



Salesperson Training in Retail Stores

Presented by :

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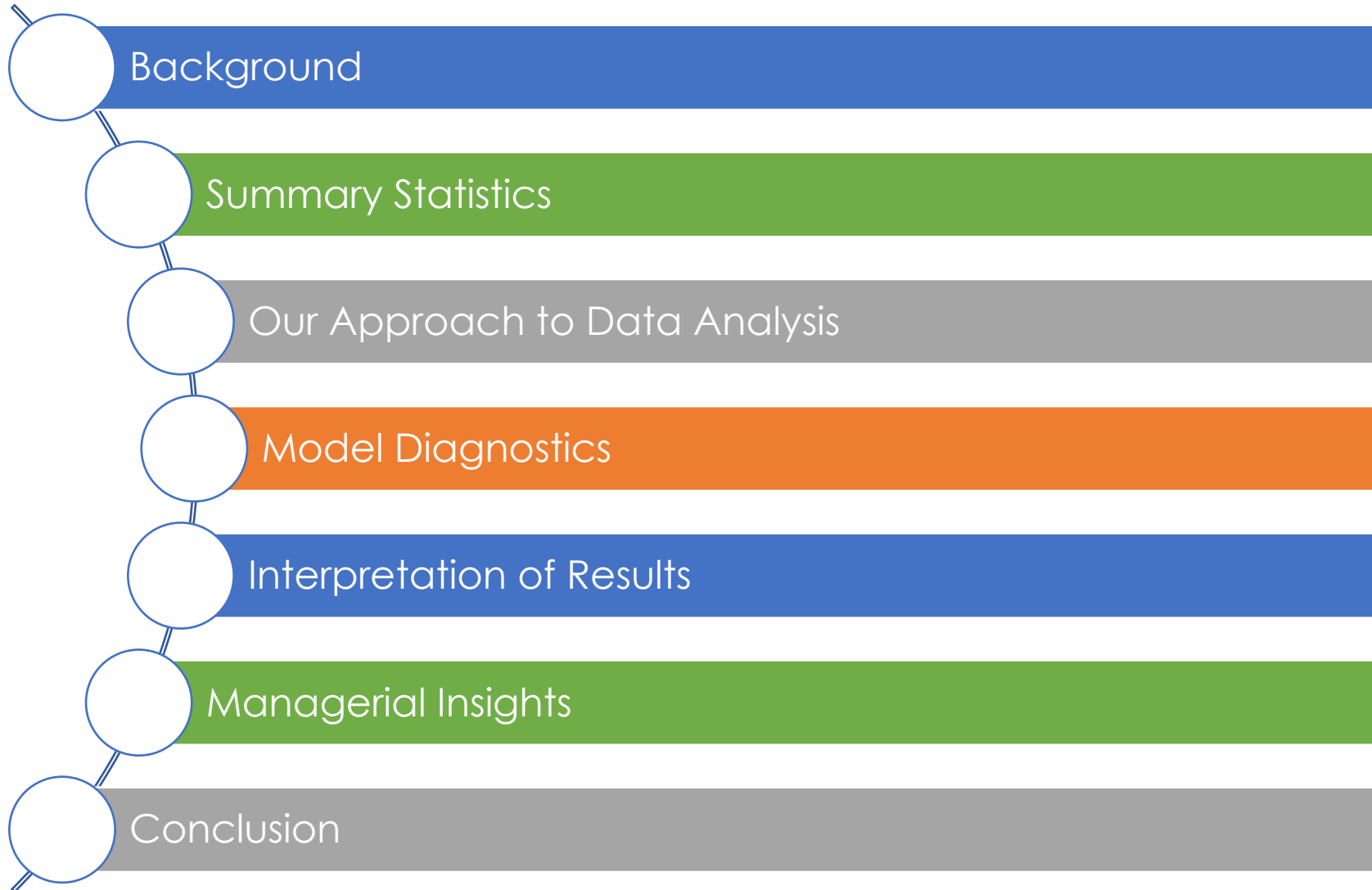
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Xingmin Bao

Agenda



Background

- Starting 2012, the company offered 3 voluntary training modules to its employees (salesperson & store manager) aimed to improve employees' sales & return performance
- In 2013, the company further improved the training program and introduced 5 new additional modules related to product knowledge and service and selling skills
- As Business analysts working on this project, we will use the data (2011-13) for following:
 - To quantify the impact of the training programs
 - To assess the change in impact owing to the service years and other parameter for the salespeople
 - To understand the effect of offering additional training modules

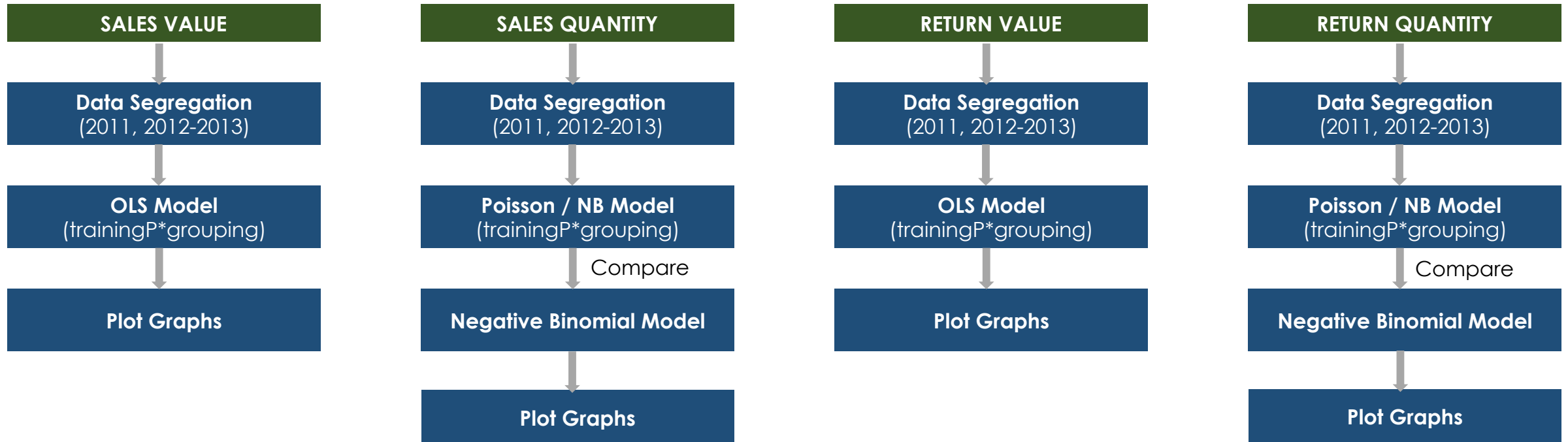
Summary Statistics

store_number	7,844	128.6	75.0	12	60	124	202	250	
employee_id	7,844	828,439.6	339,505.7	1,397	821,655.5	1,015,506	1,034,826.0	1,047,444	
sa_yearsofservice	7,827	2.5	4.0	0.0	1.0	1.0	3.0	34.0	
sa_rateofpay	7,827	48.1	370.1	0.4	8.0	8.5	9.5	24,000.0	
year	7,844	2,012.1	0.8	2,011	2,011	2,012	2,013	2,013	
salesvalue	7,844	17,899.2	64,214.3	0.0	100.0	819.8	8,637.9	1,455,707.0	Dependent variables
returnvalue	7,844	2,748.5	12,034.0	0.0	0.0	92.8	728.2	303,754.2	
salesquantity	7,844	216.8	399.7	1	3	23	235	3,483	
returnquantity	7,844	13.7	26.9	0	0	2	14	279	
avg_female	5,516	0.7	0.3	0.0	0.5	0.8	1.0	1.0	Customer Demographics (Missing Values – replaced by mean values)
avg_age	6,008	4.6	2.6	0.0	3.0	5.0	6.0	13.0	
avg_income	6,016	5.1	1.5	1.0	4.3	5.1	6.0	9.0	
avg_homeowner	6,016	0.7	0.3	0.0	0.5	0.7	0.9	1.0	
avg_residency	6,016	7.3	3.3	0.0	5.4	7.2	9.0	15.0	
avg_childowner	6,016	0.4	0.3	0.0	0.2	0.4	0.5	1.0	
numofmonths_worked	7,844	5.3	4.1	1	1	4	9	12	Mall Quality Indicators (Missing Values – replaced by mean values)
mallsalessf	1,232	367.3	119.1	120.0	320.0	350.0	397.0	700.0	
storesqft	1,232	1,746.9	422.4	1,021.0	1,500.0	1,633.0	1,964.0	2,750.0	
totalcases	1,232	30.9	5.1	22.0	28.0	30.0	34.0	44.0	
padcount	1,232	84.6	13.4	54.0	76.5	85.5	95.5	118.0	Training Modules offered in 2012
warranty	5,834	0.1	0.2	0.0	0.0	0.0	0.0	1.0	
credit	5,834	0.1	0.2	0.0	0.0	0.0	0.0	1.0	
specialevent	5,834	0.1	0.2	0.0	0.0	0.0	0.0	1.0	
celebritybrand	2,972	0.04	0.2	0.0	0.0	0.0	0.0	1.0	Training Modules offered in 2013
celebration	2,972	0.1	0.2	0.0	0.0	0.0	0.0	1.0	
watches	2,972	0.1	0.2	0.0	0.0	0.0	0.0	1.0	
color	2,972	0.1	0.2	0.0	0.0	0.0	0.0	1.0	
service_selling	2,972	0.05	0.2	0.0	0.0	0.0	0.0	1.0	

** The variables sa_assignment category, sa_dependent, sa_maritalstatus , sa_gender, st and mallgrade are not available in the summary statistics because of non-numerical data. They have later been changed and used further in the analysis

Our Approach to Data Analysis...

1 What is the impact of training program on salesperson sales and return performance?



Interpretation of Results

1 What is the impact of training program on salesperson sales and return performance?

SALES VALUE

Dependent variable:			
	logsalesvalue		
	Normal SE	HW-Robust SE	Clustered SE
	(1)	(2)	(3)
trainingP	-0.08 (0.04)	-0.08 (0.05)	-0.08 (0.06)
grouping	2.35*** (0.18)	2.35*** (0.14)	2.35*** (0.18)
trainingP:grouping	-0.02 (0.20)	-0.02 (0.14)	-0.02 (0.12)
Constant	7.48*** (1.63)	7.48*** (1.99)	7.48 (7.29)
Observations	7,662	7,662	7,662
R2	0.61	0.61	0.61
Adjusted R2	0.61	0.61	0.61
Residual Std. Error	1.66	1.66	1.66
F Statistic	716.41***	716.41***	716.41***

Coefficient is insignificant, thus no graph.

There's no impact of training program on salesperson's annual sales value.

SALES QUANTITY

Dependent variable:			
	salesquantity		
	Normal SE	HW-Robust SE	Clustered SE
	(1)	(2)	(3)
trainingP	0.04 (0.04)	0.04 (0.05)	0.04 (0.05)
grouping	-0.04 (0.16)	-0.04 (0.11)	-0.04 (0.11)
trainingP:grouping	-0.02 (0.18)	-0.02 (0.12)	-0.02 (0.10)
Constant	0.81 (1.52)	0.81 (1.13)	0.81 (1.25)
Observations	7,662	7,662	7,662
Log Likelihood	-40,013.28	-40,013.28	-40,013.28
theta	0.64*** (0.01)	0.64*** (0.01)	0.64*** (0.01)
Akaike Inf. Crit.	80,062.56	80,062.56	80,062.56

Coefficient is insignificant, thus no graph.

There's no impact of training program on salesperson's annual sales quantity.

Interpretation of Results

1 What is the impact of training program on salesperson sales and return performance?

RETURN VALUE

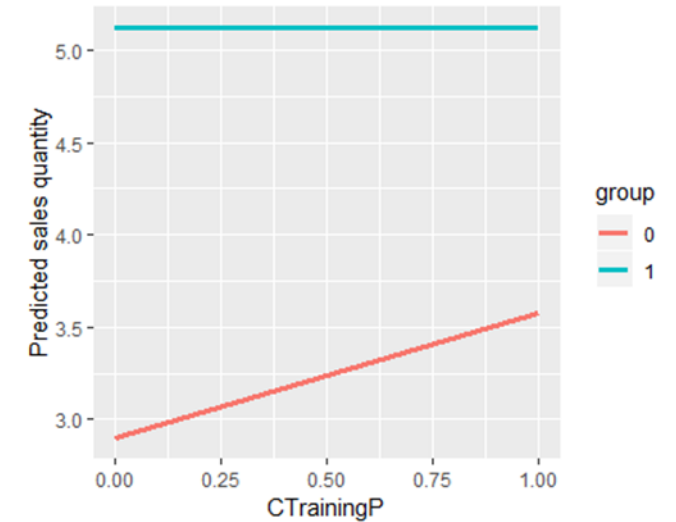
Dependent variable:			
	logreturnvalue		
	Normal SE (1)	HW-Robust SE (2)	Clustered SE (3)
trainingP	0.18*** (0.04)	0.18*** (0.05)	0.18** (0.06)
grouping	1.01*** (0.18)	1.01*** (0.11)	1.01*** (0.14)
trainingP:grouping	-0.20 (0.19)	-0.20 (0.11)	-0.20 (0.14)
Constant	-2.14*** (0.13)	-2.14*** (0.13)	-2.14*** (0.17)
Observations	7,662	7,662	7,662
R2	0.73	0.73	0.73
Adjusted R2	0.73	0.73	0.73
Residual Std. Error	1.63	1.63	1.63
F Statistic	1,605.99***	1,605.99***	1,605.99***

Coefficient is insignificant, thus no graph.
There's no impact of training program on salesperson's annual return value.

RETURN QUANTITY

Dependent variable:			
	returnquantity		
	Normal SE (1)	HW-Robust SE (2)	Clustered SE (3)
trainingP	0.21*** (0.02)	0.21*** (0.02)	0.21*** (0.03)
grouping	0.57*** (0.06)	0.57*** (0.05)	0.57*** (0.07)
trainingP:grouping	-0.21*** (0.06)	-0.21*** (0.05)	-0.21*** (0.05)
Constant	-1.23*** (0.07)	-1.23*** (0.06)	-1.23*** (0.12)
Observations	7,662	7,662	7,662
Log Likelihood	-18,802.71	-18,802.71	-18,802.71
theta	2.79*** (0.08)	2.79*** (0.08)	2.79*** (0.08)
Akaike Inf. Crit.	37,633.41	37,633.41	37,633.41

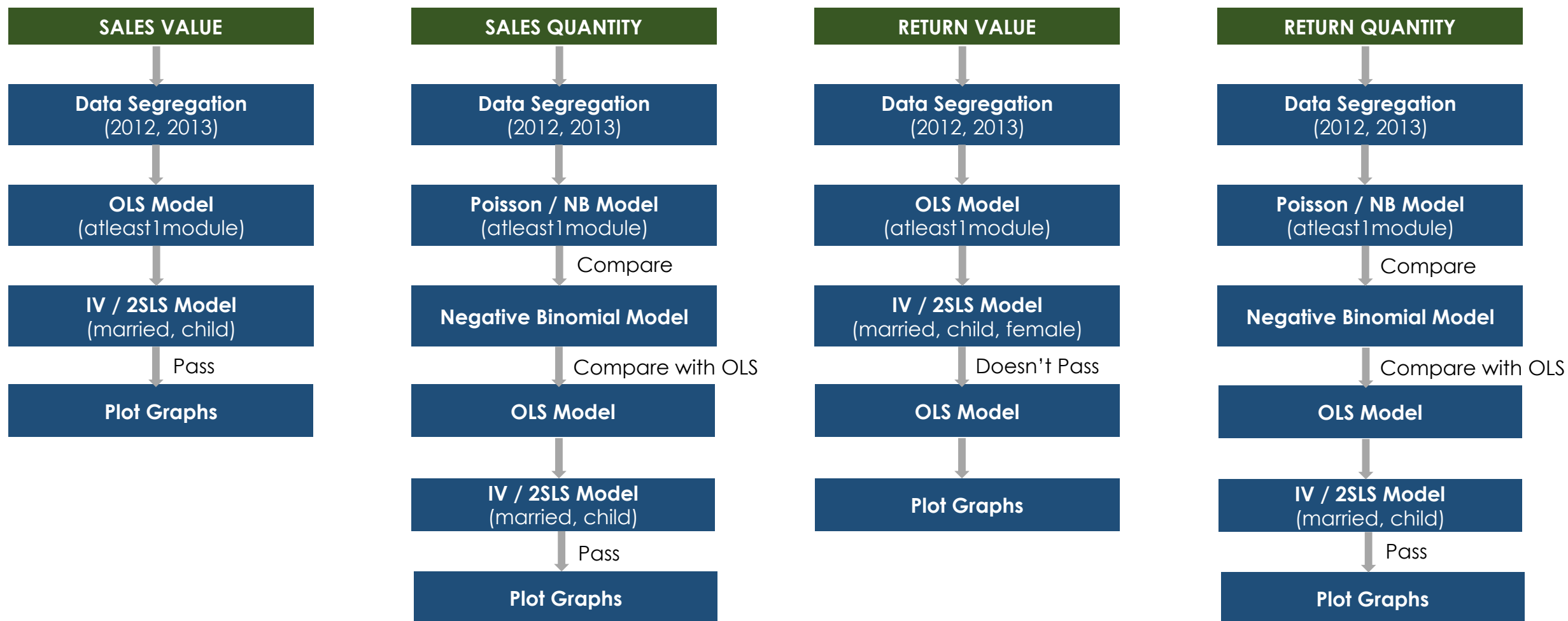
The impact of training program on salesperson's return quantity is -21%



Our Approach to Data Analysis...

2

What is the impact of completing at least one training module on salesperson sales and return performance?



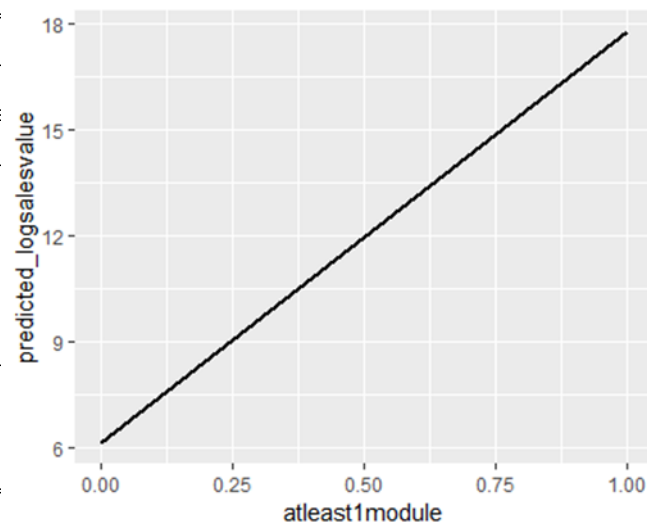
Interpretation of Results

2

What is the impact of completing at least one training module on salesperson sales and return performance?

SALES VALUE

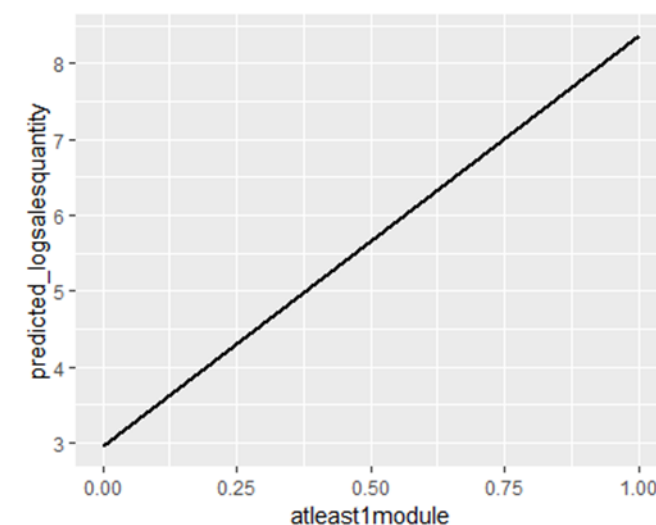
Dependent variable:		
	logsalesvalue	
	Normal SE	Clustered SE
	(1)	(2)
atleast1module	11.7007*** (2.3974)	11.7007*** (3.1321)
Constant	147.9346 (143.5255)	147.9346 (127.4873)
Observations	5,702	5,702
R2	0.0683	0.0683
Adjusted R2	0.0657	0.0657
Residual Std. Error	2.5702	2.5702



If the salesperson completes at least 1 training, his annual sales value will increase by 1170%

SALES QUANTITY

Dependent variable:		
	logsalesquantity	
	Normal SE	Clustered SE
	(1)	(2)
atleast1module	5.4137*** (0.1045)	5.4137*** (0.1226)
Constant	151.1931*** (0.2191)	151.1931*** (0.2772)
Observations	5,702	5,702
R2	0.4079	0.4079
Adjusted R2	0.4062	0.4062
Residual Std. Error	1.8410	1.8410



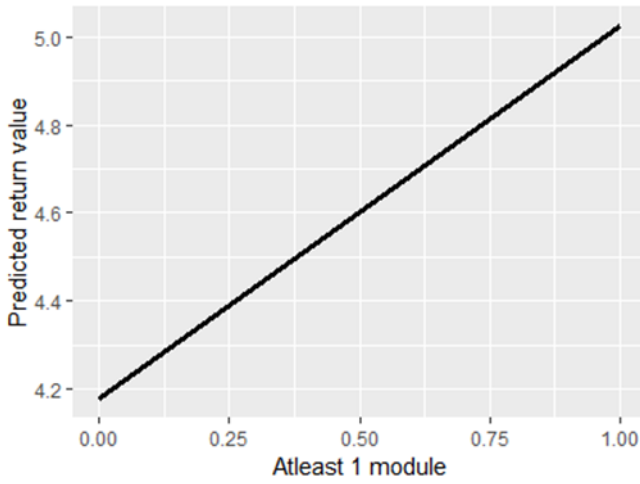
If the salesperson completes at least 1 training, his sales quantity will increase by 541%

Interpretation of Results

2 What is the impact of completing at least one training module on salesperson sales and return performance?

RETURN VALUE

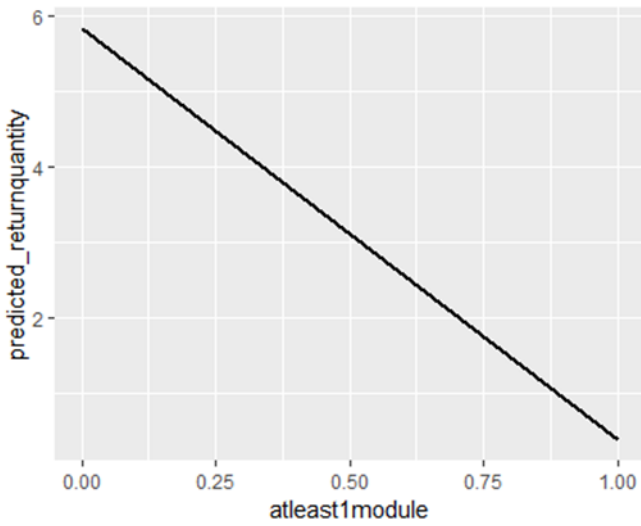
Dependent variable:		
	logreturnvalue	
	Normal SE	Clustered SE
	(1)	(2)
atleast1module	0.8486*** (0.1045)	0.8486*** (0.1226)
Constant	-2.3660*** (0.2191)	-2.3660*** (0.2772)
Observations	5,702	5,702
R2	0.7291	0.7291
Adjusted R2	0.7286	0.7286
Residual Std. Error	1.6209	1.6209
F Statistic	1,276.1110***	1,276.1110***



If the salesperson completes at least 1 training, his annual return value will increase by 84.86%

RETURN QUANTITY

Dependent variable:		
	logreturnquantity	
	Normal SE	Clustered SE
	(1)	(2)
atleast1module	-2.7569*** (0.7552)	-2.7569*** (0.7805)
Constant	-2.1409*** (0.1526)	-2.1409*** (0.1999)
Observations	5,702	5,702
R2	0.6393	0.6393
Adjusted R2	0.6385	0.6385
Residual Std. Error	0.8705	0.8705

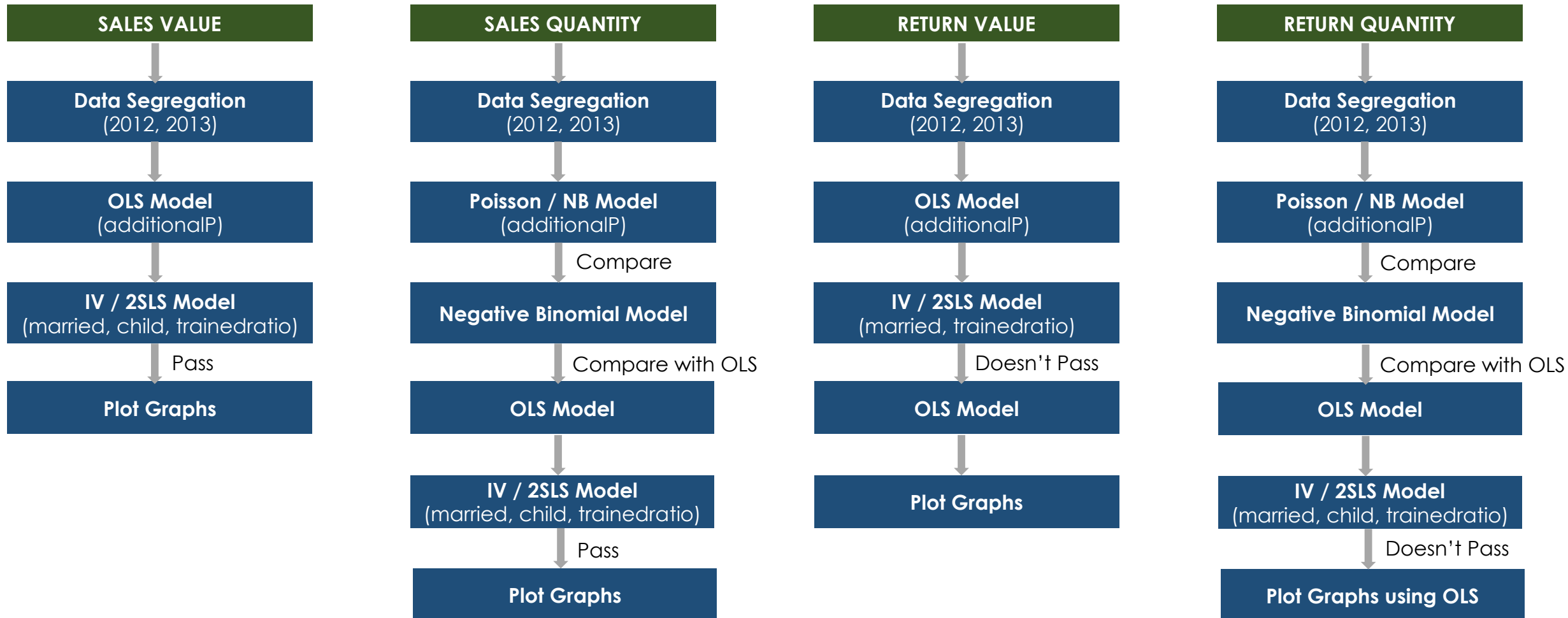


If the salesperson completes at least 1 training, his annual return quantity will decrease by 276%

Our Approach to Data Analysis...

3

What is the impact of completing every additional training module on salesperson sales and return performance?



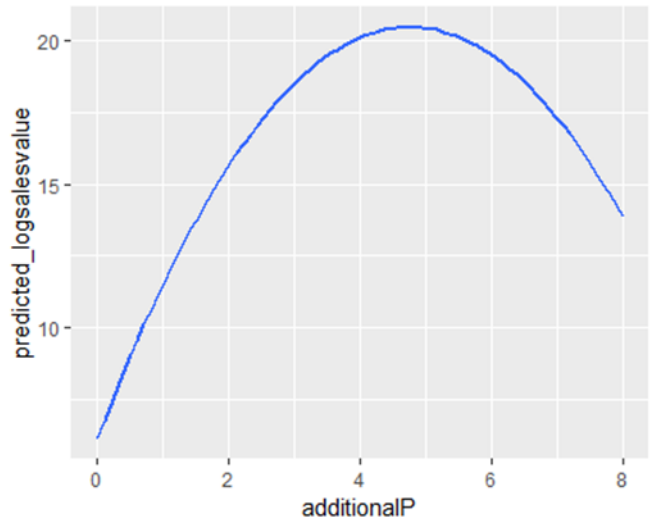
Interpretation of Results

3 What is the impact of completing every additional training module on salesperson sales and return performance?

SALES VALUE

Dependent variable:		
	logsalesvalue	
	Normal SE (1)	Clustered (2)
additionalP	6.0167*** (1.1235)	6.0167*** (1.4113)
I(additionalP2)	-0.6320*** (0.1183)	-0.6320*** (0.1425)
Constant	-1.1667 (4.6417)	-1.1667 (10.4141)

Observations	5,702	5,702
R2	0.0901	0.0901
Adjusted R2	0.0880	0.0880
Residual Std. Error	2.5392	2.5392

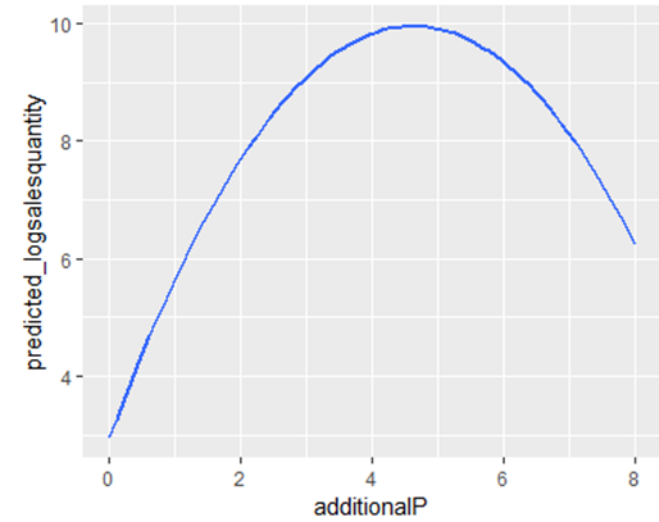


For every additional training that the salesperson takes, the annual sales value will increase by 475.27%

SALES QUANTITY

Dependent variable:	
	logsalesquantity ModelQ3
additionalP	3.02*** (0.85)
I(additionalP2)	-0.33*** (0.09)
Constant	-8.91* (4.24)

Observations	5,702
R2	0.40
Adjusted R2	0.40
Residual Std. Error	1.85



For every additional training that the salesperson takes, the annual return value will increase by 236%

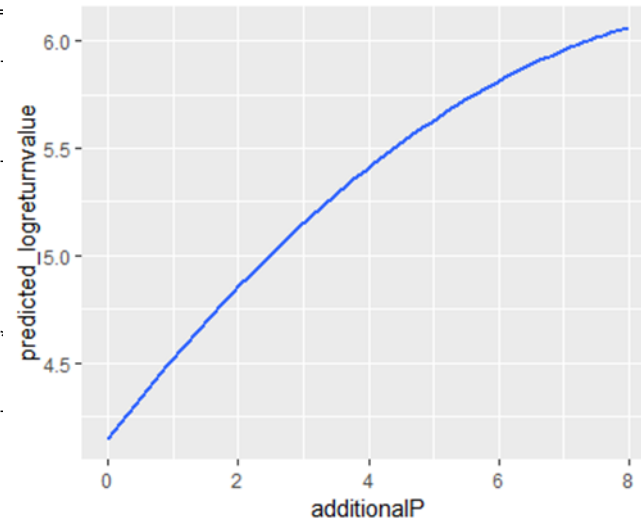
Interpretation of Results

3

What is the impact of completing every additional training module on salesperson sales and return performance?

RETURN VALUE

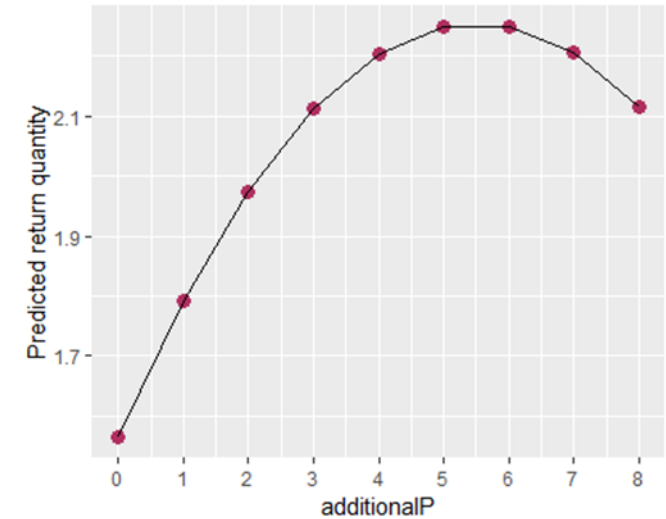
Dependent variable:		
	logreturnvalue	
	Normal SE	Clustered
	(1)	(2)
additionalP	0.3927 (1.0930)	0.3927 (1.2830)
I(additionalP2)	-0.0191 (0.1140)	-0.0191 (0.1329)
Constant	-1.9508*** (0.1766)	-1.9508*** (0.2228)
Observations	5,702	5,702
R2	0.7257	0.7257
Adjusted R2	0.7251	0.7251
Residual Std. Error	1.6311	1.6311



Not significant, there's no effect for taking additional training modules in their return value.

RETURN QUANTITY

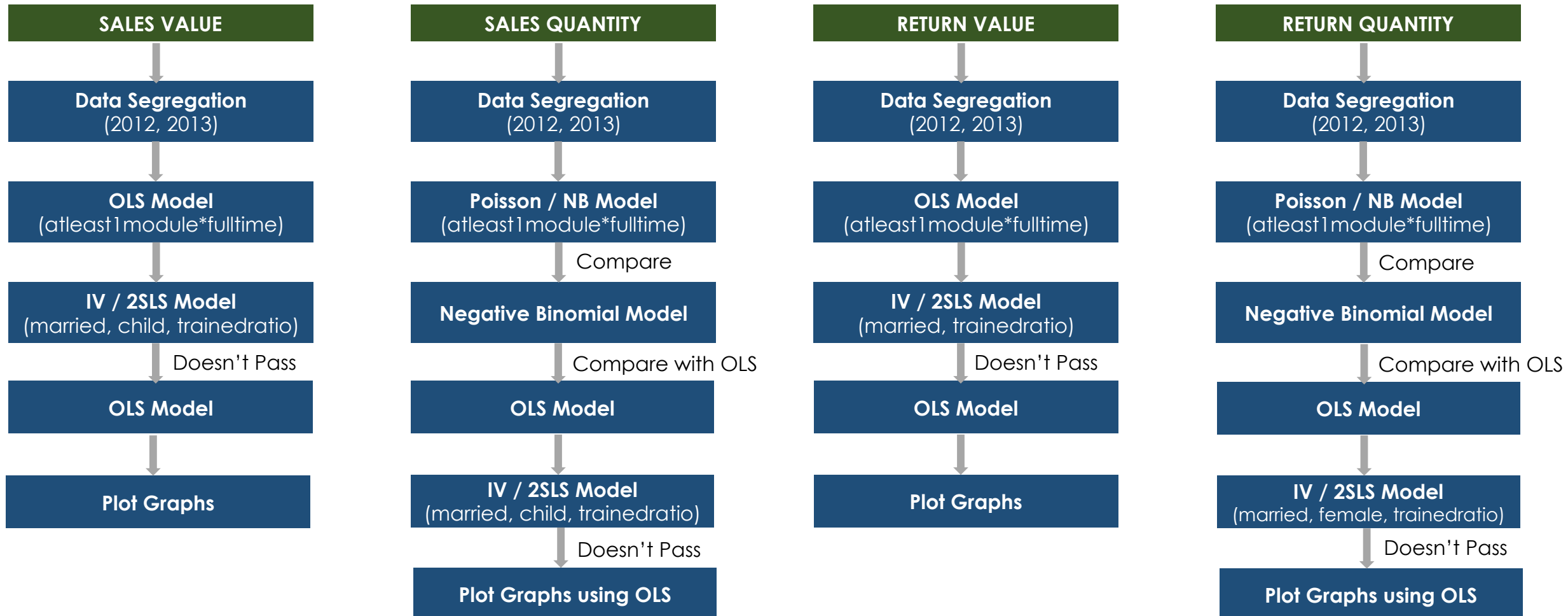
Dependent variable:	
	logreturnquantity
	OLS
additionalP	0.25*** (0.03)
I(additionalP2)	-0.02*** (0.004)
Constant	-64.47 (35.67)
Observations	5,702
R2	0.80
Adjusted R2	0.80
Residual Std. Error	0.65
F Statistic	1,737.63***



For every additional training that the salesperson takes, the annual return quantity is associated with increase by 21%

Our Approach to Data Analysis...

4 Who benefits from the training more : Full-time employees or part-time employees?

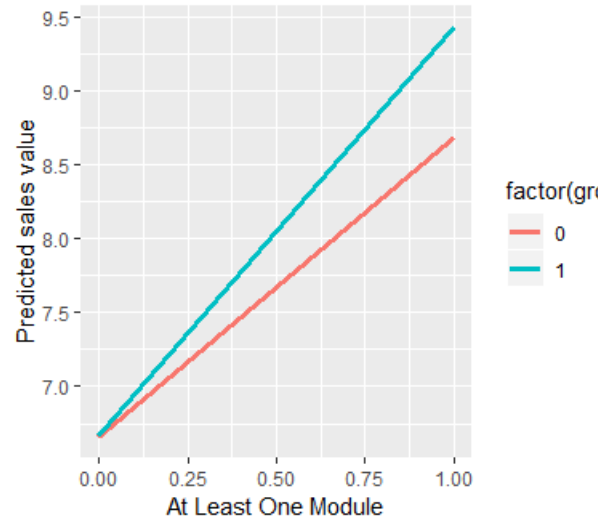


Interpretation of Results

SALES VALUE

Sales Value:

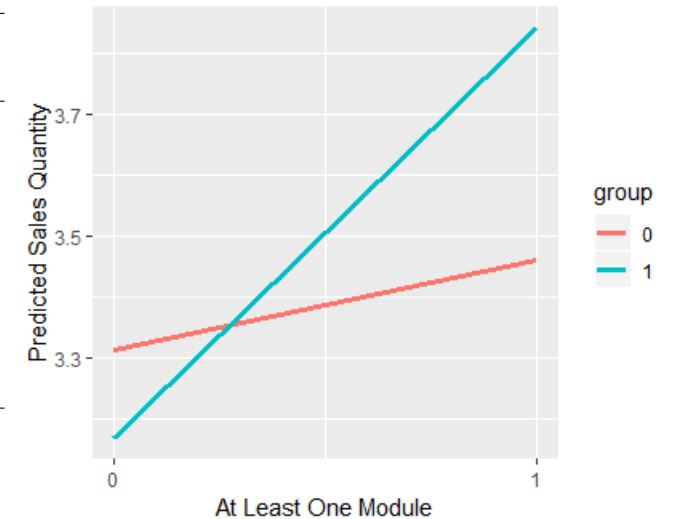
Dependent variable:		
	logsalesvalue	
	Normal SE (1)	Clustered SE (2)
atleast1module	2.0286*** (0.1508)	2.0286*** (0.1777)
fulltime	0.0136 (0.0548)	0.0136 (0.0658)
atleast1module:fulltime	0.7397*** (0.1892)	0.7397*** (0.1726)
Constant	10.0746*** (1.9796)	10.0746 (7.2188)
Observations	5,702	5,702
R2	0.6126	0.6126
Adjusted R2	0.6115	0.6115
Residual Std. Error	1.6573	1.6573
F Statistic	561.9024***	561.9024***



SALES QUANTITY

Sales Quantity:

Dependent variable:		
	logsalesquantity	
	Normal SE (1)	Clustered SE (2)
atleast1module	0.1483 (0.1484)	0.1483 (0.1800)
fulltime	-0.1446** (0.0535)	-0.1446* (0.0574)
atleast1module:fulltime	0.5293 (0.1848)	0.5293** (0.1651)
Constant	228.6771*** (0.2191)	228.6771*** (0.2771)
Observations	5,702	5,702
R2	0.6012	0.6012
Adjusted R2	0.5999	0.5999
Residual Std. Error	1.5112	1.5112
F Statistic	475.9130***	475.9130***



Interpretation of Results

RETURN VALUE

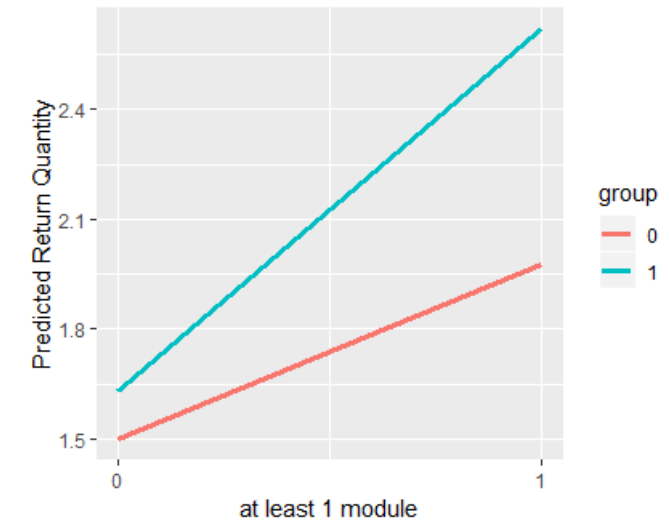
Dependent variable:		
	logreturnvalue	
	Normal SE (1)	Clustered SE (2)
atleast1module	0.7199*** (0.1484)	0.7199*** (0.1800)
fulltime	0.1712** (0.0535)	0.1712** (0.0574)
atleast1module:fulltime	0.2258 (0.1848)	0.2258 (0.1651)
Constant	-2.3633*** (0.2191)	-2.3633*** (0.2771)
Observations	5,702	5,702
R2	0.7292	0.7292
Adjusted R2	0.7286	0.7286
Residual Std. Error	1.6209	1.6209
F Statistic	1,178.1650***	1,178.1650***

Interaction insignificant, there's no impact of being fulltime and taking at least one training on salesperson's return value.

RETURN QUANTITY

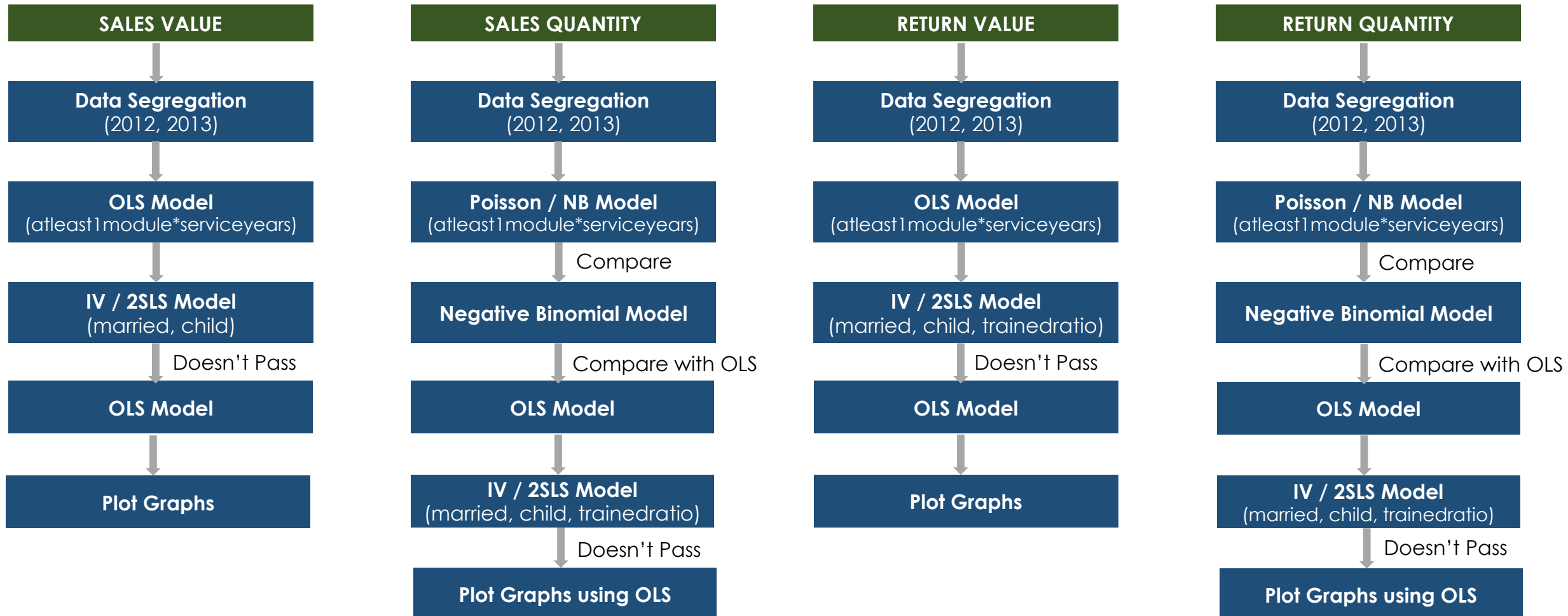
Return Quantity:

Dependent variable:		
	logreturnquantity	
	Normal SE (1)	Clustered Rob (2)
atleast1module	0.48*** (0.08)	0.48*** (0.10)
fulltime	0.13*** (0.03)	0.13*** (0.03)
atleast1module:fulltime	0.51*** (0.10)	0.51*** (0.09)
Constant	19.52 (48.95)	19.52 (52.11)
Observations	5,702	5,702
R2	0.60	0.60
Adjusted R2	0.60	0.60
Residual Std. Error	0.91	0.91
F Statistic	722.92***	722.92***



Our Approach to Data Analysis...

5 Who benefits from the training more : more experienced employees or less experienced employees?

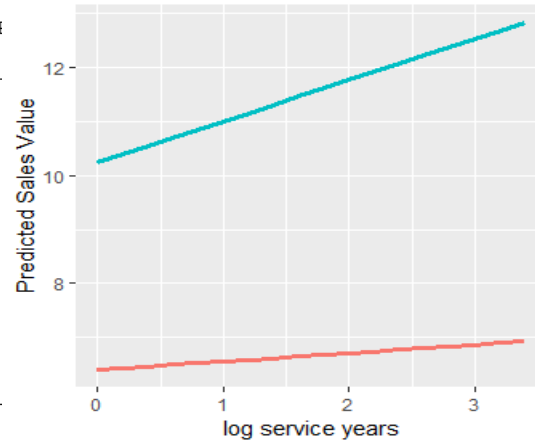


Interpretation of Results

SALES VALUE

Sales Value:

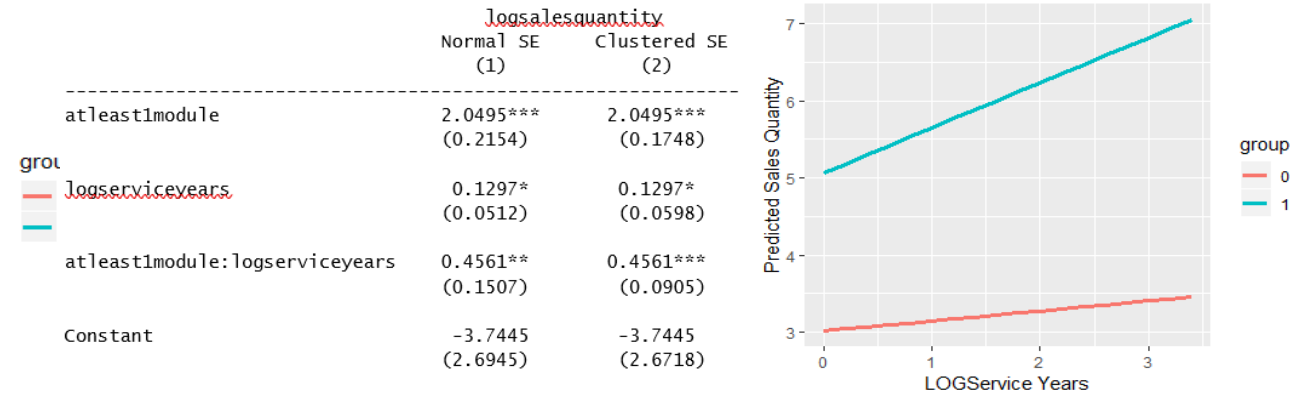
Dependent variable:		
	logsalesvalue	
	Normal SE (1)	Clustered SE (2)
atleast1module	3.8358*** (0.2230)	3.8358*** (0.2618)
logserviceyears	0.1547** (0.0530)	0.1547* (0.0632)
atleast1module:logserviceyears	0.6086*** (0.1569)	0.6086*** (0.1319)
Constant	258.4327* (127.4438)	258.4327** (97.4804)
Observations	5,702	5,702
R2	0.2055	0.2055
Adjusted R2	0.2031	0.2031
Residual Std. Error	2.3736	2.3736
F Statistic	86.4767***	86.4767***



SALES QUANTITY

Sales Quantity:

Dependent variable:		
	logsalesquantity	
	Normal SE (1)	Clustered SE (2)
atleast1module	2.0495*** (0.2154)	2.0495*** (0.1748)
logserviceyears	0.1297* (0.0512)	0.1297* (0.0598)
atleast1module:logserviceyears	0.4561** (0.1507)	0.4561*** (0.0905)
Constant	-3.7445 (2.6945)	-3.7445 (2.6718)
Observations	5,702	5,702
R2	0.0800	0.0800
Adjusted R2	0.0779	0.0779
Residual Std. Error	2.2941	2.2941
F Statistic	38.0553***	38.0553***



Interpretation of Results

RETURN VALUE

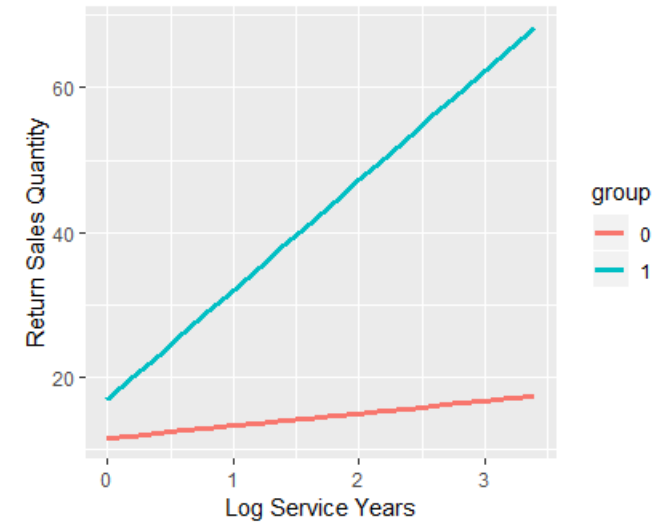
Dependent variable:		
	logreturnvalue	
	Normal SE (1)	Clustered SE (2)
atleast1module	0.7840*** (0.1576)	0.7840*** (0.1721)
logserviceyears	0.1470*** (0.0359)	0.1470*** (0.0394)
atleast1module:logserviceyears	0.0260 (0.1080)	0.0260 (0.0887)
Constant	-2.2501*** (0.2221)	-2.2501*** (0.3680)
Observations	5,702	5,702
R2	0.7227	0.7227
Adjusted R2	0.7221	0.7221
Residual Std. Error	1.6401	1.6401
F Statistic	1,235.4170***	1,235.4170***

The interaction term is insignificant.

Return Quantity:

RETURN QUANTITY

Dependent variable:		
	returnquantity	
	Normal SE (1)	Clustered SE (2)
atleast1module	5.3293** (1.8737)	5.3293 (3.5138)
logserviceyears	1.7178*** (0.4347)	1.7178** (0.5733)
atleast1module:logserviceyears	13.4369*** (1.3068)	13.4369*** (3.4190)
Constant	-26.7031*** (2.5956)	-26.7031*** (3.6987)
Observations	5,702	5,702
R2	0.4991	0.4991
Adjusted R2	0.4980	0.4980
Residual Std. Error	19.8564	19.8564
F Statistic	472.3331***	472.3331***



Our Approach to Data Analysis...

6 Is the impact of training on sales performance different for employees who completed the service and selling training from that for employees who did not complete the service and selling training ?



Interpretation of Results

SALES VALUE

Dependent variable:		
	logsalesvalue	
	Normal SE	Clustered SE
	(1)	(2)
service_selling	77.00 (60.48)	77.00 (77.25)
productknowledge	3.40* (1.60)	3.40* (1.40)
service_selling:productknowledge	-15.32 (9.31)	-15.32 (12.54)
Constant	9.68 (16.43)	9.68 (17.93)
Observations	5,702	5,702
R2	-0.74	-0.74
Adjusted R2	-0.75	-0.75
Residual Std. Error	3.52	3.52

The interaction term is insignificant. Thus the conclusion is the impact of training on sales value is the same for employees who took service and selling training and those who didn't complete the service and selling training

SALES QUANTITY

Dependent variable:		
	logsalesquantity	
	Normal SE	Clustered SE
	(1)	(2)
service_selling	33.75 (46.29)	33.75 (44.82)
productknowledge	1.70 (1.17)	1.70 (1.23)
service_selling:productknowledge	-6.98*** (6.97)	-6.98 (7.01)
Constant	-2.12 (12.16)	-2.12 (12.60)
Observations	5,702	5,702
R2	0.19	0.19
Adjusted R2	0.19	0.19
Residual Std. Error	2.16	2.16

Note: *p<0.05; **p<0.01; ***p<0.001

The interaction term is insignificant. Thus the conclusion is the impact of training on sales quantity is the same for employees who took service and selling training and those who didn't complete the service and selling training

Limitations

- Missing data in the dataset impacts analysis
- Lack of Instrumental Variables results in biased coefficients/incomplete analysis
- Insufficient store level information couldn't explain the change in sales and return behavior with respect to changes in salesperson's behavior
- Unavailability of the price range of the products results in inadequate comparison for sales quantity and value changes
- Lack of information on product categories being sold could not explain the variation in sales corresponding to the training module being taken
- Some insights on the background including experience years, education of the salesperson would have captured the impact of training

Managerial Insights / Conclusions

- The impact can be summarized as follows
 - No significant impact of overall training program on sales, however, the returns increases which signifies over-selling
 - Increase in training modules increases the sales only for initial modules. Any additional module after that decreases the sales
 - Full- time employees benefit more as compared to the part time employees. This can be attributed to the salaries, motivation level for the two groups
 - The sales increases with increase in service years
 - No significant impact of service and selling.
- Capturing more data pertaining to existing variables for an extended period
- Identifying and capturing new parameters that includes salesperson's background information(experience years, education), store level information including promotions specific to the stores
- Customized training modules and restriction/penalty on return for salespeople can be tested as a control to decrease the returns



Thank you !
