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# RETAIL STORE RETURN POLICY CHANGE

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# AGENDA

## BACKGROUND



The effect of return policy change on sales and returns.



Policy changed from 90 days to 45 days.



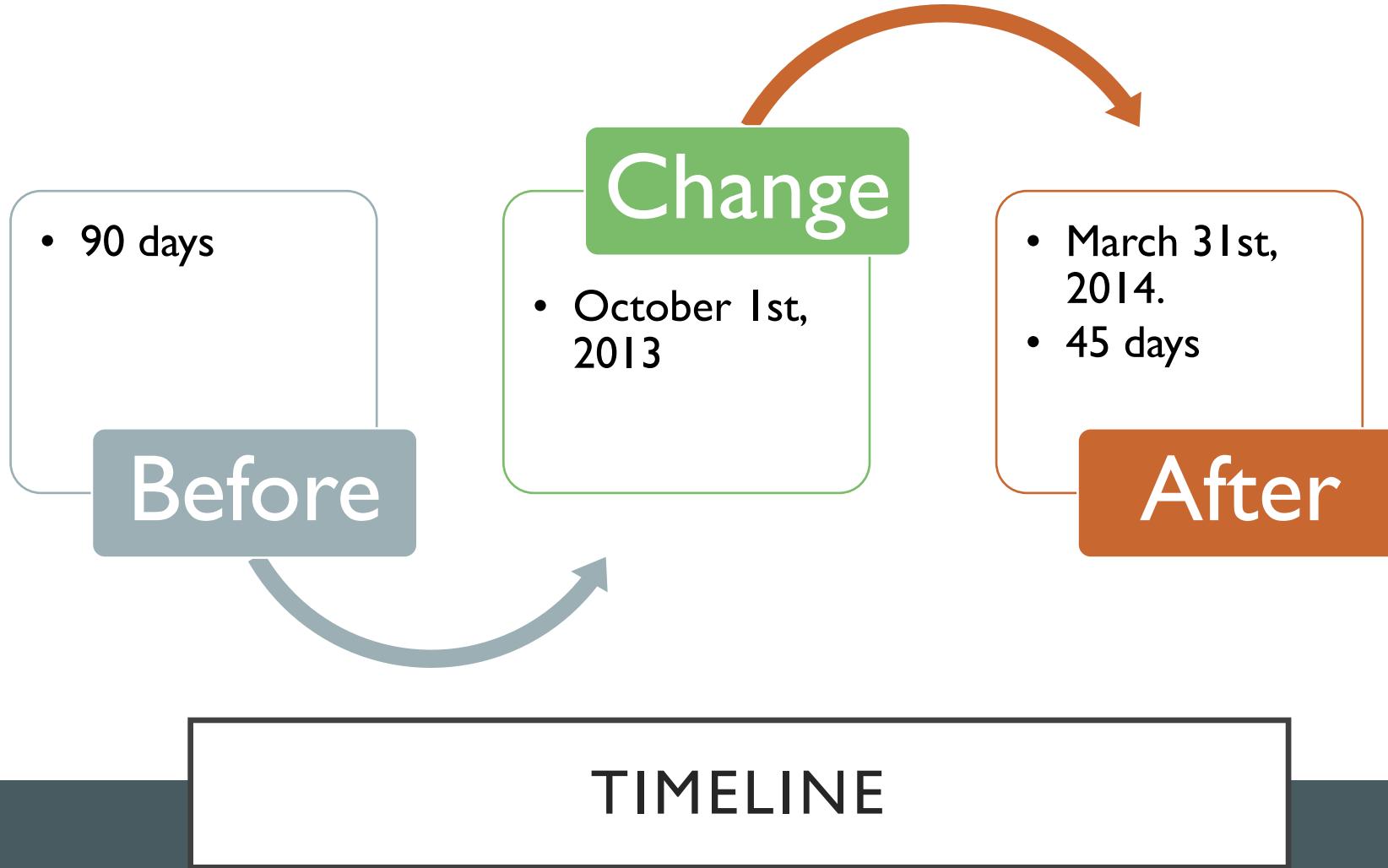
Data between April 1st, 2013 and March 31st, 2014.



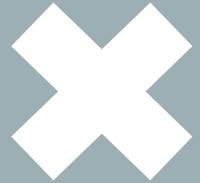
3 online brands and 4 physical brands.



Product Category:21



**NOT CHANGED**



The return policy for online store 10 and for all sister brand brick-and-mortar stores has not changed.



Still a 60-days return policy.



# RESEARCH QUESTION

Question1:What is the impact of the policy change on online channel sales?

Question2:What is the impact of the policy change on physical store sales?

Question3:What is the impact of the policy change on online channel returns?

Question4:What is the impact of the policy change on physical store returns?

Question5:What is the impact of the policy change on product level online sales and returns as well as on product level physical store sales and returns?

Question6:How does the impact of the policy change vary across product categories?

# DATA OVERVIEW

Data summary of  
online channel  
monthly  
sales-returns

Online channel monthly sales-returns

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
store_number	960	5.8	3.3	2	2	6	10	10
year	960	2,013.2	0.4	2,013	2,013	2,013	2,013	2,014
month_dummy	960	6.6	3.4	1	4	7	10	12
day	960	179.0	104.7	1	88	178	265.2	365
<b>salesvalue</b>	<b>960</b>	<b>103,682.1</b>	<b>219,624.5</b>	<b>0.0</b>	<b>4,138.5</b>	<b>12,333.3</b>	<b>138,976.5</b>	<b>2,133,233.0</b>
<b>returnvalue</b>	<b>960</b>	<b>14,748.5</b>	<b>28,608.2</b>	<b>0.0</b>	<b>310.1</b>	<b>1,549.6</b>	<b>18,883.4</b>	<b>254,989.6</b>
<b>salesquantity</b>	<b>960</b>	<b>638.9</b>	<b>1,333.9</b>	<b>1</b>	<b>59.5</b>	<b>135</b>	<b>778.8</b>	<b>13,074</b>
<b>returnquantity</b>	<b>960</b>	<b>56.4</b>	<b>109.6</b>	<b>0</b>	<b>4</b>	<b>10</b>	<b>71</b>	<b>1,033</b>
avg_female	960	0.6	0.2	0.0	0.5	0.6	0.8	1.0
avg_age	960	4.4	1.3	0.0	3.8	4.4	5.0	13.0
avg_income	960	5.3	0.7	1.0	5.1	5.3	5.5	9.0
avg_homeowner	960	0.7	0.1	0.0	0.6	0.7	0.7	1.0
avg_residency	960	7.2	1.7	0.0	6.8	7.2	7.8	15.0
avg_childowner	960	0.4	0.1	0.0	0.4	0.4	0.5	1.0
policy_dummy	960	0.7	0.5	0	0	1	1	1
time_dummy	960	0.5	0.5	0	0	0	1	1
logsalesvalue	960	9.5	2.6	0.0	8.3	9.4	11.8	14.6
logsalesquantity	960	5.0	1.9	0.7	4.1	4.9	6.7	9.5

# DATA OVERVIEW

# Data summary of online channel product level monthly sales-returns

### Online channel product level monthly sales-returns

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
store_number	9,960	5.2	3.3	2	2	6	10	10
year	9,960	2,013.2	0.4	2,013	2,013	2,013	2,013	2,014
product_category	9,960	9.5	6.2	1	4	9	14	21
month_dummy	9,960	6.8	3.5	1	4	7	10	12
day	9,960	178.6	104.2	1	87	179	263	365
salesvalue	9,960	9,665.8	23,605.7	0.0	367.1	1,328.5	8,779.9	430,846.5
returnvalue	9,960	1,378.9	3,325.9	0.0	0.0	90.0	1,176.1	59,138.5
salesquantity	9,960	59.1	180.0	1	3	12	39	3,705
returnquantity	9,960	5.2	13.1	0	0	1	4	228
avg_female	9,960	0.6	0.3	0.0	0.4	0.6	0.8	1.0
avg_age	9,960	4.3	2.2	0.0	3.3	4.3	5.2	13.0
avg_income	9,960	5.2	1.3	1.0	4.8	5.2	5.9	9.0
avg_homeowner	9,960	0.7	0.3	0.0	0.6	0.7	0.8	1.0
avg_residency	9,960	7.0	3.0	0.0	5.8	7.0	8.0	15.0
avg_childowner	9,960	0.4	0.3	0.0	0.3	0.4	0.5	1.0
policy_dummy	9,960	0.7	0.4	0	0	1	1	1
time_dummy	9,960	0.5	0.5	0	0	0	1	1
logsalesvalue	9,960	7.3	2.2	0.0	5.9	7.2	9.1	13.0
logsalesquantity	9,960	2.7	1.5	0.7	1.4	2.6	3.7	8.2

# DATA OVERVIEW

## Data summary of Brick-and-mortar store monthly sales-returns

Brick-and-mortar store monthly sales-returns

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
store_number	8,957	1,765.8	1,426.6	15	403	1,469	2,753	4,975
year	8,957	2,013.2	0.4	2,013	2,013	2,013	2,013	2,014
month_index	8,957	50.4	3.4	45	47	50	53	56
brand_number	8,957	4.5	2.5	2	2	3	8	8
month_dummy	8,957	6.5	3.4	1	4	7	9	12
<b>salesvalue</b>	<b>8,957</b>	<b>77,197.3</b>	<b>84,957.7</b>	<b>23.0</b>	<b>11,434.8</b>	<b>58,451.2</b>	<b>105,961.7</b>	<b>1,040,980.0</b>
<b>returnvalue</b>	<b>8,957</b>	<b>11,569.0</b>	<b>13,959.7</b>	<b>0.0</b>	<b>1,338.4</b>	<b>7,011.2</b>	<b>16,432.7</b>	<b>142,150.0</b>
<b>salesquantity</b>	<b>8,957</b>	<b>290.8</b>	<b>226.3</b>	<b>1</b>	<b>154</b>	<b>228</b>	<b>351</b>	<b>2,823</b>
<b>returnquantity</b>	<b>8,957</b>	<b>26.8</b>	<b>22.0</b>	<b>0</b>	<b>13</b>	<b>21</b>	<b>33</b>	<b>225</b>
avg_female	8,957	0.5	0.2	0.0	0.4	0.5	0.6	1.0
avg_age	8,957	4.8	1.3	0.0	4.2	4.8	5.5	13.0
avg_income	8,957	5.2	1.0	1.0	4.7	5.2	5.8	9.0
avg_homeowner	8,957	0.7	0.2	0.0	0.6	0.7	0.8	1.0
avg_residency	8,957	7.2	1.8	0.0	6.2	7.1	8.1	15.0
avg_childowner	8,957	0.4	0.1	0.0	0.4	0.4	0.5	1.0
store_average_price	8,957	365.2	180.3	18.9	320.3	365.2	461.3	1,280.7
store_number_of_skus	8,957	223.4	147.7	13.0	147.0	216.0	223.4	1,775.0
sa_gender	8,957	0.8	0.1	0.0	0.8	0.8	1.0	1.0
sa_full_time	8,957	0.6	0.1	0.0	0.6	0.6	0.7	1.0
sa_avg_years_of_exp	8,957	3.8	2.2	0.0	2.4	3.8	4.4	17.3
sa_married	8,957	0.3	0.2	0.0	0.2	0.3	0.4	1.0
sa_avg_rate_of_pay	8,957	9.8	1.2	6.2	9.1	9.8	10.2	16.7
sa_dependent	8,957	0.2	0.1	0.0	0.1	0.2	0.2	0.8
sales_volume_group	8,957	2.7	1.1	1.0	2.0	2.7	3.0	6.0
policy_dummy	8,957	0.7	0.5	0	0	1	1	1
time_dummy	8,957	0.5	0.5	0	0	0	1	1
logsalesvalue	8,957	10.6	1.3	3.2	9.3	11.0	11.6	13.9
logsalesquantity	8,957	5.5	0.7	0.7	5.0	5.4	5.9	7.9

# DATA OVERVIEW

**Data summary of  
Brick-and-mortar store  
product level  
monthly sales-returns**

**Brick-and-mortar store product level monthly sales-returns**

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
store_number	112,243	1,877.8	1,405.1	15	1,003	1,534	2,780	4,975
year	112,243	2,013.2	0.4	2,013	2,013	2,013	2,013	2,014
month_index	112,243	50.3	3.4	45	47	50	53	56
product_category	112,243	9.6	6.1	1	4	9	13	21
brand_number	112,243	4.2	2.4	2	2	3	5	8
month dummy	112,243	6.6	3.4	1	4	7	9	12
<b>salesvalue</b>	<b>112,243</b>	<b>5,868.7</b>	<b>10,698.9</b>	<b>0.0</b>	<b>560.3</b>	<b>2,378.7</b>	<b>6,161.1</b>	<b>209,777.8</b>
<b>returnvalue</b>	<b>112,243</b>	<b>886.0</b>	<b>2,398.0</b>	<b>0</b>	<b>0</b>	<b>123.5</b>	<b>679.0</b>	<b>72,684</b>
<b>salesquantity</b>	<b>112,243</b>	<b>22.4</b>	<b>37.2</b>	<b>1</b>	<b>5</b>	<b>11</b>	<b>22</b>	<b>627</b>
<b>returnquantity</b>	<b>112,243</b>	<b>2.1</b>	<b>3.1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>130</b>
avg_female	112,243	0.5	0.3	0.0	0.3	0.5	0.6	1.0
avg_age	112,243	4.8	2.1	0.0	3.7	4.8	5.9	13.0
avg_income	112,243	5.2	1.3	1.0	4.5	5.2	6.0	9.0
avg_homeowner	112,243	0.7	0.2	0.0	0.6	0.7	0.8	1.0
avg_residency	112,243	7.1	2.8	0.0	5.5	7.1	8.4	15.0
avg_childowner	112,243	0.4	0.2	0.0	0.3	0.4	0.5	1.0
store_average_price	112,243	380.8	174.3	18.9	332.8	380.8	471.3	1,280.7
store_number_of_skus	112,243	230.7	153.2	13.0	149.0	217.0	230.7	1,775.0
sa_gender	112,243	0.8	0.2	0.0	0.8	0.8	1.0	1.0
sa_full_time	112,243	0.6	0.1	0.0	0.6	0.6	0.7	1.0
sa_avg_years_of_exp	112,243	3.9	2.2	0.0	2.3	3.9	4.6	17.3
sa_married	112,243	0.3	0.2	0.0	0.2	0.3	0.4	1.0
sa_avg_rate_of_pay	112,243	9.9	1.2	6.2	9.1	9.9	10.3	16.7
sa_dependent	112,243	0.2	0.1	0.0	0.1	0.2	0.3	0.8
sales_volume_group	112,243	2.7	1.1	1.0	2.0	2.7	3.0	6.0
policy_dummy	112,243	0.8	0.4	0	1	1	1	1
time_dummy	112,243	0.5	0.5	0	0	0	1	1
logsalesvalue	112,243	7.5	1.8	0.0	6.3	7.8	8.7	12.3
logsalesquantity	112,243	2.5	1.1	0.7	1.8	2.5	3.1	6.4



ANALYSIS

# VARIABLES

## Key independent variables

- Time
- Policy

## Independent variables

Store average price

Product number

...

## Dependent Variables

Sales value  
Sales quantity  
Return value  
Return quantity

## Control variables

- Customers characteristics
- Salespeople characteristics

Physical stores only

## MODELS-SALES

- Sales Value Model
- $\log(\text{Sales value}) = \text{policy} * \text{time} + \text{customers characteristics}$   
+ Salespeople characteristics(physical only)
- Sales Quantity Model
- Sales quantity =  $\text{policy} * \text{time} + \text{customers characteristics} +$   
Salespeople characteristics(physical only)

## MODELS-RETURNS

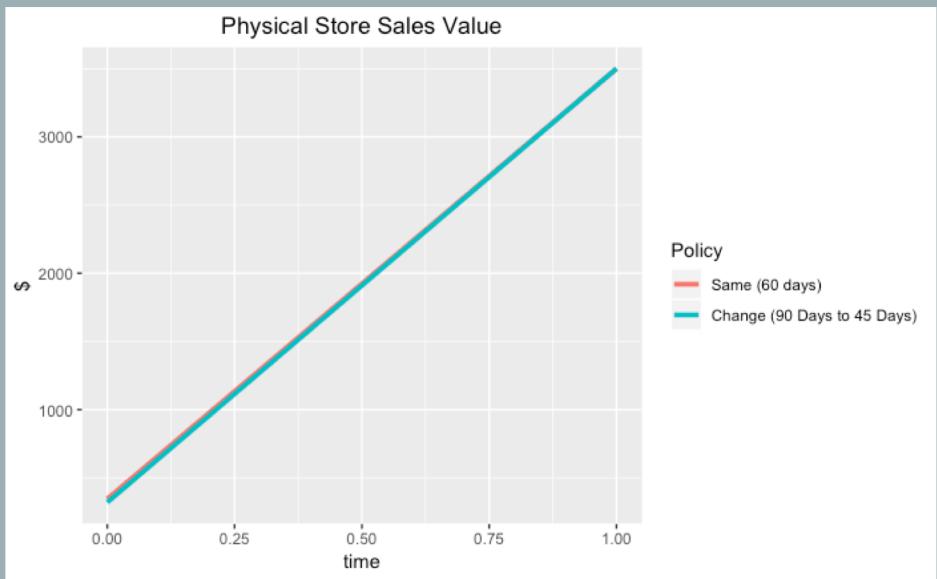
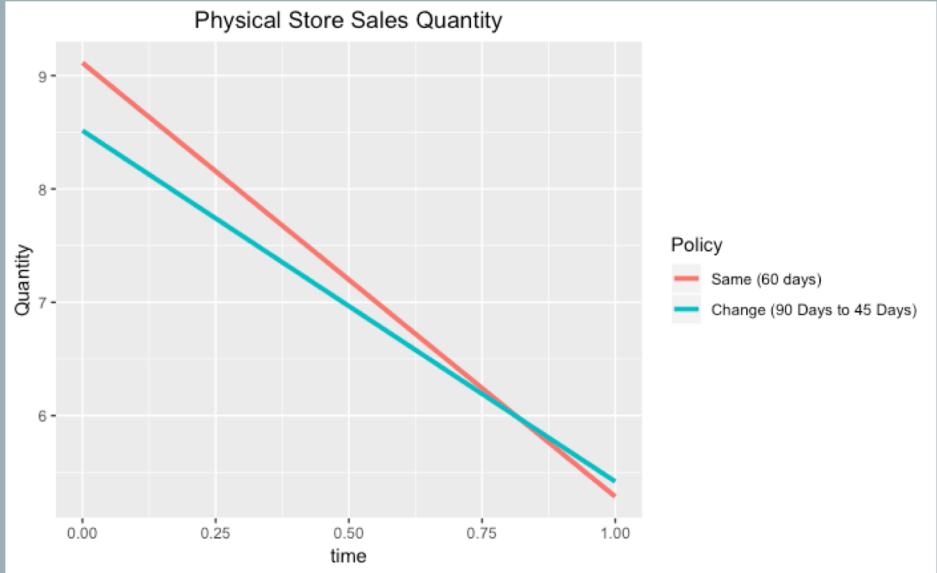
- Return Value Model
- $\log(\text{return value}+1) = \text{policy} * \text{time} + \log(\text{sales value}) + \text{customers characteristics}$
- Return Quantity Model
- Return quantity =  $\text{policy} * \text{time} + \log(\text{sales quantity}) + \text{customers characteristics}$

For question 1, according to the results of the models, the change of return policy does not have a significant impact on sales value & quantity on online channel.

## RESULTS-ONLINE SALES VALUE & QUANTITY

Regression Results	
Dependent variable:	
log(salesvalue + 1)	
HW-Robust SE	
policy_dummy	2.38*** (0.35)
time_dummy	0.20 (0.27)
avg_female	-1.24 (0.92)
avg_age	0.12 (0.10)
avg_income	0.30 (0.18)
avg_homeowner	-0.99 (1.18)
avg_residency	0.13 (0.09)
avg_childowner	0.29 (0.88)
policy_dummy:time_dummy	-0.11 (0.32)
Constant	5.99*** (1.42)
<hr/>	
Observations	960
R2	0.21
Adjusted R2	0.20
Residual Std. Error	2.36
F Statistic	27.58***
<hr/>	
Note:	*p<0.05; **p<0.01; ***p<0.001

Regression Results	
Dependent variable:	
salesquantity	
Normal SE	
policy_dummy	-0.21 (0.12)
time_dummy	0.29* (0.15)
avg_female	-4.59*** (0.25)
avg_age	0.10*** (0.03)
avg_income	0.56*** (0.05)
avg_homeowner	-3.28*** (0.28)
avg_residency	0.12*** (0.02)
avg_childowner	1.08*** (0.21)
policy_dummy:time_dummy	0.03 (0.18)
Constant	6.49*** (0.34)
<hr/>	
Observations	960
Log Likelihood	-6,719.99
theta	0.52*** (0.02)
Akaike Inf. Crit.	13,459.97
<hr/>	
Note:	*p<0.05; **p<0.01; ***p<0.001



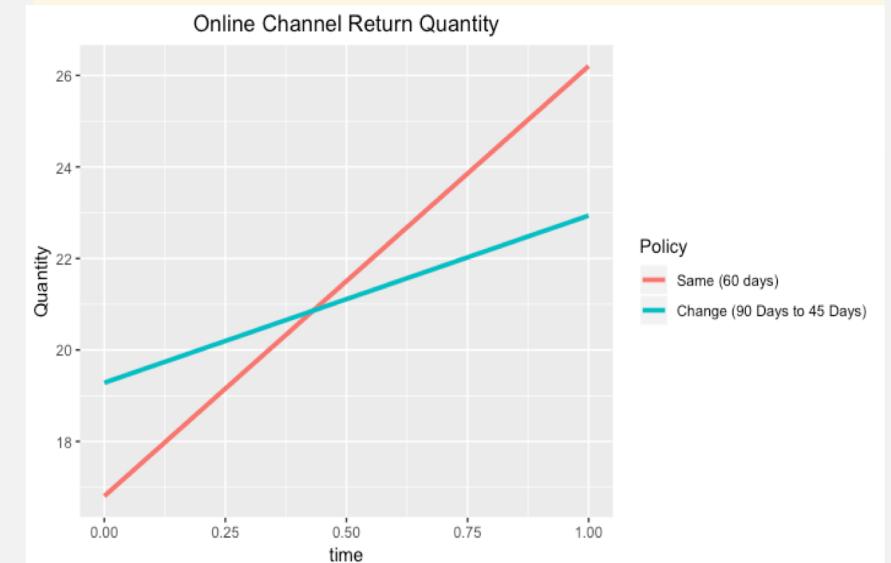
## RESULTS-PHYSICAL SALES VALUE & QUANTITY

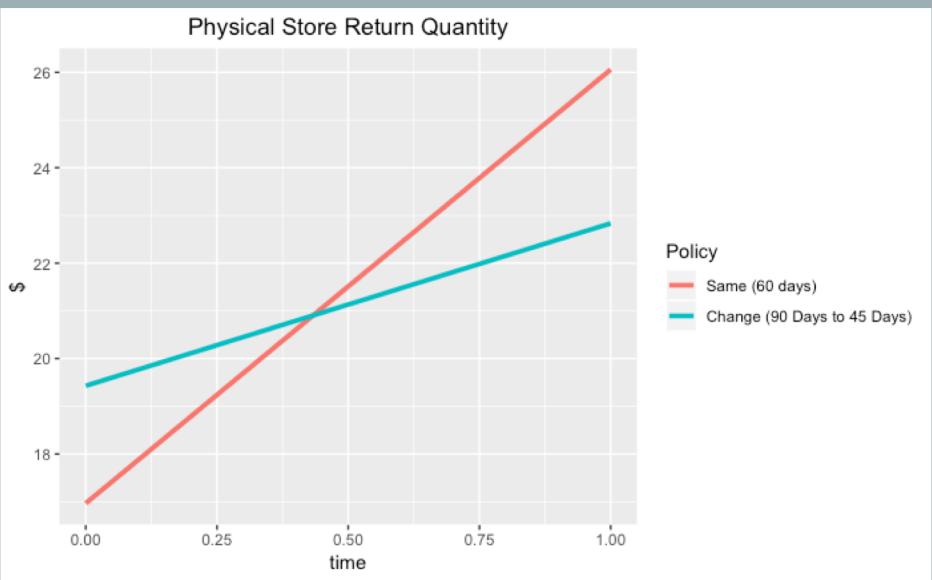
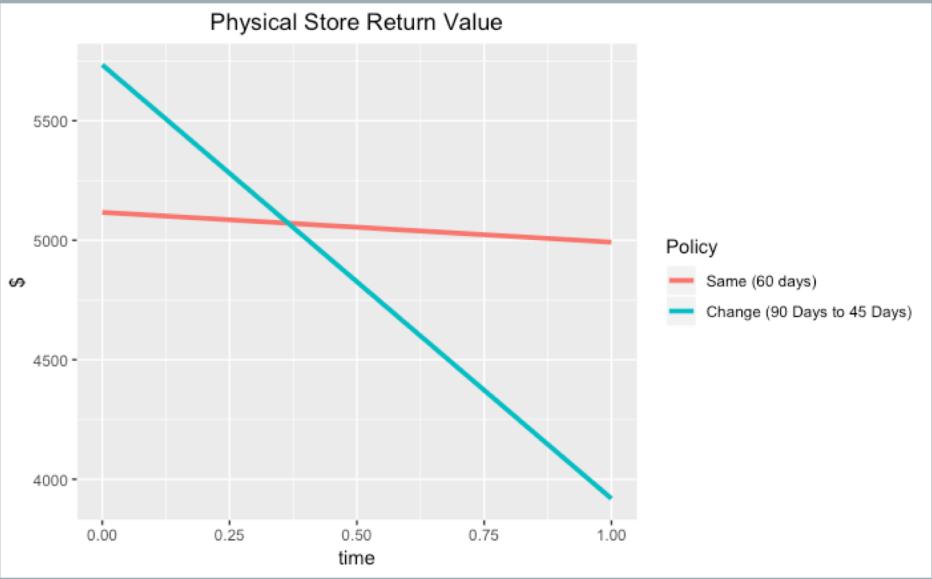
For question 2, the change of policy has a slight affect on physical stores sales value ( 0.08% ) , and has a significant impact ( 9.7% ) , on physical stores sales quantity.

## RESULTS-ONLINE RETURNS VALUE & QUANTITY

For question 3, the change of return policy does not have a significant impact on returns value. However, policy change helps decreasing returns quantity by ( -23.72% ) on online channel.

Regression Results	
<hr/>	
Dependent variable:	
	(log(returnvalue + 1))
	Normal SE
<hr/>	
policy_dummy	-0.05 (0.19)
time_dummy	-0.10 (0.15)
...	
policy_dummy:time_dummy	-0.10 (0.18)
<hr/>	
Constant	-2.85*** (0.83)
<hr/>	
Observations	960
R2	0.83
Adjusted R2	0.82





## RESULTS-PHYSICAL RETURNS VALUE & QUANTITY

For question 4, physical stores, return policy change has a slight impact on declining (-0.36%) returns value.

However, it helps dropping returns quantity ( -23.48% ).

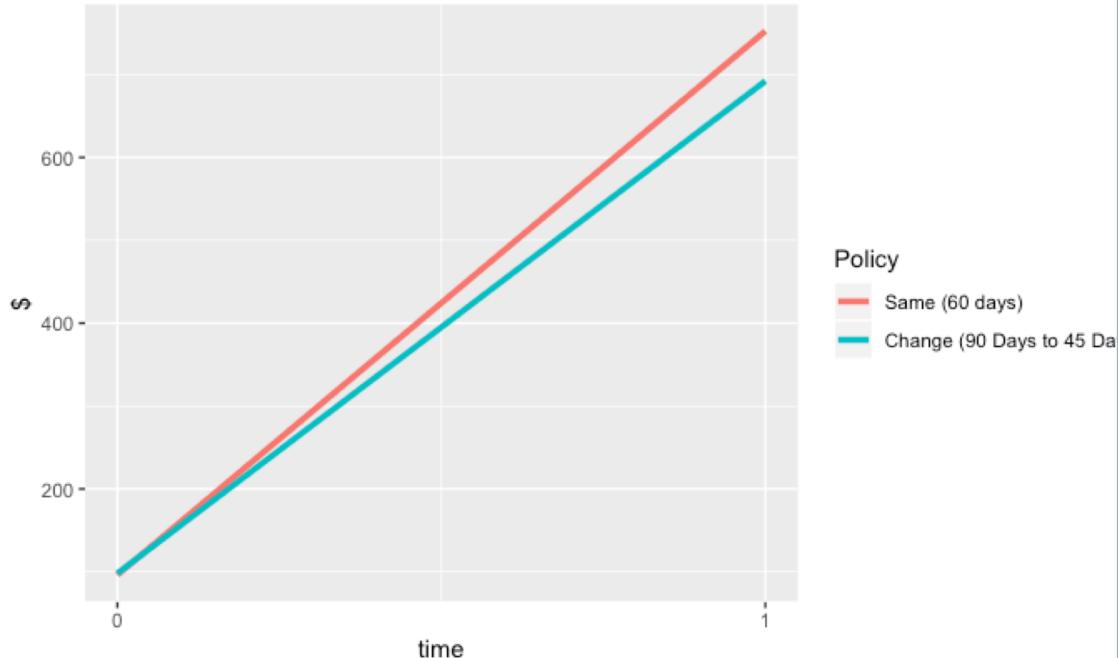
avg_age	0.014*
	(0.006)
avg_income	0.136***
	(0.011)
avg_homeowner	-0.358***
	(0.059)
avg_residency	0.014**
	(0.005)
avg_chldowner	0.125*
	(0.051)
policy_dummy:time_dummy	-0.003
	(0.060)
Constant	1.080***
	(0.089)
<hr/>	
Observations	9,960
Log Likelihood	-44,481.750
theta	0.613*** (0.008)
Akaike Inf. Crit.	89,019.500
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Note:	*p<0.05; **p<0.01; ***p<0.001

## RESULTS-PRODUCT LEVEL ONLINE SALES VALUE & QUANTITY

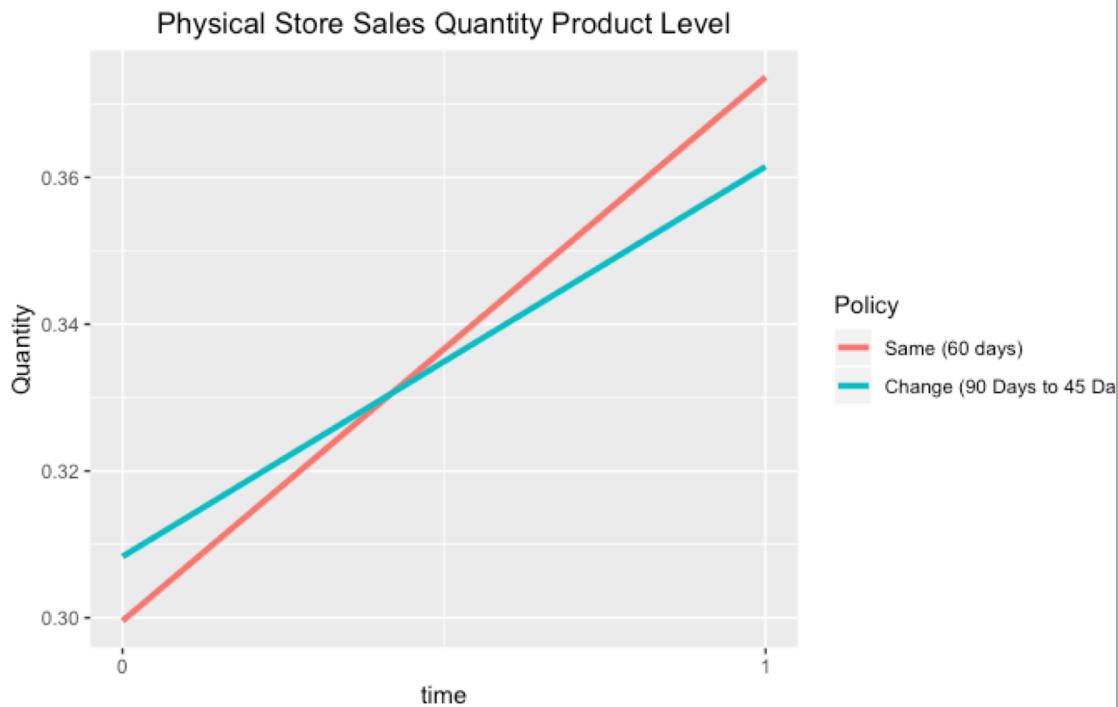
avg_age	0.015
	(0.009)
avg_income	0.094***
	(0.016)
avg_homeowner	-0.249**
	(0.084)
avg_residency	0.002
	(0.007)
avg_chldowner	-0.023
	(0.071)
policy_dummy:time_dummy	-0.007
	(0.085)
Constant	6.115***
	(0.124)
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Observations	9,960
R2	0.332
Adjusted R2	0.330
Residual Std. Error	1.840
F Statistic	182.888***
<hr/>	
Note:	*p<0.05; **p<0.01; ***p<0.001

For question 5, return policy change does not have a significant impact on online channel sales value and quantity.

Physical Store Sales Value Product Level



## RESULTS-PRODUCT LEVEL PHYSICAL STORES SALES VALUE & QUANTITY



For question 5, in product level physical stores, for physical stores sales value has a n impact and a bigger effect on sales quantity.

# VARY ACROSS PRODUCT CATEGORIES

Category	Online Channel			
	Sales Value	Sales Quantity	Return Value	Return Quantity
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-33%
5	-	-	-86%	-39%
6	-	-	-	-
7	-88%	-285%	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
12	-	-	-	-28%
13	-	-	-	-
14	-	-	-	-
15	-	-	-	-
16	-	-	-	-
17	-	80%	-	-
18	-	-	-	-
19	-	-	-	-
20	-	-	-	-
21	-	-	-	-

Category	Physical Stores			
	Sales Value	Sales Quantity	Return Value	Return Quantity
1	-	-10%	-	-
2	-14%	-	31%	-
3	-	-3%	-	-
4	11%	-	-	-
5	14%	8%	-	14%
6	-	-	37%	12%
7	-	-	13%	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
12	12%	7%	-	-
13	-35%	-26%	29%	-
14	-	-25%	-18%	-
15	-	-46%	-	-
16	-	-	-	-
17	-	-	-	-
18	-	-	-	-
19	-	-	-	-
20	-	-	-	-
21	12%	-	-	8%

## CONCLUSION (ONLINE CHANNEL) VARY ACROSS PRODUCT CATEGORIES

### Positive Effects:

- + Sales value: Insignificant
- + Sales quantity : Events;
- - Return value in: Dimond Fashion, Semi Precious, Gold Chain/Jewelry;
- - Return quantity in: Semi Precious;

### Negative Effects:

- - Sales value in: Golden Earrings;
- - Sales quantity in: Golden Earrings;
- + Return value in: Insignificant
- + Return quantity in: Insignificant

## CONCLUSION (PHYSICAL STORE) VARY ACROSS PRODUCT CATEGORIES

### Positive Effects:

- + Sales value: Dimond Fashion, Semi Precious, Gold Chain/Jewelry; Sterling Silver
- + Sales quantity : Semi Precious, Gold Chain/Jewelry;
- - Return value in: Pre-Owned;
- - Return quantity in: Insignificant;

### Negative Effects:

- - Sales value in: Gold Wed Bands, Watches;
- - Sales quantity in: Bridal, Solitaries, Watches, Pre-owned, Specialized Jewelry;
- + Return value in: Gold Wed Bands, Mens, Gold Earrings, Watches;
- + Return quantity in: Semi Precious, Mens, Sterling Silver;

## CONCLUSION VARY ACROSS PRODUCT CATEGORIES

- Semi Precious and Gold Chain/Jewelry

Policy change has notable impact on decreasing returns and increasing sales.

**Beneficial** to company.

- Gold Wed Bands and Watches

Policy change has notable impact on increasing returns and decreasing sales.

**Not Beneficial** to company.

## RECOMMENDATION

- Overall, change of return policy has a more significant impact on return quantity on both online channel and physical stores.
- We recommend continuing the policy to control return quantity as it outweighs the loss in sales.
- On the other hand it helps the sales quantity in physical stores, as well as having a negligible impact on online channel sales and returns value.

		Value	Quantity
Sales	Online Channel	-	-
Return	Physical Store	-0.08%	9.70%
Sales	Online Channel	-	-23.72%
Return	Physical Store	-0.36%	-23.48%

## COMPARISON BY PRODUCT CATEGORY LEVEL - ONLINE CHANNEL AND PHYSICAL STORE

- Return policy change has insignificant effect on online channel sales by product category level. However, it is significant for physical store sales. It increases sales quantity by 6.01% and decreases sales value by 0.10%.
- Return policy change has similar impact on return quantity for both online channel and physical store, it decreases 12.01% and 16.32% respectively and decreases return value by 0.20% and 0.42% respectively.

	Value	Quantity
Sales	Online	-
	Channel	-
Physical	-0.10%	6.01%
	Store	
Return	Online	-
	Channel	-
Physical	-0.20%	-12.07%
	Store	
Value	-0.42%	-16.32%
	Quantity	

# SUMMARY

			Value	Quantity
Sales	Online Channel	Brand Level	-	-
		Product Category Level	-	-
	Physical Store	Store Level	-0.08%	9.70%
		Product Category Level	-0.01%	-6.01%
Return	Online Channel	Brand Level	-	-23.72%
		Product Category Level	-0.20%	-12.07%
	Physical Store	Store Level	-0.36%	-23.48%
		Product Category Level	-0.42%	-16.32%

\* Positive Impact

\* Negative Impact

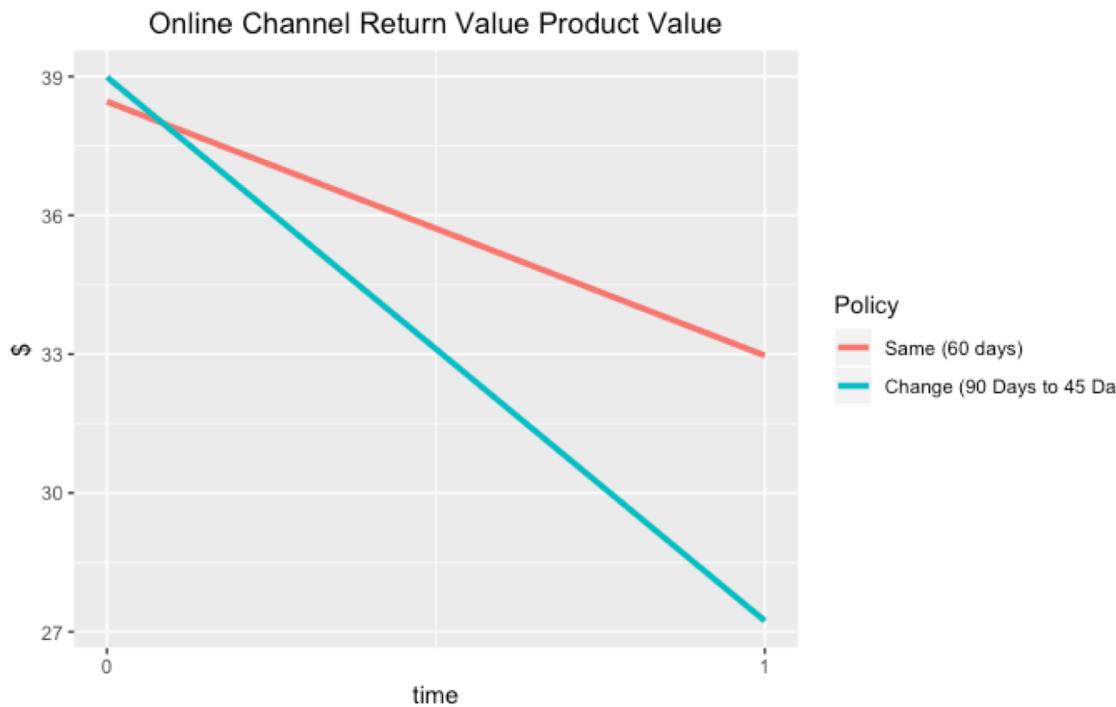
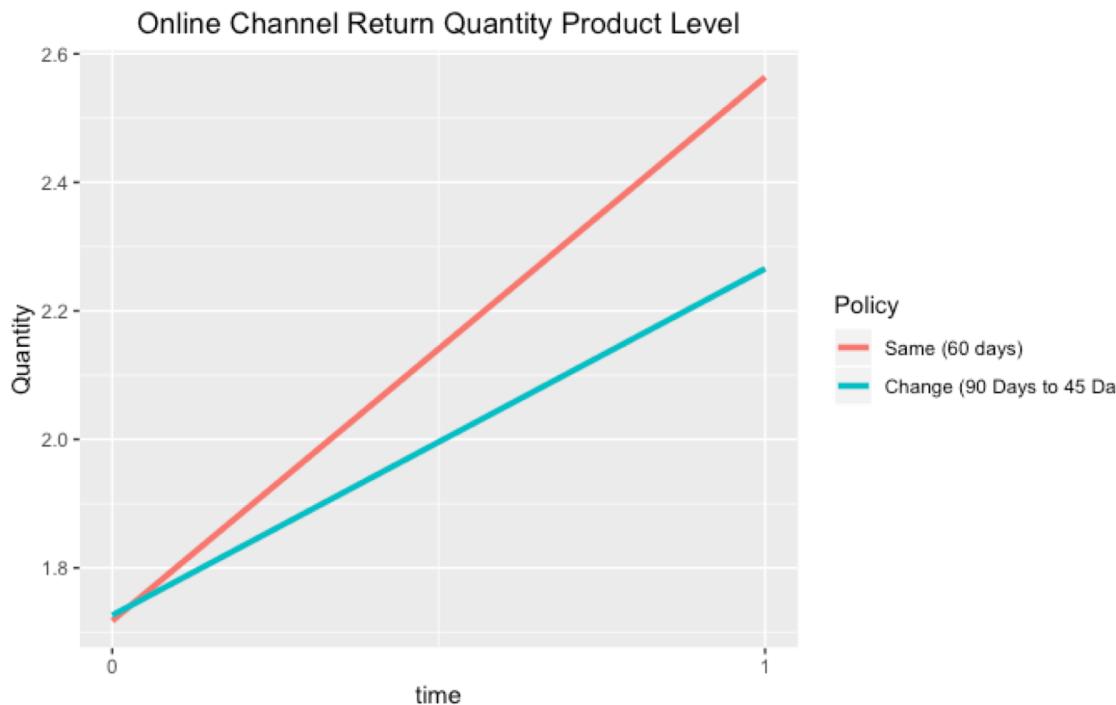
- Overall, policy change decrease sale quantity and value, however, the benefit in return quantity and value outweighs the loss of sales.



## LIMITATIONS

- Data size is not big enough
  - Only 6 months before vs 6 months after
- Missing value for observations
- Lack of variables for online dataset
- More variables : physical stores locations, advertisements,

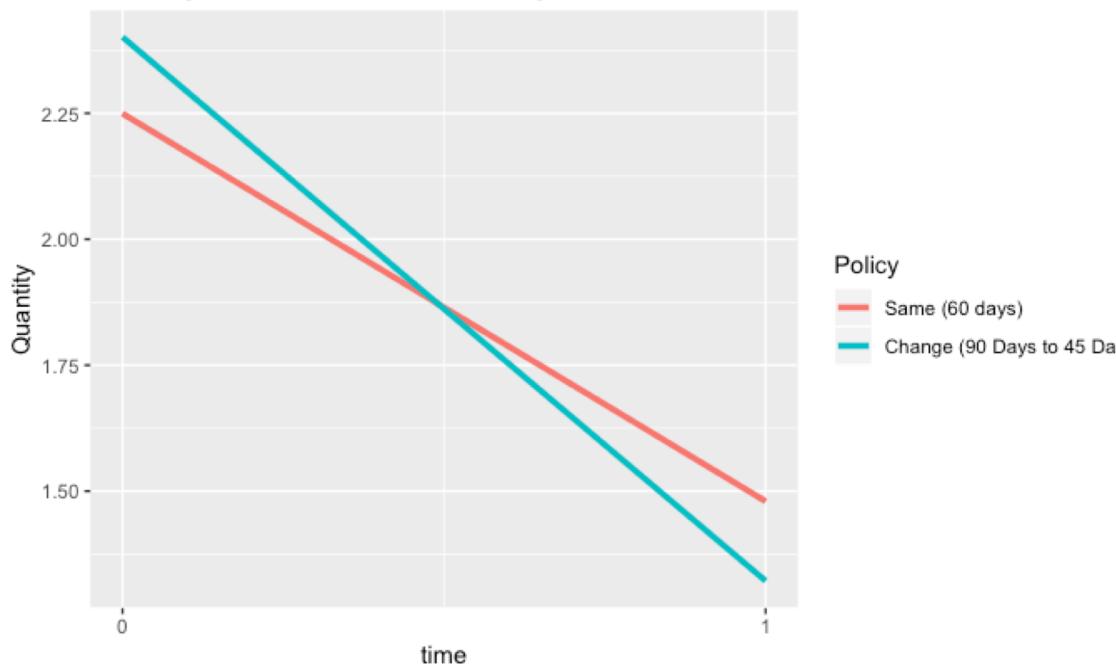
# APPENDIX



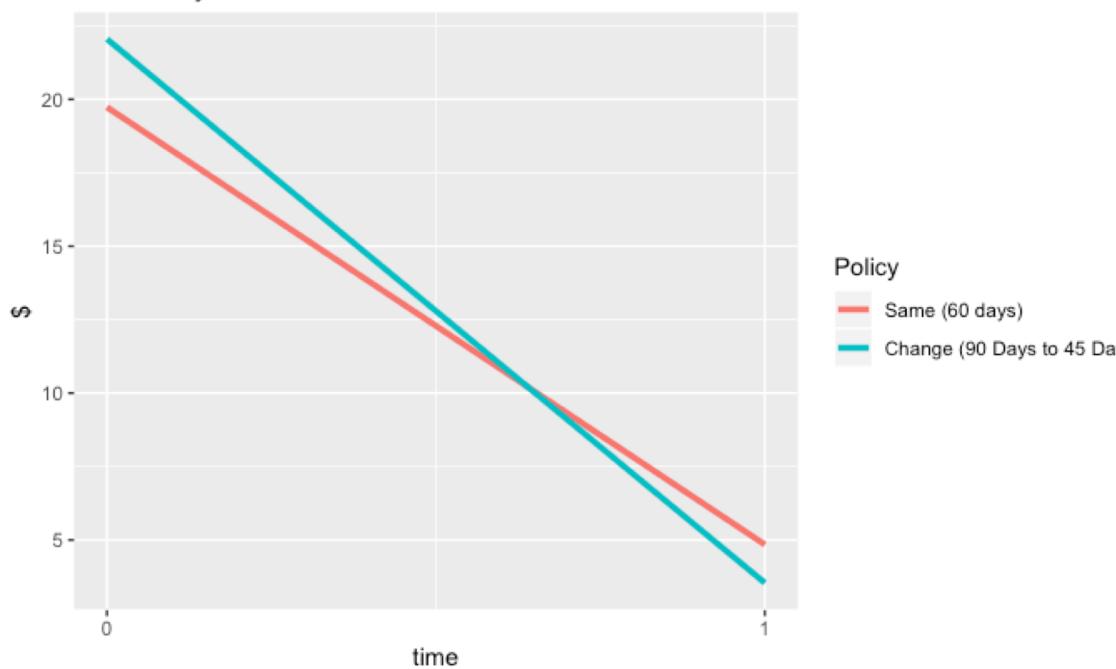
## RESULTS-PRODUCT LEVEL ONLINE RETURNS VALUE & QUANTITY

For question 5,

Physical Store Return Quantity Product Level



Physical Store Return Value Product Level



## RESULTS-PRODUCT LEVEL PHYSICAL RETURNS VALUE & QUANTITY

For question 5,

## CONTROL VARIABLES

### **Customers characteristics**

gender

age

income

homeowner

residency

child owner

...

### **Salespeople characteristics**

experience

hourly wage

...