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

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Outline

- Motivation, BOS background

- Non-response framework

- Data and variables

- Estimation strategy

- Empirical results

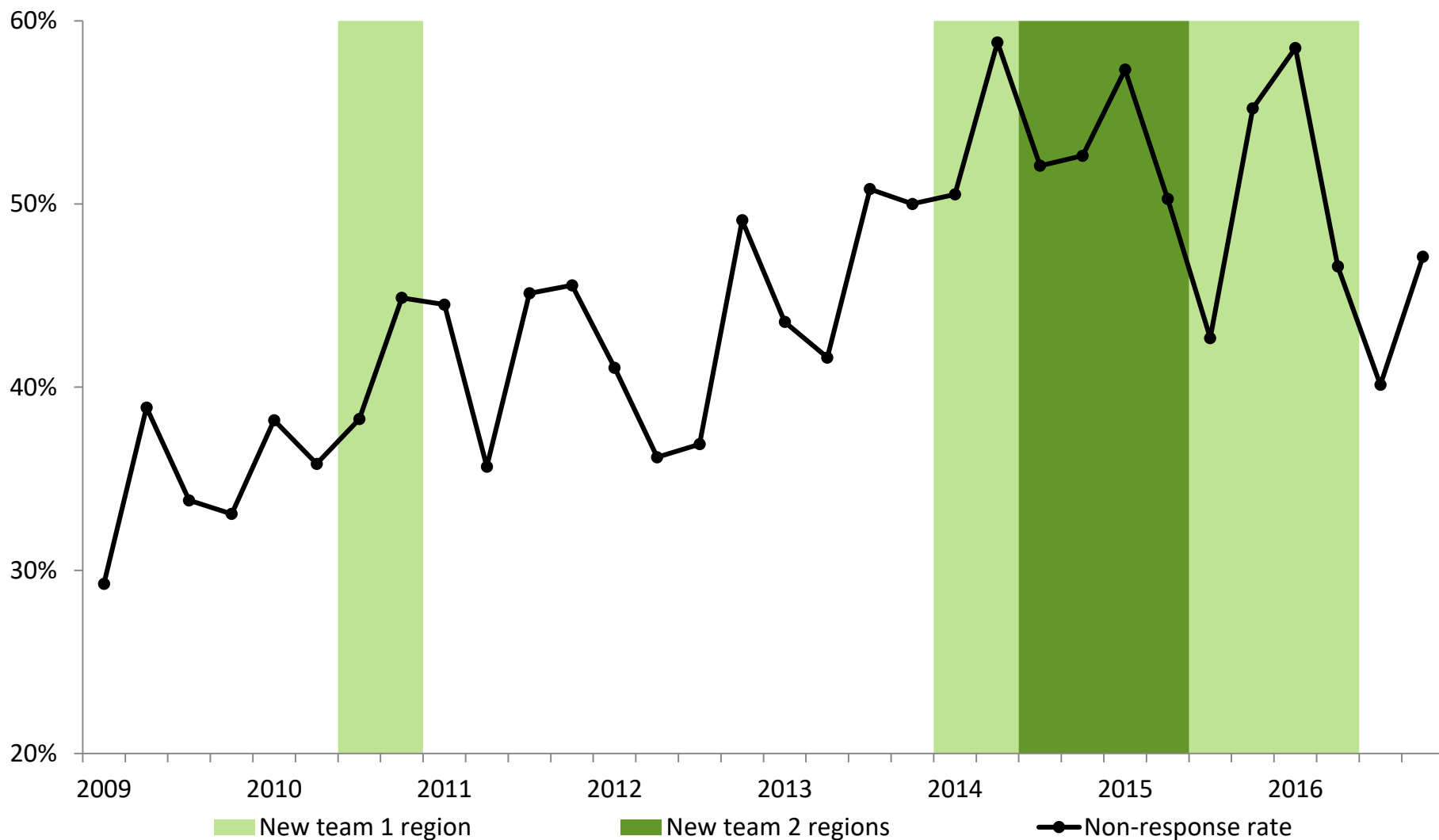 - Extensions

Motivation

- Unit non-response is undesirable for two main reasons:

  1. If not random, source of bias

     - Munnik, Illing and Dupuis (2013) suggest little bias

  2. Decreases staff productivity

- Recently, BOS non-response rate increased

  – During this period, some turnover of booking team staff

  – What drives non-response?

     - Booking team tenure?

     - Firm demographics?
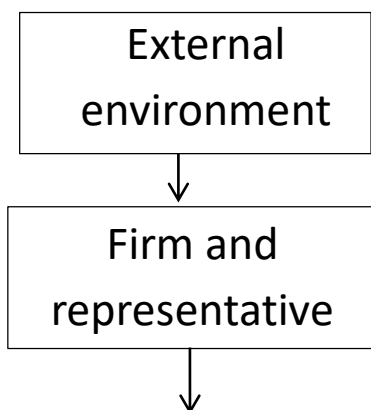
BOS background

- Face-to-face consultations with senior business representatives:
  - 5 regional offices
  - Quota sample of 100 firms each quarter
    - Region, industry and size
  - Voluntary participation: refused firms replaced

- Each regional office has 1 booking team:
  - 1 Regional Director (RD)
  - 1 Executive Assistant (EA)
  - New team = both RA and EA < 18 months experience

Non-response rate
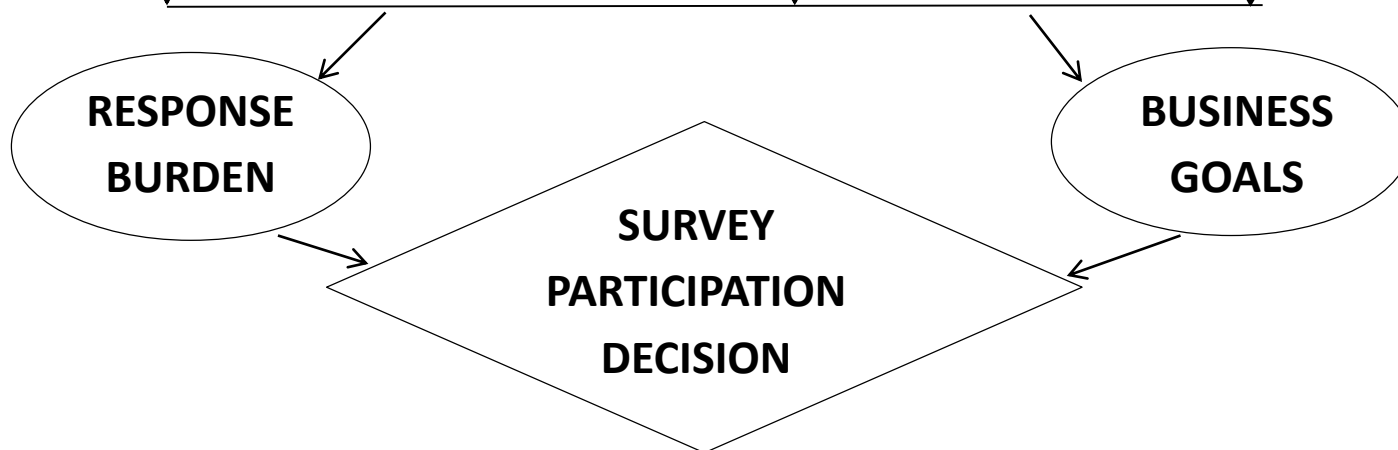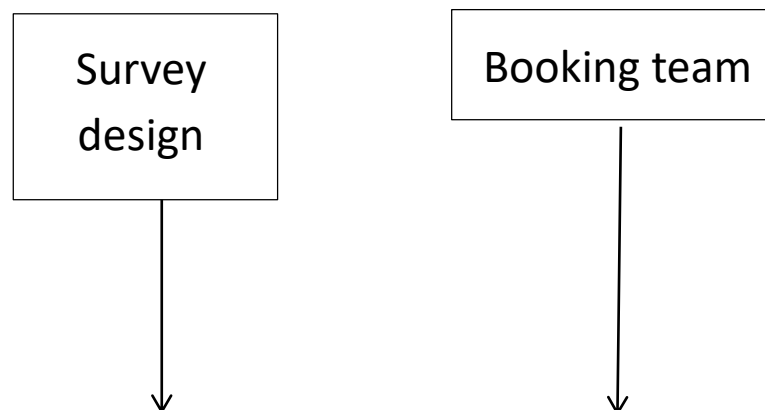
Non-response framework

NON-CONTROLLABLE

CONTROLLABLE

External environment

Survey design

Booking team

Firm and representative

RESPONSE BURDEN

BUSINESS GOALS
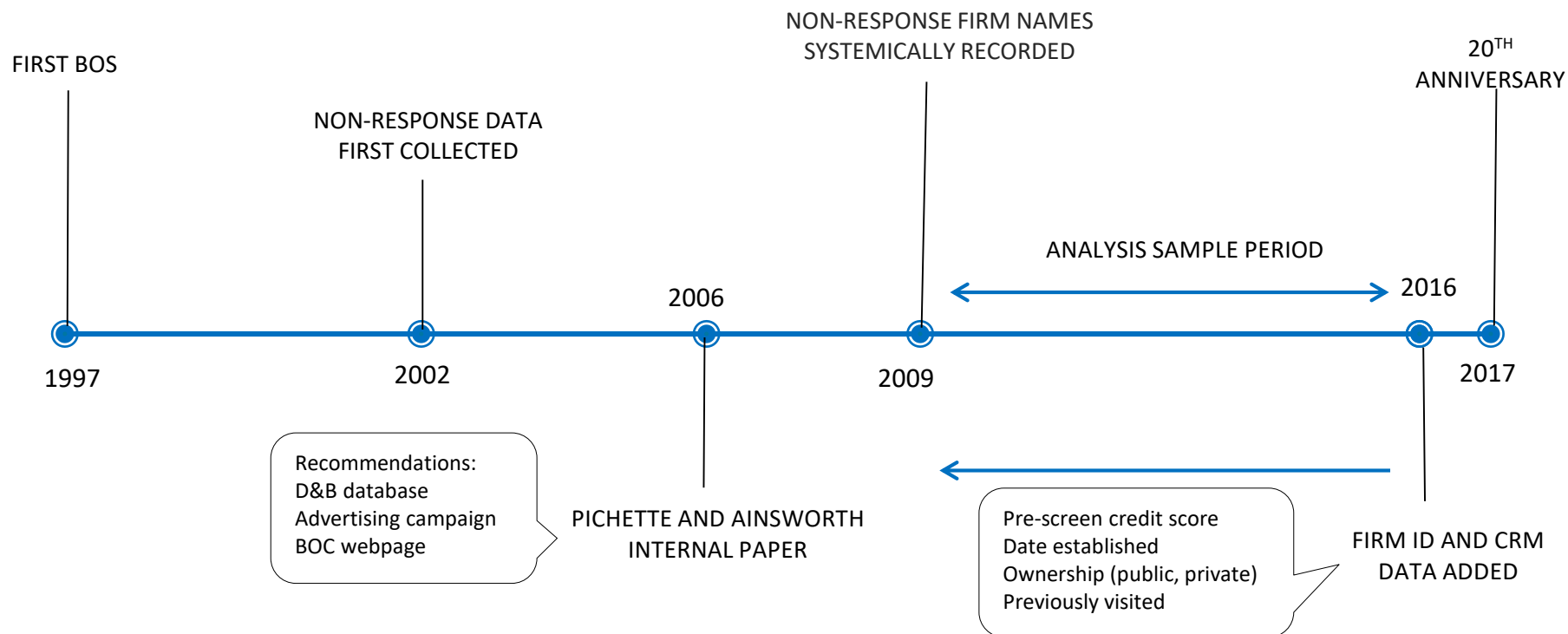
SURVEY PARTICIPATION DECISION

Data

- Firm non-response data:

  - Collected by regional offices since 2009

  - Firm contacts for 2009Q1 – 2016Q4 (32 quarters)

  - 5,371 observations

- Data sources:

  - Bank of Canada: regional offices, BOS, HR

  - Dun & Bradstreet Hoovers Business Directory

  - Firm websites

  - Innovation, Science and Economic Development Canada

  - Bloomberg

Main variables

- Dependent variable

  - Non-response:

    - 1 if firm does not participate in BOS; 0 otherwise
      - Mean: 45.7 per cent
      - Max: 58.8 per cent (2014Q2)
      - Min: 29.3 per cent (2009Q1)

- Main independent variable

  - New booking team:

    - 1 if both RD and EA have < 18 months experience

Independent variables - Firm

- New firm:
  - 1 if not visited since 2006; 0 otherwise

- Credit risk score:
  - 1 if medium and high risk; 0 if low risk

- Size:
  - S: 0-< 100 FTEs, M: 100-500, L: >500

- International subsidiary:
  - 1 if sub; 0 otherwise

Independent variables - Firm

- Type of ownership
  - 1 if public; 0 otherwise

- Exporter
  - 1 if any exports; 0 otherwise

- 6 sectors
  - CITU, CPBS, FIRE, manufacturing (base), primary, trade

- Exporter
  - 1 if any exports; 0 otherwise

Independent variables – External environment

- Regional economic growth:
  - Bank of Canada nowcast
    - Dynamic factor model (DFM) estimates (Chernis, Cheung and Velasco 2017)
    - Quarterly estimates of provincial GDP growth

- Time
  - Fixed effects for each quarter (32)
  - Quarter fixed effects

Independent variables – Survey design

- Acknowledge but not included:
  - Title of the survey
    - Constant
  - Pre-notification
    - Constant
  - Method of contact
    - Varies but consistent by EA, captured in team fixed effects
  - Follow-up reminder
    - Constant

Estimation strategy

- Linear probability model:

$$P\left(Y_{fgt} = 1 \mid Z\right) = \beta NewTeam_g + \lambda_t + \gamma X_{ft} + \theta v_{rt} + \varepsilon_{fgt}$$

- Y_{fgt}: BOS non-response
- $NewTeam_g$: new booking team
- λ_t: time effects (32)
- X_{ft} and v_{rt}: firm and external environment variables
- ε_{fgt}: error term

Estimation strategy

- **Difference-in-differences**

$$P\left(Y_{fgt} = 1 \mid Z\right) = \beta NewTeam_g + \delta_g + \lambda_t + \gamma X_{ft} + \theta v_{rt} + \varepsilon_{fgt}$$

- Y_{fgt}: BOS non-response
- $NewTeam_g$: "treatment"
- δ_g: team effects (24)
- λ_t: time effects (32)
- X_{ft} and v_{rt}: covariates
- ε_{fgt}: error term

![Bank of Canada / Banque du Canada logo]

Difference-in-differences

Example: Non-response rate by quarter by booking teams
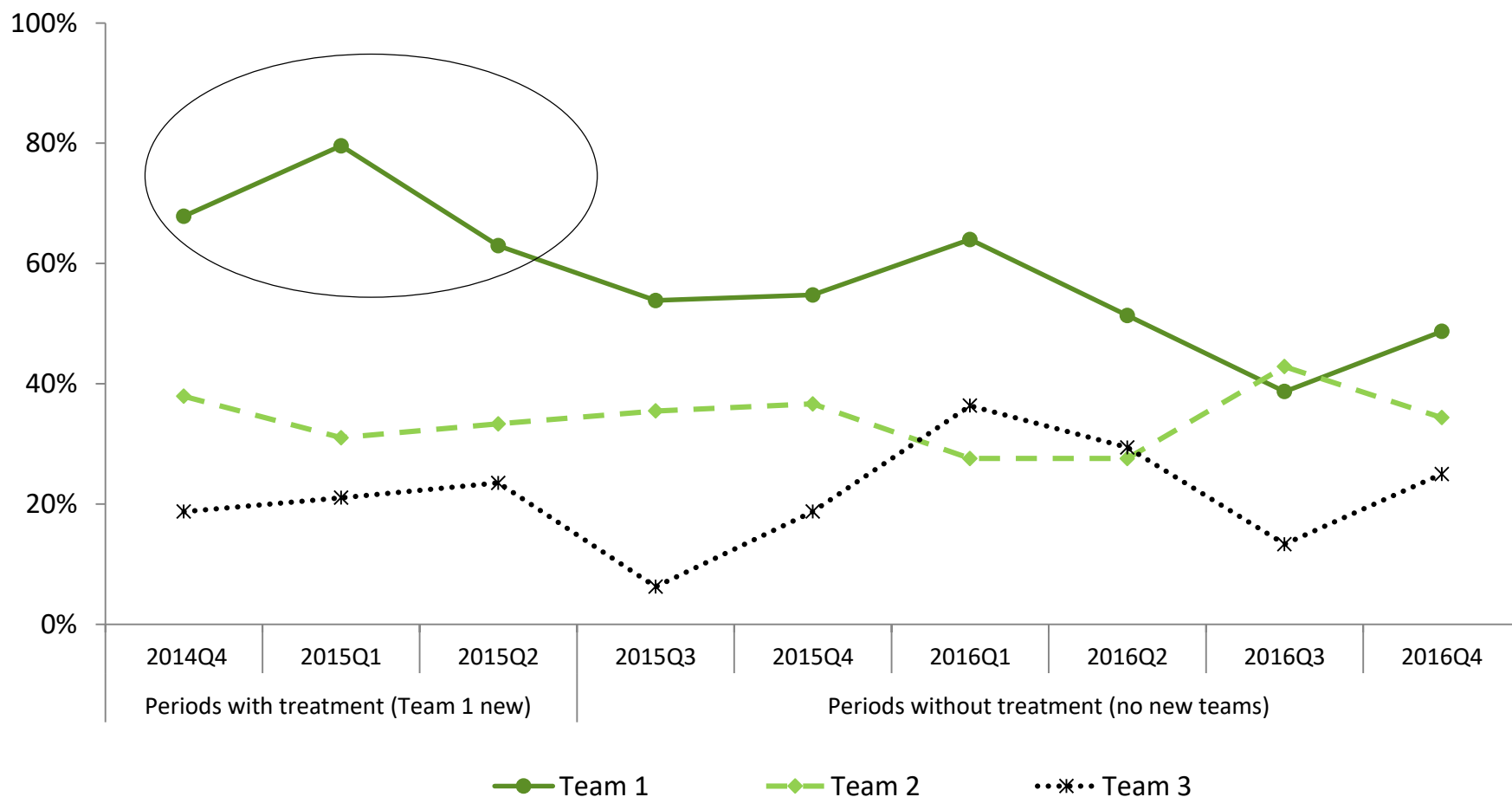
	LPM	DD
New team (<18 mos)	**0.194*****	**0.127****
	(0.0326)	**(0.0568)**
New firm	0.137***	0.119***
	(0.0164)	(0.0170)
New firm X New team (<18 mos)	-0.0480	-0.0291
	(0.0382)	(0.0373)
Large firm (500+ FTE)	-0.0327*	-0.0398**
	(0.0188)	(0.0184)
International subsidiary	0.0704***	0.0535**
	(0.0229)	(0.0233)
Public firm	-0.0703***	-0.0801***
	(0.0190)	(0.0190)
CPBS	-0.0442*	-0.0268
	(0.0234)	(0.0235)
FIRE	-0.108***	-0.114***
	(0.0267)	(0.0263)
Primary	-0.0596**	-0.0451
	(0.0288)	(0.0292)
DFM growth estimate	0.0115*	0.0252***
	(0.00619)	(0.00958)
Q2	0.125**	0.0409
	(0.0561)	(0.0712)
Q3	0.139**	0.0433
	(0.0569)	(0.0705)
Q4	0.201***	0.0881
	(0.0547)	(0.0691)
Constant	0.231***	0.401***
	(0.0474)	(0.0721)
Time FE (32)	Yes	Yes
Team FE (24)	No	Yes
Firm FE	No	No

	DD
New team (<18 mos)	0.127**
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Time FE (32)	Yes
Team FE (24)	Yes
Firm FE	No

Non-response rate

Extension: time trend?

	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

Extension: impact of change in booking team?

	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

Summary

- New booking teams increase likelihood of non-response by 13%
    - Other results:

+	−
• New firms	• Large firms (500+ FTEs)
• International subsidiaries	• Publicly traded
• Stronger regional growth	• Finance, insurance, real estate

   - No obvious time trend
   - Experience that matters, not staff change per se

- Future work: do repeat firm respond differently to BOS questions?

Thank you! Questions?

	LPM	DD	DD with firm FE
New team (<18 mos)	0.194***	0.127**	0.134*
	(0.0326)	(0.0568)	(0.0778)
New firm	0.137***	0.119***	-0.267***
	(0.0164)	(0.0170)	(0.0271)
New firm X New team (<18 mos)	-0.0480	-0.0291	-0.215***
	(0.0382)	(0.0373)	(0.0717)
Large firm (500+ FTE)	-0.0327*	-0.0398**	
	(0.0188)	(0.0184)	
International subsidiary	0.0704***	0.0535**	
	(0.0229)	(0.0233)	
Public firm	-0.0703***	-0.0801***	
	(0.0190)	(0.0190)	
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FIRE	-0.108***	-0.114***	
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Primary	-0.0596**	-0.0451	
	(0.0288)	(0.0292)	
DFM growth estimate	0.0115*	0.0252***	0.00105
	(0.00619)	(0.00958)	(0.0125)
Q2	0.125**	0.0409	-0.0862
	(0.0561)	(0.0712)	(0.0926)
Q3	0.139**	0.0433	-0.0571
	(0.0569)	(0.0705)	(0.0912)
Q4	0.201***	0.0881	0.00506
	(0.0547)	(0.0691)	(0.0966)
Constant	0.231***	0.401***	0.497**
	(0.0474)	(0.0721)	(0.220)
Time FE (32)	Yes	Yes	Yes
Team FE (24)	No	Yes	Yes
Firm FE	No	No	Yes