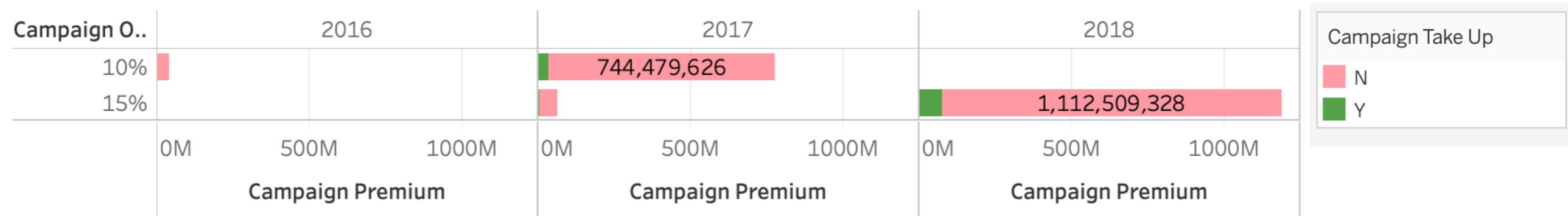


Phoenix Campaign Enhancement

Presentation May 2020

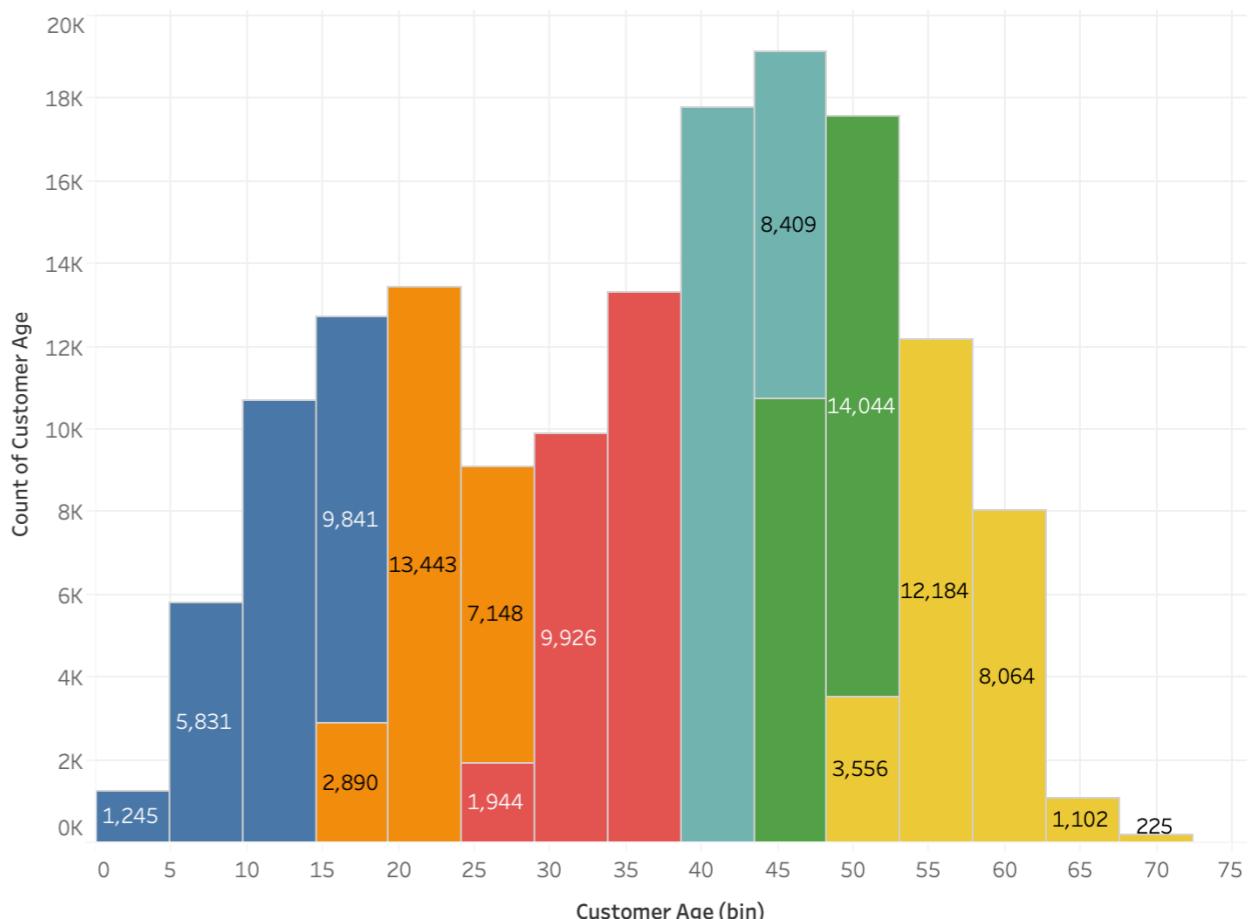
2016 - 2018



Age Range

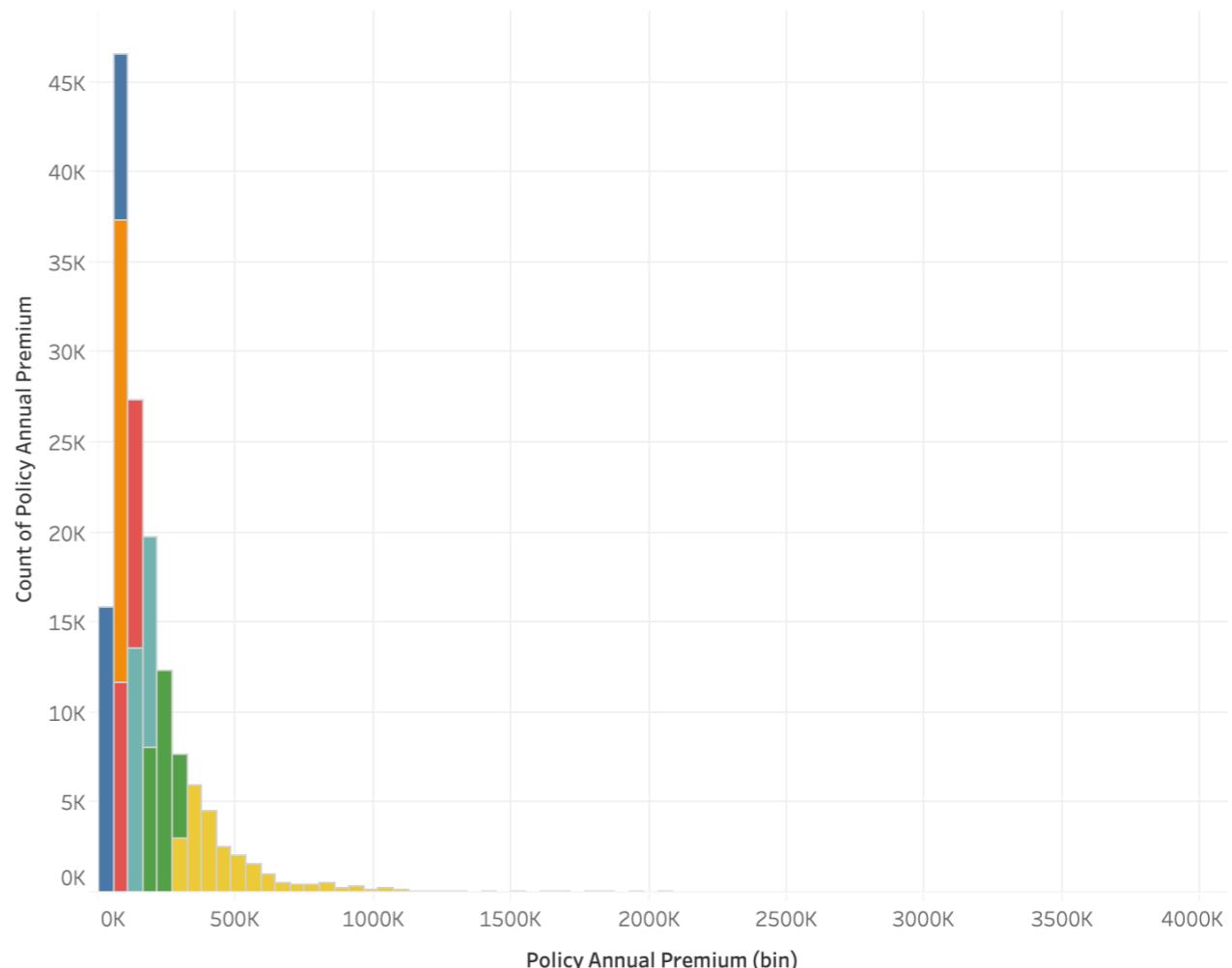
1 - 18
19 - 27
28 - 38
39 - 45
46 - 52
53+

Age distribution



Policy Annual Premium Range

1 - 60,000
60,001 - 88,000
88,001 - 130,000
130,000 - 190,000
190,001 - 300,000
300,001+



Age Range

Annual Range

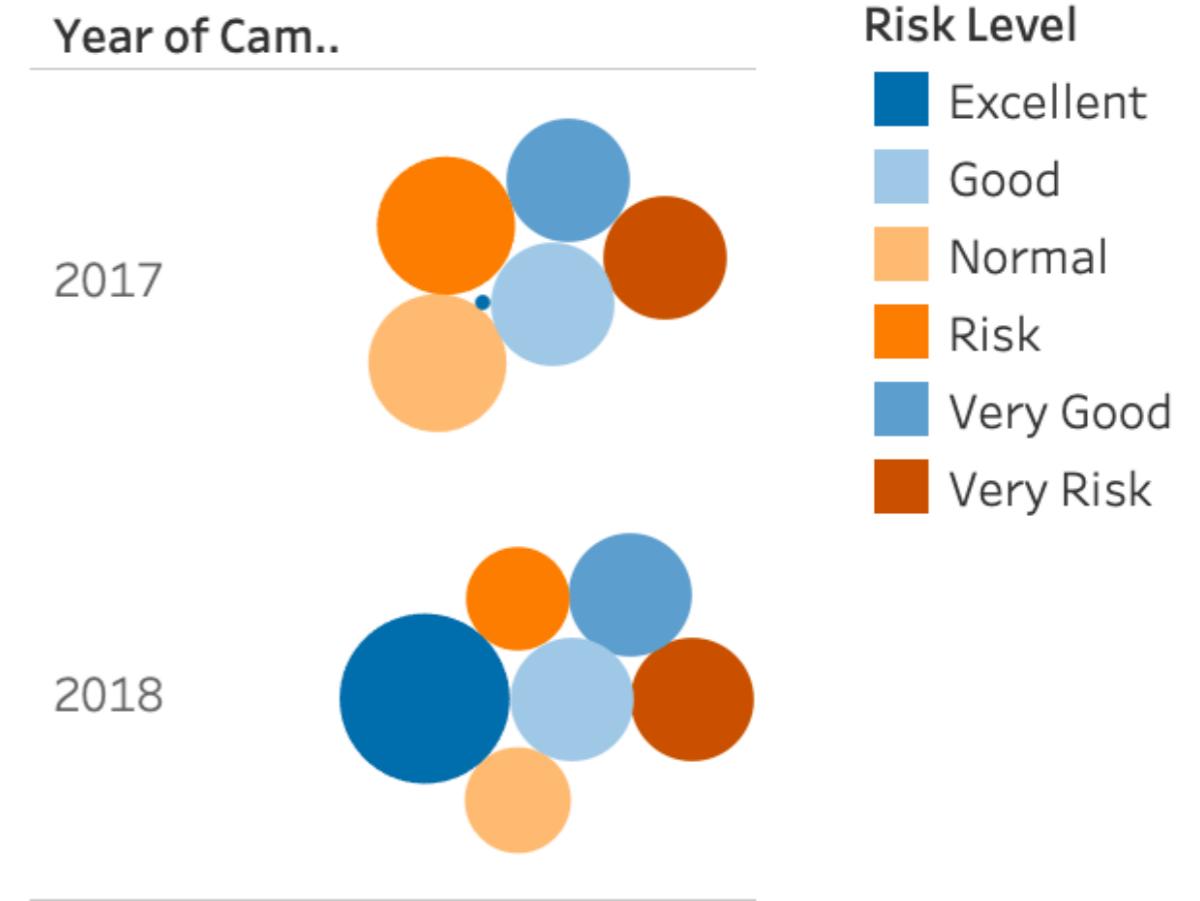
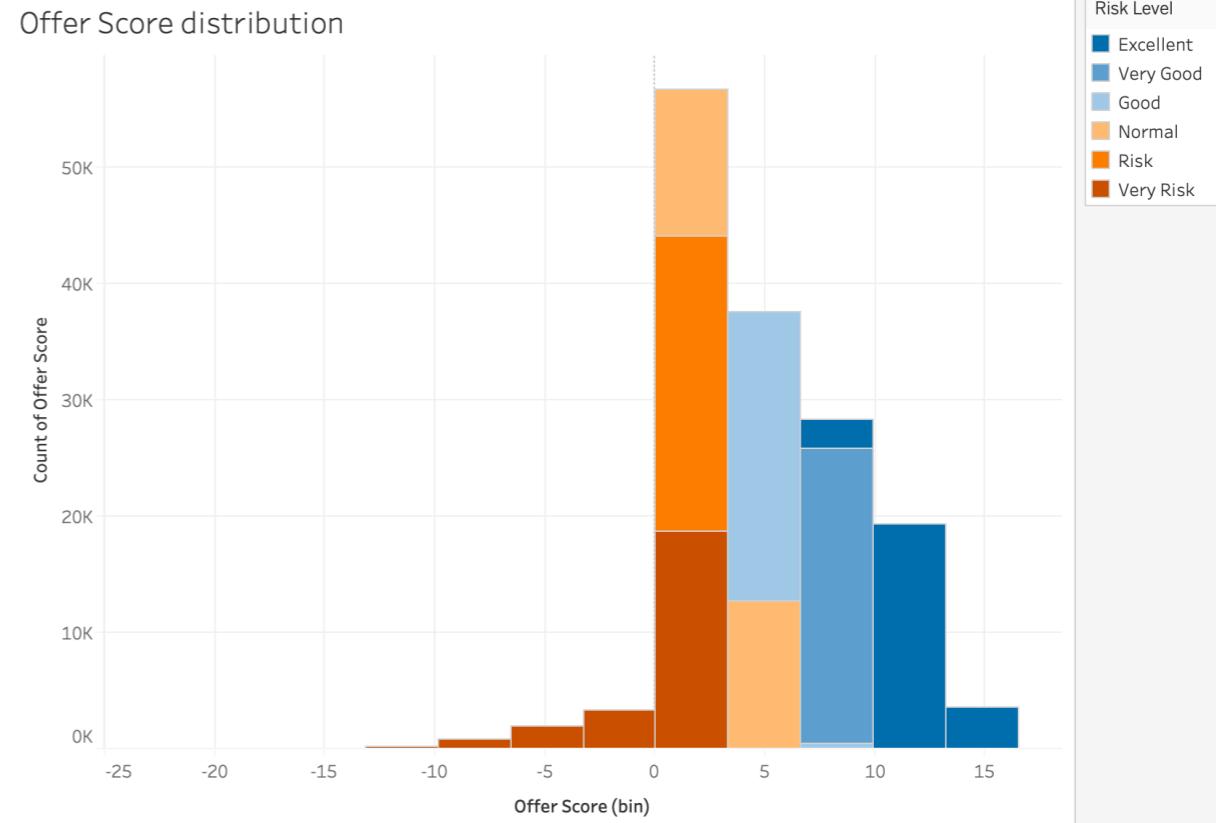
Actual Offer Percent =
Campaign Premium * 100 / Policy Annual Premium

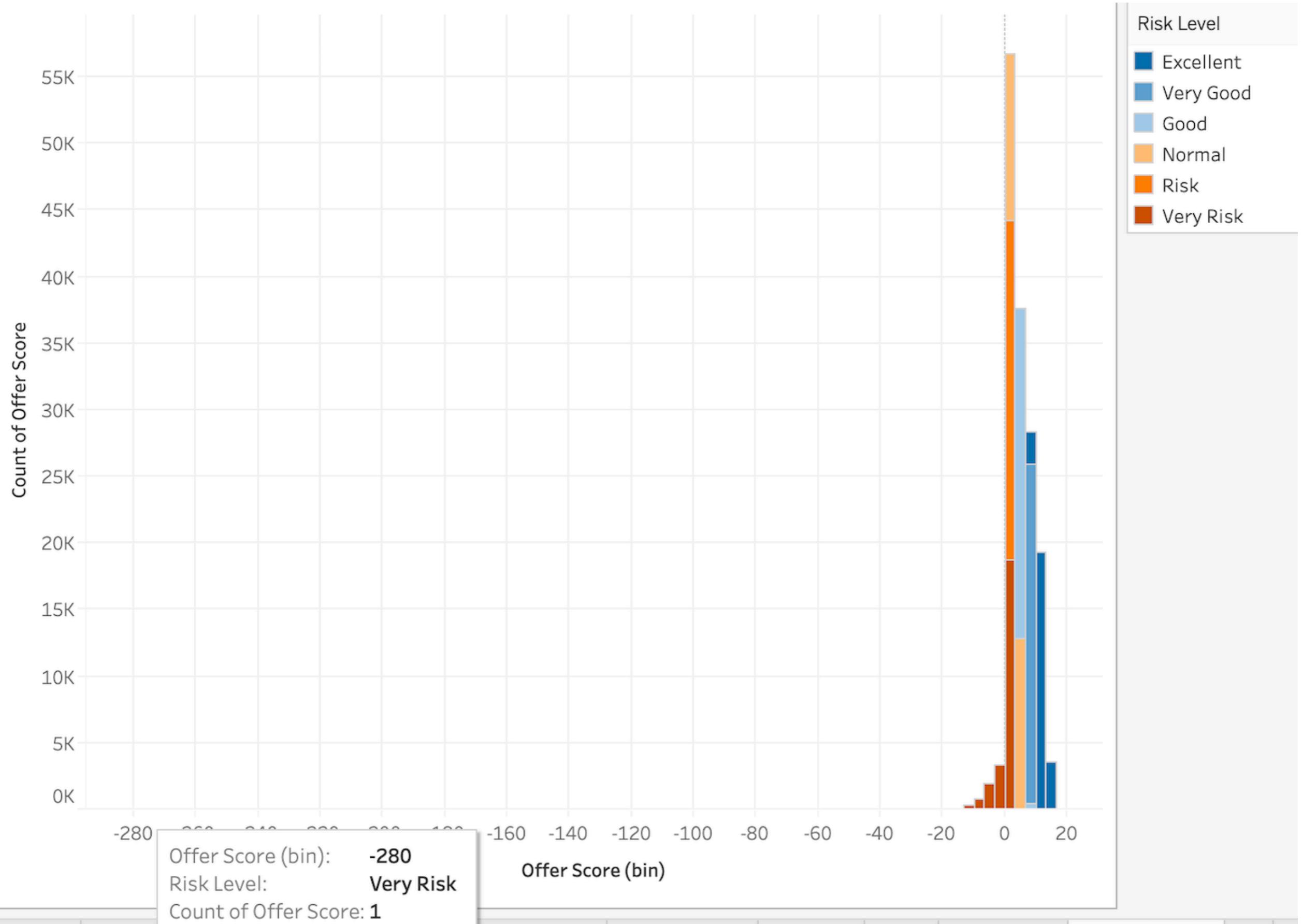
Offer Score =
Campaign Offer Percent - Actual Offer Percent



Risk Level

- Very Risk
(offer score ≤ 0.98)
- Risk
(offer score ≤ 2.41)
- Normal
(offer score ≤ 4.45)
- Good
(offer score ≤ 6.63)
- Very Good
(offer score ≤ 9.43)
- Excellent
(offer score > 9.43)





Hypothesis Testing

$$H_0: \mu_1 \leq \mu_2$$

$$H_1: \mu_1 > \mu_2$$

Null Hypothesis: Average Campaign Premium in 2018 (15%) is less than or equal to Average Campaign Premium in 2017 (10%)

Alternative Hypothesis: Average Campaign Premium in 2018 (15%) is greater than Average Campaign Premium in 2017 (10%)

Testing Criteria

- Age Range
- Annual Premium Range
- Customer Gender
- Customer Marital Status
- Campaign Offer Product
- Risk Level

Level 1 - Criteria

```
1 arr = ['age_range', 'customer_gender', 'cus_marital_status', 'annual_range', 'campaign_offer_product', 'risk_level']
2 r = 1
3 for each in rSubset(arr, r):
4     cols = [each_2 for each_2 in each]
5     print(cols)
```

```
['age_range']
['customer_gender']
['cus_marital_status']
['annual_range']
['campaign_offer_product']
['risk_level']
```

Level 2 - Criteria

```
1 arr = ['age_range', 'customer_gender', 'cus_marital_status', 'annual_range', 'campaign_offer_product', 'risk_level']
2 r = 2
3 for each in rSubset(arr, r):
4     cols = [each_2 for each_2 in each]
5     print(cols)
```

```
['age_range', 'customer_gender']
['age_range', 'cus_marital_status']
['age_range', 'annual_range']
['age_range', 'campaign_offer_product']
['age_range', 'risk_level']
['customer_gender', 'cus_marital_status']
['customer_gender', 'annual_range']
['customer_gender', 'campaign_offer_product']
['customer_gender', 'risk_level']
['cus_marital_status', 'annual_range']
['cus_marital_status', 'campaign_offer_product']
['cus_marital_status', 'risk_level']
['annual_range', 'campaign_offer_product']
['annual_range', 'risk_level']
['campaign_offer_product', 'risk_level']
```

Level 1 - Criteria

Total of 28 Criteria (excluding product H1, H2)

Average Campaign Premium in 2018 (15%) of **26** criteria is significantly greater than Average Campaign Premium in 2017 (10%)

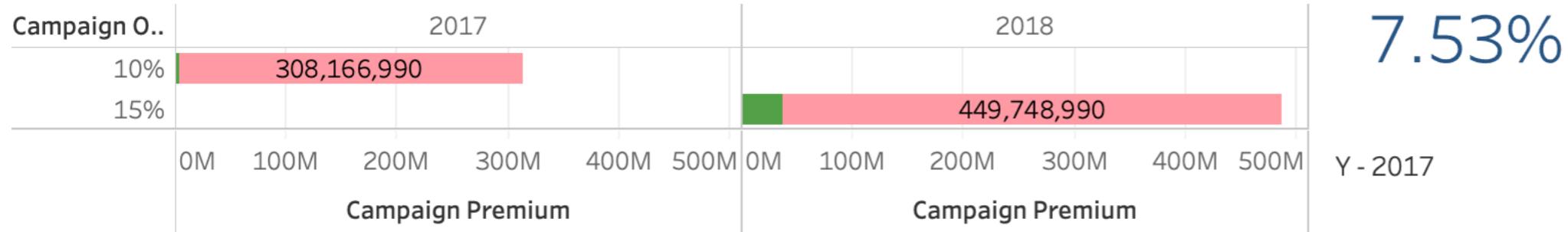
While Average Campaign Premium in 2018 (15%) of **2** criteria (A2, C1) is not significantly greater than Average Campaign Premium in 2017 (10%)

$$26 * 100 / 28 = 92.86\%$$

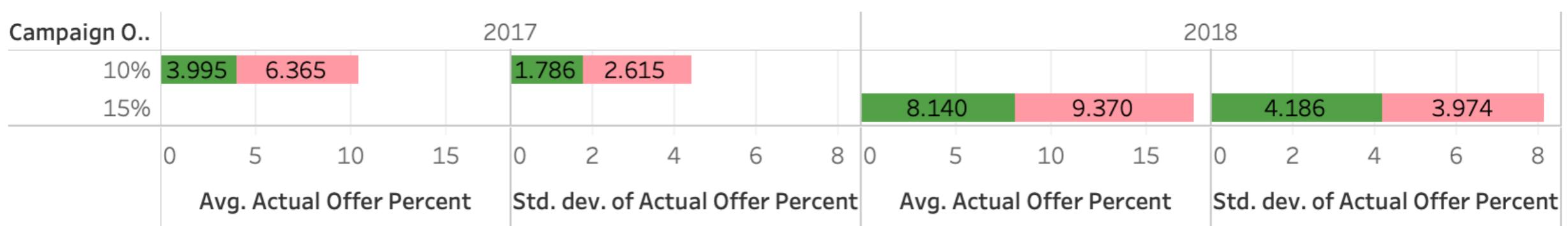
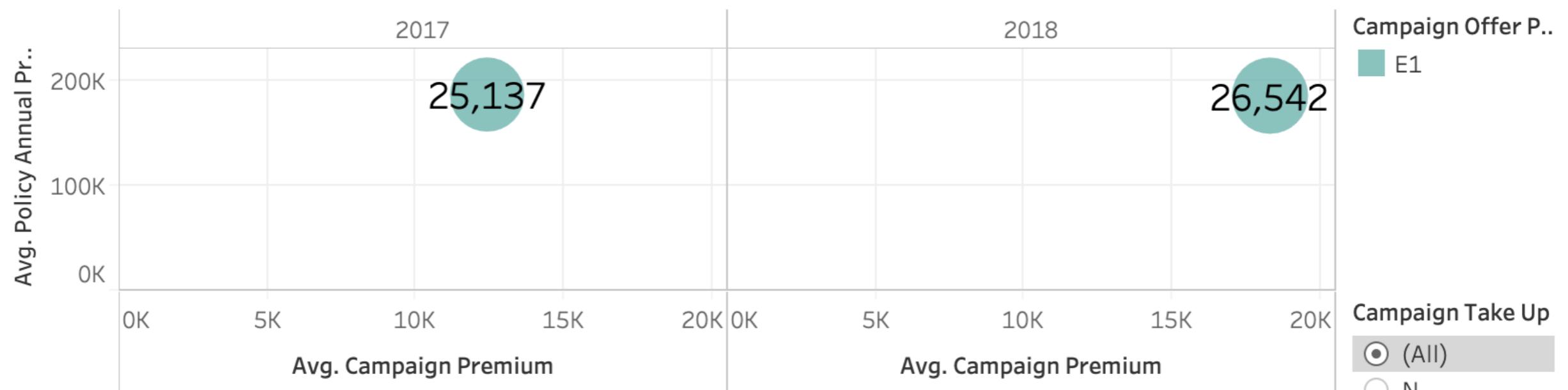
| group | sample_2018_no | sample_2017_no | y_2018 | y_2017 | y_score | greater_p_value | premium_2018_Mean | premium_2017_Mean |
|------------------|----------------|----------------|--------|--------|---------|-----------------|-------------------|-------------------|
| E1 | 2951 | 1359 | 7.53 | 1.41 | 6.13 | 0.0 | 12,417.0 | 3,232.0 |
| 28-38 | 909 | 364 | 5.36 | 1.92 | 3.44 | 0.0 | 10,959.0 | 6,940.0 |
| Very Good | 1217 | 714 | 7.24 | 3.93 | 3.32 | 0.0 | 8,191.0 | 4,033.0 |
| Good | 2471 | 1809 | 7.67 | 4.4 | 3.27 | 0.0 | 9,158.0 | 4,021.0 |
| 1-18 | 1487 | 1029 | 7.73 | 4.57 | 3.17 | 0.0 | 5,864.0 | 4,405.0 |
| 01 Single | 3679 | 2294 | 7.13 | 4.08 | 3.05 | 0.0 | 7,992.0 | 4,984.0 |
| 190,001-300,0000 | 812 | 377 | 5.85 | 2.88 | 2.97 | 0.0 | 17,536.0 | 12,208.0 |
| 300,001+ | 604 | 226 | 4.18 | 1.5 | 2.68 | 0.0 | 32,529.0 | 22,385.0 |
| 19-27 | 1731 | 1175 | 10.19 | 7.69 | 2.5 | 0.0 | 6,814.0 | 4,518.0 |
| F | 3103 | 2092 | 5.8 | 3.45 | 2.35 | 0.0 | 11,647.0 | 6,720.0 |
| Very Risk | 840 | 834 | 5.55 | 3.26 | 2.3 | 0.0 | 18,643.0 | 9,136.0 |
| 130,000-190,000 | 975 | 543 | 6.9 | 4.61 | 2.29 | 0.0 | 12,070.0 | 9,074.0 |
| 46-52 | 923 | 770 | 5.91 | 3.62 | 2.29 | 0.0 | 15,164.0 | 7,074.0 |
| 39-45 | 862 | 613 | 4.76 | 2.68 | 2.08 | 0.0 | 13,366.0 | 7,010.0 |
| 00 NA | 1195 | 874 | 5.34 | 3.42 | 1.93 | 0.0 | 13,771.0 | 7,694.0 |
| M | 3821 | 2968 | 7.0 | 5.13 | 1.87 | 0.0 | 10,358.0 | 6,391.0 |
| Risk | 1479 | 1945 | 5.42 | 3.74 | 1.68 | 0.0 | 19,299.0 | 8,725.0 |
| 04 Divorce | 43 | 44 | 5.53 | 4.05 | 1.48 | 0.0 | 14,504.0 | 6,559.0 |
| 02 Maried | 1959 | 1816 | 6.38 | 4.97 | 1.41 | 0.0 | 14,534.0 | 7,841.0 |

Overall - E1

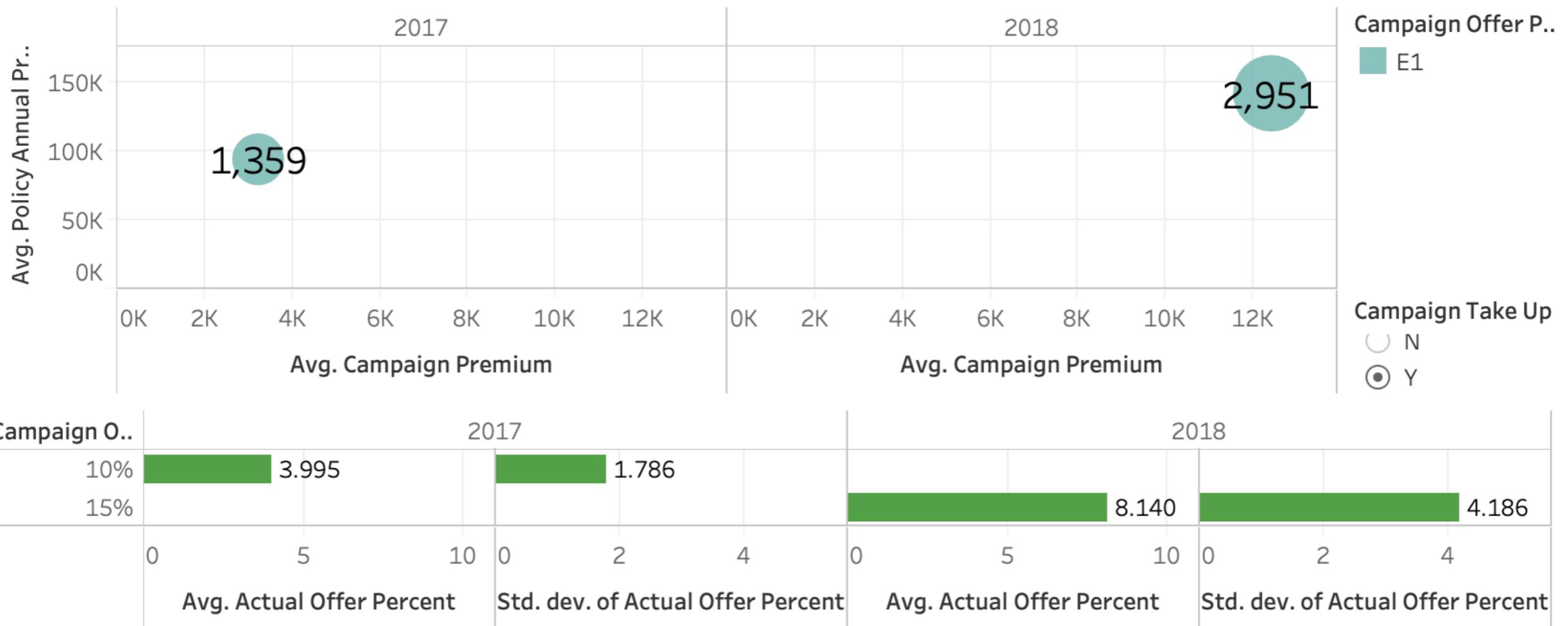
Campaign Premium 17/18



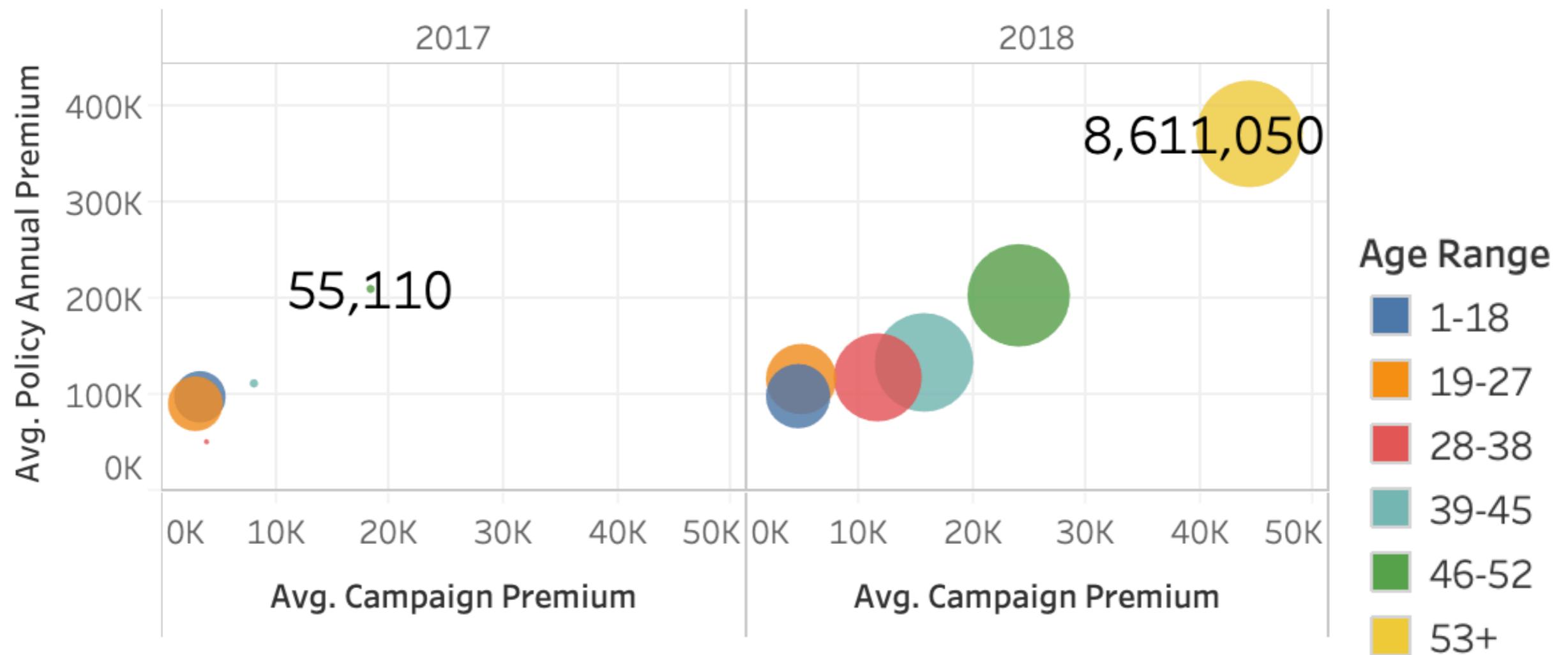
- Campaign Take Up**
 - N
 - Y
- Age Range**
 - (All)
 - 1-18
 - 19-27
 - 28-38
 - 39-45
 - 46-52
 -



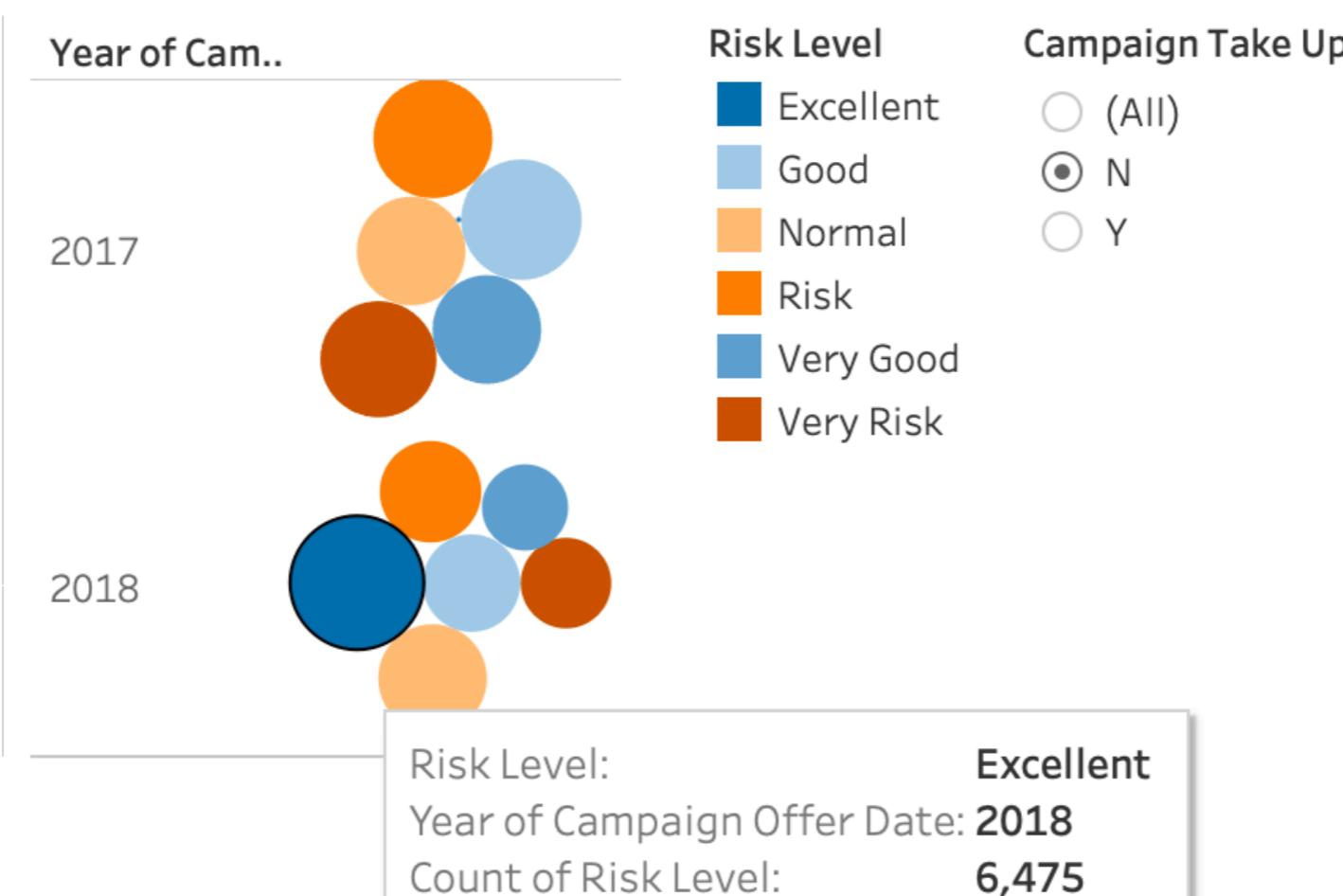
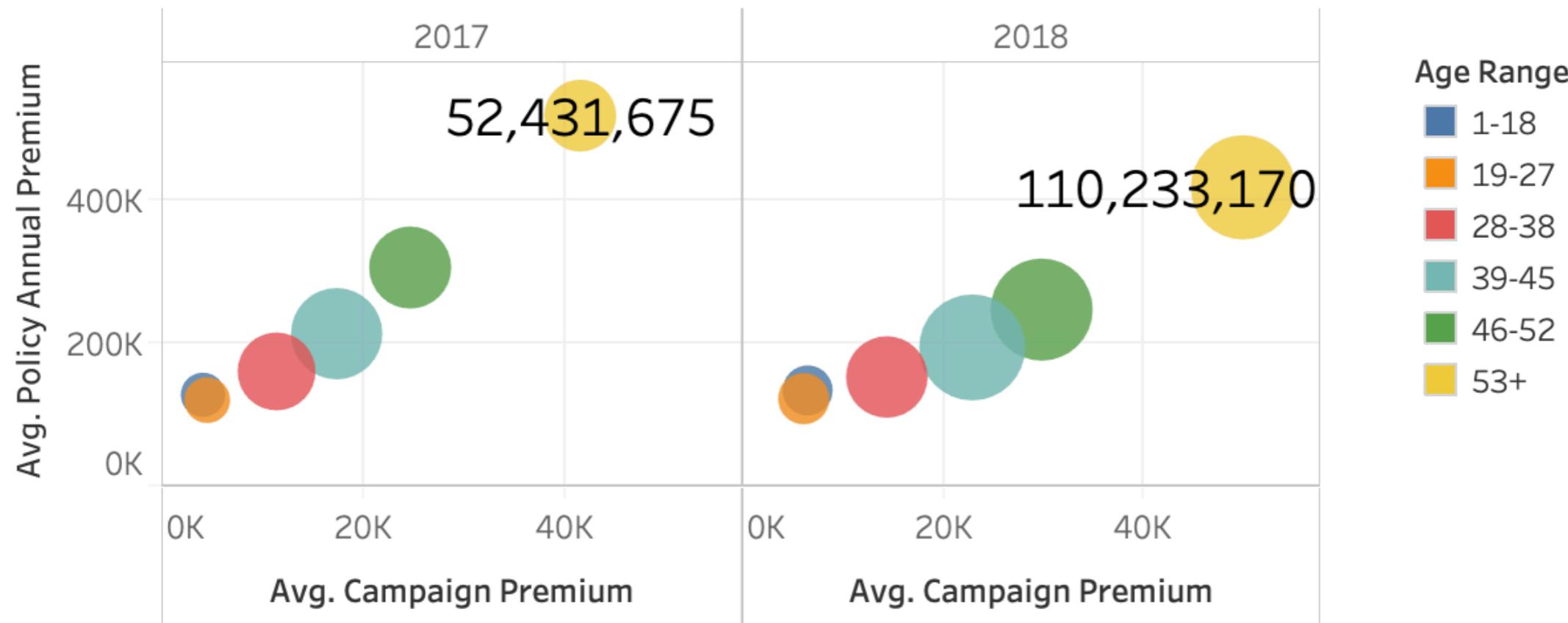
E1 - Campaign Take Up = Yes



E1 - Campaign Take Up = Yes



E1 - Campaign Take Up = No



Level 2 - Criteria

Total of 262 Criteria

Average Campaign Premium in 2018 (15%) of **239** criteria is significantly greater than Average Campaign Premium in 2017 (10%)

While Average Campaign Premium in 2018 (15%) of **23** criteria (A1:2, A2:11, C1:9, 19-27 Married) is not significantly greater than Average Campaign Premium in 2017 (10%)

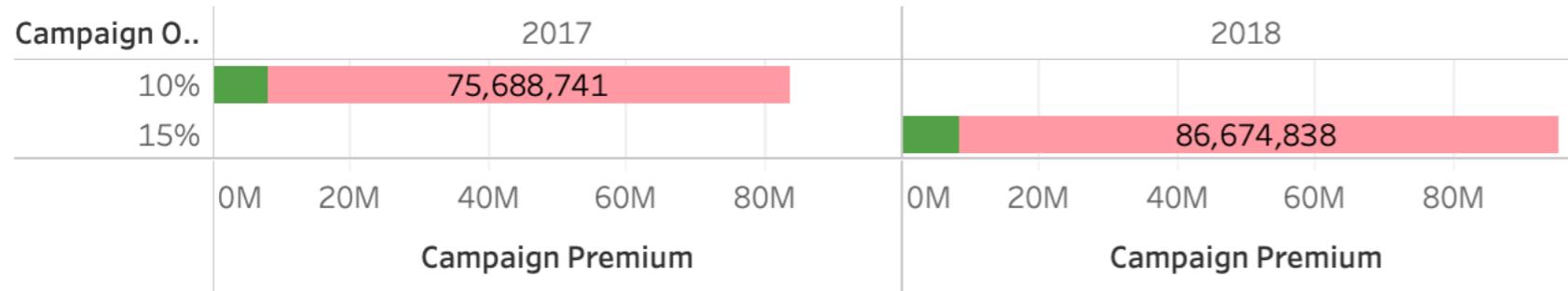
$$239 * 100 / 262 = 91.22\%$$

| group | sample_2018_no | sample_2017_no | y_2018 | y_2017 | y_score | greater_p_value | premium_2018_Mean | premium_2017_Mean |
|---------------------|----------------|----------------|--------|--------|---------|-----------------|-------------------|-------------------|
| 88,001-130,0000_E1 | 421 | 117 | 10.51 | 1.76 | 8.75 | 0.0 | 9,584.0 | 2,942.0 |
| C1_Good | 120 | 42 | 11.17 | 2.49 | 8.69 | 0.0 | 13,453.0 | 6,978.0 |
| 60,001-88,000_E1 | 631 | 306 | 13.48 | 5.03 | 8.45 | 0.0 | 5,647.0 | 2,686.0 |
| 02 Maried_E1 | 719 | 32 | 7.49 | 0.16 | 7.33 | 0.0 | 19,822.0 | 6,089.0 |
| 130,000-190,000_E1 | 421 | 119 | 8.86 | 1.59 | 7.28 | 0.0 | 13,702.0 | 5,155.0 |
| E1_Very Risk | 262 | 44 | 7.0 | 0.27 | 6.73 | 0.0 | 30,629.0 | 7,358.0 |
| F_E1 | 1433 | 394 | 7.43 | 0.73 | 6.69 | 0.0 | 13,946.0 | 3,221.0 |
| E1_Normal | 434 | 74 | 7.03 | 0.49 | 6.54 | 0.0 | 17,531.0 | 3,530.0 |
| 190,001-300,0000_E1 | 373 | 100 | 7.36 | 0.95 | 6.41 | 0.0 | 21,974.0 | 6,771.0 |
| E1_Risk | 368 | 56 | 6.63 | 0.4 | 6.23 | 0.0 | 22,362.0 | 6,570.0 |
| 28-38_60,001-88,000 | 219 | 87 | 10.55 | 4.54 | 6.01 | 0.0 | 7,448.0 | 4,728.0 |
| 1-18_Risk | 32 | 106 | 8.46 | 2.46 | 6.0 | 0.0 | 8,907.0 | 5,447.0 |
| 19-27_Good | 405 | 387 | 12.35 | 6.7 | 5.65 | 0.0 | 7,738.0 | 2,920.0 |
| 01 Single_E1 | 1667 | 1128 | 8.75 | 3.24 | 5.51 | 0.0 | 7,651.0 | 2,992.0 |
| 00 NA_E1 | 538 | 197 | 6.41 | 0.97 | 5.44 | 0.0 | 16,795.0 | 4,094.0 |
| M_E1 | 1518 | 965 | 7.66 | 2.24 | 5.43 | 0.0 | 10,974.0 | 3,237.0 |
| A1_Good | 664 | 364 | 10.47 | 5.23 | 5.24 | 0.0 | 7,172.0 | 5,942.0 |
| 300,001+_E1 | 275 | 42 | 5.51 | 0.29 | 5.22 | 0.0 | 45,414.0 | 10,405.0 |
| 02 Maried_Very Good | 196 | 78 | 7.34 | 2.2 | 5.14 | 0.0 | 11,259.0 | 4,905.0 |

| group | sample_2018_no | sample_2017_no | y_2018 | y_2017 | y_score | greater_p_value | premium_2018_Mean | premium_2017_Mean |
|---------------------|----------------|----------------|--------|--------|---------|-----------------|-------------------|-------------------|
| 88,001-130,0000_A1 | 356 | 481 | 6.9 | 9.05 | -2.15 | 1.0 | 7,108.0 | 7,135.0 |
| F_C1 | 263 | 275 | 7.2 | 8.51 | -1.3 | 1.0 | 10,310.0 | 10,788.0 |
| 53+_C1 | 232 | 230 | 9.79 | 10.8 | -1.01 | 1.0 | 20,259.0 | 21,268.0 |
| 00 NA_C1 | 123 | 126 | 7.1 | 7.71 | -0.6 | 1.0 | 13,328.0 | 14,358.0 |
| 00 NA_A2 | 157 | 72 | 2.91 | 3.19 | -0.28 | 1.0 | 14,061.0 | 16,568.0 |
| 300,001+_C1 | 127 | 83 | 6.18 | 6.33 | -0.15 | 1.0 | 21,089.0 | 29,863.0 |
| 39-45_A2 | 182 | 84 | 2.96 | 2.82 | 0.14 | 1.0 | 14,986.0 | 15,589.0 |
| F_A2 | 456 | 184 | 3.11 | 2.73 | 0.38 | 1.0 | 13,508.0 | 13,887.0 |
| 02 Maried_A2 | 565 | 213 | 4.2 | 3.75 | 0.45 | 1.0 | 13,113.0 | 13,125.0 |
| 46-52_A2 | 207 | 63 | 3.36 | 2.64 | 0.72 | 1.0 | 13,841.0 | 15,857.0 |
| 28-38_A2 | 133 | 56 | 2.87 | 2.07 | 0.8 | 1.0 | 14,898.0 | 14,953.0 |
| M_A2 | 529 | 180 | 4.42 | 3.48 | 0.94 | 1.0 | 13,860.0 | 14,502.0 |
| 01 Single_A2 | 221 | 65 | 3.24 | 1.85 | 1.39 | 1.0 | 15,153.0 | 15,213.0 |
| A2_Very Risk | 469 | 97 | 4.15 | 2.5 | 1.66 | 1.0 | 12,651.0 | 18,800.0 |
| 190,001-300,0000_C1 | 124 | 70 | 9.58 | 7.78 | 1.8 | 1.0 | 13,240.0 | 19,354.0 |
| 53+_1-60,000 | 43 | 117 | 5.99 | 19.2 | -13.21 | 0.0 | 11,006.0 | 4,500.0 |
| 46-52_1-60,000 | 58 | 156 | 6.76 | 18.3 | -11.54 | 0.0 | 10,284.0 | 4,500.0 |
| 53+_60,001-88,000 | 190 | 370 | 8.18 | 18.63 | -10.45 | 0.0 | 11,542.0 | 5,080.0 |
| 1-60,000_Very Risk | 189 | 352 | 6.63 | 15.77 | -9.14 | 0.0 | 10,121.0 | 4,435.0 |

Overall - C1

Campaign Premium 17/18

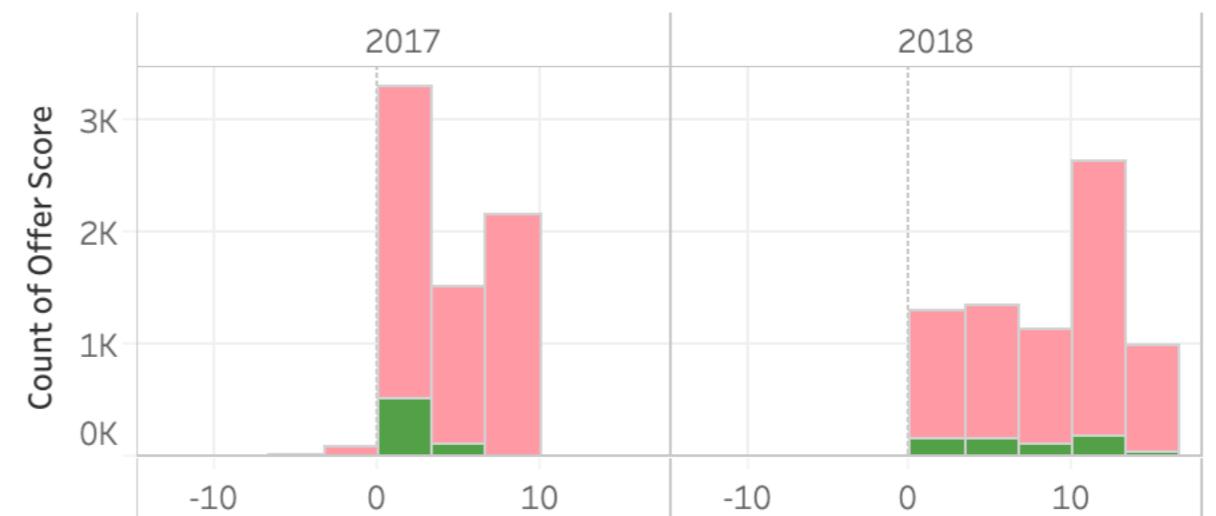


Y - 2018

8.87%

Y - 2017

9.33%



Campaign Take Up

N

Y

Age Range

(All)

1-18

19-27

28-38

39-45

46-52

53+

Annual Range

(All)

1-60,000

60,001-88,000

88,001-130,0000

130,000-190,000

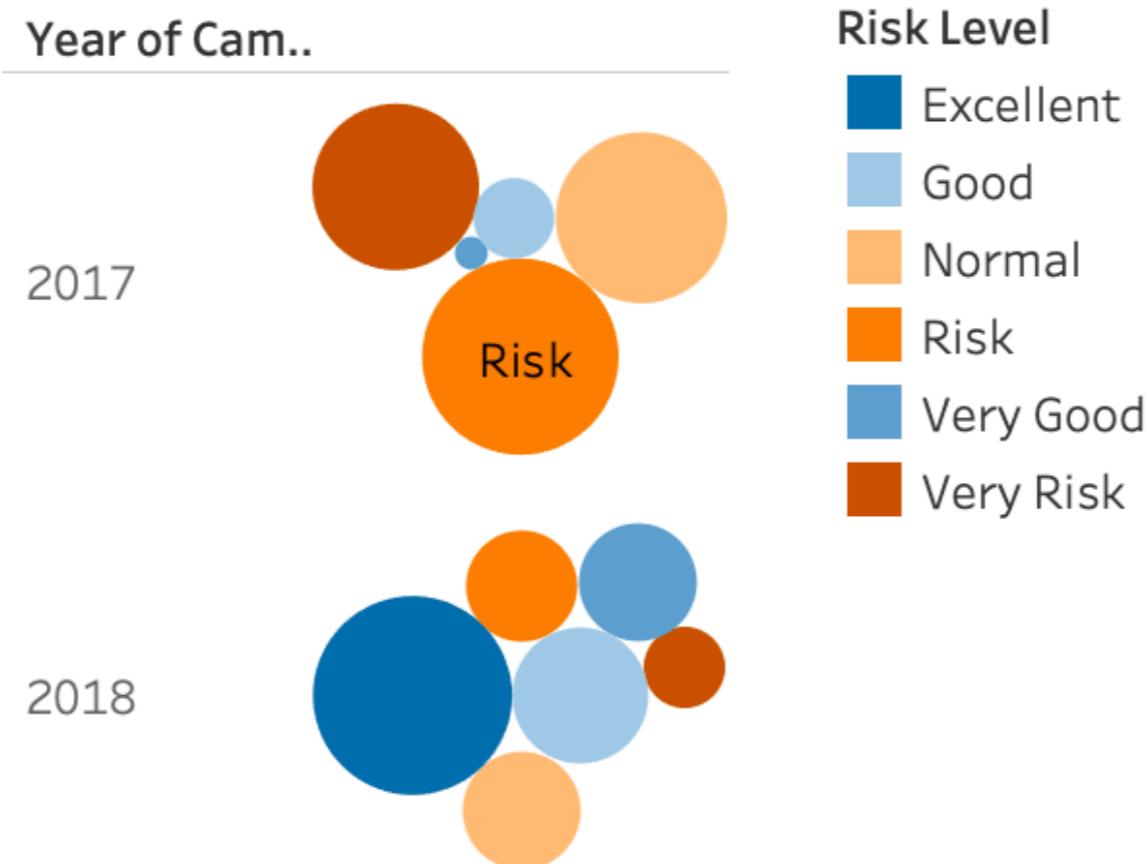
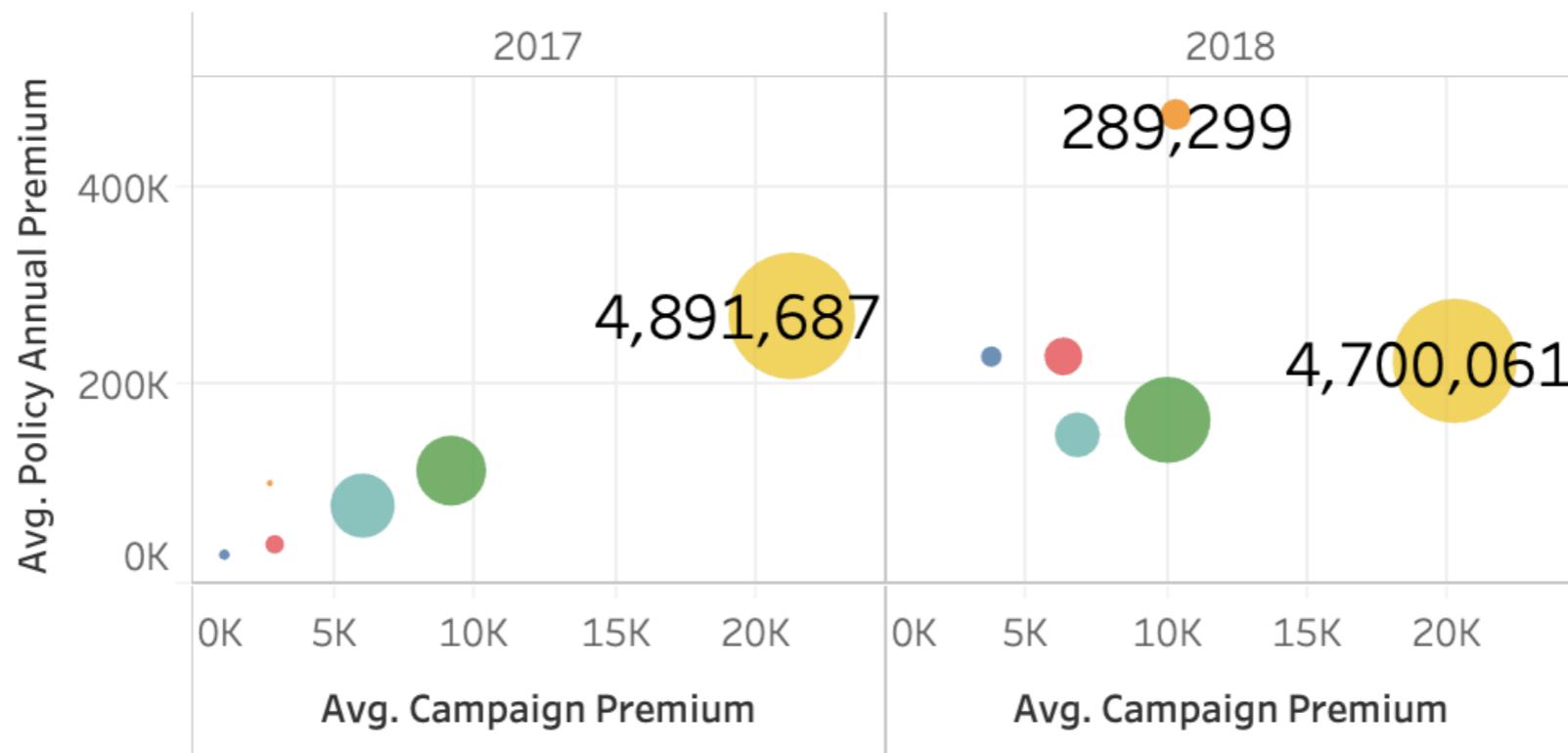
190,001-300,0000

300,001+

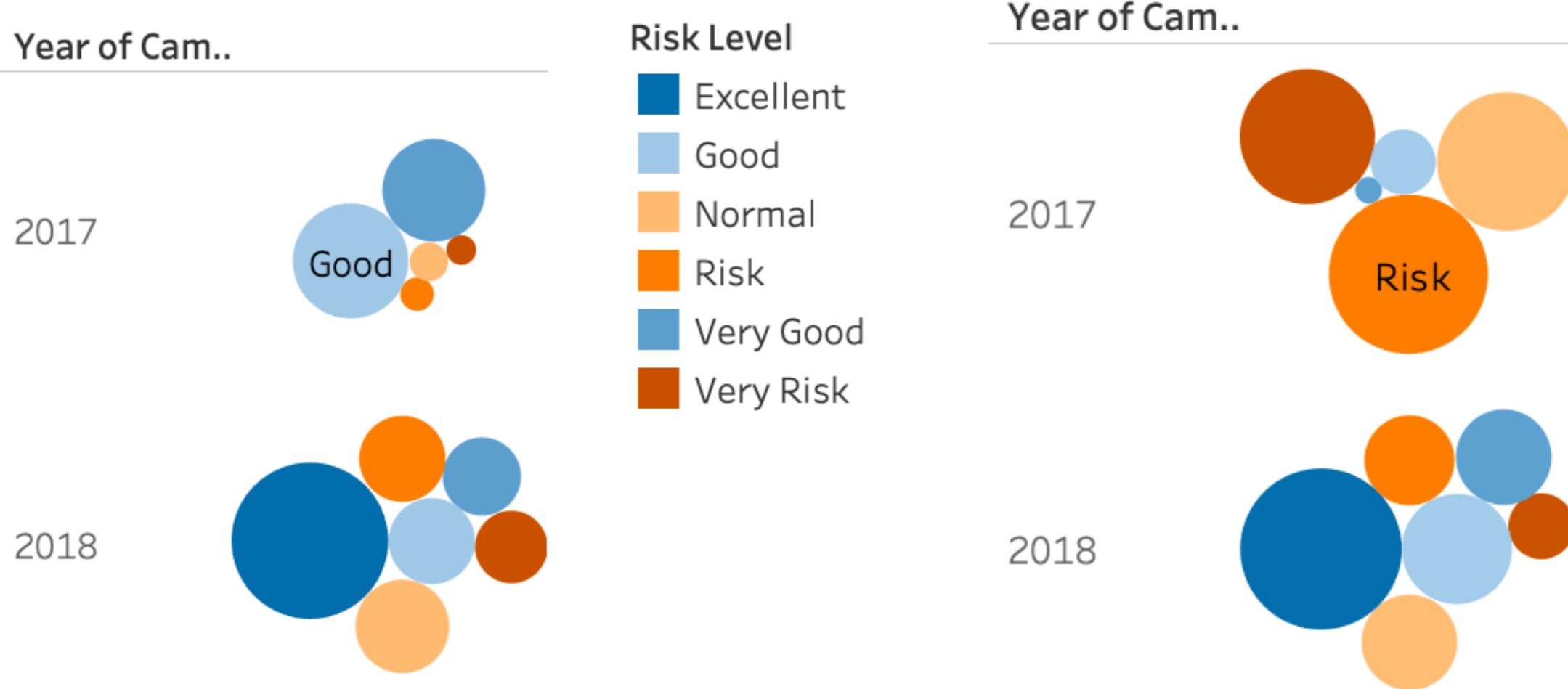
Overall - C1



C1 - Campaign Take Up = Yes

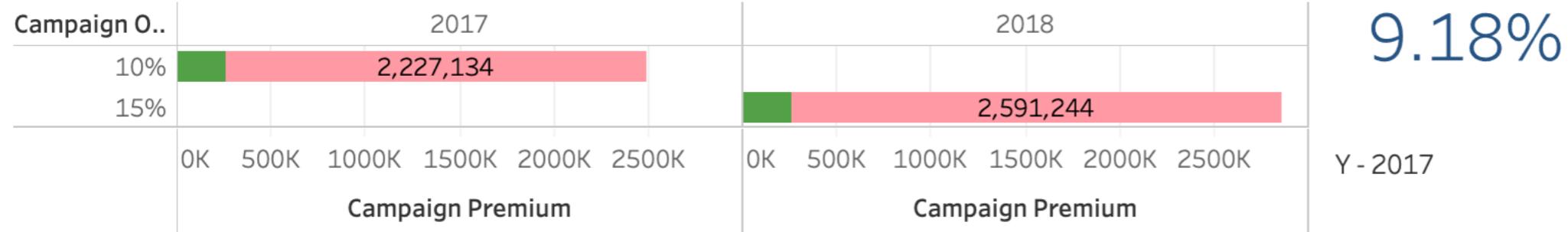


E1 (Yes) vs C1 (Yes)



Overall 19 - 27 Married

Campaign Premium 17/18



Y - 2018

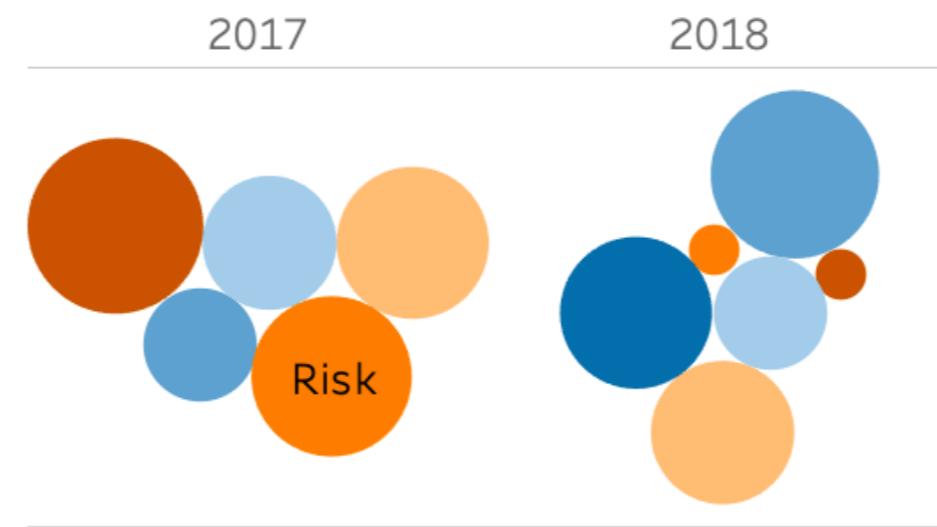
9.18%

Y - 2017

10.54%

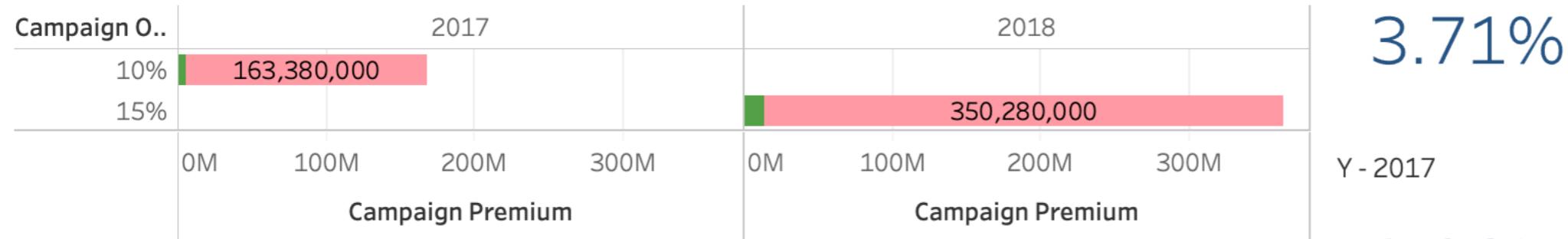
- Campaign Take Up
N
Y
- Age Range
(All)
1-18
19-27 (selected)
28-38
39-45
46-52

19 - 27 Married (Yes)



Overall A2 (11 False of 17)

Campaign Premium 17/18



Campaign Take Up

N

Y

Age Range

(All)

1-18

19-27

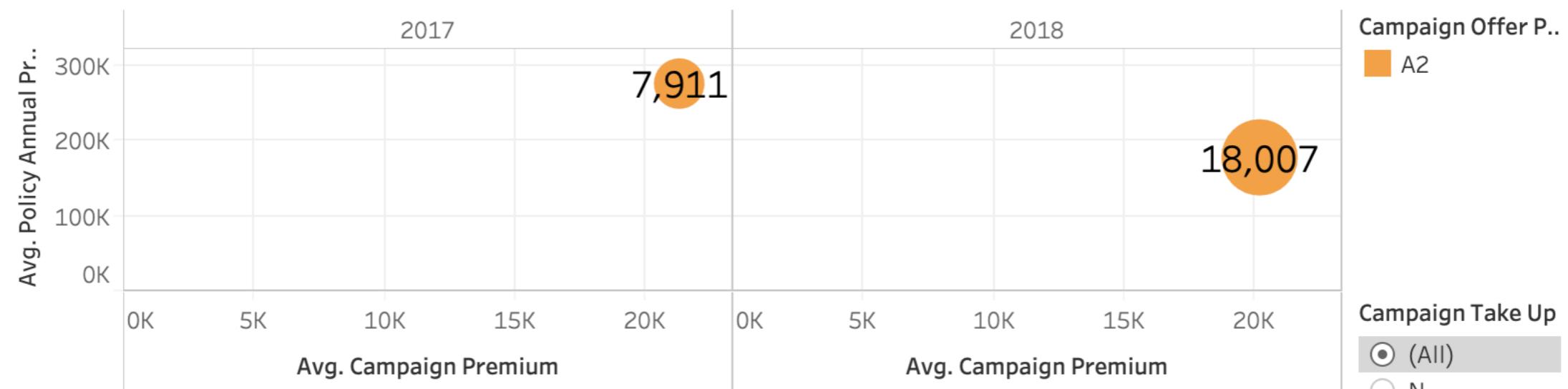
28-38

39-45

46-52

3.71%

3.06%



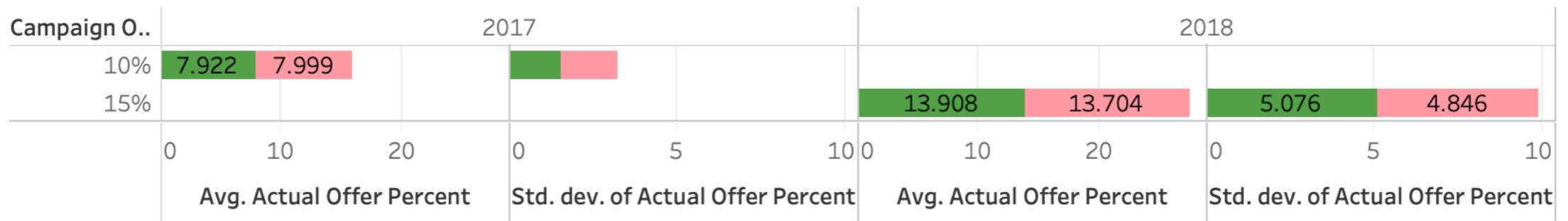
Campaign Offer P..

A2

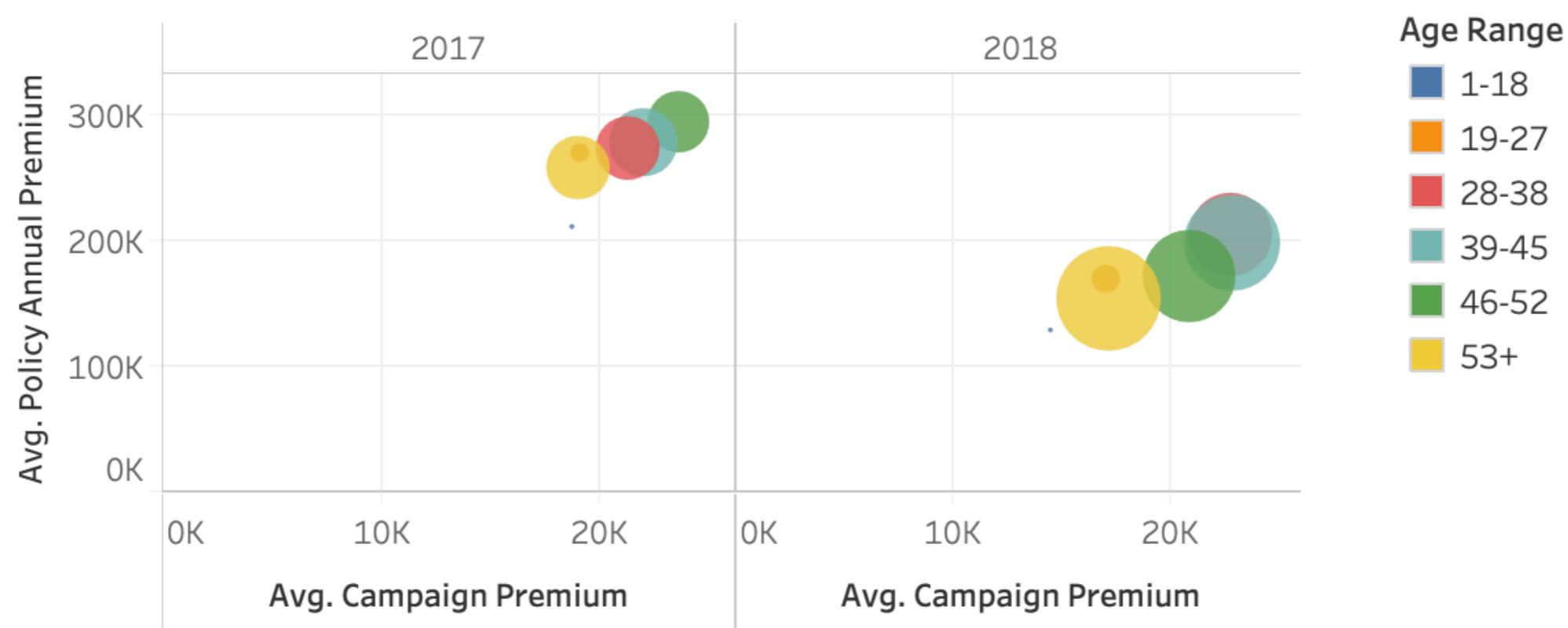
Campaign Take Up

(All)

N



Reduced Policy Annual Premium in A2



Level 3 - Criteria

Total of 874 Criteria

Average Campaign Premium in 2018 (15%) of **742** criteria is significantly greater than Average Campaign Premium in 2017 (10%)

While Average Campaign Premium in 2018 (15%) of **132** criteria (A1:37, A2:36, C1:36, E1:2) is not significantly greater than Average Campaign Premium in 2017 (10%)

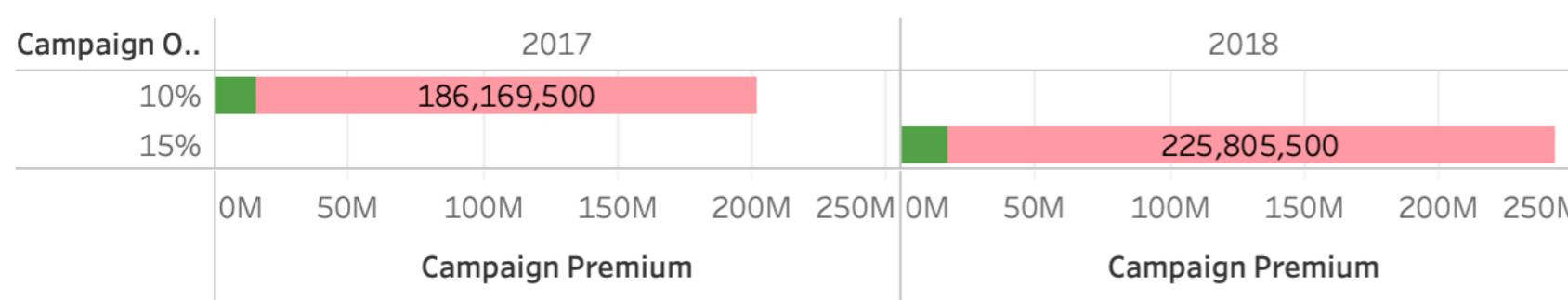
$$742 * 100 / 874 = 84.89\%$$

| group | sample_2018_no | sample_2017_no | y_2018 | y_2017 | y_score | greater_p_value | premium_2018_Mean | premium_2017_Mean |
|------------------------------|----------------|----------------|--------|--------|---------|-----------------|-------------------|-------------------|
| 1-60,000_E1_Risk | 51 | 29 | 15.36 | 4.07 | 11.29 | 0.0 | 6,074.0 | 3,106.0 |
| 01 Single_C1_Good | 16 | 25 | 13.21 | 2.2 | 11.01 | 0.0 | 12,869.0 | 2,853.0 |
| F_60,001-88,000_E1 | 265 | 65 | 13.1 | 2.32 | 10.78 | 0.0 | 6,171.0 | 2,603.0 |
| 00 NA_60,001-88,000_E1 | 57 | 21 | 14.39 | 3.73 | 10.66 | 0.0 | 6,383.0 | 2,240.0 |
| 00 NA_88,001-130,0000_E1 | 80 | 27 | 12.78 | 2.5 | 10.28 | 0.0 | 9,605.0 | 2,384.0 |
| F_88,001-130,0000_E1 | 202 | 34 | 10.81 | 1.01 | 9.8 | 0.0 | 10,119.0 | 2,947.0 |
| 28-38_1-60,000_Normal | 32 | 20 | 13.15 | 3.56 | 9.59 | 0.0 | 5,508.0 | 2,917.0 |
| 00 NA_1-60,000_E1 | 73 | 45 | 17.59 | 8.33 | 9.26 | 0.0 | 3,715.0 | 1,990.0 |
| 19-27_F_Good | 171 | 112 | 12.49 | 3.93 | 8.56 | 0.0 | 8,107.0 | 2,902.0 |
| 39-45_1-60,000_Risk | 20 | 71 | 22.31 | 13.81 | 8.5 | 0.0 | 6,370.0 | 4,442.0 |
| F_130,000-190,000_E1 | 228 | 43 | 8.91 | 1.01 | 7.9 | 0.0 | 14,590.0 | 5,258.0 |
| M_88,001-130,0000_E1 | 219 | 83 | 10.22 | 2.53 | 7.7 | 0.0 | 9,091.0 | 2,940.0 |
| 01 Single_60,001-88,000_Risk | 64 | 30 | 14.59 | 7.03 | 7.56 | 0.0 | 9,488.0 | 6,049.0 |
| 00 NA_130,000-190,000_E1 | 139 | 38 | 8.79 | 1.25 | 7.54 | 0.0 | 13,479.0 | 3,954.0 |
| 28-38_M_60,001-88,000 | 139 | 49 | 12.03 | 4.56 | 7.46 | 0.0 | 7,627.0 | 4,813.0 |
| F_1-60,000_E1 | 389 | 211 | 13.82 | 6.66 | 7.16 | 0.0 | 3,311.0 | 2,141.0 |
| F_E1_Normal | 249 | 20 | 7.44 | 0.28 | 7.16 | 0.0 | 17,863.0 | 4,006.0 |
| 19-27_300,001+_E1 | 43 | 19 | 11.63 | 4.58 | 7.05 | 0.0 | 14,227.0 | 9,387.0 |
| F_C1_Good | 20 | 17 | 8.16 | 1.18 | 6.98 | 0.0 | 15,005.0 | 4,229.0 |

| group | sample_2018_no | sample_2017_no | y_2018 | y_2017 | y_score | greater_p_value | premium_2018_Mean | premium_2017_Mean |
|-------------------------------|----------------|----------------|--------|--------|---------|-----------------|-------------------|-------------------|
| 53+_88,001-130,0000_A1 | 31 | 166 | 4.77 | 13.59 | -8.82 | 1.0 | 5,129.0 | 7,383.0 |
| 02 Maried_88,001-130,0000_A1 | 106 | 242 | 7.84 | 13.21 | -5.37 | 1.0 | 5,533.0 | 7,196.0 |
| 39-45_88,001-130,0000_A1 | 46 | 49 | 8.38 | 11.88 | -3.5 | 1.0 | 5,543.0 | 7,255.0 |
| 46-52_88,001-130,0000_A1 | 63 | 94 | 8.49 | 11.33 | -2.84 | 1.0 | 5,167.0 | 6,957.0 |
| 46-52_130,000-190,000_C1 | 20 | 36 | 7.32 | 10.08 | -2.76 | 1.0 | 8,274.0 | 10,282.0 |
| 53+_F_C1 | 87 | 97 | 8.72 | 10.31 | -1.58 | 1.0 | 17,170.0 | 20,522.0 |
| F_300,001+_C1 | 58 | 39 | 4.82 | 6.31 | -1.49 | 1.0 | 15,455.0 | 27,554.0 |
| 00 NA_A2_Very Risk | 90 | 30 | 3.44 | 3.66 | -0.22 | 1.0 | 13,000.0 | 22,012.0 |
| M_A2_Very Risk | 254 | 44 | 4.85 | 2.77 | 2.07 | 1.0 | 12,617.0 | 20,651.0 |
| F_190,001-300,0000_C1 | 45 | 17 | 7.84 | 4.75 | 3.1 | 1.0 | 9,933.0 | 20,567.0 |
| 39-45_A2_Very Risk | 81 | 24 | 3.3 | 2.65 | 0.64 | 0.999 | 13,028.0 | 23,188.0 |
| M_190,001-300,0000_C1 | 79 | 53 | 10.45 | 10.01 | 0.43 | 0.998 | 15,124.0 | 18,965.0 |
| F_A2_Very Risk | 215 | 53 | 3.56 | 2.27 | 1.28 | 0.998 | 12,691.0 | 17,264.0 |
| 00 NA_300,001+_C1 | 23 | 18 | 3.74 | 4.39 | -0.65 | 0.997 | 18,833.0 | 29,414.0 |
| 00 NA_190,001-300,0000_C1 | 32 | 22 | 10.61 | 8.05 | 2.55 | 0.997 | 15,163.0 | 20,829.0 |
| F_130,000-190,000_C1 | 47 | 42 | 8.29 | 12.36 | -4.07 | 0.995 | 10,818.0 | 13,592.0 |
| 02 Maried_300,001+_C1 | 57 | 49 | 7.65 | 8.76 | -1.12 | 0.995 | 23,932.0 | 30,507.0 |
| 02 Maried_190,001-300,0000_C1 | 48 | 41 | 8.41 | 9.17 | -0.76 | 0.994 | 14,964.0 | 18,978.0 |
| 46-52_A2_Very Risk | 128 | 22 | 4.24 | 2.41 | 1.83 | 0.994 | 12,712.0 | 19,705.0 |

Overall A1 (37 False of 121)

Campaign Premium 17/18



Y - 2018

7.06%

Y - 2017

7.61%

Campaign Take Up

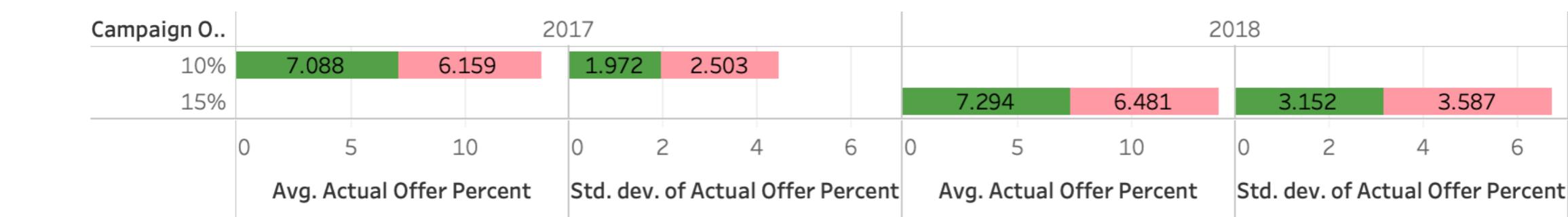
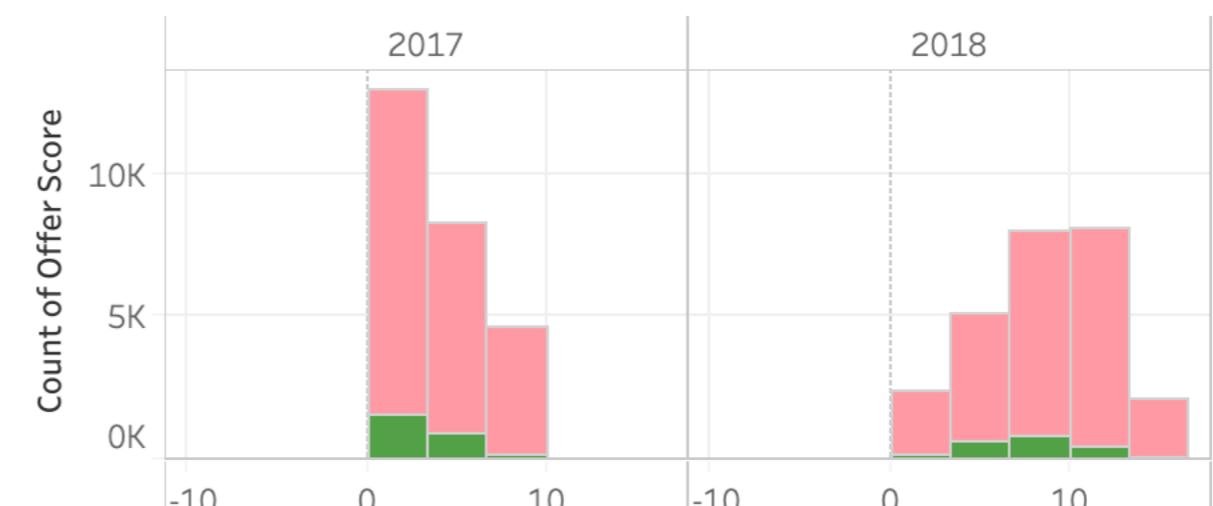
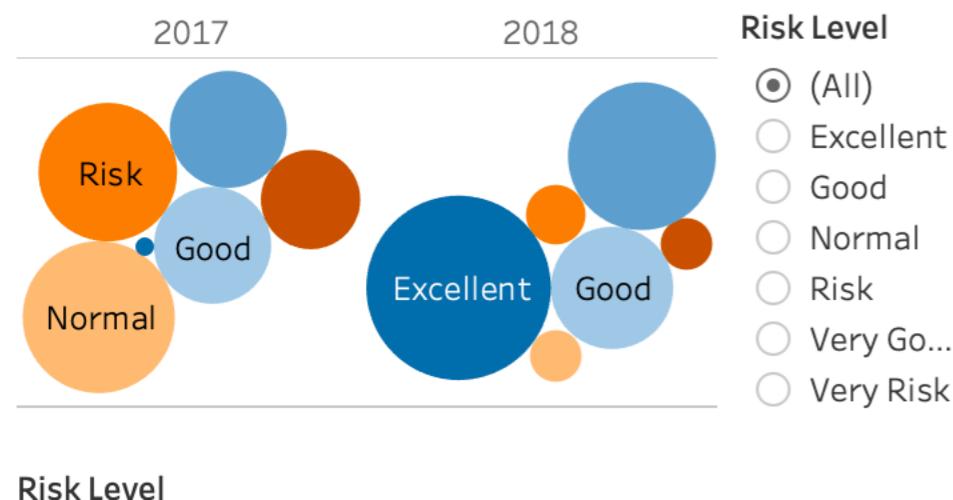
- N
- Y

Age Range

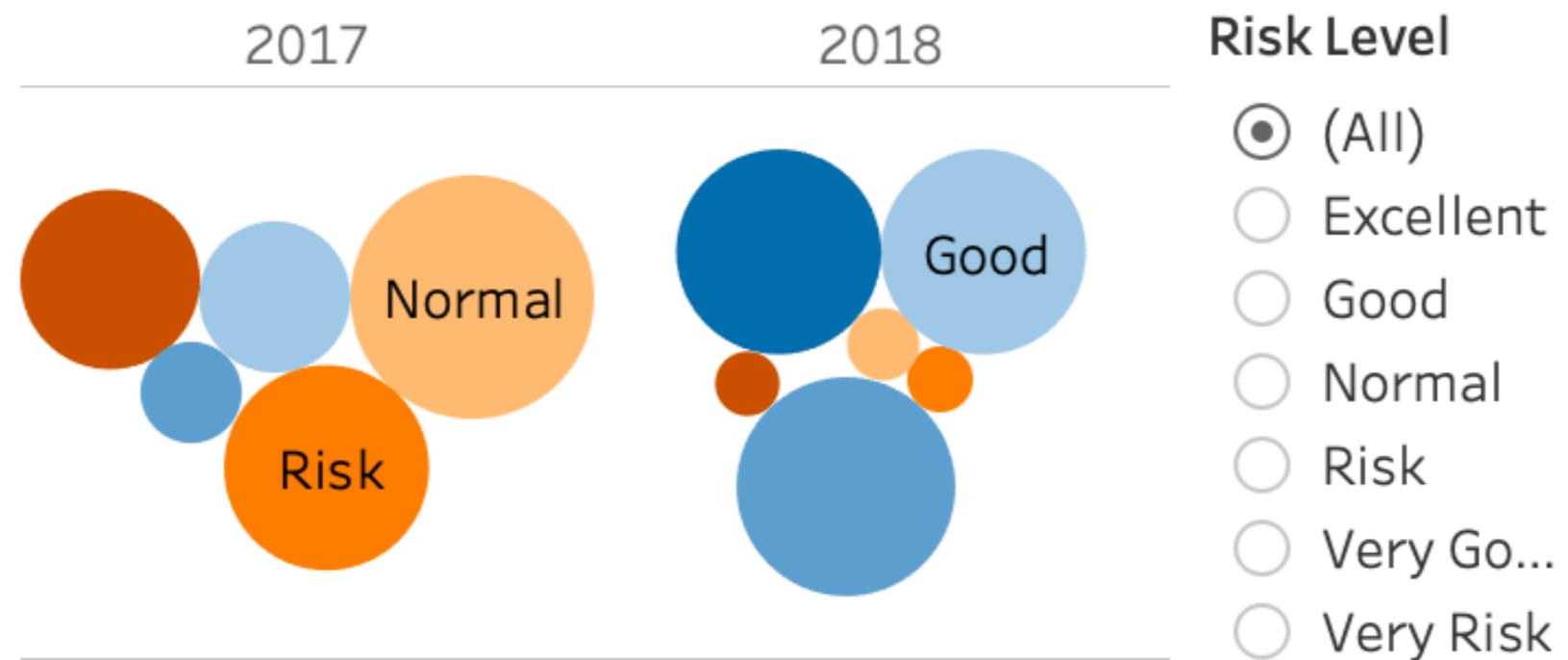
- (All)
- 1-18
- 19-27
- 28-38
- 39-45
- 46-52
- 53+

Annual Range

- (All)
- 1-60,000
- 60,001-88,000
- 88,001-130,0000
- 130,000-190,000
- 190,001-300,0000
- 300,001+



Overall A1 (Yes)

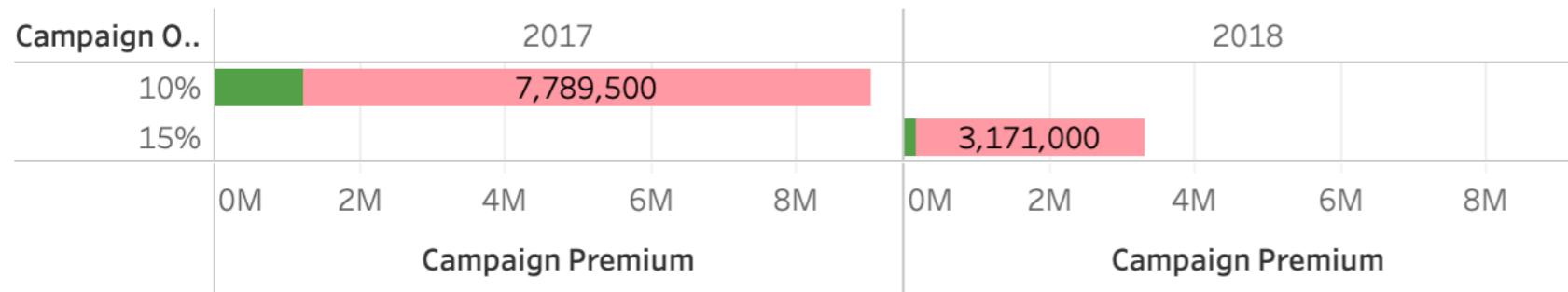


A1

Aged: 53+

Annual Premium: 88,001-130,0000

Campaign Premium 17/18



Y - 2018

4.77%

Y - 2017

13.59%

Campaign Take Up

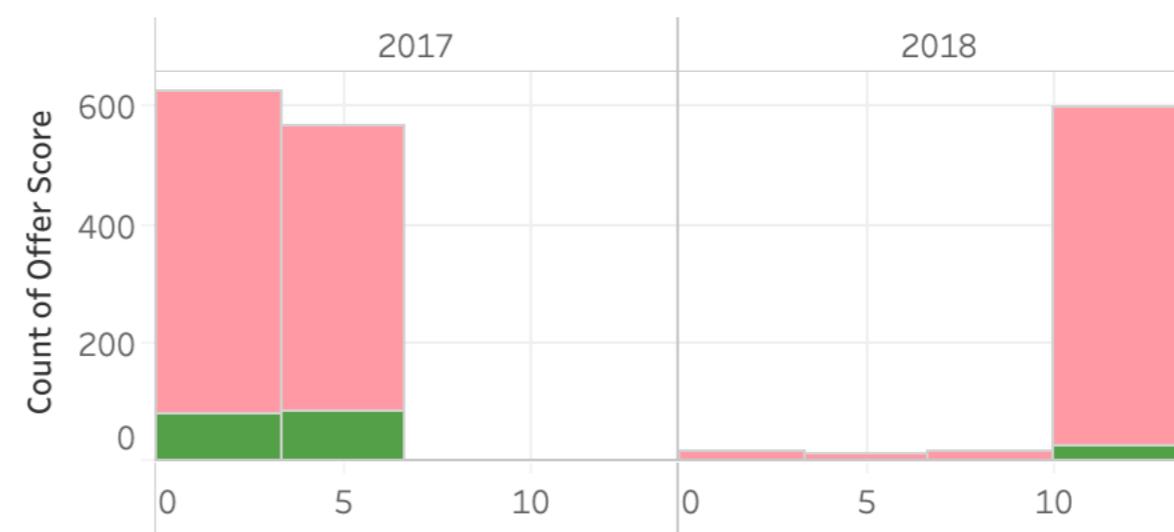
- N
- Y

Age Range

- (All)
- 1-18
- 19-27
- 28-38
- 39-45
- 46-52
- 53+

Annual Range

- (All)
- 1-60,000
- 60,001-88,000
- 88,001-130,0000
- 130,000-190,000
- 190,001-300,0000
- 300,001+

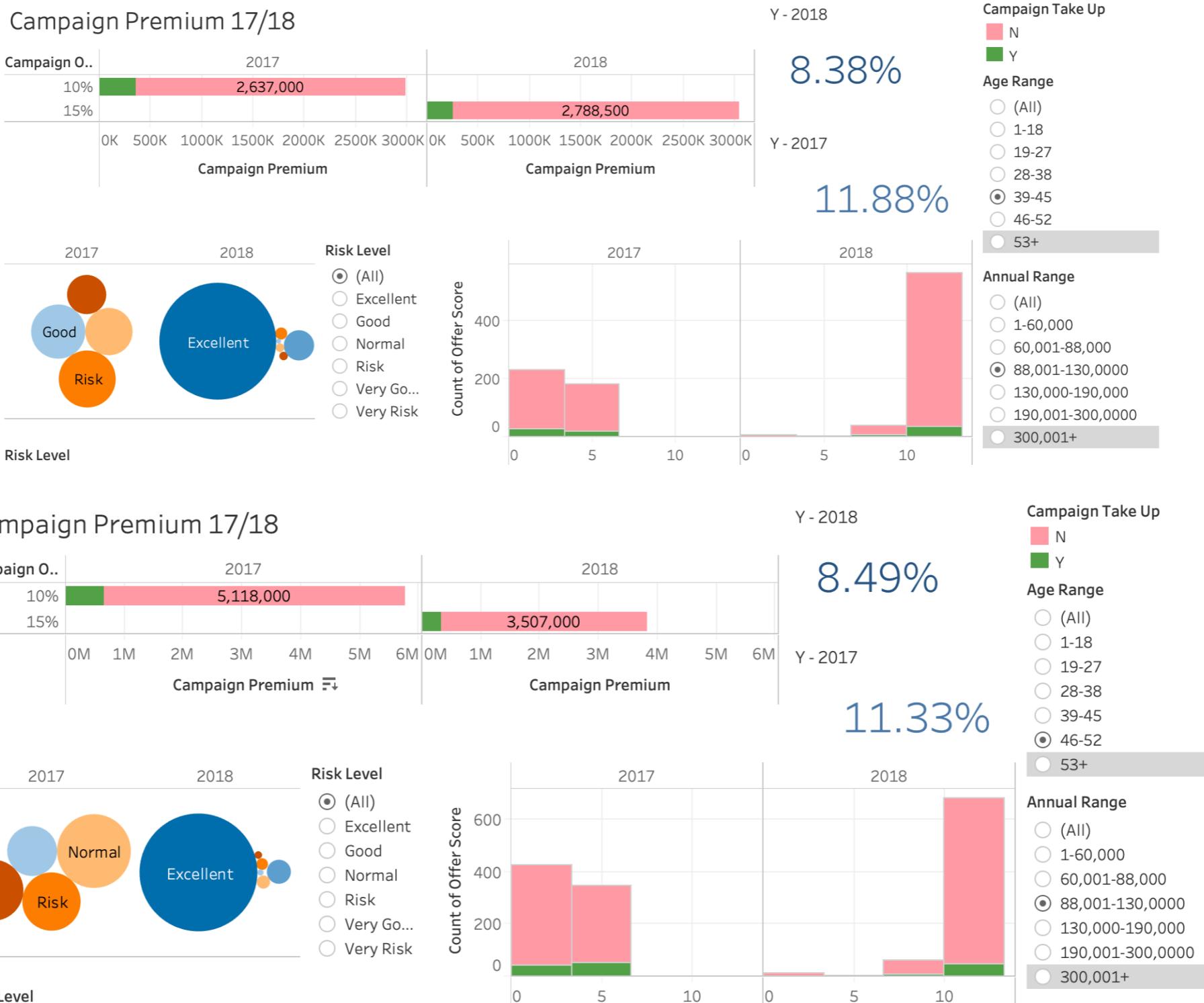


Customer Gender

A1

Aged: 39-45, 46-52

88,001-130,0000

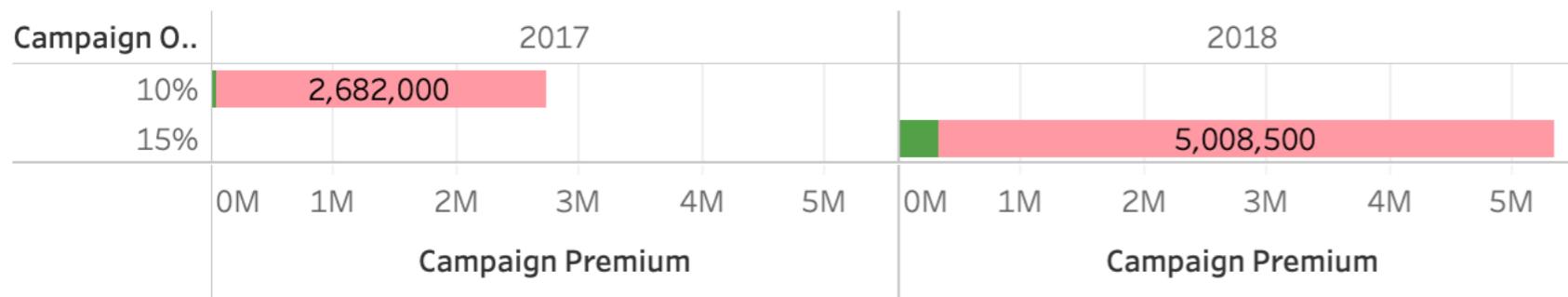


A1

Aged: 53+

Annual Premium: 300,001+

Campaign Premium 17/18



Y - 2018

6.16%

Y - 2017

1.81%

Campaign Take Up

- N
- Y

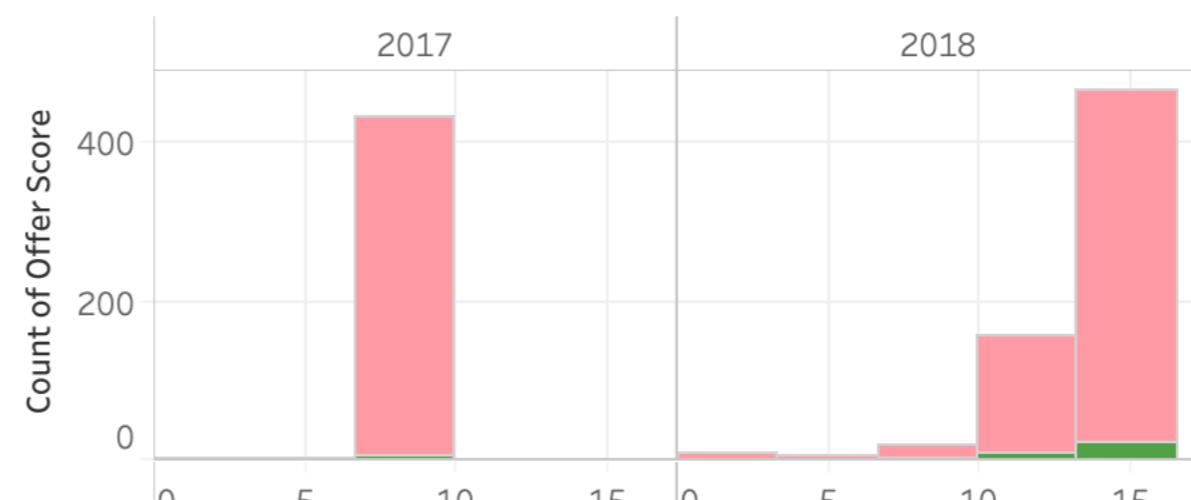
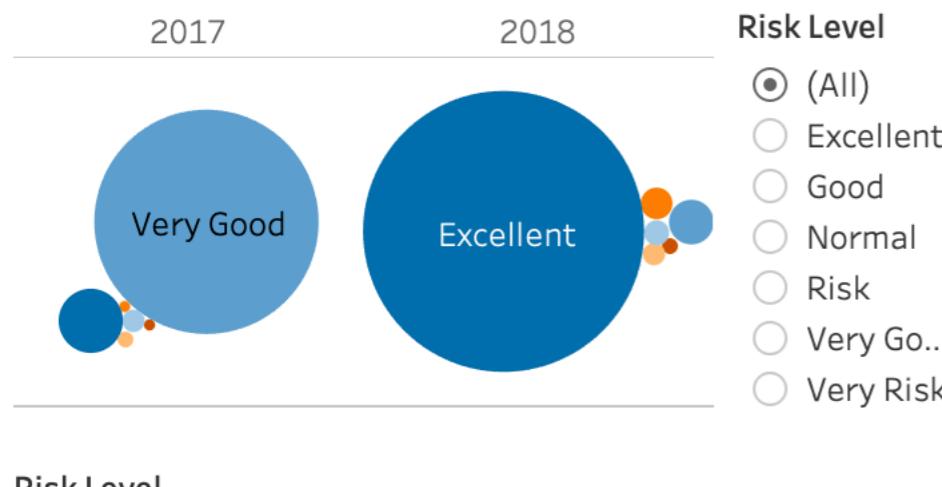
Age Range

- (All)
- 1-18
- 19-27
- 28-38
- 39-45
- 46-52

- 53+

Annual Range

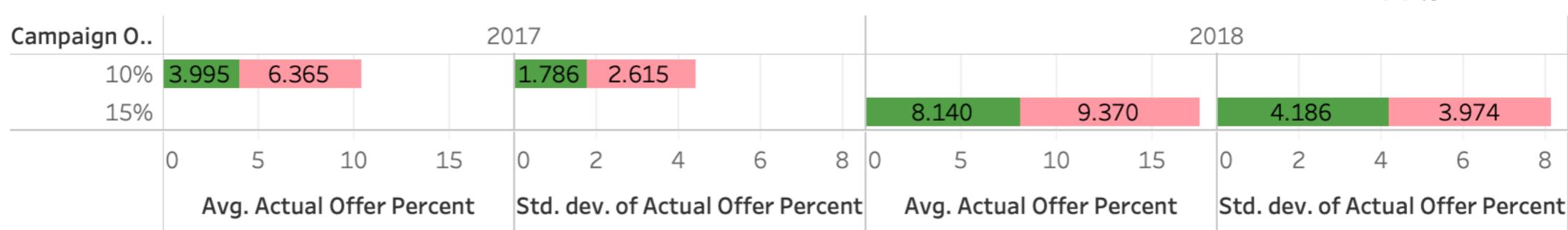
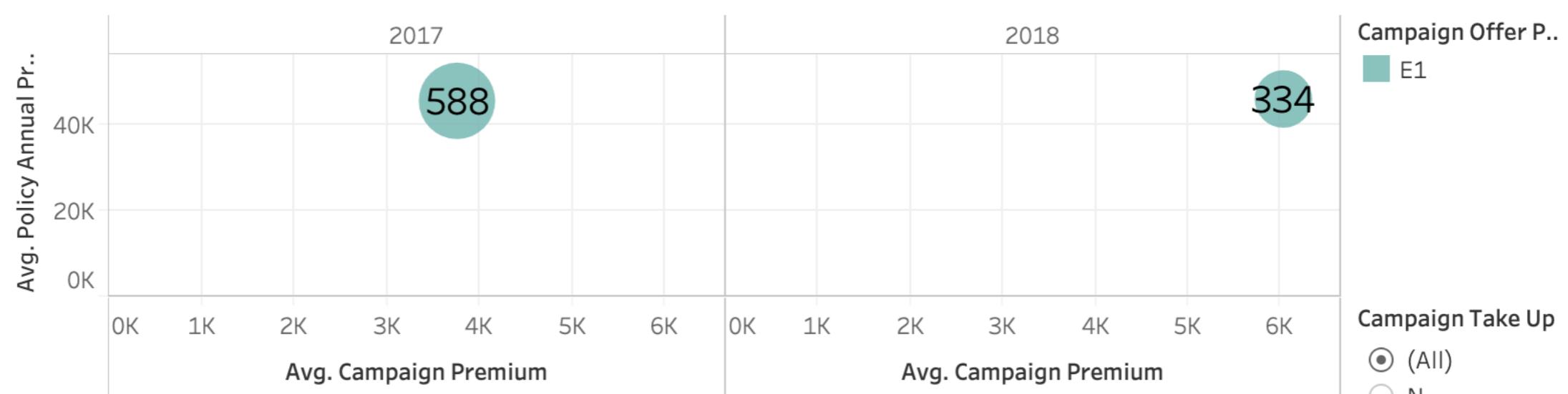
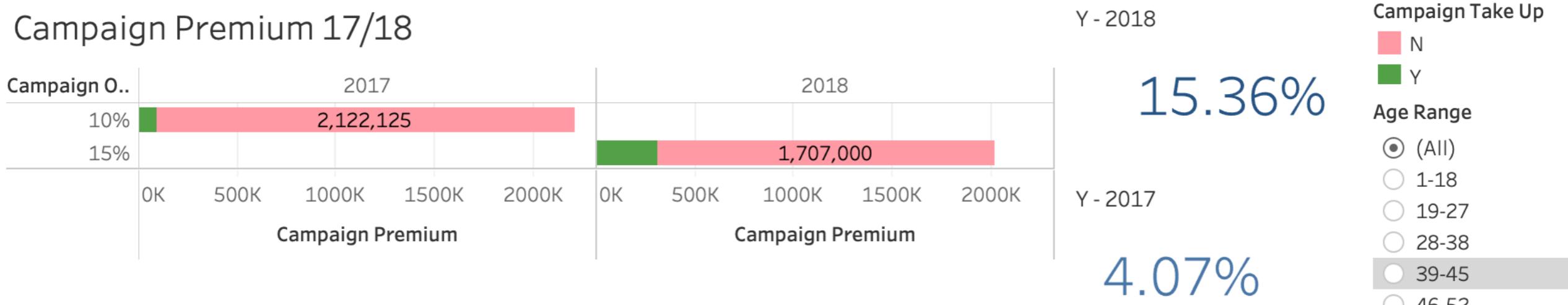
- (All)
- 1-60,000
- 60,001-88,000
- 88,001-130,0000
- 130,000-190,000
- 190,001-300,0000
- 300,001+



E1

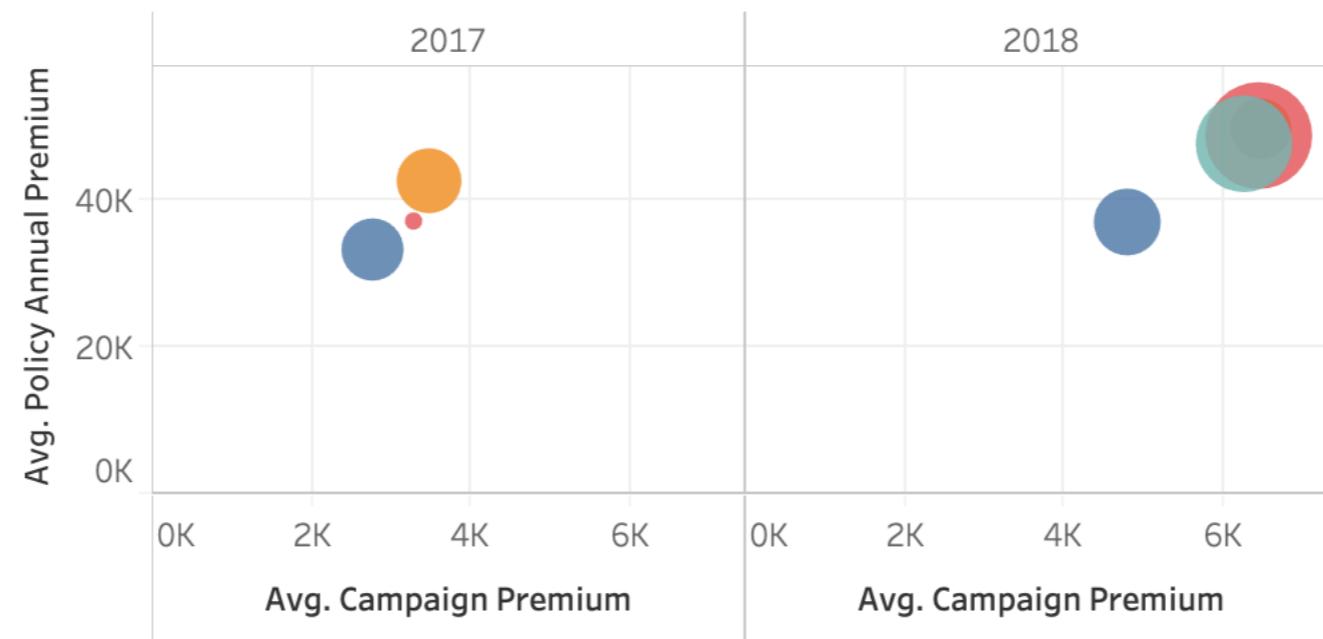
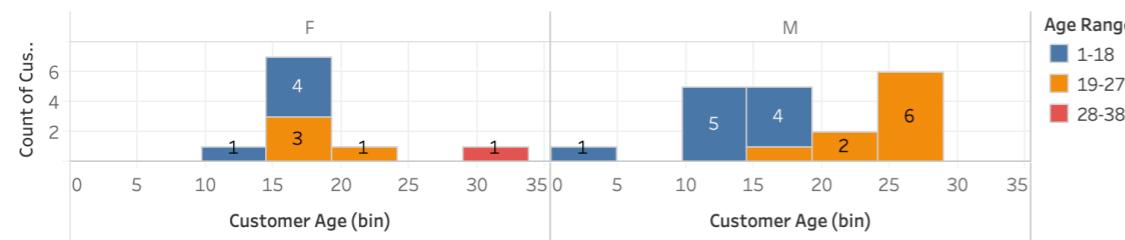
Annual Premium: 1-60,000

Risk



E1

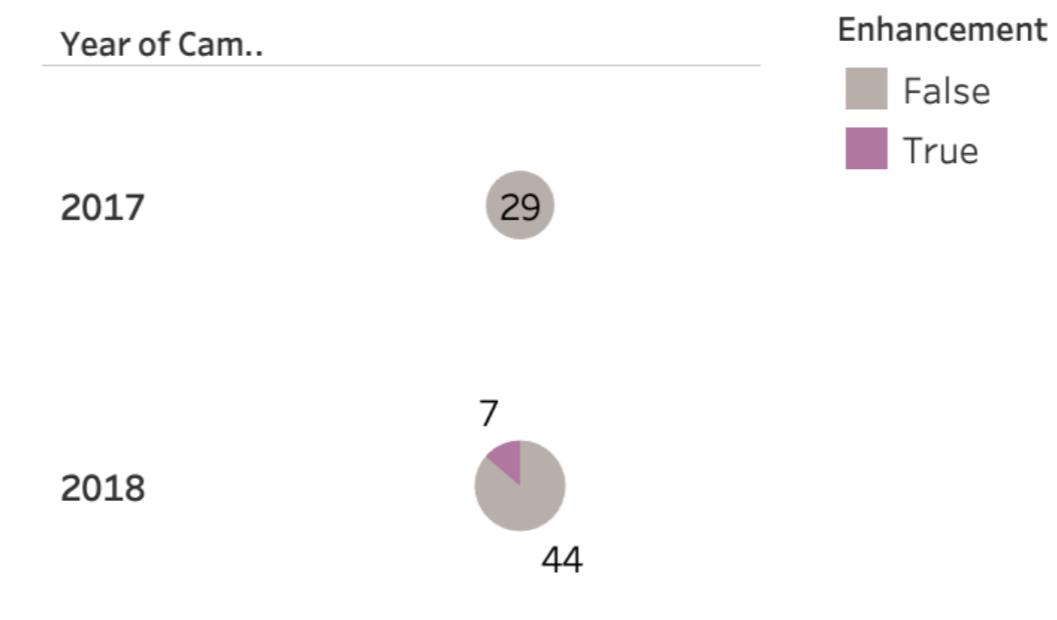
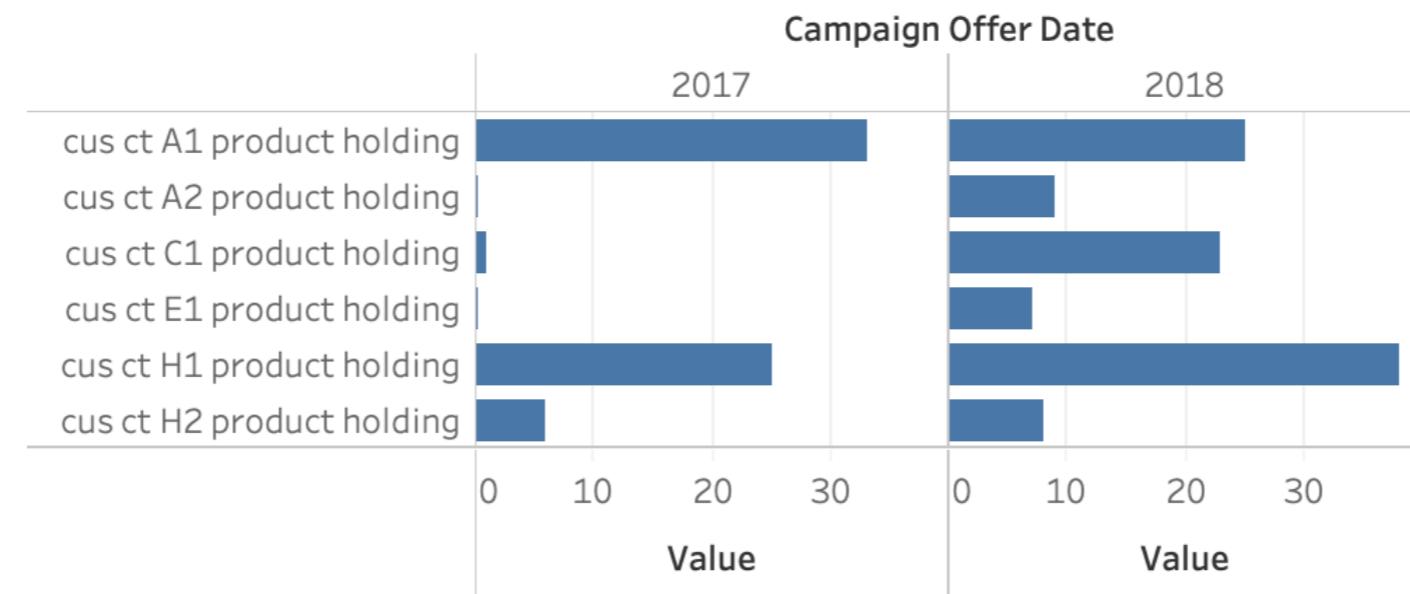
Annual Premium: 1-60,000 Risk (Yes)

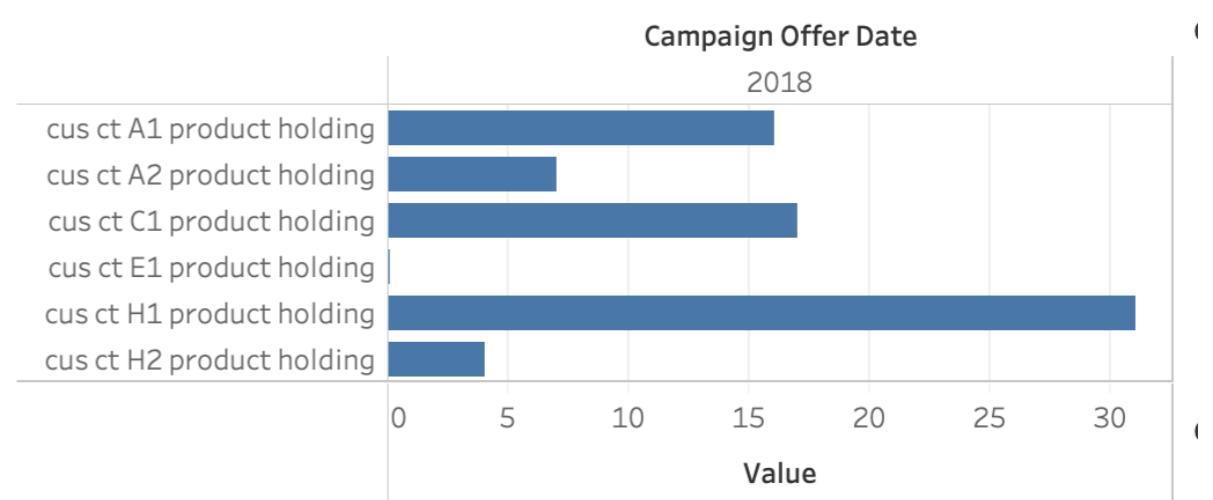
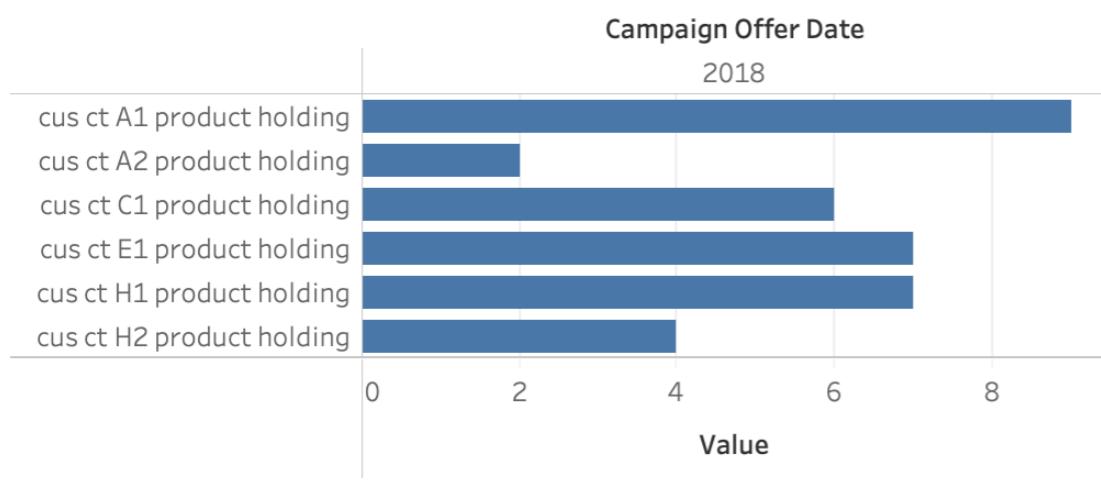
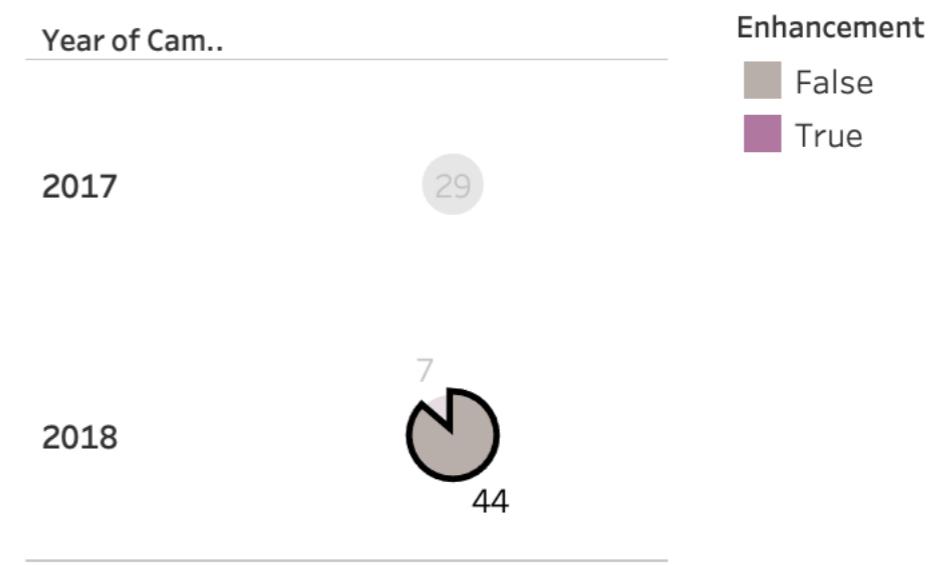
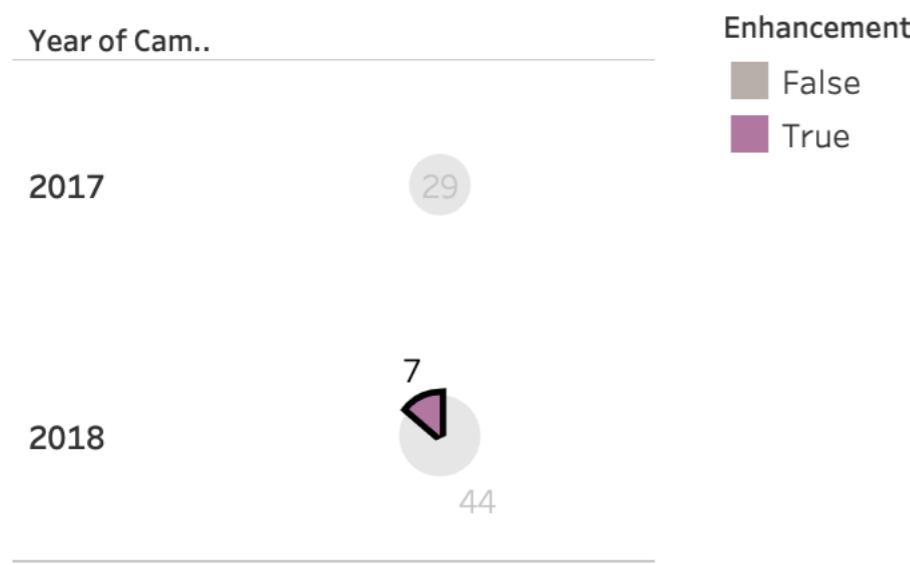


E1

Annual Premium: 1-60,000

Risk (Yes)





Overall Performance

| prod | count | unique | top | freq | true_prob |
|------|-------|--------|-------|------|-----------|
| A1 | 121 | 2 | True | 84 | 0.69 |
| A2 | 74 | 2 | True | 38 | 0.51 |
| C1 | 81 | 2 | False | 45 | 0.44 |
| E1 | 84 | 2 | True | 82 | 0.98 |
| None | 514 | 2 | True | 502 | 0.98 |

| prod | count | mean | std | min | 25% | 50% | 75% | max |
|------|-------|---------------------|--------------------|--------|---------|--------------------|-------|-------|
| A1 | 121.0 | -0.7566942148760331 | 4.248410759415367 | -10.36 | -4.61 | -0.67 | 2.61 | 8.45 |
| A2 | 74.0 | -0.315945945945946 | 1.5154744443766388 | -5.74 | -1.0425 | -0.035 | 0.62 | 2.14 |
| C1 | 81.0 | -1.0774074074074076 | 3.983911324872134 | -10.46 | -3.56 | -0.79 | 0.9 | 11.01 |
| E1 | 84.0 | 3.580119047619047 | 4.021379459431956 | -8.09 | 0.97 | 4.6850000000000005 | 6.58 | 11.29 |
| None | 514.0 | 0.6714785992217899 | 3.767556039561591 | -14.46 | -1.17 | 1.5 | 3.015 | 10.0 |

| | age_range | count | unique | top | freq | true_prob |
|---|-----------|-------|--------|------|------|-----------|
| 0 | 1-18 | 77 | 2 | True | 71 | 0.92 |
| 1 | 19-27 | 86 | 2 | True | 78 | 0.91 |
| 2 | 28-38 | 67 | 2 | True | 59 | 0.88 |
| 3 | 39-45 | 75 | 2 | True | 60 | 0.8 |
| 4 | 46-52 | 82 | 2 | True | 65 | 0.79 |
| 5 | 53+ | 100 | 2 | True | 73 | 0.73 |
| 6 | None | 387 | 2 | True | 336 | 0.87 |

| | age_range | count | mean | std | min | 25% | 50% | 75% | max |
|---|-----------|-------|----------------------|--------------------|--------|---------------------|-------|-------------------|-------|
| 0 | 1-18 | 77.0 | 1.885194805194805 | 2.8796027734054293 | -6.18 | 0.41 | 2.35 | 3.81 | 7.51 |
| 1 | 19-27 | 86.0 | 0.9626744186046512 | 3.7367051936852556 | -9.2 | -1.5074999999999998 | 1.295 | 3.1475 | 8.56 |
| 2 | 28-38 | 67.0 | 2.243880597014925 | 2.905144838210559 | -5.59 | 1.155 | 2.78 | 3.975 | 9.59 |
| 3 | 39-45 | 75.0 | -0.264 | 3.4746261708314794 | -10.46 | -2.64 | 0.5 | 2.16 | 8.5 |
| 4 | 46-52 | 82.0 | -0.30512195121951224 | 4.4624494308861244 | -14.46 | -1.9425000000000001 | 0.69 | 2.04 | 10.0 |
| 5 | 53+ | 100.0 | -2.1454000000000004 | 4.2702273068919006 | -14.12 | -3.7300000000000004 | -1.33 | 0.4525 | 5.16 |
| 6 | None | 387.0 | 0.8390956072351415 | 3.803569970007428 | -11.22 | -1.21 | 1.16 | 3.014999999999997 | 11.29 |

| | annual_range | count | unique | top | freq | true_prob |
|---|------------------|-------|--------|------|------|-----------|
| 0 | 1-60,000 | 77 | 2 | True | 74 | 0.96 |
| 1 | 130,000-190,000 | 99 | 2 | True | 91 | 0.92 |
| 2 | 190,001-300,0000 | 74 | 2 | True | 59 | 0.8 |
| 3 | 300,001+ | 53 | 2 | True | 47 | 0.89 |
| 4 | 60,001-88,000 | 98 | 2 | True | 93 | 0.95 |
| 5 | 88,001-130,0000 | 105 | 2 | True | 93 | 0.89 |
| 6 | None | 368 | 2 | True | 285 | 0.77 |

| | annual_range | count | mean | std | min | 25% | 50% | 75% | max |
|---|------------------|-------|----------------------|--------------------|--------|---------|-------|--------------------|-------|
| 0 | 1-60,000 | 77.0 | -1.5398701298701298 | 6.25831604505189 | -14.46 | -6.31 | -0.59 | 2.92 | 11.29 |
| 1 | 130,000-190,000 | 99.0 | 1.2450505050505047 | 3.0913029330613693 | -5.74 | -0.99 | 1.66 | 3.4400000000000004 | 7.9 |
| 2 | 190,001-300,0000 | 74.0 | 1.0485135135135133 | 2.5067895106091007 | -5.4 | -0.66 | 1.245 | 2.61 | 6.8 |
| 3 | 300,001+ | 53.0 | 2.519811320754717 | 1.8835436024093175 | -2.22 | 1.39 | 2.58 | 3.34 | 7.05 |
| 4 | 60,001-88,000 | 98.0 | -1.2944897959183674 | 4.740932989749683 | -12.08 | -4.4425 | -1.82 | 1.6974999999999998 | 10.78 |
| 5 | 88,001-130,0000 | 105.0 | -0.38752380952380944 | 3.499185009770237 | -8.99 | -2.48 | -0.76 | 1.76 | 10.28 |
| 6 | None | 368.0 | 1.0744021739130434 | 3.4379110429413124 | -10.36 | -0.5575 | 1.455 | 3.1325000000000003 | 11.01 |

| | cust_gender | count | unique | top | freq | true_prob |
|----------|--------------------|--------------|---------------|------------|-------------|------------------|
| 0 | F | 197 | 2 | True | 166 | 0.84 |
| 1 | M | 292 | 2 | True | 249 | 0.85 |
| 2 | None | 385 | 2 | True | 327 | 0.85 |

| | cust_gender | count | mean | std | min | 25% | 50% | 75% | max |
|----------|--------------------|--------------|---------------------|--------------------|------------|---------------------|------------|------------|------------|
| 0 | F | 197.0 | 1.2458883248730965 | 3.864946054975826 | -13.73 | -0.46 | 2.04 | 3.51 | 10.78 |
| 1 | M | 292.0 | 0.261746575342466 | 3.6667839449753683 | -13.08 | -1.6649999999999998 | 0.87 | 2.5475 | 10.0 |
| 2 | None | 385.0 | 0.31633766233766253 | 4.114773477495923 | -14.46 | -1.93 | 0.87 | 2.78 | 11.29 |

| | cus_marital_status | count | unique | top | freq | true_prob |
|---|--------------------|-------|--------|------|------|-----------|
| 0 | 00 NA | 129 | 2 | True | 108 | 0.84 |
| 1 | 01 Single | 158 | 2 | True | 137 | 0.87 |
| 2 | 02 Maried | 128 | 2 | True | 104 | 0.81 |
| 3 | 03 Widow | 1 | 1 | True | 1 | 1.0 |
| 4 | None | 458 | 2 | True | 392 | 0.86 |

| | cus_marital_status | count | mean | std | min | 25% | 50% | 75% | max |
|---|--------------------|-------|--------------------|--------------------|--------|---------|--------------------|--------|-------|
| 0 | 00 NA | 129.0 | 0.5994573643410853 | 3.7345720784978997 | -11.67 | -0.67 | 1.32 | 2.66 | 10.66 |
| 1 | 01 Single | 158.0 | 1.8472151898734182 | 3.2460515698557075 | -8.58 | 0.5975 | 2.3049999999999997 | 3.4725 | 11.01 |
| 2 | 02 Maried | 128.0 | -0.509765625 | 3.879720434940802 | -13.08 | -2.3325 | 0.1050000000000001 | 2.0875 | 6.86 |
| 3 | 03 Widow | 1.0 | 4.11 | nan | 4.11 | 4.11 | 4.11 | 4.11 | 4.11 |
| 4 | None | 458.0 | 0.2960917030567686 | 4.099268575455452 | -14.46 | -1.9575 | 0.6950000000000001 | 2.87 | 11.29 |

| risk_level | count | unique | top | freq | true_prob |
|------------|-------|--------|------|------|-----------|
| Good | 87 | 2 | True | 82 | 0.94 |
| None | 420 | 2 | True | 314 | 0.75 |
| Normal | 108 | 2 | True | 103 | 0.95 |
| Risk | 98 | 2 | True | 94 | 0.96 |
| Very Good | 76 | 2 | True | 73 | 0.96 |
| Very Risk | 85 | 2 | True | 76 | 0.89 |

Good
(offer score = 4.46 - 6.63)

| risk_level | count | mean | std | min | 25% | 50% | 75% | max |
|------------|-------|---------------------|--------------------|--------|---------|--------------------|-------------------|-------|
| Good | 87.0 | 2.0759770114942526 | 3.5355692478640734 | -8.99 | 0.03 | 2.67 | 4.279999999999999 | 11.01 |
| None | 420.0 | 0.1949999999999995 | 4.164182511664619 | -13.73 | -2.0825 | 0.765 | 2.875 | 10.78 |
| Normal | 108.0 | 0.7585185185185184 | 3.114708493527743 | -7.18 | -1.0725 | 0.935 | 2.63 | 9.59 |
| Risk | 98.0 | 1.0080612244897962 | 3.2303910133768174 | -8.13 | -1.065 | 1.27 | 2.7025 | 11.29 |
| Very Good | 76.0 | 0.7064473684210529 | 3.325397902586443 | -8.15 | -1.12 | 1.0750000000000002 | 2.9975 | 10.0 |
| Very Risk | 85.0 | -0.6264705882352941 | 4.7083013583109 | -14.46 | -2.43 | 1.15 | 2.37 | 6.63 |

Hypothesis Testing - 2

$$H_0: \mu_1 = \mu_2$$

$$H_1: \mu_1 \neq \mu_2$$

Null Hypothesis: Average Actual Offer Percent in 2018 (15%) is equal to Average Actual Offer Percent in 2017 (10%)

Alternative Hypothesis: Average Actual Offer Percent in 2018 (15%) is not to Average Actual Offer Percent in 2017 (10%)

Level 3 - Criteria

Total of 874 Criteria

Average Actual Offer Percent in 2018 (15%) of **806** criteria is significantly not to Average Actual Offer Percent in 2017 (10%)

While Actual Offer Percent in 2018 (15%) of **68** criteria is significantly equal to Average Actual Offer Percent in 2017 (10%)

$$806 * 100 / 874 = 92.21\%$$

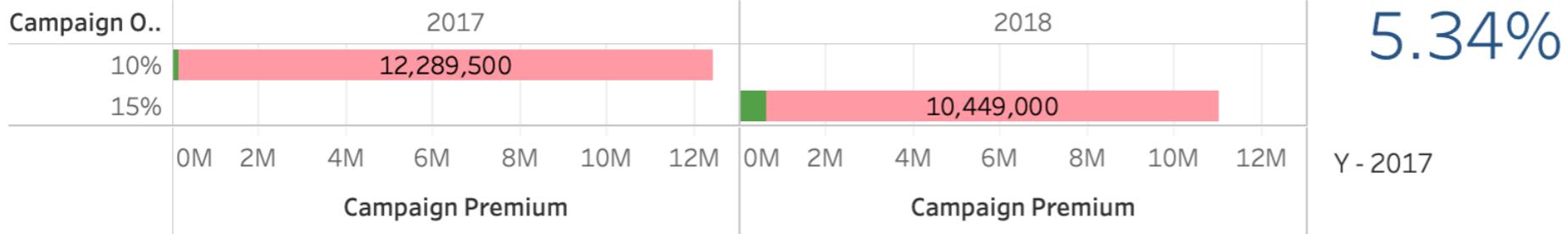
| group | sample_2018_no | sample_2017_no | y_2018 | y_2017 | y_score | greater_p_value | two_sided_p_value | premium_2018_Mean | premium_2017_Mean |
|------------------------------------|----------------|----------------|--------|--------|---------|-----------------|-------------------|-------------------|-------------------|
| 28-38_02 Maried_88,001-130,0000 | 52 | 19 | 8.15 | 3.31 | 4.84 | 0.038 | 0.085 | 9,832.0 | 8,605.0 |
| 1-18_00 NA_A1 | 65 | 20 | 5.34 | 1.09 | 4.25 | 0.035 | 0.814 | 9,069.0 | 6,750.0 |
| M_01 Single_300,001+ | 97 | 36 | 4.42 | 1.46 | 2.96 | 0.008 | 0.184 | 28,555.0 | 19,643.0 |
| F_300,001+_A1 | 73 | 22 | 4.21 | 1.29 | 2.93 | 0.023 | 0.181 | 18,616.0 | 13,909.0 |
| 19-27_F_00 NA | 122 | 57 | 7.06 | 4.31 | 2.75 | 0.012 | 0.18 | 9,604.0 | 7,115.0 |
| 01 Single_300,001+_A1 | 69 | 26 | 4.34 | 1.59 | 2.74 | 0.02 | 0.111 | 21,587.0 | 16,442.0 |
| 00 NA_300,001+_A1 | 44 | 16 | 3.83 | 1.22 | 2.61 | 0.018 | 0.207 | 19,023.0 | 12,094.0 |
| M_02 Maried_300,001+ | 104 | 42 | 4.36 | 1.78 | 2.58 | 0.002 | 0.06 | 39,154.0 | 28,033.0 |
| M_300,001+_A1 | 75 | 29 | 4.14 | 1.6 | 2.54 | 0.026 | 0.209 | 17,700.0 | 12,724.0 |
| 19-27_00 NA_300,001+ | 36 | 24 | 6.5 | 4.01 | 2.49 | 0.035 | 0.081 | 17,991.0 | 12,597.0 |
| 1-18_F_300,001+ | 33 | 18 | 3.47 | 1.34 | 2.13 | 0.045 | 0.493 | 15,617.0 | 11,942.0 |
| 19-27_60,001-88,000_E1 | 163 | 139 | 13.49 | 11.57 | 1.93 | 0.015 | 0.071 | 3,258.0 | 2,820.0 |

Aged 1-18

NA

A1

Campaign Premium 17/18

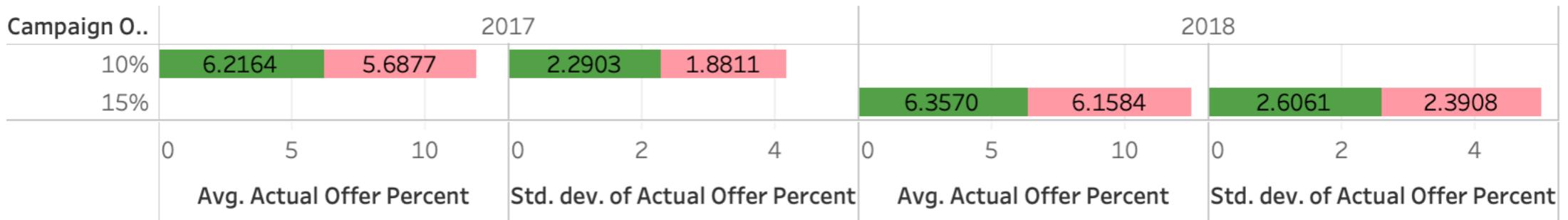
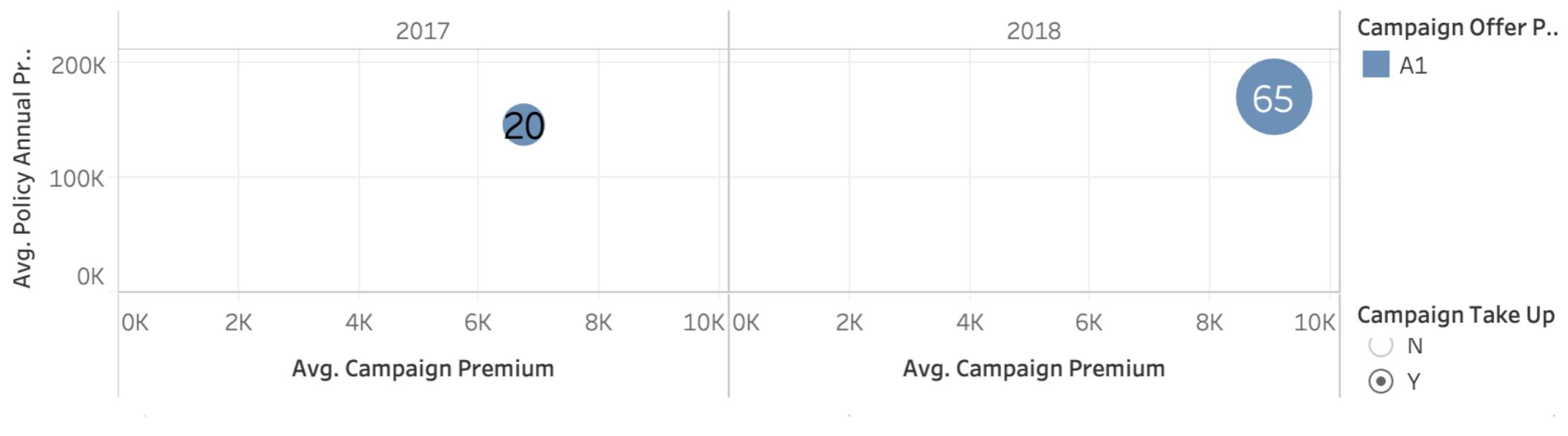


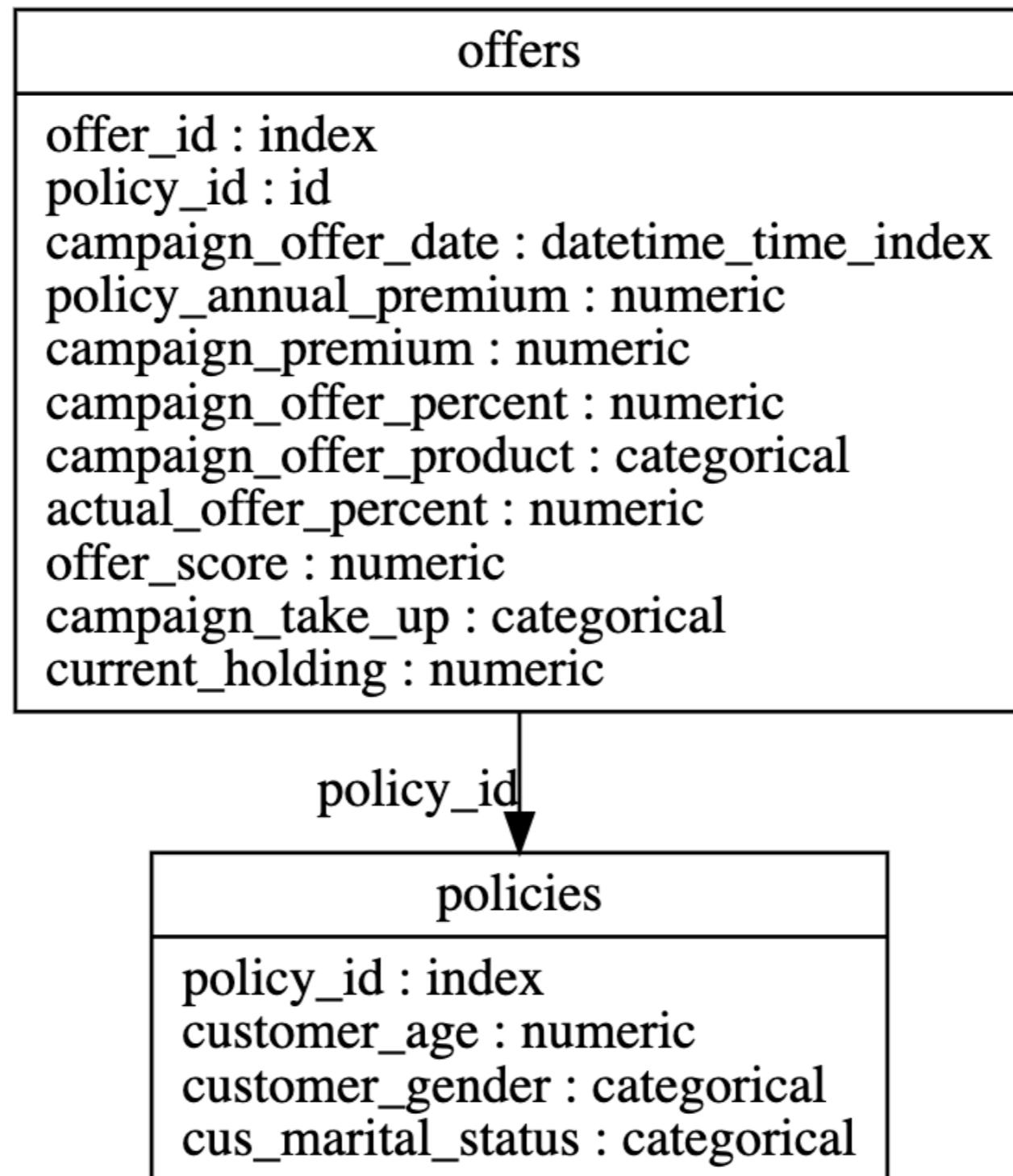
Campaign Take Up

- N (Red)
- Y (Green)

Age Range

- (All) (White)
- 1-18 (Dark Blue)
- 19-27 (Light Blue)
- 28-38 (Yellow)
- 39-45 (Orange)
- 46-52 (Red)





```
feature_matrix_policy, features_defs = ft.dfs(entities=es, entityset=es,
                                             agg_primitives=['max','median','trend','avg_time_between',\
                                              'min','std','mean','sum','skew',\
                                              'count','mode','last','time_since_first']
```

| | name | type | description |
|----|------------------|-------------|---|
| 0 | std | aggregation | Computes the dispersion relative to the mean v... |
| 1 | num_unique | aggregation | Determines the number of distinct values, igno... |
| 2 | time_since_first | aggregation | Calculates the time elapsed since the first da... |
| 3 | sum | aggregation | Calculates the total addition, ignoring `NaN`. |
| 4 | skew | aggregation | Computes the extent to which a distribution di... |
| 5 | max | aggregation | Calculates the highest value, ignoring `NaN` v... |
| 6 | mean | aggregation | Computes the average for a list of values. |
| 7 | avg_time_between | aggregation | Computes the average number of seconds between... |
| 8 | time_since_last | aggregation | Calculates the time elapsed since the last dat... |
| 9 | median | aggregation | Determines the middlemost number in a list of ... |
| 10 | min | aggregation | Calculates the smallest value, ignoring `NaN` ... |
| 11 | all | aggregation | Calculates if all values are 'True' in a list. |
| 12 | n_most_common | aggregation | Determines the `n` most common elements. |
| 13 | mode | aggregation | Determines the most commonly repeated value. |
| 14 | any | aggregation | Determines if any value is 'True' in a list. |
| 15 | percent_true | aggregation | Determines the percent of 'True` values. |
| 16 | count | aggregation | Determines the total number of values, excludi... |
| 17 | last | aggregation | Determines the last value in a list. |

```
feature_matrix_policy length: 604

policy_id
customer_age
customer_gender
cus_marital_status
MAX(offers.offer_score)
MAX(offers.policy_annual_premium)
MAX(offers.current_holding)
MAX(offers.campaign_premium)
MAX(offers.actual_offer_percent)
MAX(offers.campaign_offer_percent)
MEDIAN(offers.offer_score)
MEDIAN(offers.policy_annual_premium)
MEDIAN(offers.current_holding)
MEDIAN(offers.campaign_premium)
MEDIAN(offers.actual_offer_percent)
MEDIAN(offers.campaign_offer_percent)
TREND(offers.policy_annual_premium, campaign_offer_date)
TREND(offers.current_holding, campaign_offer_date)
TREND(offers.campaign_offer_percent, campaign_offer_date)
TREND(offers.campaign_premium, campaign_offer_date)
TREND(offers.actual_offer_percent, campaign_offer_date)
TREND(offers.offer_score, campaign_offer_date)
AVG_TIME_BETWEEN(offers.campaign_offer_date)
MIN(offers.offer_score)
MIN(offers.policy_annual_premium)
```

```
es[ "offers" ][ "campaign_take_up" ].interesting_values = [ "Y", "N" ]  
es[ "offers" ][ "campaign_offer_product" ].interesting_values = [ "E1", "A1", "A2", "C1", "H1", "H2" ]
```

```
TREND(offers.offer_score, campaign_offer_date WHERE campaign_take_up = N)  
TREND(offers.offer_score, campaign_offer_date WHERE campaign_offer_product = E1)  
TREND(offers.offer_score, campaign_offer_date WHERE campaign_offer_product = A1)  
TREND(offers.offer_score, campaign_offer_date WHERE campaign_offer_product = C1)  
AVG_TIME_BETWEEN(offers.campaign_offer_date WHERE campaign_take_up = Y)  
AVG_TIME_BETWEEN(offers.campaign_offer_date WHERE campaign_offer_product = H2)  
AVG_TIME_BETWEEN(offers.campaign_offer_date WHERE campaign_offer_product = H1)  
AVG_TIME_BETWEEN(offers.campaign_offer_date WHERE campaign_offer_product = A2)  
AVG_TIME_BETWEEN(offers.campaign_offer_date WHERE campaign_take_up = N)  
AVG_TIME_BETWEEN(offers.campaign_offer_date WHERE campaign_offer_product = E1)  
AVG_TIME_BETWEEN(offers.campaign_offer_date WHERE campaign_offer_product = A1)  
AVG_TIME_BETWEEN(offers.campaign_offer_date WHERE campaign_offer_product = C1)  
MIN(offers.offer_score WHERE campaign_take_up = Y)  
MIN(offers.offer_score WHERE campaign_offer_product = H2)  
MIN(offers.offer_score WHERE campaign_offer_product = H1)  
MIN(offers.offer_score WHERE campaign_offer_product = A2)  
MIN(offers.offer_score WHERE campaign_take_up = N)  
MIN(offers.offer_score WHERE campaign_offer_product = E1)  
MIN(offers.offer_score WHERE campaign_offer_product = A1)
```

<https://github.com/thanatchon36/phoenix-enhancement>

thanatchon36 / phoenix-enhancement

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README.md

phoenix-enhancement

<https://github.com/thanatchon36/phoenix-enhancement>

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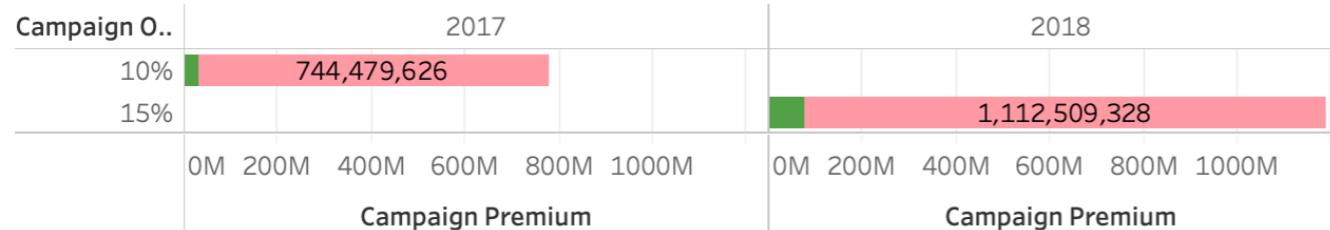
thanatchon36 add analytic report Latest commit 1ed3c2c 11 hours ago

..

| | | |
|---|---------------------|--------------|
| 📄 .DS_Store | first commit | 23 hours ago |
| 📄 Data_Phoenix_Campaign_Enhancement.csv | first commit | 23 hours ago |
| 📄 defined_Data_Phoenix_Campaign_Enhancement.csv | first commit | 23 hours ago |
| 📄 feature_matrix_policy.csv.zip | first commit | 23 hours ago |
| 📄 testReport_level_1.csv | add analytic report | 11 hours ago |
| 📄 testReport_level_2.csv | add analytic report | 11 hours ago |
| 📄 testReport_level_3.csv | add analytic report | 11 hours ago |
| 📄 testReport_level_4.csv | add analytic report | 11 hours ago |
| 📄 testReport_level_all.csv | add analytic report | 11 hours ago |

Q&A / Live Demo

Campaign Premium 17/18

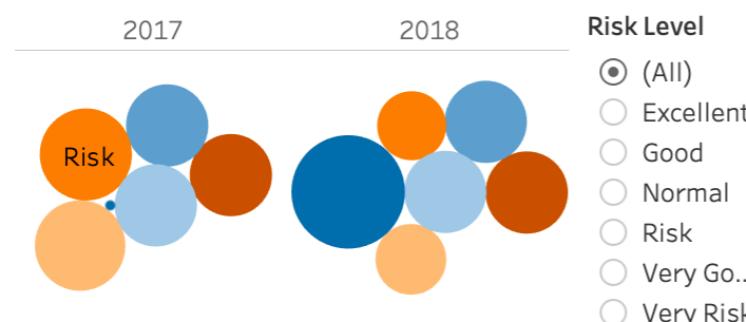


Y - 2018

6.37%

Y - 2017

4.25%



Risk Level

- (All)
- Excellent
- Good
- Normal
- Risk
- Very Good
- Very Risk



Campaign Take Up

- N
- Y

Age Range

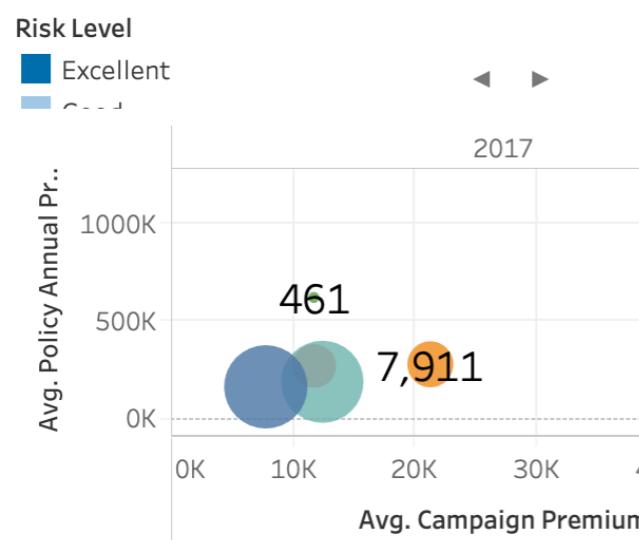
- (All)
- 1-18
- 19-27
- 28-38
- 39-45
- 46-52
- 53+

Annual Range

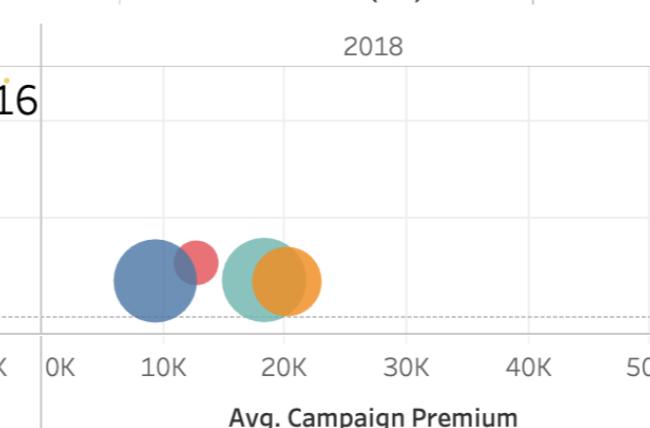
- (All)
- 1-60,000
- 60,001-88,000
- 88,001-130,000
- 130,000-190,000
- 190,001-300,000
- 300,001+

Customer Gender

- (All)
- F
- M



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Campaign Offer P..

- A1
- A2
- C1
- E1
- H1
- H2

Cus Marital Status

- (All)
- 00 NA
- 01 Single
- 02 Married
- 03 Widow

Campaign Take Up

- (All)
- N

Campaign Offer Product

- (All)
- A1
- A2
- C1
- E1

