CARLSON SCHOOL
OF MANAGEMENT
UNIVERSITY OF MINNESOTA

Field Experiments on Sales Compensation

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Agenda

- Who we are
- What we do
- Findings
- Common Elements/Background
- Study 1: Bonuses versus Commissions
- Study 2: Is Cash King?
- Takeaways

Who we are ….

Xiaolin Li	University of Texas-Dallas (ex-doctoral student)
Madhu Viswanathan	University of Arizona (ex-doctoral Student)
Sunil Kishore	McKinsey & Co (ex-doctoral student)
Ranjan Banerjee	SPJIMR, Mumbai, India (ex-doctoral student)
Raghunath S. Rao	University of Texas-Austin (ex-doctoral student)
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Om Narasimhan London School of Economics (ex-MN faculty)
George John, U of Minnesota Old Guy

What we do …

- Common interest in B2B Marketing
- Not a formal “lab” or “research group”
- No external funding; all expenses from RATS funds (research and teaching supplements)
- Theoretical lens is “enriched” economics of compensation
- Method lens is field experimentation

What we do ...

1 2 3 4 5 6 7 8

1 Lab Experiment
2 Artefactual Field Experiment
3 Framed Field Experiment
4 Natural Field Experiment
5 Natural Experiment
6 Propensity Score Estimation
7 Instrumental Variables Estimation
8 Structural Modeling

Source: List and Rasul (2015)

What we do ….

Attribute	**Field Experiments**		
	Artefactual	Framed	Natural
In the Wild		Y	Y
"Real" Incentives		Y	Y
"Real" Effort		Y	Y
"Real" People	Y	Y	Y
Unaware of Experiment			Y

Common/different elements

- OOOOOOXOOOOO designs given Hawthorne effects and differential attrition problems with control groups.
- These designs require long strings of observations. All our experiments are multi-year studies
- Intervening variable measures (effort) not available/desirable
- Treatment Effects and structural analyses

Study 1: Background

Two most common plans

- Bonuses (35%)
- Commissions (35%)
- A combination of the two (25%)

(Joseph and Kalwani 1998)

Questions

- Which type is cheaper/better plan at motivating salespeople?
- Which type is more prone to "gaming"?
- Which type has more severe multi-tasking concerns?

Study 1: Background

Theory is a mixed bag

Quotas accommodate territory heterogeneity (e.g., Raju and Srinivasan, 1986) but induce "timing games" (Oyer, 1998). Psych theory is friendlier; quotas are motivational devices (e.g., Latham and Locke, 1991)

Scarce, mixed evidence

Oyer (1998) and Misra-Nair (2009) find quota-bonus plans induce timing games, but not Steenburgh (2008).

Study 1: Setting

- Doctoral student established initial contact with Indian pharma company.
- Faculty provided free consulting to induce cooperation
- 458 territories with heterogeneity in numbers of salespeople
- No overlap in territory geography
- In 190 multi-person territories, each sales rep gets equal credit for observed sales

Study 1: Setting

- Firm -> wholesaler -> pharmacy -> consumer
- Multiple wholesalers and pharmacies in each territory
- Doctor Rx may (by law) omit brand name; pharmacies (by law) may substitute brand Rx with customer consent
- Individual Rx sale not traceable to prescriber

Study 1: Policies

No incentive pay for behavior

- Each salesperson assigned to doctors and pharmacies
- Doctor calls as Information provision
- Pharmacy calls as Persuasion

Incentive pay for credited sales

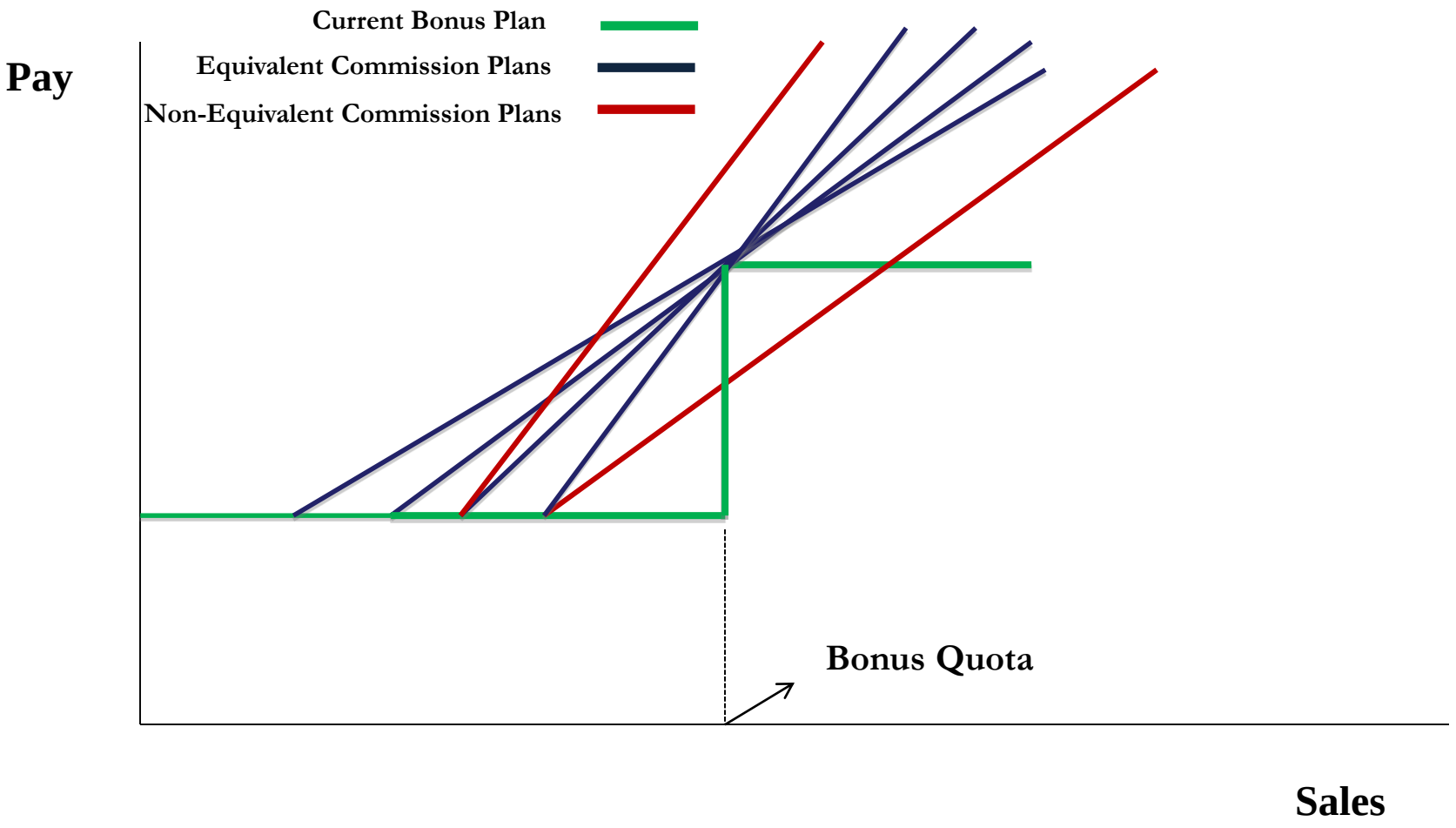
- Quarterly quota (monthly sales observed)
- Quota changes set company-wide at start of fiscal year

Study 1: Intervention

Two-step procedure

- We asked the firm to first set up the *bonus quotas* as they would in any quarter based upon their existing processes
- We then asked the firm to come up with a *linear quota commission* plan such that under this new plan, sales that equaled the bonus-quota level in the first step would earn the same amount (*Equivalence*)

Study 1: Intervention



Study 1: Theory

- Under equivalent bonus and commission schemes, the salesperson who is indifferent between earning a positive level of commission and a fixed salary is of lower ability compared to the salesperson who is indifferent between earning a bonus and a fixed salary.

  $\Rightarrow$ Greatest productivity improvement show occur at lowest deciles of ability

- A realistically achievable bonus plan tends to amplify distortions induced by timing games whereas an equivalent commissions plan exacerbates multi-tasking concerns.

Study 1: Data

- 458 territories
- 36 months (18 pre- and 18 post-intervention months)
- Monthly sales
- Monthly visits (doctors, pharmacies)
- Quarterly quotas

Study 1: Findings

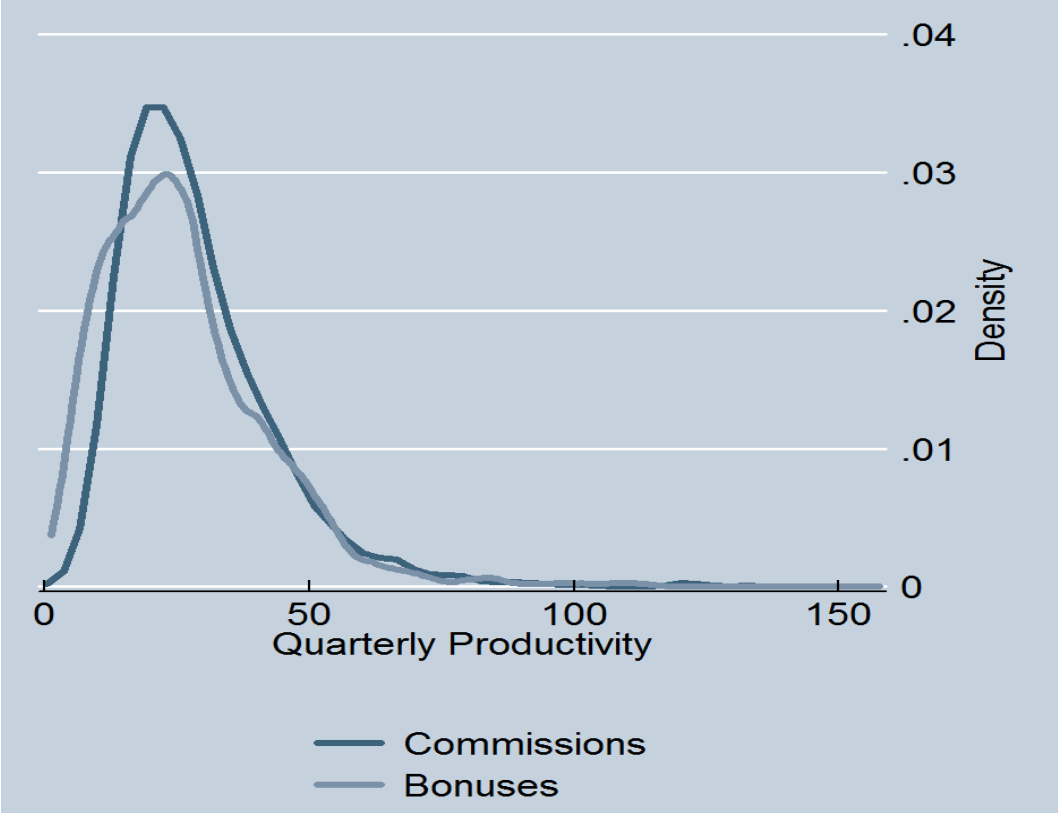
Greater Productivity: Sales productivity increased 24% with commissions.

Heterogeneous effect: Largest effect at *lowest* decile of salespeople

Timing Games: Less sales timing behavior with commissions plan

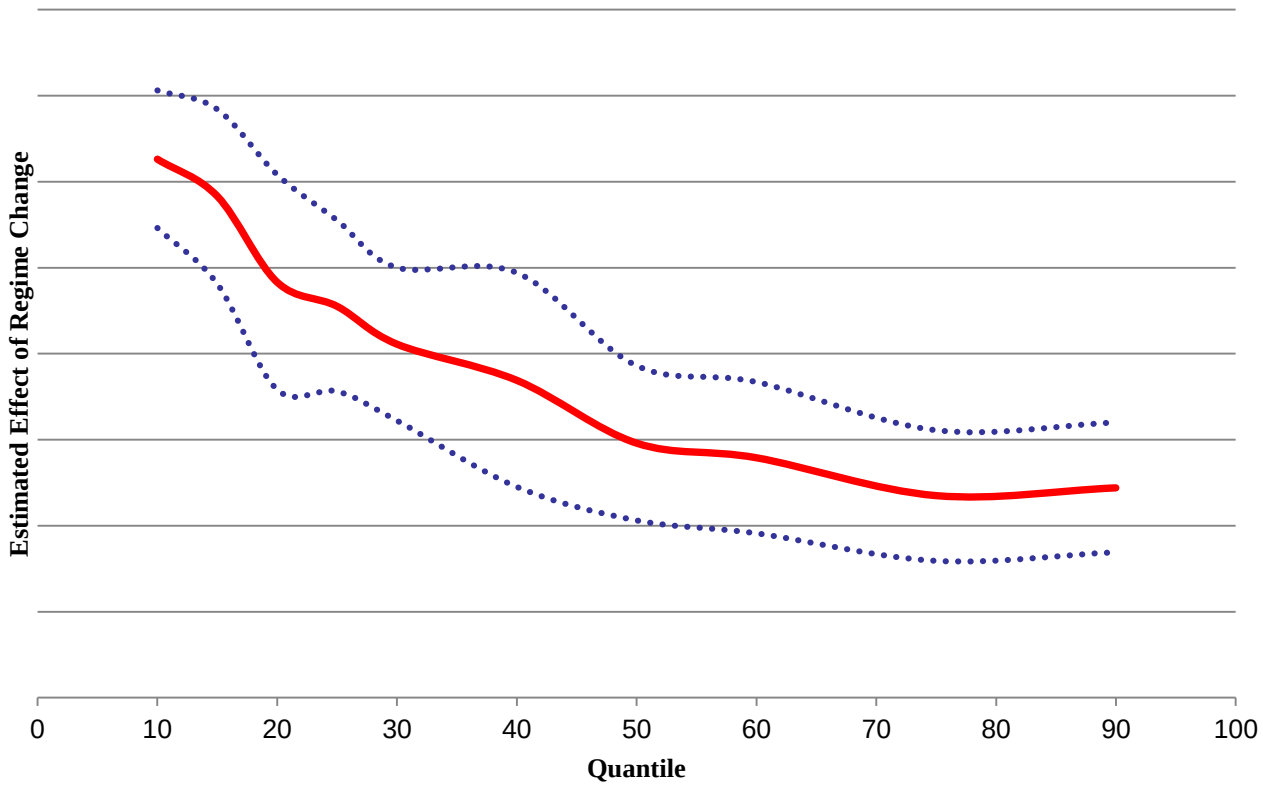
Multi-task distortion: More neglect of non-incentivized task (calls) with commissions plan

Study 1: Sales result



$$\log(y_{it}) = a_0 + \sum_i a_i S_i + \sum_t g_t YM_t + bNewPlan_t + d_1 \log(QtrTarget_{it}) + d_2 GroupSize_{it} + e_{it}$$

Study 1: Heterogeneity result



$$Quant_q(\log(y_{it})\,|\,.) = a_{0q} + \sum_t g_{tq} YM_t + b_q \text{NewPlan}_t + d_{1q}\log(QtrTarget_{it}) + d_{2q}\text{GroupSize}_i + e_{it}$$

Study 1: Timing games result

Dependent Variable: Log(Monthly Revenues)

VARIABLES	A Quota Bonus Regime	B Quota Commissions Regime
Exceeded	-0.390***	0.185***
	(0.087)	(0.024)
Near	0.163***	0.104***
	(0.023)	(0.011)
Stretch	0.102***	0.091***
	(0.013)	(0.014)
Far	-0.228***	-0.069
	(0.041)	(0.098)
PostExceeded	0.281***	0.028
	(0.066)	(0.026)
PostNear	0.029	0.014
	(0.028)	(0.013)
PostStretch	-0.047***	0.010
	(0.016)	(0.015)
PostFar	0.178***	0.124
	(0.041)	(0.076)

Study 1: Multi-tasking distortion results

	log (Pharmacy Visits)	log(Doctor Visits)
New Plan	0.309 (0.005)***	-0.256 (0.004)***
EXCEEDED	-0.383 (0.022)***	0.288 (0.010)***
NEAR	-0.015 (0.014)	-0.009 (0.008)
STRETCH	0.007 (0.008)	0.005 (0.003)
FAR	0.002 (0.013)	0.0006 (0.008)
New Plan * EXCEEDED	0.645 (0.024)***	-0.450 (0.021)***
New Plan* NEAR	0.0386 (0.016)**	0.0007 (0.011)
New Plan* STRETCH	0.003 (0.011)	-0.0167 (0.105)
New Plan* FAR	0.012 (0.032)	-0.0174 (0.053)
Group Size	0.005 (0.005)	0.0026 (0.003)
log(Qtr Target)	0.011 (0.006)*	-0.008 (0.006)
Constant	1.51 (0.030)***	2.329 (0.023)***
Month-Year Effects	Included	Included
Fixed Effects	Included	Included
Observations	7107	7,392
Clusters	444	438
R-squared (overall)	0.394	0.293

Study 1: Validity threat Assessments

Differential attrition

- Quit rates before and after the intervention are virtually identical
- Re-ran regression models with
  - territories without turnover
  - Added territory*set fixed effects

Noisiness of sales signal

Multi-person territories have noisier sales signals– redid analysis without multi-person territories

Racheting of quotas

Misra-Nair regression specification to predict quotas in period *t* from prior period sales and quotas. No evidence of racheting.

Study 1: Managerial guideposts

- If sales output is the primary focus
  - Commissions > Lump sum bonuses
- If timing games are costly
  - Commissions > Lump sum bonuses
- If non-incentivized tasks are important
  - Lump sum bonuses > Commissions

Study 1: Theory guideposts

- Incentives matter; heterogeneous impact
- Salespeople game the output but the extent of gaming varies across incentive regimes
- Provides a nuanced rationale to the existence of lump sum bonuses

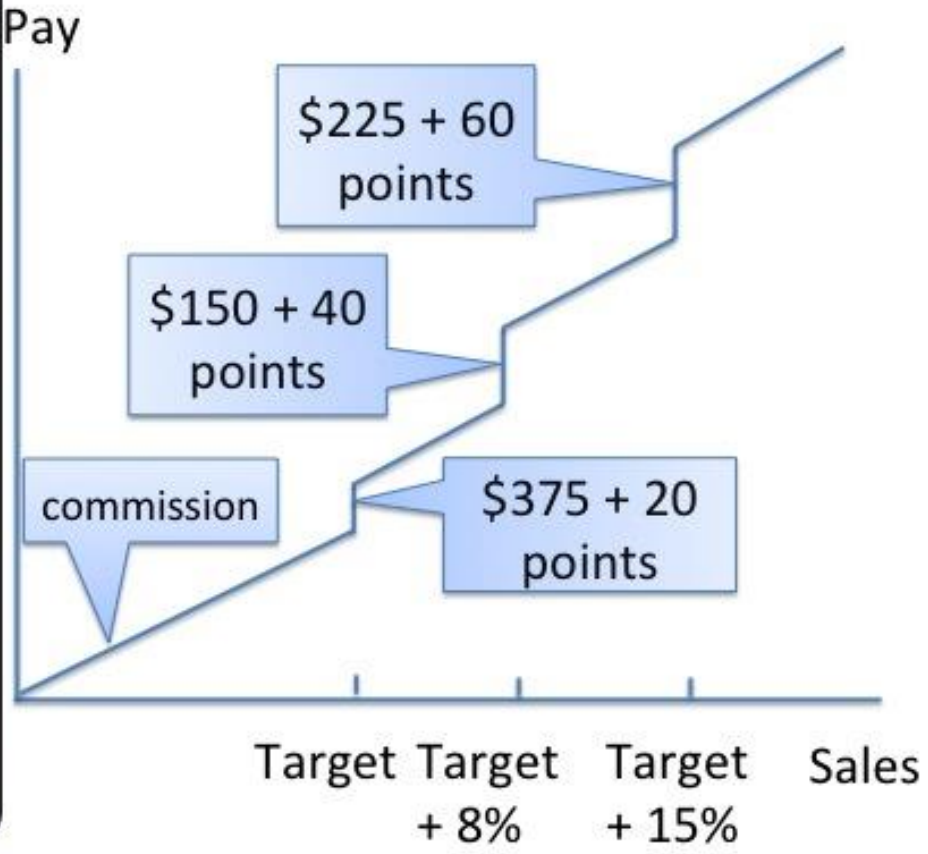
Study 2: Background

Cash motivates effort because of utility for wealth

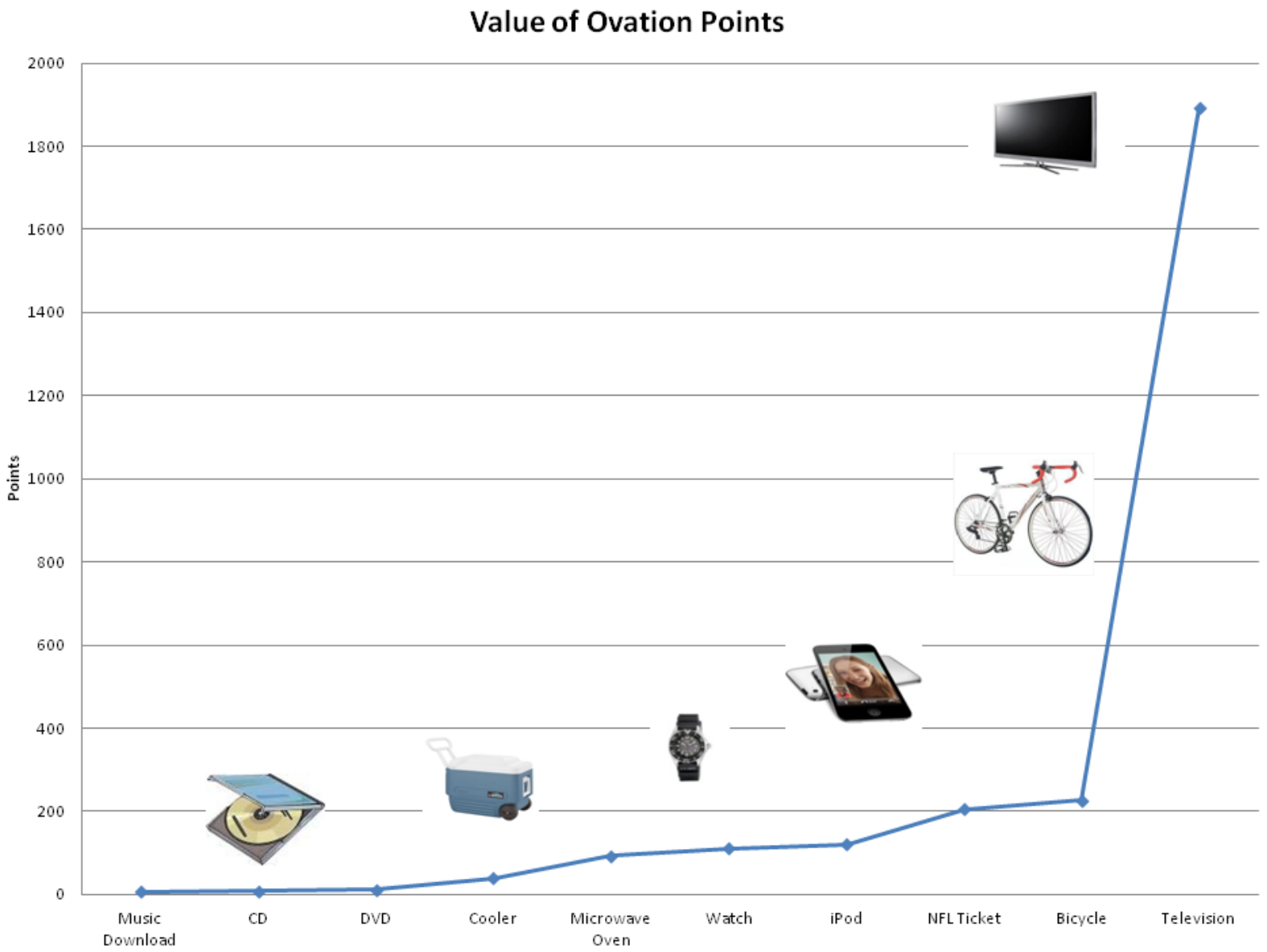
What about tangible merchandise plans? 78% of firms use them; >$40B

Recognition motivates effort because of social utility

Study 2: Cash plus merchandise "points"



Study 2: Redeemable items



Study 2: Literature

Theory is a mixed bag

(-ve) Lower admin costs of cash awards

(-ve) Greater flexibility of cash awards

(-ve) Greater social utility of symbolic awards (see Jeffrey & Shaffer 2007)

(+ve) Mental accounting (see Thaler, 1985) predicts higher weight on merchandise versus cash

- eases segregation of earnings from total family income;
- easier to direct the extra income toward luxuries
- increase control over the extra income

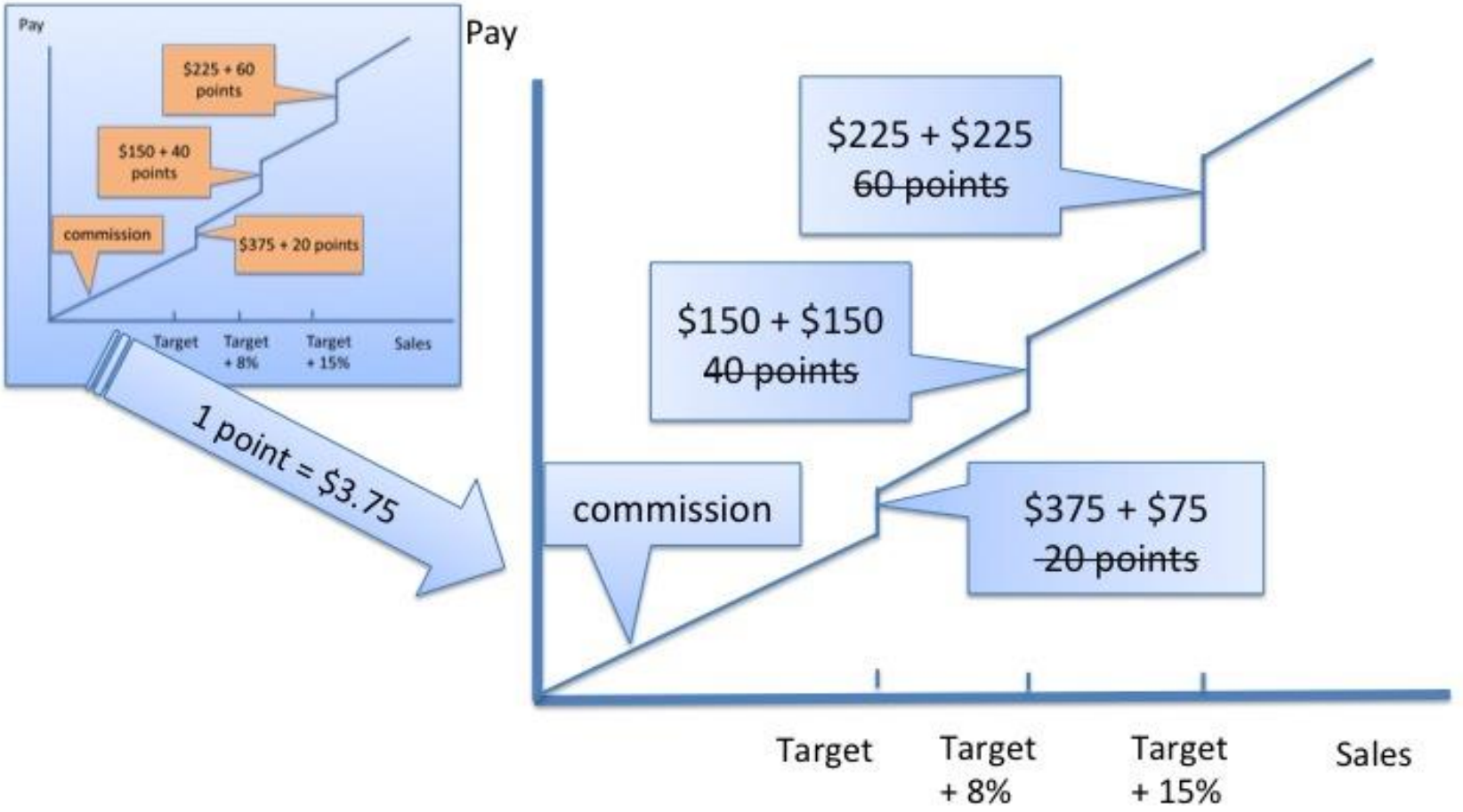
No evidence of labor supply effect

– Hastings and Shapiro (2011) on gasoline consumption

Study 2: Setting

- Faculty contacted local firm (division of national frozen foods firm). Offered doctoral student for one year as analyst to organize existing data, design experiments
- New national sales manager eager to know if merchandise incentive program was effective
- 590 Direct-Store-Delivery salespeople
- Commissions with monthly targets plus cash and "points" bonuses at target attainment

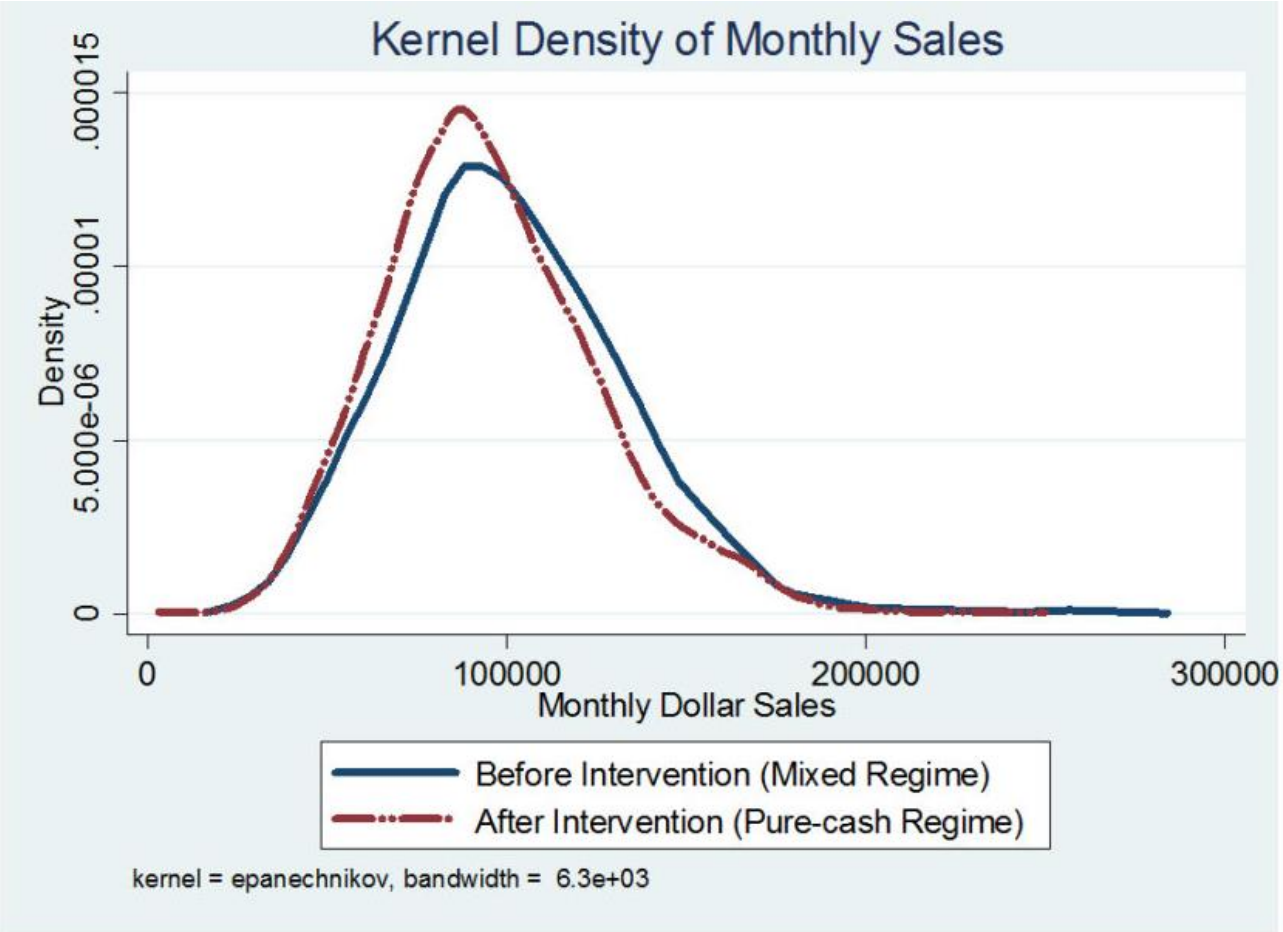
Study 2: Intervention: Switched points to cash



Study 2: Data

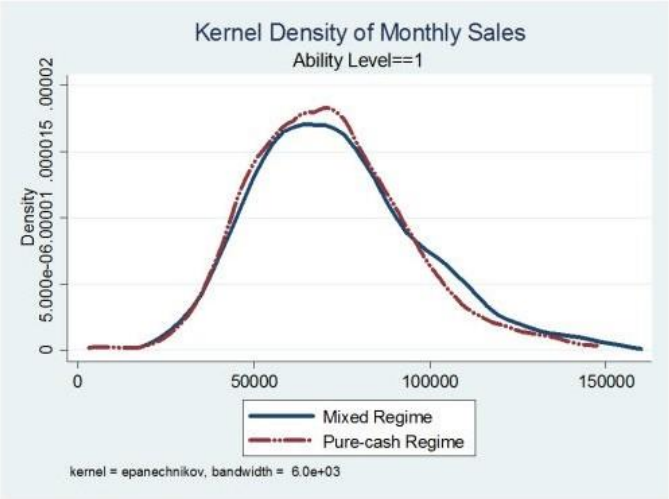
- 590 territories
- 24 months (Monthly territory sales, Monthly territory quotas, Monthly Category territory sales)
- Intervention in Month 10, Year 2
- For 3 months pre- and 3 months post-intervention, we have weekly level sales.

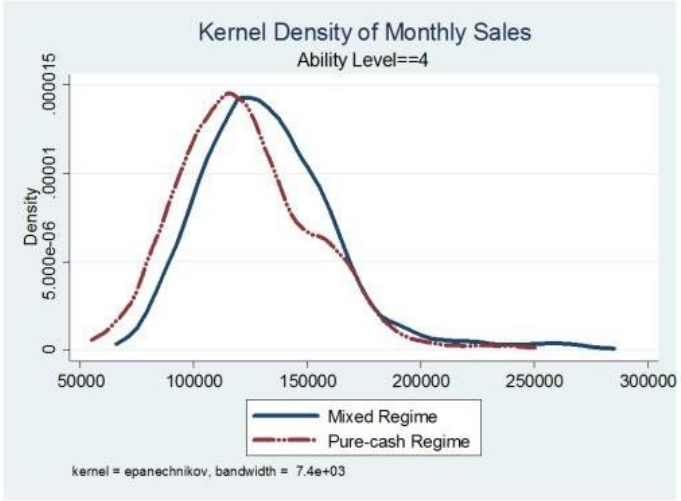
Study 2: Sales result (~ –6%)



$$Sales_{it} = \alpha_i + \beta_1 Target_{it} + \beta_2 Regime_t + Sales_{i(t-12)} + \epsilon_{it-}$$

Study 2: Heterogeneity result





Bigger treatment effect at top quartile

Study 2: Structural Analysis

- Utility of monetary and non-monetary compensation is additive and separable
- Recover cost of effort parameter and the conversion rate from points to cash so as to extrapolate to untested plans via counterfactuals
- We have weekly sales under monthly targets, thus, we see inter-temporal effort tradeoff, enabling identification
- Use Bajari et al (2007) two-step estimator with Aricidiacono and Miller (2011) latent class approach to unobserved heterogeneity.

Study 2: Effort Response Pattern to quota

Study 2: Parameter Estimates

Parameter	Coefficient (Std. Error)		
	Average	Segment 1	Segment 2
Dollar per point conversion (3.75 is firm's cost in $/point)	5.71 (0.25)	4.61 (0.22)	6.97 (0.29)
Cost of Effort	3.7e-03 (4.03e-04)	3.93e-03 3.67e-04	2.34e-03 (6.61e-04)

Points valued above cost

More able salespeople value points higher

Study 2: Counterfactuals

Counterfactual Plan	Effort Change vs. Base Case
Double Cash Bonus	+2.26%
Double Points Bonus	+8.44%
Move to All Points Bonus	+4.71%

Summary of findings

Commissions > Bonuses

Merchandise bonuses > Cash bonuses

Other Field Experiments

- Upstream incentive pay warranted only for complementary effort responses between upstream and downstream units
- Adding non-sales (call-report-based) incentive pay works more so with diminished sales signals

Lessons learned

Field experiments are not budget-intensive, but require engaging clients in creative ways (free consulting in Study 1; near-free intern in Study 2)

Topic must address gaps in workhorse theory (principal-agent in Study 1 and Study 2)

Strongly encourage structural analysis (but we haven't convinced reviewers)