are contacted by the same but more experienced booking team.[25] Relative to other key covariates, the size of the effect of being contacted by a new team is slightly larger than being a new firm.[26] Estimates for a linear probability model with no booking team or individual staff effects (and therefore not a DD specification) are presented in column 4 for comparison. The coefficient estimate for the new team variable is larger than in the DD specification, suggesting that new booking teams are correlated with certain teams or individuals, and need to be taken into account.

[25] Estimates for variables of interest with RD and EA effects are nearly identical to those with team effects. For the rest of the paper, only results with team effects are presented and discussed.

[26] Results from equivalent logistic regressions (available upon request) also suggest a positive, statistically significant effect.

5.2 Sensitivity to alternative tenure periods

As mentioned earlier, we expect that non-response will improve with experience and then plateau, and for the BOS, 18 months seems a reasonable point to plateau. However, we investigate other lengths of time. DD estimates (not shown but available upon request) of the effect of booking team tenure where new teams are defined as those where both the RD and the EA have less than 15 months of experience are similar; however, the coefficient estimate in the model equivalent in column 2 is slightly smaller and no longer statistically significant. Given this set-up, this smaller coefficient is likely driven by one or more individuals, rather than a team, being associated with higher non-response.[27] In regressions with new booking teams defined as those with the RD and EA having less than 21 months' experience, the new team estimators are still positive but smaller and no longer statistically significant, suggesting the effect is waning (results are similar with less than 24 months' experience). We also examined a similar set of specifications but with a focus on tenure of RDs and EAs individually, and estimates did not provide evidence of statistically significant effects (results also available upon request). These results suggest that it's not having a new RD or a new EA that has a negative effect on the probability of participation, but it's when both are new at the same time that matters.

5.3 Covariate results

If we concentrate on the first two columns of Table 1, we find that all statistically significant results for the covariates are of the expected hypothesized sign. Several results are worth highlighting. First, new booking teams are slightly more likely to contact new firms (63 per cent of all contacted firms by new teams versus 57 per cent of all contacted firms by experienced teams). By definition, new firms generally have little prior knowledge or experience with the BOS, and therefore may differ from repeat firms in non-response, so it is important to include a variable to control for new firms in the specifications. We are also curious if responses for new booking teams differ if the firm contacted is new or repeat, so an additional variable is included that interacts the new firm variable with the new booking team variable. In line with the capacity-to-respond argument, the new firm coefficient estimates are associated with an increase in the probability of unit non-response. This is consistent with Janik and Kohaut (2012) and Seiler (2014), who find that the duration of participation in the panel survey is related to a decrease in non-response. The interaction term between the new firm and new booking team variables is small and not statistically significant. Together with the main new booking team

[27] Other coefficient estimates (not shown but available upon request) where the new team variable is defined as both the RD and the EA having less than 12 months' experience are even smaller, have larger standard errors and are not statistically significant. The smaller sample (530 observations versus 851) is likely playing a role.

results, this suggests that while new booking teams lead to higher non-response, the effect does not differ between new and repeat firms.

Second, Canadian subsidiaries of foreign firms also have a higher non-response rate, which suggests that having authority to respond matters. Similarly, Janik and Kohaut (2012) find that if an establishment is an independent company or company headquarters, participation is less frequently refused. Stronger economic growth in the region of the firm's head office is also associated with a higher probability of non-response. This is consistent with findings from Seiler (2014) and the capacity-to-respond argument that busier firms have fewer resources to participate in the BOS. It may also support the motivation to participate—firms may believe it is in their best interests to talk to the Bank in tough economic times.

Third, there are several variables have negative relationships with non-response. For example, larger firms are more likely to participate than others. This is consistent with findings in Seiler (2014) but not Janik and Kohaut (2012), who find that non-response increases with firm size. Publicly traded firms as well as those in the FIRE sector are also more likely to participate than their counterparts. For both sets of firms, motive to respond and capacity to respond are likely playing important roles. In addition, firms in the FIRE sector may be more of aware of the Bank of Canada and its mandate.

Finally, the coefficient estimate for the credit score risk variable, our measure of firm performance, is small and not statistically significant. Reassuringly, this provides some evidence that BOS participation is not systematically related to performance.[28]

5.4 Firm fixed-effects results

Column 3 of Table 1 presents the results of the firm fixed-effects version for the model specified in column 1. While these estimates provide some support for the results in columns 1 and 2, and have the potential of being strong findings, they have important differences and caveats, and therefore are not emphasized. In this regression, the coefficient estimates require more than one observation for a particular firm and rely on variation in the variable of interest. For example, the new team estimator here relies on outcomes where a firm has been exposed to the same team when new and when

[28] Given that individual booking team effects are added to the specification, regional effects should already be taken into account. Estimates from specifications that include regional indicator variables are very similar.

experienced. Any influences based on outcomes from firms that were always contacted by a new team or always contacted by an experienced team will be absorbed in the firm fixed effect.

Looking at the results, the new booking team coefficient estimate is positive and statistically significant though slightly larger in magnitude than those in columns 1 and 2. However, the new firm estimator in column 3 with firm fixed effects is negative and statistically significant, and completely at odds with the findings in columns 1 and 2. The interaction between the new firm and new booking team variables is also negative, large and statistically significant. Taken together, these results suggest that relative to experienced booking teams, new booking teams contacting repeat firms have a higher probability of non-response rate. However, they also suggest that new booking teams contacting new firms have a lower likelihood of non-response relative to experienced booking teams contacting repeat firms, which is counterintuitive.

There are two things to consider when interpreting the results from the firm fixed-effects specification. First, the estimates are based on a very small and non-random sample. In total, there are 90 observations where there is variation in the tenure of the booking team for a firm, and most of this variation happens with one booking team. Second, these results suffer from selection bias. Similar to the new booking team estimators, influences from firms that are always new firms (even if only one observation) are absorbed in the firm fixed effects. These observations are more likely to be firms contacted only once, and overall have a higher non-response rate (i.e., many don't participate and are not contacted again). At the same time, those that are always repeat firms have a lower than average non-response rate but this is also absorbed in the firm fixed effect. Therefore, the new firm estimators are based on outcomes where the same firm has gone from being a "new firm" to a "repeat firm," or in other words, cases where new firms agree to participate at some point—therefore giving them a much lower non-response rate than new firms, on average.

6 Extensions

6.1 Is there an upward trend in the BOS non-response rate?

The BOS non-response rate in Figure 1 appears to rise over the sample period. While there is much evidence that suggests an upward trend in household survey non-response (Meyer, Mok and Sullivan 2015; Groves et al. 2004; de Leeuw and de Heer 2002), it is not clear there is a similar trend in business surveys. For example, Cycyota and Harrison (2006) document a decline in response rates among surveys

targeted at executives, while Petroni et al. (2004) find that response rates for three US Bureau of Labor Statistics establishment surveys to be relatively stable. Willimack, Nichols and Sudman (2002) point to literature that finds nearly the same number of surveys with increasing non-response as with decreasing non-response. Using panel data from the Ifo Business Survey, Seiler (2014) finds a declining trend in participation among West German firms but an increasing trend in response from firms in East Germany. Finally, Janik and Kohaut (2012) report an increase in unit non-response in recent years for new firms but no change in the non-response rate of firms that have already participated in the survey.

There are several reasons the BOS non-response rate may be increasing over time. First, Meyer, Mok and Sullivan (2015), who find an increase in non-response among household surveys, argue the increase is driven by households being overburdened by surveys and telemarketers. A similar argument may be valid for firms but perhaps to a lesser extent for face-to-face surveys like the BOS. Second, as suggested by Bavdaz (2010), time may be a greater constraint because of increased global competition and emphasis on higher productivity. Third, the early quarters of this sample were those following the financial crisis, and if firms looked to the Bank of Canada for information to better understand the macroeconomic environment or were motivated to participate by the weak economic environment, the response rate may have been higher.[29]

Column 1 of Table 2 presents results for similar models to those in Table 1 with a set of 24 team effects and various control variables, but with the set of 32 quarters replaced by seven year effects. There is no evidence of a statistically significant, consistent increase during this period. Similarly, in column 2 of Table 2, the set of time effects is replaced by a continuous time variable. The time variable is not statistically significant, again suggesting no obvious trend in non-response over time.

6.2 Does a change in booking team matter?

In addition to looking at new versus experienced teams, we also examine whether it is the change in booking teams since the previous visit that matters, similar to Janik and Kohaut (2012). We estimate specifications like those in Table 1, except we include only firms that have already participated in the BOS after 2006, since we need data on the previous visit. This reduces the sample from 5,371 to 2,265 observations. Table 3 presents the results. Unlike Janik and Kohaut (2012), who find a change in

[29] Other possible reasons proposed in the household literature, which seem less relevant in the business survey context, include increasing urbanization, a decline in public spirit, rising crime, and increasing concerns about privacy and confidentiality (Meyer, Mok and Sullivan 2015).

interviewers is related to an increase in the probability of refusal, we find little evidence that a change in booking teams has a statistically significant association with BOS participation. The difference between our results arises for two reasons. The first is methodology. Here, as in the previous equations, we are controlling for the booking teams, while Janik and Kohaut (2012) do not control for different interviewers. In fact, when we exclude booking team effects, the coefficient estimates for the change in booking teams are positive and statistically significant, similar to findings in Janik and Kohaut (2012). This suggests that it's not the change in booking teams that matters, but that some have different response rates in general. Another likely reason for the difference in results is that in most cases in Janik and Kohaut (2012), the change in interviewer also represents a new interviewer, since firms are interviewed annually. In contrast, we do not visit firms more than every 18 months (except in special circumstances), thus the booking team may have changed from the previous visit but may not necessary be new. This is not inconsistent with our earlier estimates, and together the results suggest that it is experience that matters, not staff change per se.

7 Conclusion

While previous Bank research (de Munnik, Illing and Dupuis 2013) suggests that unit non-response had resulted in little bias in BOS results, it remains important to minimize non-response when possible. In recent years, there were periods in which the BOS non-response rate had increased. The purpose of this analysis is to examine the potential determinants of a firm's participation in the BOS, including the tenure of survey booking teams and firm demographics.

DD estimates controlling for individual booking teams and quarterly effects suggest that new survey booking teams increase the probability of BOS unit non-response. This finding provides empirical support to emphasize the importance of transition management, staff retention and extensive training for new survey booking team staff, and contributes to ongoing discussions among central banks aimed at determining best practices in conducting business surveys. Given that this influence is unrelated to firms, it is unlikely it introduces bias in the main BOS results.

Several other results are worth highlighting. First, new firms are less likely to participate than repeat firms, suggesting that firms find it less costly to participate in the BOS once they've already participated. However, there is little evidence that the effect of new booking teams differs significantly for new versus repeat firms. Second, regression estimates provide further support that firm characteristics matter for

non-response. Firms that are large, publicly traded or in the FIRE sector are related with lower probabilities of non-response, suggesting that awareness and self-interest may be factors influencing participation. Conversely, firms of international subsidiaries are associated with a higher likelihood of non-response relative to their counterparts. Finally, estimates from these regressions, which control for many other factors potentially influencing non-response, suggest there is no statistically significant relationship between firms' credit scores and BOS participation, and no obvious upward trend in BOS non-response. These results provide useful insights for business survey design and implementation.

The data set created for this analysis, which pulls information from multiple sources at the Bank's regional offices as well as Hoovers Business Directory, will provide additional opportunities to analyze other interesting BOS questions. For example, do BOS responses differ between repeat and new firms? Also, does firm size impact BOS responses? Regional offices have also recently begun collecting reasons for non-response and respondent characteristics, which will allow further in-depth research. While the BOS has played an important role in the Bank of Canada's monetary policy function, providing timely information at the firm level, its sample size is relatively small—a reality of the costlier face-to-face nature of the interactions. The results from this paper and future related analyses will help inform decisions for the design of the BOS going forward.

References

Bavdaz, M. 2010. “Sources of Measurement Errors in Business Surveys.” *Journal of Official Statistics* 26 (1): 25–42.

Bethlehem, J., F. Cobben and B. Schouten. 2011. *Handbook of Nonresponse in Household Surveys*. Wiley.

Blom, A., E. de Leeuw and J. Hox. 2011. “Interviewer Effects on Nonresponse in the European Social Survey." *Journal of Official Statistics* 27 (2): 359–377.

Bloomberg. 2016. http://www.bloomberg.com/Research/common/symbollookup/symbollookup.asp?lookuptype=private&region=all

Chernis, T., C. Cheung and G. Velasco. 2017. “A Three-Frequency Dynamic Factor Model for Nowcasting Canadian Provincial GDP Growth.” Bank of Canada Staff Discussion Paper No. 2017-8.

Curtin, R., S. Presser and E. Singer. 2000. “The Effects of Response Rate Changes on the Index of Consumer Sentiment.” *Public Opinion Quarterly* 64: 413–428.

Cycyota, C. S. and D. A. Harrison. 2006. “What (Not) to Expect When Surveying Executives: A Meta-Analysis of Top Manager Response Rates and Techniques Over Time.” *Organizational Research Methods* 9 (2): 133–160.

De Leeuw, E. and W. de Heer. 2002. “Trends in Household Survey Nonresponse: A Longitudinal and International Comparison.” In *Survey Nonresponse*, edited by R. M. Groves, 41–54. New York: Wiley.

De Munnik, D., M. Illing and D. Dupuis. 2013. "Assessing the Accuracy of Non-Random Business Conditions Surveys: A Novel Approach." *Journal of the Royal Statistical Society: Series A (Statistics in Society)* 176 (2): 371–388.

Dun & Bradstreet. 2016. “D&B Hoovers database.”

Durrant, G., R. Groves, L. Staetsky and F. Steele. 2010. “Effects of Interviewer Attitudes and Behaviors on Refusal in Household Surveys.” *Public Opinion Quarterly* 74: 1–36.

Federal Reserve of Atlanta. 2017. Central Bank Business Survey Database. https://www.frbatlanta.org/research/surveys/central-bank-business-database.aspx

Groves, R. M. and M. P. Couper. 1998. *Nonresponse in Household Interview Surveys*. New York: Wiley.

Groves, R. M., F. J. Fowler, M. P. Couper, J. M. Lepkowski, E. Singer and R. Tourangeau. 2004. *Survey Methodology*, 2nd Edition. Hoboken: Wiley.

Groves, R. M., S. Presser and S. Dipko. 2004. "The Role of Topic Interest in Survey Participation Decisions." *Public Opinion Quarterly* 68 (1): 2–31.

Innovation, Science and Economic Development Canada. 2016. "Canadian Company Capabilities." http://www.ic.gc.ca/eic/site/ccc-rec.nsf/eng/home

Irving Fisher Committee on Central Bank Statistics, Bank for International Settlements. 2009. "The Use of Surveys by Central Banks." Proceedings of the IFC Workshops.

Janik, F. and S. Kohaut. 2012. "Why Don't They Answer? Unit Non-Response in the IAB Establishment Panel." *Quality and Quantity: International Journal of Methodology* 46 (3): 917–934.

Loosveldt, G., A. Carton and J. Pickery. 1998. "The Effect of Interviewer and Respondent Characteristics on Refusals in a Panel Survey." *International Workshop on Household Survey Nonresponse* 4: 249–262.

Martin, M. and C. Papile. 2004. "The Bank of Canada's *Business Outlook Survey*: An Assessment." Bank of Canada Staff Working Paper No. 2004-15.

Meyer, B. D., W. K. C. Mok and J. X. Sullivan. 2015. "Household Surveys in Crisis." *Journal of Economic Perspectives* 29 (4): 199-226.

Moore, D. and J. Tarnai. 2002. "Evaluating Nonresponse Error in Mail Surveys." In *Survey Nonresponse*, edited by R. M. Groves, 197–211. New York: Wiley.

Petroni, R., R. Sigman, D. Willimack, S. Cohen and C. Tucker. 2004. "Response Rates and Nonresponse in Establishment Surveys—BLS and Census Bureau." Federal Economic Statistics Advisory Committee.

Pichette, L. and T. Ainsworth. 2006. "The BOS Nonresponse Rate." Bank of Canada Internal Document.

Seiler, C. 2014. "The Determinants of Unit Non-Response in the Ifo Business Survey." *AStA Wirtschafts- und Sozialstatistisches Archiv* 8 (3): 161–177.

Tomaskovic-Devey, D., J. Leiter and S. Thompson. 1994. "Organizational Survey Nonresponse." *Administrative Science Quarterly* 39 (3): 439–457.

Tomaskovic-Devey, D., J. Leiter and S. Thompson. 1995. "Item Nonresponse in Organizational Surveys." *Sociological Methodology* 25: 77–110.

Willimack, D., E. Nichols and S. Sudman. 2002. "Understanding Unit and Item Nonresponse in Business Surveys." In *Survey Nonresponse*, edited by R. M. Groves, 213–227. New York: Wiley.

Wooldridge, J. 2010. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, Massachusetts: MIT Press.

TABLE 1
Difference-in-differences estimates of the effect of new booking teams on BOS unit non-response (2009Q1–2016Q4)

	DD (team)	DD (SR+EA)	DD (team) with firm FE	LPM
New team (<18 mos)	0.127**	0.125**	0.134*	0.194***
	(0.0568)	(0.0568)	(0.0778)	(0.0326)
New firm	0.119***	0.120***	-0.267***	0.137***
	(0.0170)	(0.0170)	(0.0271)	(0.0164)
New firm X New team (<18 mos)	-0.0291	-0.0293	-0.215***	-0.0480
	(0.0373)	(0.0373)	(0.0717)	(0.0382)
Medium or high credit risk	-0.00957	-0.00961		-0.00432
	(0.0175)	(0.0175)		(0.0178)
Large firm (500+ FTE)	-0.0398**	-0.0399**		-0.0327*
	(0.0184)	(0.0184)		(0.0188)
Small firm (<100 FTE)	0.0216	0.0218		0.00947
	(0.0172)	(0.0172)		(0.0176)
International subsidiary	0.0535**	0.0541**		0.0704***
	(0.0233)	(0.0233)		(0.0229)
Public firm	-0.0801***	-0.0802***		-0.0703***
	(0.0190)	(0.0190)		(0.0190)
Exporter	-0.0129	-0.0123		-0.0216
	(0.0164)	(0.0164)		(0.0167)
CITU	0.0109	0.0112		0.0117
	(0.0211)	(0.0211)		(0.0215)
CPBS	-0.0268	-0.0273		-0.0442*
	(0.0235)	(0.0235)		(0.0234)
FIRE	-0.114***	-0.113***		-0.108***
	(0.0263)	(0.0263)		(0.0267)
Primary	-0.0451	-0.0453		-0.0596**
	(0.0292)	(0.0292)		(0.0288)
Trade	0.00595	0.00596		0.0179
	(0.0242)	(0.0242)		(0.0249)
Five years or younger	0.0123	0.0127	0.0256	0.0111
	(0.0328)	(0.0328)	(0.0630)	(0.0338)
DFM growth estimate	0.0252***	0.0244**	0.00105	0.0115*
	(0.00958)	(0.00957)	(0.0125)	(0.00619)
Q2	0.0409	0.0339	-0.0862	0.125**
	(0.0712)	(0.0711)	(0.0926)	(0.0561)
Q3	0.0433	0.0362	-0.0571	0.139**
	(0.0705)	(0.0704)	(0.0912)	(0.0569)
Q4	0.0881	0.0811	0.00506	0.201***
	(0.0691)	(0.0689)	(0.0966)	(0.0547)
Constant	0.401***	0.284***	0.497**	0.231***
	(0.0721)	(0.0644)	(0.220)	(0.0474)
Time FE (32)	Yes	Yes	Yes	Yes
Team FE (24)	Yes	No	Yes	No
RD+EA FE (48)	No	Yes	No	No
Firm FE	No	No	Yes	No
Observations	5371	5371	5371	5371
R2	0.105	0.105	0.149	0.0739

Robust standard errors clustered at the firm level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Sources: Bank of Canada; Hoovers; Bloomberg; Innovation, Science and Economic Development Canada.

TABLE 2
Linear probability model estimates with year effects and time (2009Q1–2016Q4)

	Team + year FE	Team FE + time
New team (<18 mos)	0.118**	0.140***
	(0.0461)	(0.0430)
2010	-0.0181	
	(0.0434)	
2011	0.00103	
	(0.0486)	
2012	0.00337	
	(0.0498)	
2013	0.0666	
	(0.0496)	
2014	0.0703	
	(0.0505)	
2015	0.0425	
	(0.0489)	
2016	0.00156	
	(0.0512)	
Time		0.00104
		(0.00165)
Constant	0.465***	0.251
	(0.0612)	(0.332)
Team FE (24)	Yes	Yes
Time FE (32)	No	No
Observations	5371	5371
R2	0.0992	0.0974

Robust standard errors clustered at the firm level in parentheses. Covariates are suppressed for brevity. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Sources: Bank of Canada regional offices; BOS; Hoovers; Bloomberg; Innovation, Science and Economic Development Canada.

TABLE 3
Linear probability estimates of change in booking team on non-response, previously visited firms only

	Team FE	Team + firm FE
Change in booking team	-0.0595	0.0396
	(0.0403)	(0.0563)
Time FE	Yes	Yes
Team FE	Yes	Yes
Firm FE	No	Yes
Observations	2265	2265
R2	0.115	0.167

Robust standard errors clustered at the firm level in parentheses. Covariates are suppressed for brevity. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Sources: Bank of Canada; Hoovers; Bloomberg; Innovation, Science and Economic Development Canada.

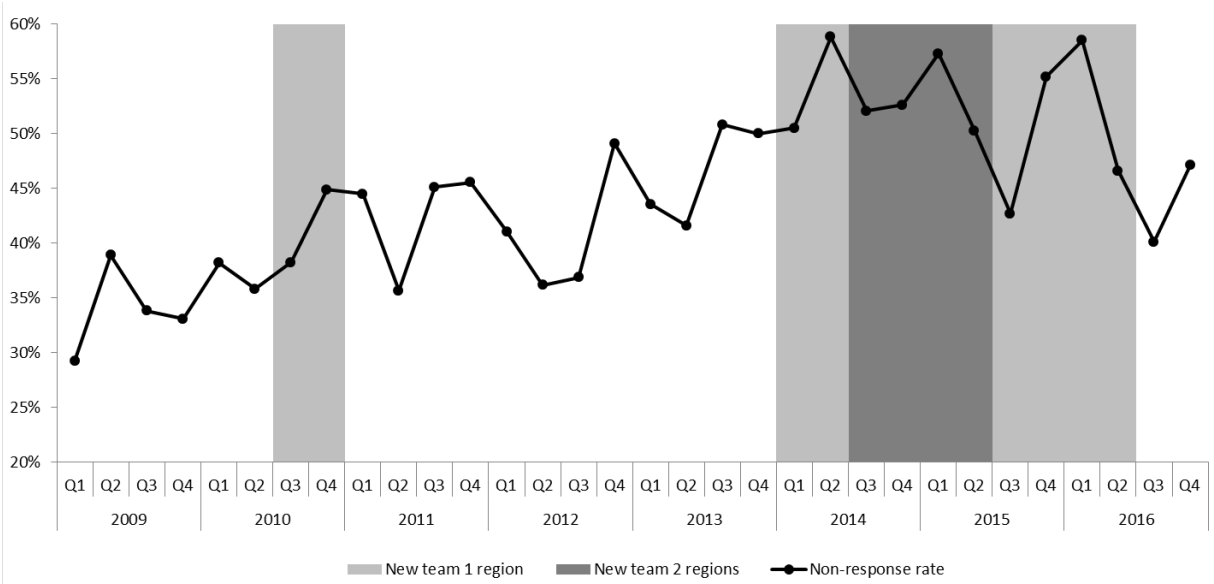


FIGURE 1 Unit non-response rate with shaded quarters for new survey booking teams

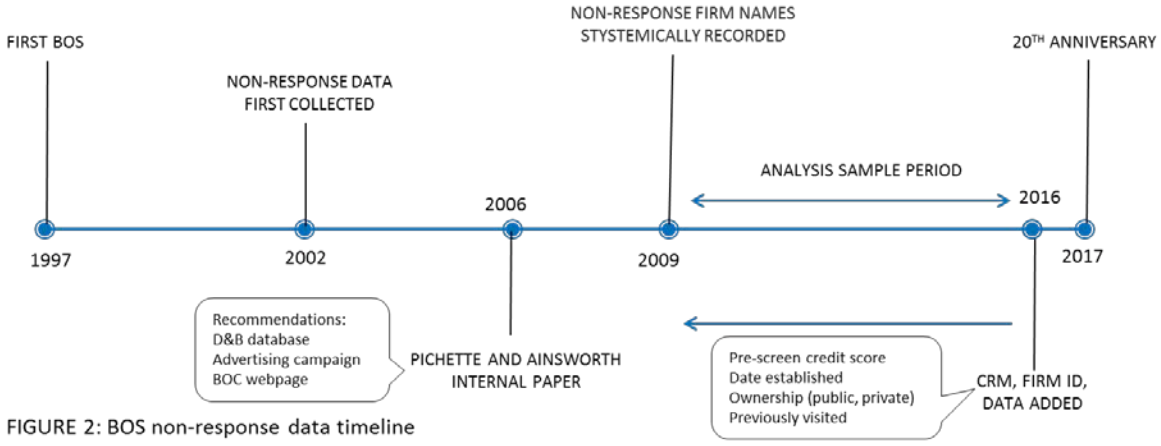


FIGURE 2: BOS non-response data timeline

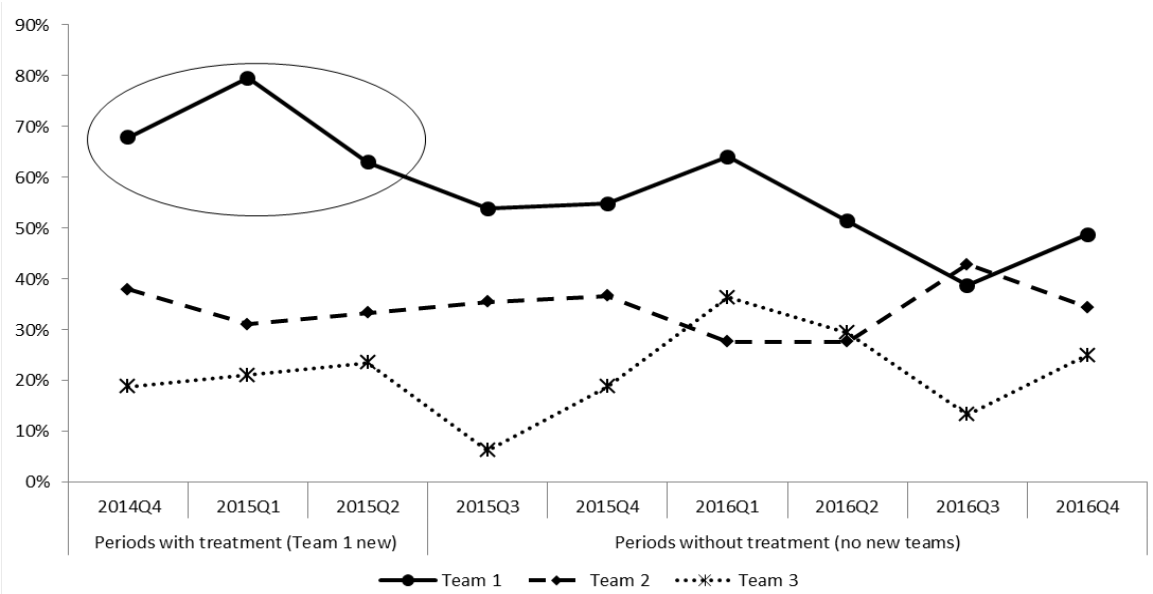


FIGURE 3 Average non-response rates by booking teams in periods with and without treatment