Information Frictions and Firm Reputation

Jie Bai

Harvard Kennedy School & Microsoft Research

Industrial Upgrading and Economic Growth in China

October, 2016

Motivation

- Lack of reliable provision of high quality goods and services in many markets
  - The problem is exacerbated in markets with information problems
    - Experience goods (food products, drugs, etc)
- Why is there a lack of quality provision?
  - Low demand for quality, perhaps due to low income and high costs
  - Other reasons: $\rightarrow$ information problem and the lack of reputation
- The questions are, then
  - Why is there a lack of high quality brands in developing countries?
  - What are the barriers that hinder quality upgrading?

Outline

1. The melons experiment
   - Understand the lack of quality premium in a typical developing country setting
   - Examine the role of consumer learning and sellers' reputational incentives
   - Provide a framework and highlight some general economic forces
2. An experiment on Aliexpress (with Maggie Chen)
   - An intervention that facilitates initial reputation building for perspective sellers
3. China's food exports to the EU (with Ludovica Gazze)
   - Information frictions in export markets
   - An important externality due to collective reputation

Local Watermelon Markets in China

- Feature #1: A large number of localized markets with long-term interactions
  - On average, households consume 1 watermelon per week in the summer (30% of total fruit expenditures) ▸ household baseline summary stats
  - 80% of watermelon transactions take place in local markets

A Local Market

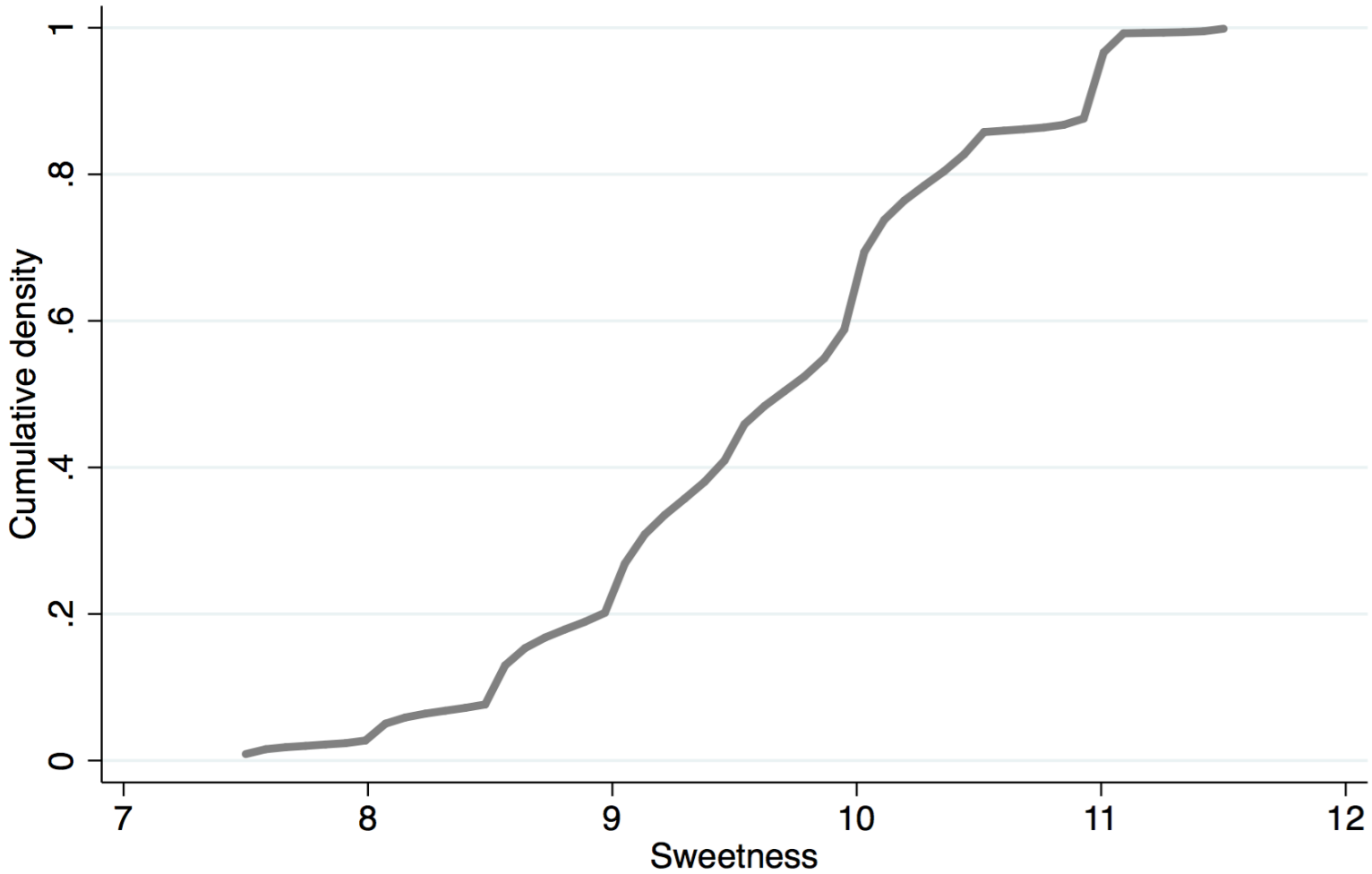
Local Watermelon Markets in China

- Feature #1: A large number of localized markets with long-term interactions
  - On average, households consume 1 watermelon per week in the summer (30% of total fruit expenditures) ▸ household baseline summary stats
  - 80% of watermelon transactions take place in local markets
- Feature #2: Quality is captured by a one-dimensional measure of sweetness
  - Key dimension of quality: sweetness of watermelons ▸ sweetness meter

Local Watermelon Markets in China

- Feature #1: A large number of localized markets with long-term interactions
  - On average, households consume 1 watermelon per week in the summer (30% of total fruit expenditures) household baseline summary stats
  - 80% of watermelon transactions take place in local markets
- Feature #2: Quality is captured by a one-dimensional measure of sweetness
  - Key dimension of quality: sweetness of watermelons sweetness meter
- Feature #3: Considerable quality variation and asymmetric information
  - Sorting ability tests with 30 sellers and 5 consumers per seller

Considerable Quality Variation



- 70% of the variation is explained within sellers

Local Watermelon Markets in China

- Feature #1: A large number of localized markets with long-term interactions
  - On average, households consume 1 watermelon per week in the summer (30% of total fruit expenditures) household baseline summary stats
  - 80% of watermelon transactions take place in local markets
- Feature #2: Quality is captured by a one-dimensional measure of sweetness
  - Key dimension of quality: sweetness of watermelons sweetness meter
- Feature #3: Considerable quality variation and asymmetric information
  - Sorting ability tests with 30 sellers and 5 consumers per seller
- Feature #4: No quality differentiation at baseline
  - Sellers sell a big pool of watermelons and charge a uniform price
  - In stark contrast to many other fruits

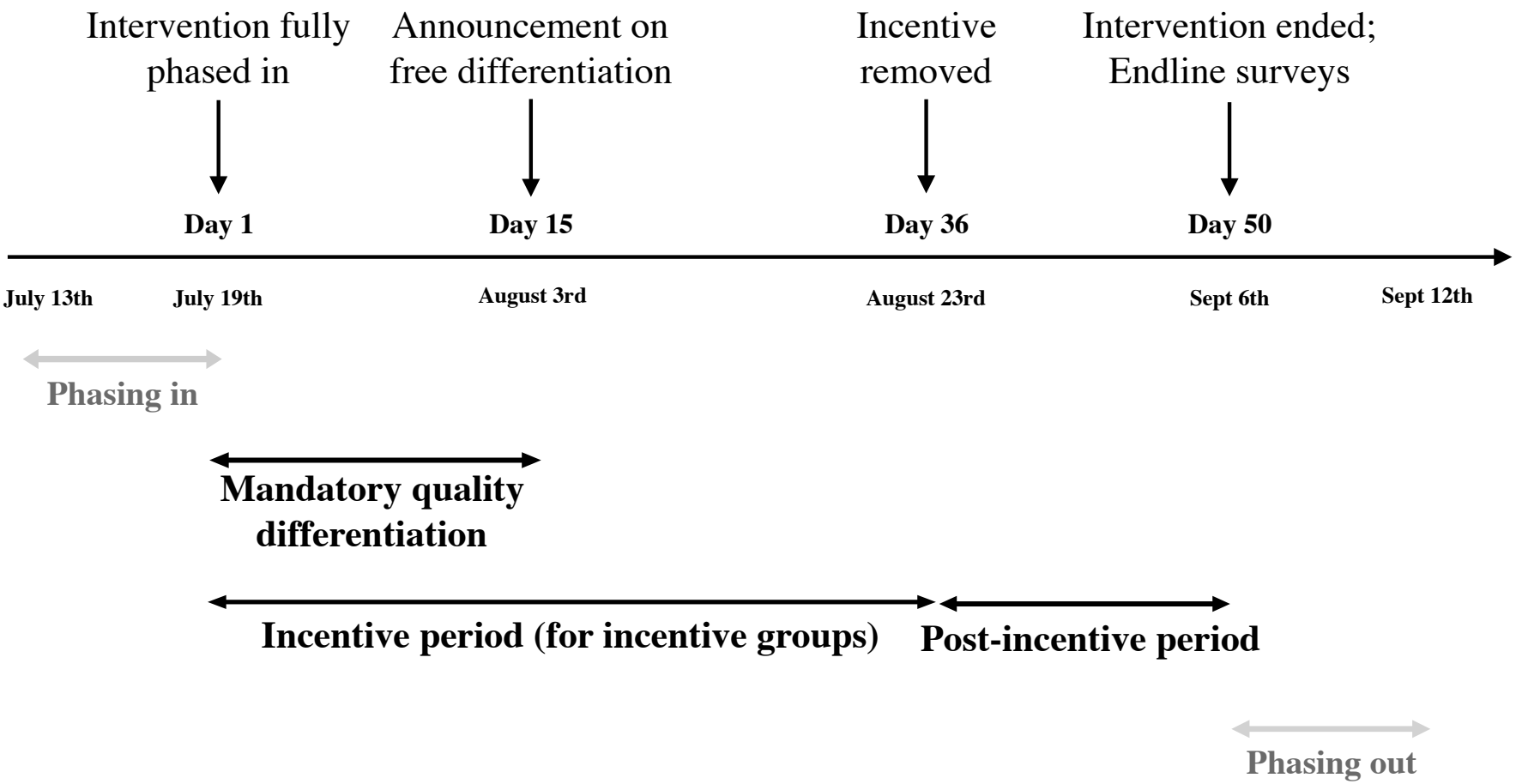
The Experimental Design

- Recruited 60 sellers in 60 different markets in Shijiazhuang, Hebei
  ▸ map ▸ sampling strategy
  - 3 to 5 sellers per market, but only 1 was selected
  - Little spillover across markets (avg. distance $\sim$ 3km)
- Asked all sample sellers to experiment with differentiating quality at sale
  - A premium pile and a normal pile
  - Free to set the prices and quality for each pile
- Sellers were randomized into 3 branding treatment groups
  (1) Novel laser-cut label of the words "*premium watermelon*"
  (2) Existing sticker branding of the same words
  (3) Label-less

Branded Watermelon

- laser machine
- branding treatments

Timeline

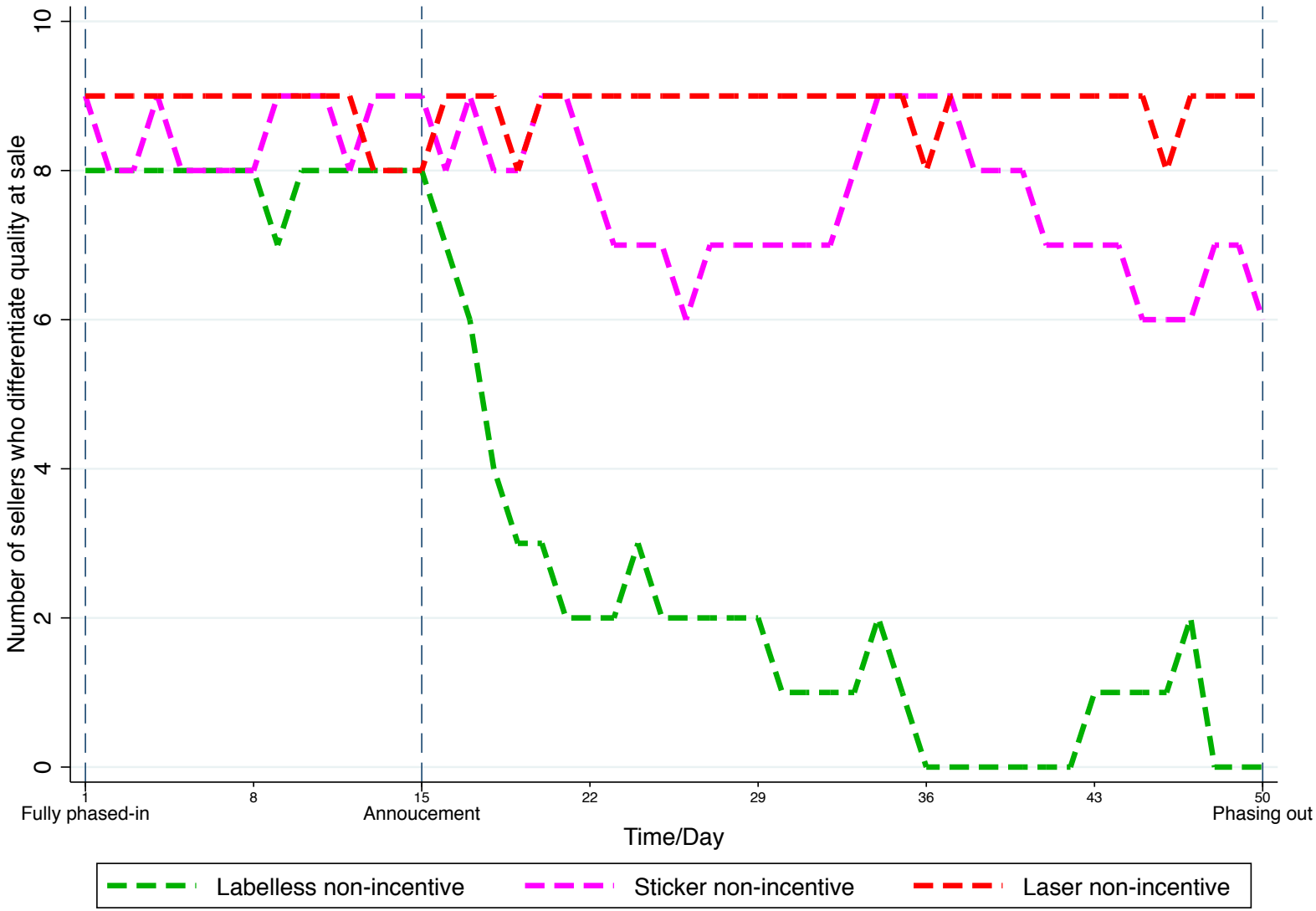

Intervention fully phased in
Announcement on free differentiation
Incentive removed
Intervention ended; Endline surveys
Day 1
Day 15
Day 36
Day 50
July 13th
July 19th
August 3rd
August 23rd
Sept 6th
Sept 12th
Phasing in
Mandatory quality differentiation
Incentive period (for incentive groups)
Post-incentive period
Phasing out

Data

- Supply side:
  - Prices
    - Sample sellers (for each pile), other sellers, wholesale price
  - Quality (measured in sweetness)
    - Biweekly quality checks for randomly selected watermelons from each pile
  - Sales quantity
    - Sellers' daily sales record (49,252 watermelon transactions)
- Demand side:
  - Purchasing behavior
    - 675 households in 27 markets (evenly distributed across treatment groups)
    - Date, place of purchase, labeled or non-labeled, price, quantity, expenditure
  - Consumption experience
    - Self-reported satisfaction ratings from 1 to 5
- Endline and follow-up surveys

▸ summary stats and balance checks ▸ seller's recording sheet ▸ household's recording sheet ▸ sweetness meter

Higher Incentive to Differentiation Quality Under Laser



all groups

Repurchasing More Responsive to Experiences Under Laser

	Households in the Laser Markets		Households in the Sticker Markets	
	(1)	(2)	(3)	(4)
Panel A. Purchase of the premium pile				
Lagged avg. satisfaction rating	0.280**		0.049	
	(0.090)		(0.044)	
Lagged % of very good experiences		0.454**		0.110
		(0.129)		(0.075)
Observations	165	167	183	183
Panel B. Purchase of the normal pile				
Lagged avg. satisfaction rating	0.035		-0.014	
	(0.029)		(0.039)	
Lagged % of very good experiences		0.010		-0.016
		(0.032)		(0.086)
Observations	520	576	497	530
Household Baseline Controls	✓	✓	✓	✓
Week Fixed Effects	✓	✓	✓	✓

Note: Household baseline characteristics: household size, percentage of elderly, monthly income, average number of watermelons consumed per week reported in the baseline survey, and the baseline self-reported willingness to pay for quality (measured in RMB/Jin). Standard errors clustered at the seller level.

Higher Quality Under Laser

$$\text{Sweetness (Premium Pile)}_{it} = \alpha + \beta \text{Laser}_i + \lambda_t + \epsilon_{it}$$

Sample: Sticker and laser non-incentive groups

	All		Non-incentive		Incentive	
	(1)	(2)	(3)	(4)	(5)	(6)
Laser	0.509***	0.418**	0.711***	0.619**	0.282*	0.309**
	(0.176)	(0.176)	(0.222)	(0.266)	(0.136)	(0.128)
Observations	468	468	238	238	230	230
Baseline Controls		✓		✓		✓
Sticker mean	10.184		9.738		10.654	
Std. dev.	(1.102)		(1.104)		(0.886)	

Note: Baseline controls include number of competitors in the local market, average housing price, and distance to the nearest supermarket. All regressions control for time fixed effects. Standard errors clustered at the seller level.

▸ quality of premium vs normal piles

Sales Under Different Branding Technologies

A Qualitative Explanation for the Lack of Quality Differentiation at Baseline

$$y_{it} = \alpha + \beta_1 \text{Sticker}_i + \beta_2 \text{Laser}_i + \lambda_t + X_i'\gamma + \epsilon_{it}$$

Sample: non-incentive groups

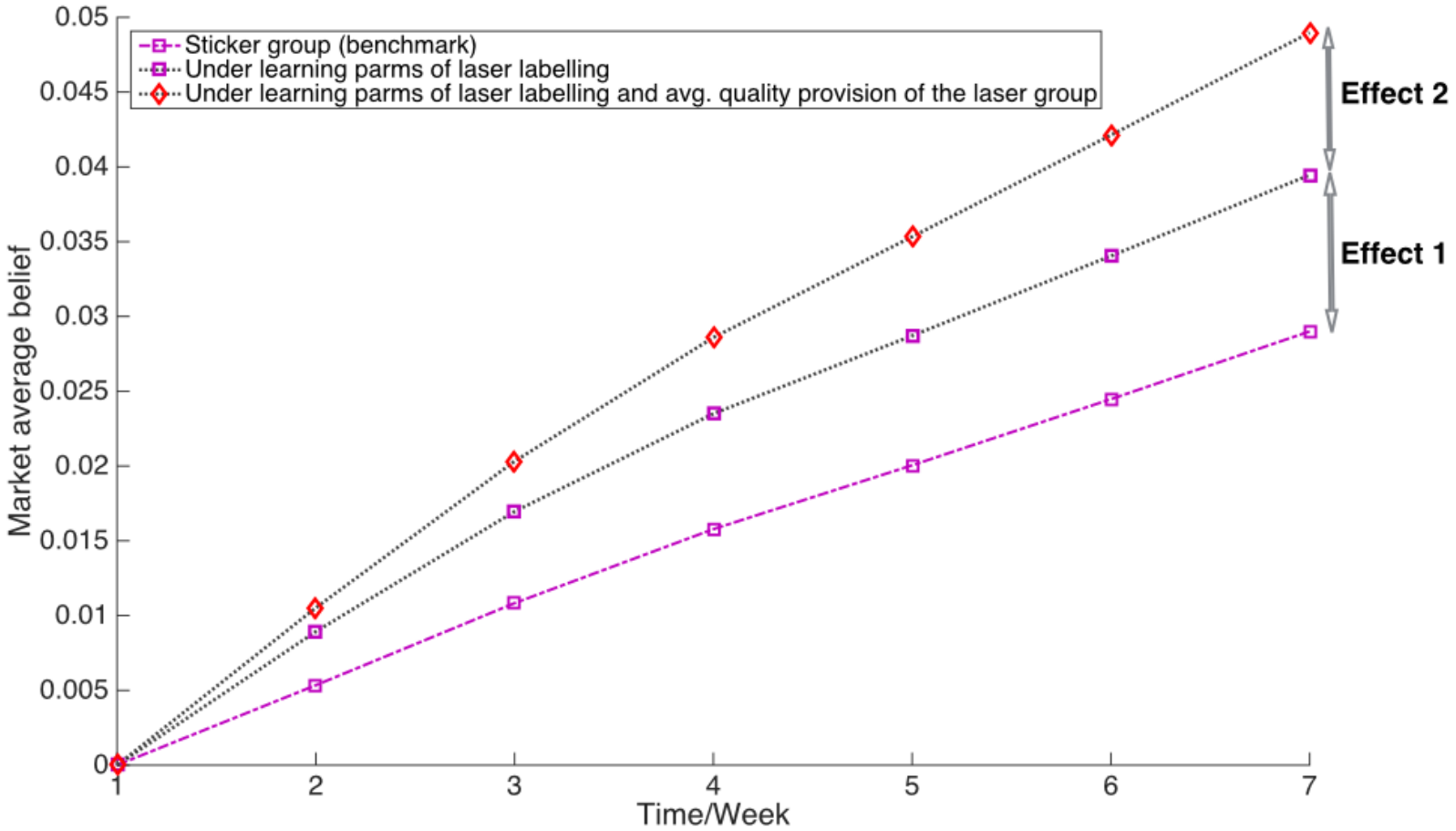
	Ln(Gross Profits) (in RMB)	Premium Price (in RMB/Jin)	Premium Quantity (in Jin ≈ 1.1 pound)	Normal Price (in RMB/Jin)	Normal Quantity (in Jin ≈ 1.1 pound)
	(1)	(2)	(3)	(4)	(5)
Sticker	-0.038	0.029*	49.454*	-0.017	-55.550**
	(0.196)	(0.016)	(28.506)	(0.014)	(23.831)
Laser	0.396**	0.074***	70.450***	0.008	-4.449
	(0.156)	(0.024)	(23.296)	(0.019)	(18.699)
Observations	1452	1456	1462	1456	1462
Labelless Mean	4.284	1.008	56.313	0.961	180.475
Std. dev.	(0.687)	(0.095)	(136.508)	(0.073)	(124.07)
p-value (sticker = laser)	0.073	0.074	0.478	0.201	0.084

Note: Baseline controls include number of competitors in the local market, average housing price, and distance to the nearest supermarket. All regressions control for time fixed effects. Standard errors clustered at the seller level.

- Laser group earned 40% higher sales profits than the labelless group
- Quality differentiation under sticker did not outperform no differentiation
- After the intervention was lifted, all markets reverted back to baseline
  - The increase in profits may not justify the investment for individual sellers

Simulated Beliefs Evolution

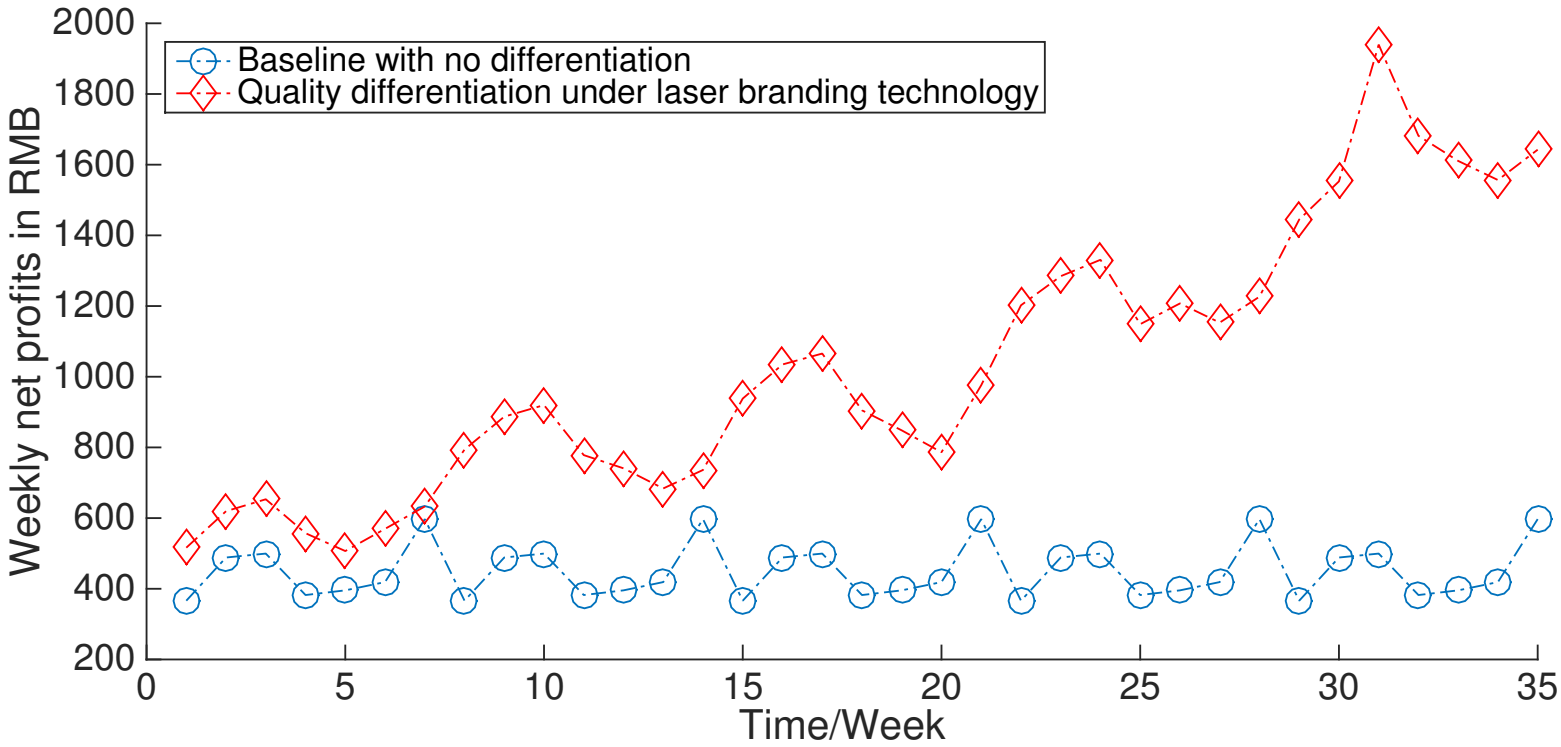
A Decomposition Exercise: Consumer Learning and Seller's Endogenous Quality Choice



- Effect 1: holding supply side fixed, laser branding induces faster belief updating
- Effect 2: different prior beliefs shape seller's reputational incentive and quality

Simulated Evolution of Net Profits

A Quantitative Explanation for the Lack of Quality Differentiation at Baseline



- An extrapolation to 5 seasons suggests that there might be large gains
  - ~ 13 kRMB higher net profits than baseline (~ 11 kRMB)
- Still smaller than the cost of laser machines ($\sim$ 50-60 kRMB)
  - Rationalizes the observed behavior
  - Two reasons: (1) small market size; (2) hard to extract consumer surplus

Takeaways from the Melons Experiment

- Information frictions and fragmented markets lead to significant under-provision of quality
  - Consumers are hesitant to upgrade their perception about quality under stickers, which makes reputation building a low-return investment
  - New branding technology enhances learning and increases the return of building reputation
  - Small firm size and market competition prevent the adoption of a new branding technology that could enhance the return of reputation
- Policies that could enhance consumer learning or entry of large firms may be needed to motivate high quality provision
- Third-party interventions that subsidize initial reputation building for sellers could improve welfare

An Experiment on Aliexpress

- The world's leading B2C cross-border trading platform
  - A subsidiary of Alibaba founded in April 2010
  - 1.1 million active sellers, over 50 million product listings, and over 20 billion transactions each day in 2013 (Chen and Wu 2016)
  - Concentration of superstars
- An intervention that provides new perspective exporters an opportunity to establish reputation:
  - Study sample: sellers of children's t-shirts
  - Cross-randomize orders (0, 1 and 3 consecutive) and reviews (YES/NO)
- Questions we ask:
  - What's the impact of subsidizing the initial reputation building process?
    - Can we initiate the learning process and enhance the role of reputation?
    - Can the intervention induce sales growth and subsequent quality upgrading?
  - Reputation spillovers/externalities and GE effects
    - Across direct competitors and across varieties
    - Implications for total producer surplus and consumer surplus

Information Frictions in Trade and Collective Reputation

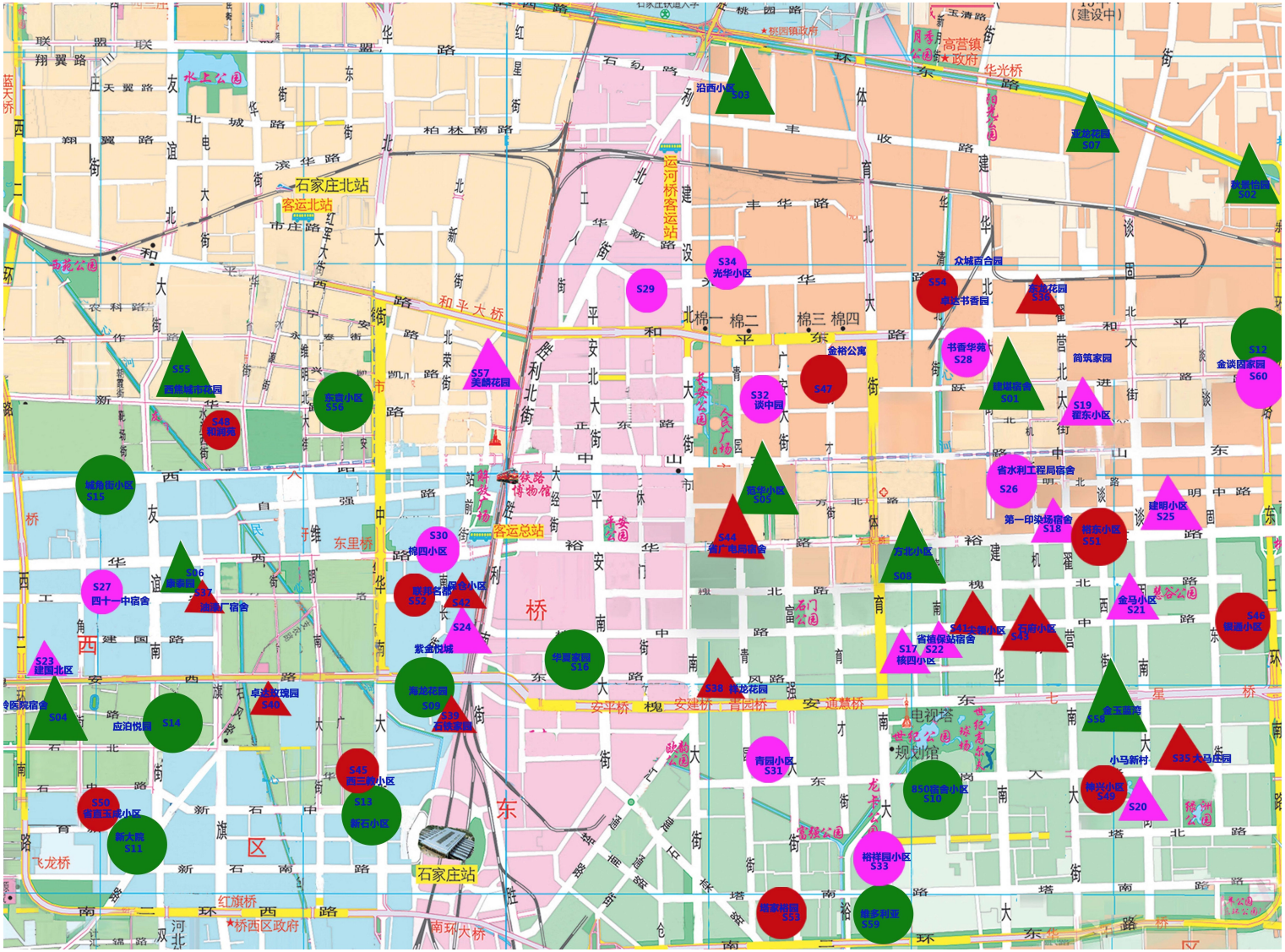
- Collective reputation matters in trade
  - Many examples: Austrian wine in 1980s, California spinach in 2006, Chinese diary products in 2008, etc
  - Difficulty in penetrating high-end markets with a damaged collective reputation
- An important externality
  - It can be hard for a single firm to break away from the collective reputation
  - Individual firms would not internalize the externality they impose on the others
- Study these issues in the context of China's food exports to the EU:
  - Rapid Alert System for Food and Feed, merged with Chinese Customs data
  - Research questions:
    - How big and persistent are the effects of the negative information shocks?
    - Do firms endogenously respond in terms of pricing, product quality/scope, and export destination choices?
    - How big are the reputation spillovers across products and geographic areas?

Sweetness Meter

Back to setting Back to data

Map of Randomization

Go back



Screening, Sampling and Recruitment

Markets and Sellers

Go back

- Conducted in Shijiazhuang, the capital city of Hebei province
  - Urban area: 399.3 sq km (154.2 sq mi); urban population: 2,861,784; urban density: 7,200/sq km (19,000/sq mi)
- Baseline census of all residential communities and local markets in the central urban area of the city:
  - Restrict to markets that are present all year long and house > 1 fruit sellers
  - 500 plus gated communities and 130 markets fit these criteria
- Expression of interest survey for one seller selected from each market
  - Selling multiple fruits in the summer
  - Closest to the entrance
  - Participating in a two-month field research project:
    - Record daily fruit sales information (in return for 100 RMB/week)
    - Experiment with quality differentiation for watermelons at sale
- Recruited the 60 sellers with the highest willingness to participate.

Screening, Sampling and Recruitment

Households

Go back

- Within each of the 6 treatment units, half were randomly selected to collect household-level data from nearby gated communities:
  - Excluded very small communities with fewer than 5 buildings
  - Restricted to those located closest to the sample seller
  - Selected the largest one (in terms of housing units) among those that satisfied the above two criteria
- Surveyors put up a table at the gate and approached residents as representatives from a marketing research company
- Recorded the family's fruit purchasing and consumption experiences in exchange for receiving a small fruit coupon per week
- Recruited 25 households in 27 communities; 675 in total

Balance Checks

Baseline Community and Market Characteristics

Go back

	Labelless Non-incentive (1)	Labelless Incentive (2)	Sticker Non-incentive (3)	Sticker Incentive (4)	Laser Non-incentive (5)	Laser Incentive (6)	p-value (7)
Size measured in the number of housing units	1708.4	211.5	907.2	-301.6	445.2	-21.9	.781
	353.155	600.734	1047.796	458.423	797.797	731.985	.
Housing price (in RMB/meter^2)	8035.4	214.6	-715.9	919.6	451.7**	664.6	.092
	400.926	713.145	745.83	442.205	766.026	526.907	.
% of elderly	28.5	-5	8.5	2.5	-5	-4	.073
	4.537	5.431	6.021	6.094	5.38	5.845	.
Distance to the nearest supermarket (meter)	1320	620	380	195	10	275	.765
	369.248	525.674	517.161	504.439	431.946	496.356	.
Years since establishment	19.9	-5.7	3	-4.3	-2.6	-4	.708
	4.391	5.737	6.458	5.293	4.827	5.314	.
Number of competitors in the local market	3.9	-.3	.6	-.5	-1.3**	-.7	.18
	.407	1.363	.839	.709	.571	.654	.

Go to baseline summary: community and market characteristics

Balance Checks

Baseline Seller Characteristics

Go back

	Labelless Non-incentive	Labelless Incentive	Sticker Non-incentive	Sticker Incentive	Laser Non-incentive	Laser Incentive	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gender	.3	.3	.2	.2	.4*	.2	.591
	.153	.224	.226	.226	.216	.226	
Age	39.5	5.6	-1.3	3.9	1	.2	.604
	3.317	4.763	4.369	4.293	4.108	4.295	
Years of schooling	10.3	-.7	.2	.5	-.189	-.1	.921
	.871	1.456	1.1	.999	1.377	.999	
Number of years selling fruits	9.4	1.7	-.5	.5	-1.7	-2.3	.772
	1.759	3.21	2.194	2.694	2.617	2.416	
Number of years selling fruits at this location	7.4	3.7	-.4	1.4	-.9	-1	.73
	1.565	3.206	2.061	2.646	2.549	2.34	

Go to baseline summary: seller characteristics

Balance Checks

Baseline Household Characteristics

Go back

	Labelless Non-incentive (1)	Labelless Incentive (2)	Sticker Non-incentive (3)	Sticker Incentive (4)	Laser Non-incentive (5)	Laser Incentive (6)	p-value (7)
Household size	3.4	.064	.624	.32*	.439	.683**	.132
	.186	.239	.318	.271	.315	.302	
% of elderly	.186	.017	-.051	-.042	-.057	.047	.352
	.075	.083	.089	.088	.078	.096	
% of female	.501	-.005	-.001	-.028	.012	-.004	.879
	.007	.013	.014	.029	.019	.013	
Household monthly income (in RMB)	5331.461	-464.525	-417.526	321.171	152.146	73.802	.67
	525.635	669.145	586.713	705.323	696.495	894.775	
Fruit consumptions as % of total food consumptions	31.133	5.95	.867	-1.171	-.182	-1.733	.187
	5.631	6.024	6.749	5.93	5.676	9.65	
Watermelon consumptions as % of total fruit consumptions	22.14	24.045**	11.36	23.329**	4.157	15.291	.045
	6.732	9.701	8.409	9.585	7.559	11.536	
Number of watermelons consumed per week	1.278	-.122	.079	.14	.094	-.005	.104
	.083	.12	.133	.091	.199	.114	.
Mostly buy watermelons from the local wet market (dummy)	.67	.186**	-.118	.08	.202***	.16**	.002
	.037	.085	.074	.113	.055	.078	
Mostly buy watermelons from nearby supermarkets (dummy)	.15	.018	.242	.14	-.014	.07	.096
	.121	.133	.143	.139	.13	.139	
Willingness to pay for quality (in RMB/Jin)	1.804	.095	.184	.186*	.135	.097	.388
	.053	.118	.112	.098	.102	.081	.

Go to baseline summary: household characteristics

Laser Machine

Go back

Branding Treatments

Go back

Baseline Summary Statistics

Community and Market Characteristics

Back to data

	Observation	Median	Mean	Std. Dev
Size measured in the number of housing units	60	1350	1915	1930
Housing price (in thousand RMB/meter^2)	60	8.95	8.291	1.594
Fraction of elderly	60	0.25	0.28	0.123
Distance to the nearest supermarket (in kilometer)	60	1.5	1.567	1.046
Years since establishment	60	15.5	17.633	11.242
Number of competitors in the local market	60	3	3.533	2.273

Go to balance check

Baseline Summary Statistics

Seller Characteristics

Back to data

	Observation	Median	Mean	Std. Dev
Gender (female=1 and male=0)	60	0	0.483	0.504
Age	60	42	41.067	9.189
Years of schooling	59	9	10.254	2.509
Selling fruits as primary income source (dummy)	60	1	0.95	0.22
Selling fruits only in the summer (dummy)	60	0	0.033	0.181
Planning to stop selling fruits (dummy)	60	0	0.017	0.129
Number of years selling fruits	60	8	9.017	6.035
Number of years selling fruits at this location	60	6.5	7.867	6.239
Planning to relocate (dummy)	60	0	0	0
Purchasing from fixed wholesaler(s) (dummy)	60	0	0.217	0.415

Go to balance check

Baseline Summary Statistics

Household Characteristics

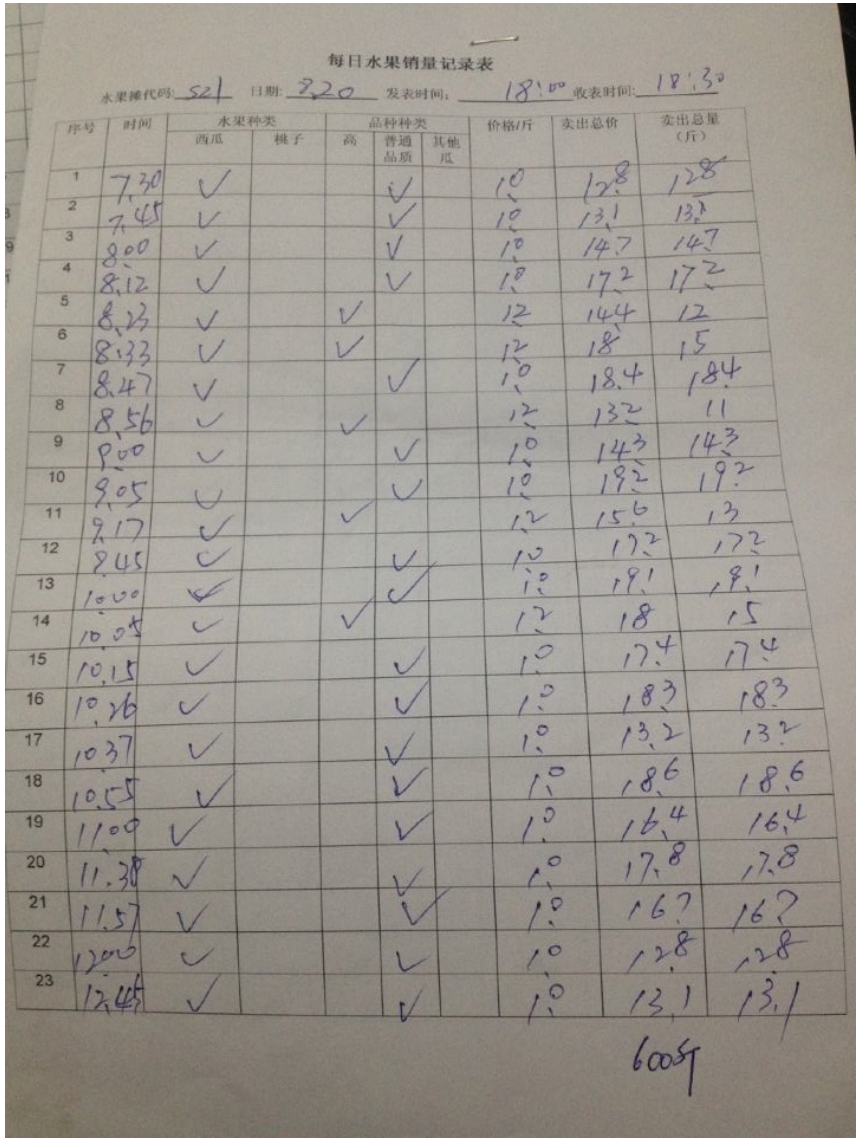
Back to setting Back to data

	Observation	Median	Mean	Std. Dev
Household size	658	3.5	3.76	1.366
Fraction of elderly	657	0	0.169	0.272
Fraction of female	657	0.5	0.498	0.154
Household monthly income (in thousand RMB)	647	4	5.250	3.235
Fruit as % of total food consumption	602	30	32.01	17.906
Watermelon as % of total fruit consumption	626	30	35.627	25.292
Number of watermelons consumed per week	654	1	1.308	.695
Local market as main purchase source (dummy)	675	1	0.756	0.43
Supermarkets as main purchase source (dummy)	675	0	0.227	0.419
Willingness to pay for quality (RMB/Jin)	633	2	1.926	0.312

Go to balance check

Seller Recording Sheet (Example)

Go back



每日水果销量记录表

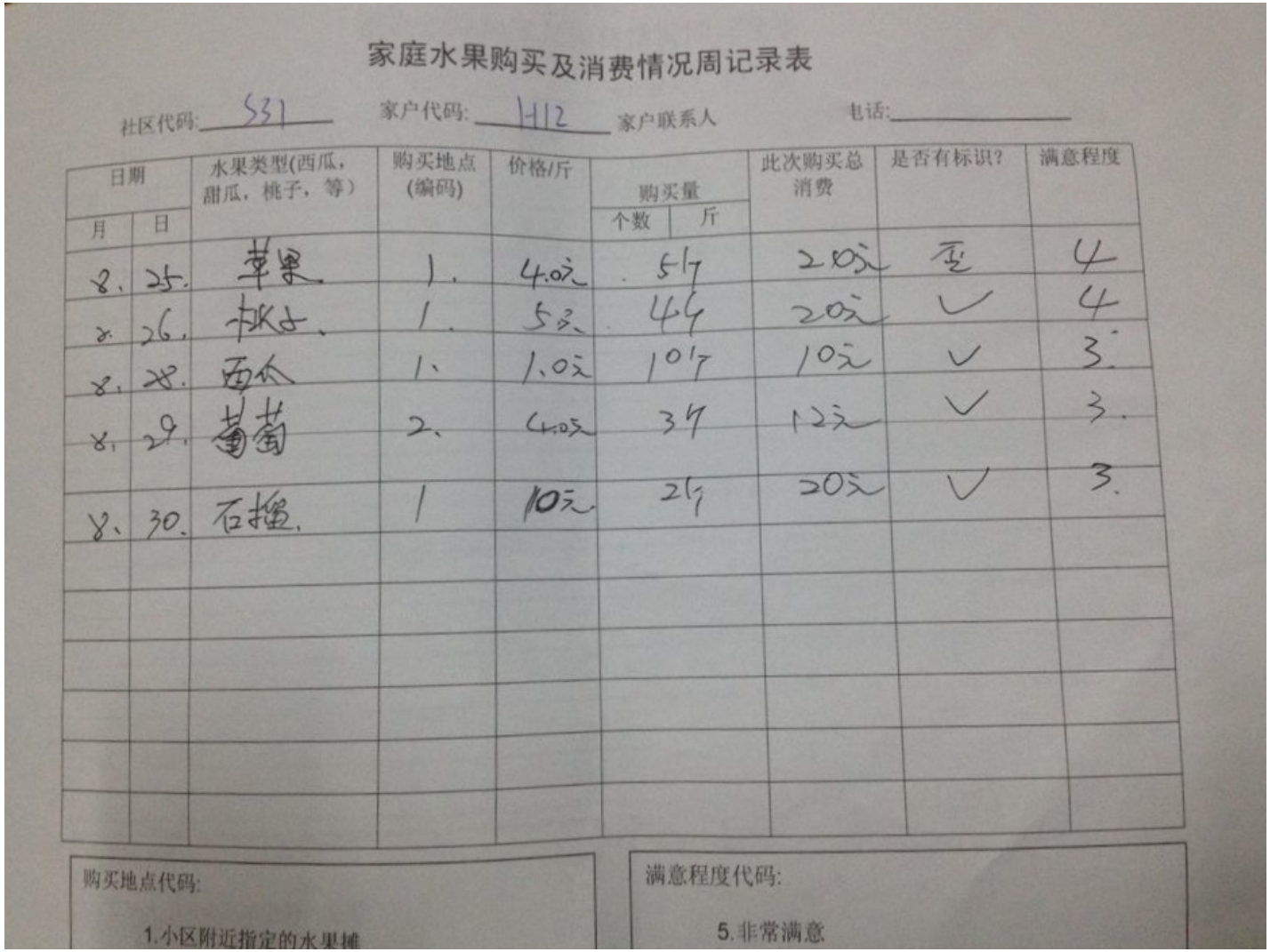
水果摊代码: 521 日期: 3.20 发表时间: 18:00 收表时间: 18:30

序号	时间	水果种类		品种种类			价格/斤	卖出总价	卖出总量（斤）
		西瓜	桃子	高	普通品质	其他瓜			
1	7:30	√			√		10	12.8	12.8
2	7:45	√			√		10	13.1	13.1
3	8:00	√			√		10	14.7	14.7
4	8:12	√			√		10	17.2	17.2
5	8:23	√		√			12	14.4	12
6	8:33	√		√			12	18	15
7	8:47	√			√		10	18.4	18.4
8	8:56	√		√			12	13.2	11
9	9:00	√			√		10	14.3	14.3
10	9:05	√			√		10	19.2	19.2
11	9:17	√		√			12	15.6	13
12	9:45	√			√		10	17.2	17.2
13	10:00	√			√		10	18.1	18.1
14	10:05	√		√			12	18	15
15	10:15	√			√		10	17.4	17.4
16	10:26	√			√		10	18.3	18.3
17	10:37	√			√		10	13.2	13.2
18	10:55	√			√		10	18.6	18.6
19	11:09	√			√		10	16.4	16.4
20	11:38	√			√		10	17.8	17.8
21	11:57	√			√		10	16.7	16.7
22	12:05	√			√		10	12.8	12.8
23	12:45	√			√		10	13.1	13.1

600斤

Household Recording Sheet (Example)

Go back



家庭水果购买及消费情况周记录表

社区代码: 531　家户代码: 112　家户联系人　电话:

日期 月	日	水果类型(西瓜，甜瓜，桃子，等)	购买地点(编码)	价格/斤	购买量 个数	购买量 斤	此次购买总消费	是否有标识?	满意程度
8.	25.	苹果	1.	4.0元		5斤	20元	无	4
8.	26.	桃子	1.	5元		4斤	20元	√	4
8.	28.	西瓜	1.	1.0元		10斤	10元	√	3.
8.	29.	葡萄	2.	4.0元		3斤	12元	√	3.
8.	30.	石榴	1	10元		2斤	20元	√	3.

购买地点代码:

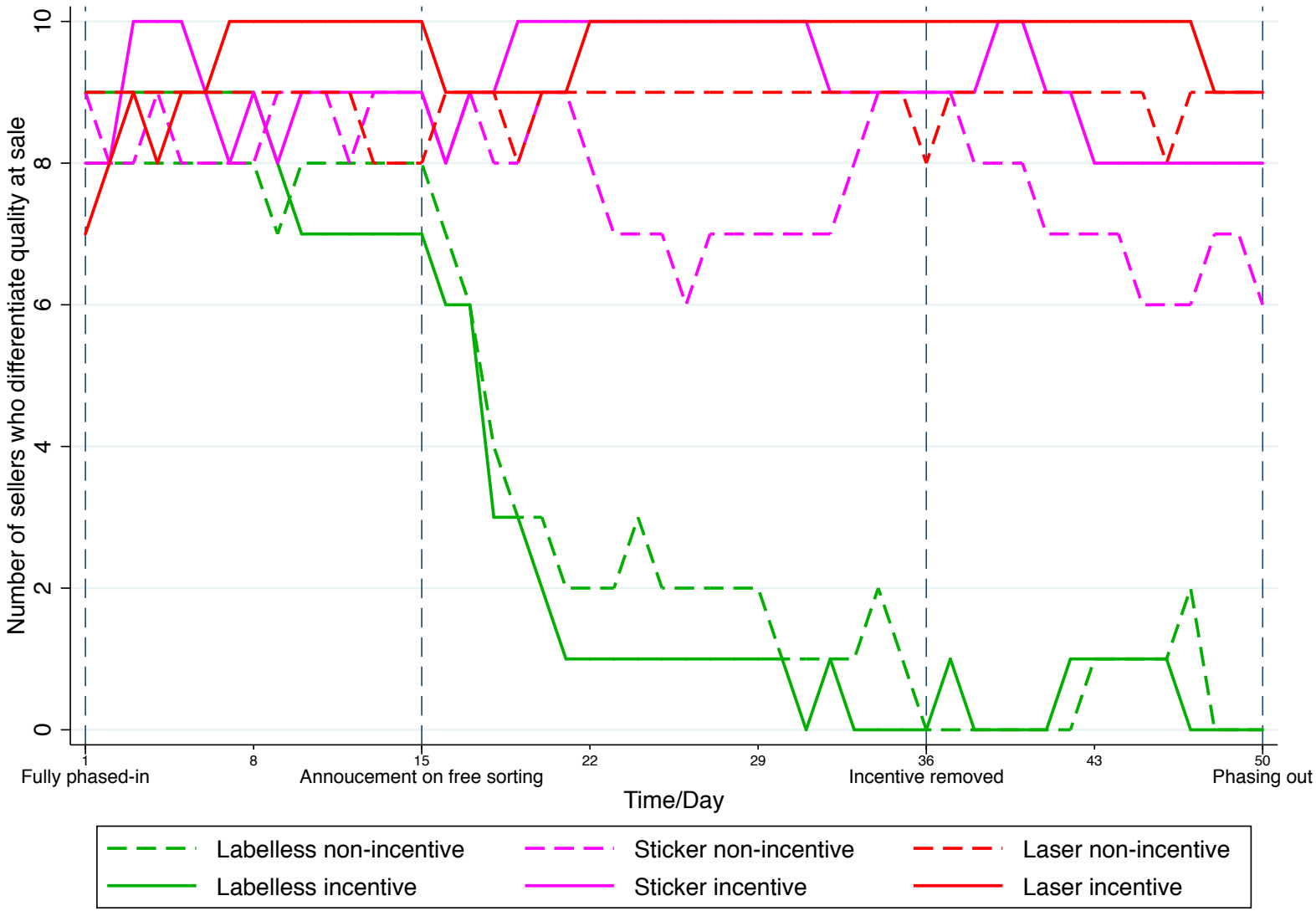
1.小区附近指定的水果摊

满意程度代码:

5.非常满意

Quality Differentiation Behavior Across Groups

Go back



Effect of Labeling Treatments on Sales and Profits

Go back

$$y_{it} = \alpha + \beta_1 \text{Sticker}_i + \beta_2 \text{Laser}_i + \lambda_t + \epsilon_{it}$$

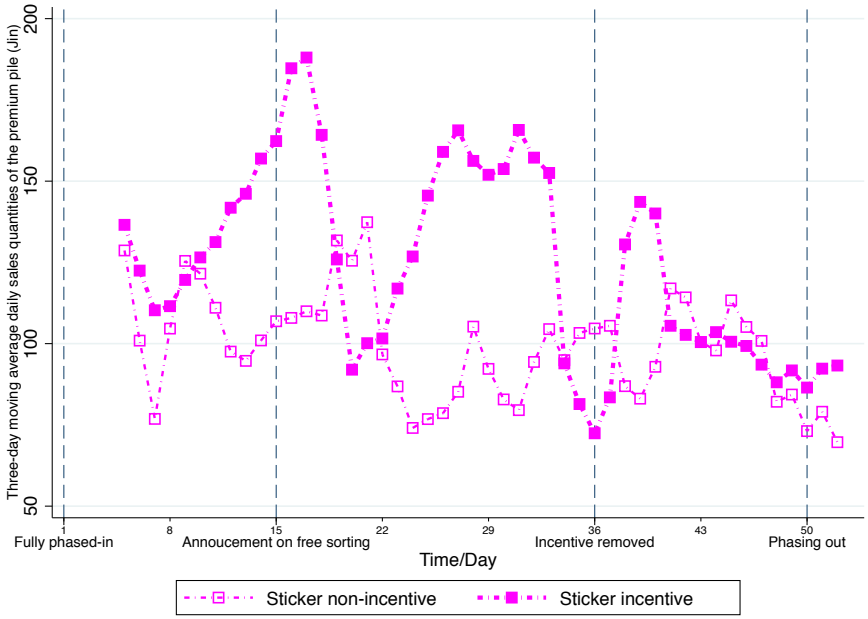
Sample: non-incentive groups

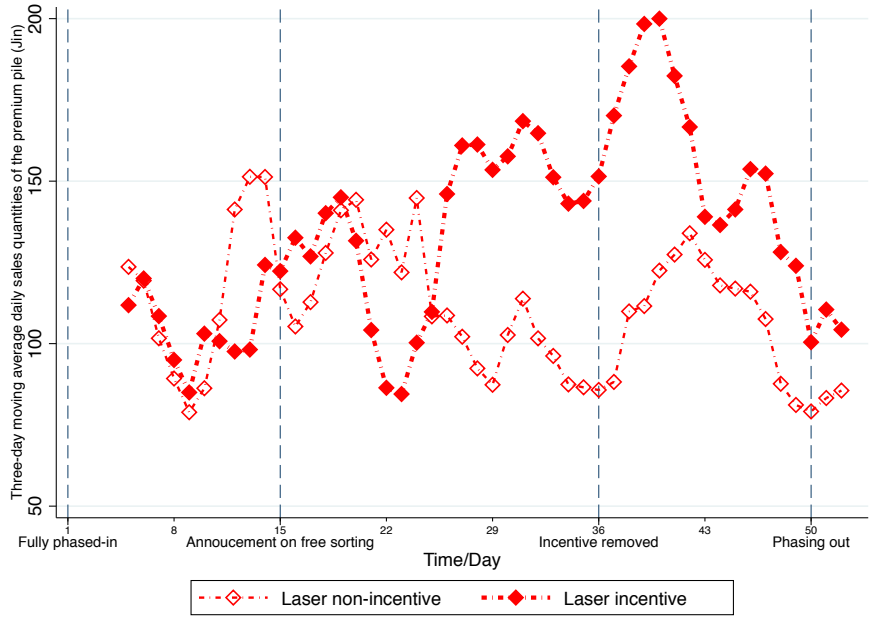
	Ln(Profits) (1)	Premium Markup (2)	Premium Quantity (3)	Normal Markup (4)	Normal Quantity (5)	Total Quantity (6)
Sticker	0.031	0.025	49.852*	-0.012	-40.374	9.478
	(0.199)	(0.016)	(28.758)	(0.013)	(24.860)	(39.378)
Laser	0.297*	0.076***	62.041***	0.000	-12.445	49.596
	(0.154)	(0.026)	(22.073)	(0.020)	(26.705)	(36.728)
Observations	1452	1456	1462	1456	1462	1462
Time Fixed Effects	✓	✓	✓	✓	✓	✓
Labelless Mean	4.284	0.055	56.313	0.011	180.475	236.788
Std. dev.	(0.687)	(0.091)	(136.508)	(0.084)	(124.07)	(156.597)

Note: Standard errors clustered at the seller level.

Raw Data: Quantity Dynamics

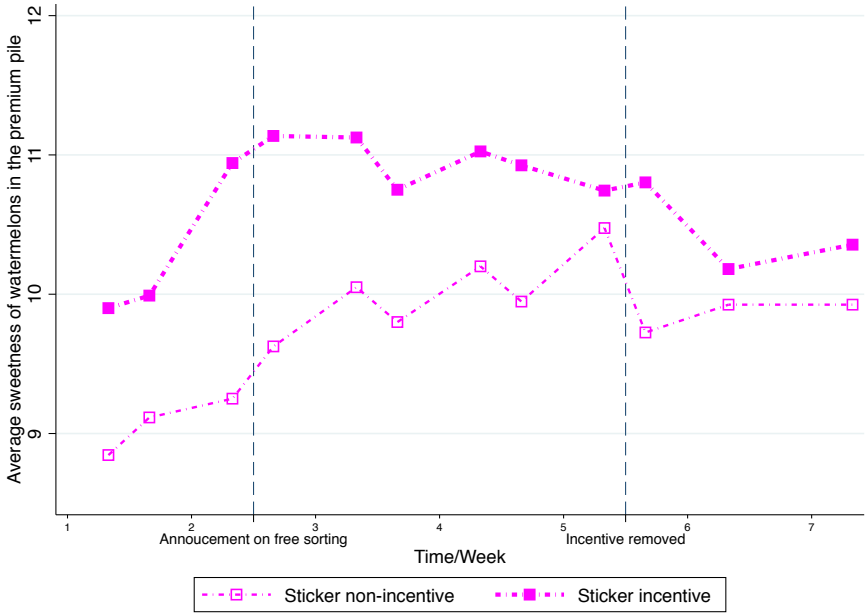
Go back

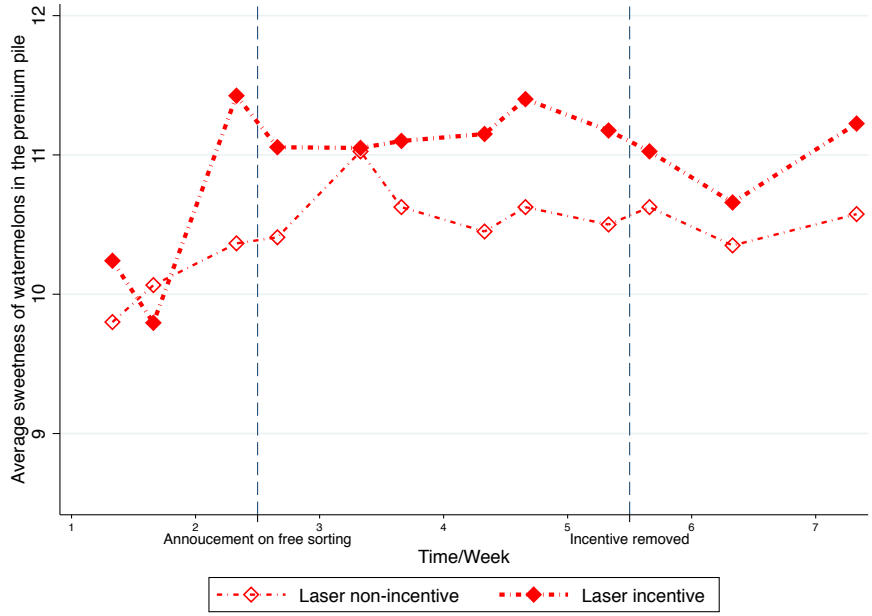




Raw Data: Quality Dynamics

Go back





A Closer Look at Quality Differentiation Behavior

Go back

$$y_{ipt} = \alpha + \beta \text{Premium}_p + \gamma_i + \lambda_t + \epsilon_{it}$$

Sample: non-incentive groups

	Dep var: Quality measured in sweetness			
	A. Level		B. Diff. from the avg. pool	
	Laser	Sticker	Laser	Sticker
	(1)	(2)	(3)	(4)
Premium pile	0.735***	0.378**	0.786***	0.453**
	(0.157)	(0.163)	(0.129)	(0.172)
Observations	212	184	142	116
Seller Fixed Effects	✓	✓	✓	✓
Time Fixed Effects	✓	✓	✓	✓
Normal pile mean	9.787	9.366	0.102	-0.285
Std. dev.	(0.99)	(0.923)	(0.774)	(0.965)

Note: Standard errors clustered at the seller level.