

San Francisco Thieves Appear to Value Night-Time Sleep More Than Their Seattle Counterparts

Summary

This comparison of crime statistics of Seattle and San Francisco (SFO) focuses on how theft-related incidents are distributed over the course of the day. As the data indicate, thievery in SFO occurs less often during the 1am-7am time period compared to Seattle, and the SFO perpetrators seem to favor the early evening hours more than their “colleagues” in Seattle.

Data Preparation

The data sets of [this challenge](#) contain crime incidents recorded in Seattle and San Francisco in the period from June through August 2014. The crime classification systems of both cities are different from each other and need to be mapped to a common set of categories in order to compare crime rates. Excel’s VLOOKUP makes it easy to apply such a mapping to derive the “type” for each incident; I chose three types for this particular comparison:

1. Car-related thefts
2. Robbery (involving force)
3. Other Theft

All other categories were mapped to “NA”; the mappings are listed in the appendix.

For ease of comparison, I used Excel to derive the hour of the day without minutes, so there are effectively 24 “hour” buckets.

Population Count vs. Theft Count

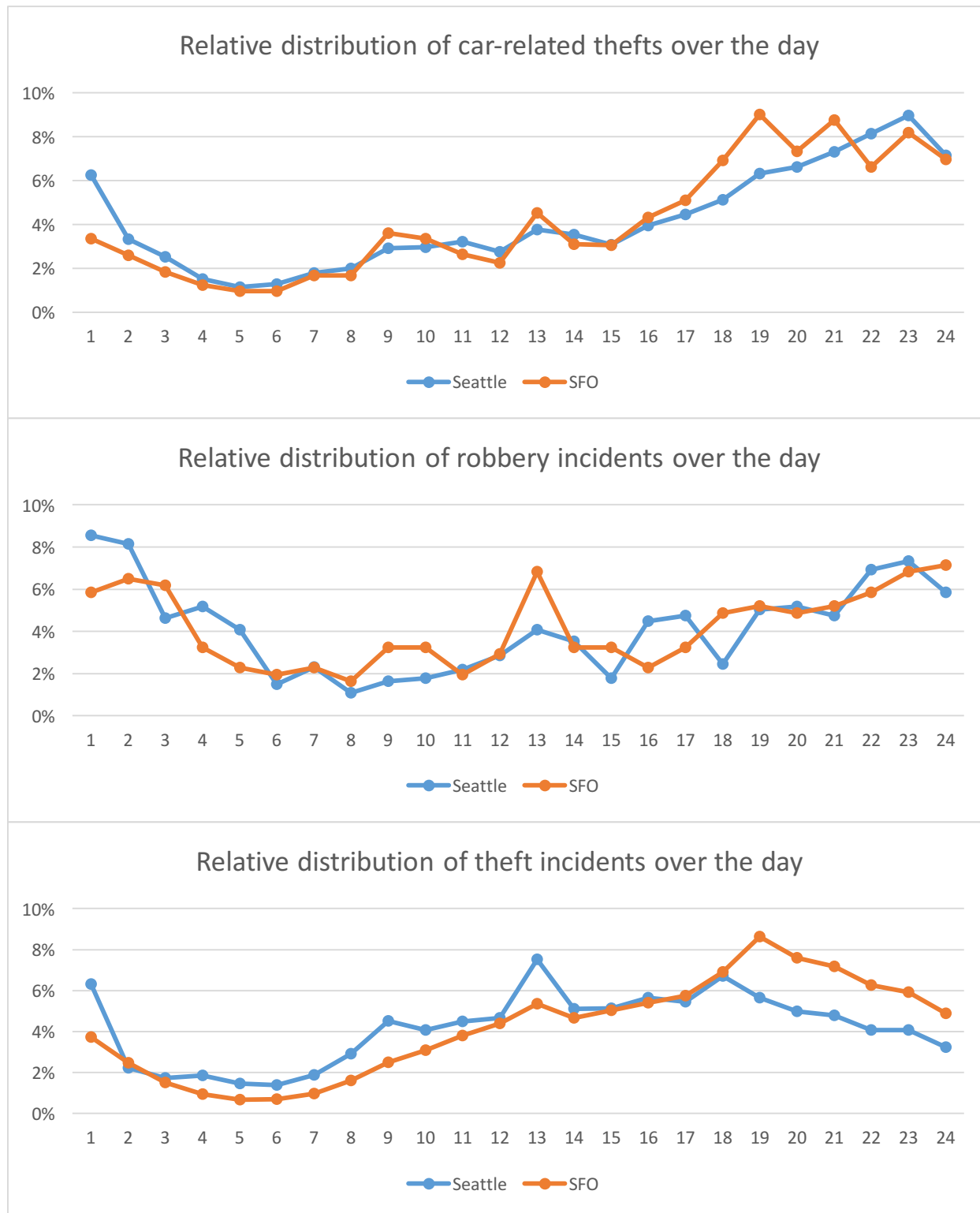
Population-wise, San Francisco (SFO) is the larger of the two cities. According to the government census Web sites for [SFO](#) and [Seattle](#), it had 852,469 inhabitants in 2014, that is 28% more than Seattle’s 668,342 inhabitants. Aggregating the overall counts by category and city shows however that 76% more theft incidents were reported in Seattle:

| Type / City | Grand Total |
|-------------|-------------|
| CAR | 11253 |
| Seattle | 9287 |
| SFO | 1966 |
| ROBBERY | 1044 |
| Seattle | 736 |
| SFO | 308 |
| THEFT | 20122 |
| Seattle | 10642 |
| SFO | 9480 |

Most / Least Activity Time Periods

For this exercise, I wanted to look at how the crime incidences are spread across the day in the two cities. In the light of the significant difference in incident counts between the 2 cities, it makes sense to compare the *percentages* of crimes rather than absolute values in each category for each hour. Pivoting the data by crime type, city and hour and lastly normalizing against the total in each type by

city provides the basis for the following charts. The pivot tables are included in the appendix as reference.



Overall, the crime rates per hour follow similar up- and downward trends in the two cities, but two observations stand out:

- The SFO numbers are fairly consistently below the Seattle percentages from the hours of 1am to 7am, with only a few exceptions in the robbery category.
- Contrary to at least my preconception, there were fewer incidents in the night/early morning hours

than during the day.

The highest number of unarmed thefts (i.e., excluding robbery) occurs in the evening hours, with a spike around 1pm; in SFO even more so than in Seattle. After 7pm the rate starts to decline in both cities, but Seattle thieves appear to keep going longer than their SFO counterparts, and stay more active which is apparent in their higher percentages from the 1am hour all the way to 7am. Their higher night-time activity applies to the robbery category as well (albeit with a few outliers), which lead me to the conclusion that SFO does not only have a much lower theft crime rate than Seattle, its thieves are also more likely to leave you alone during the hours after midnight.

Appendix

Seattle Crime Category to Type Mapping

| | |
|-----------------------------|-------|
| ANIMAL COMPLAINT | NA |
| ASSAULT | NA |
| BIAS INCIDENT | NA |
| BIKE THEFT | THEFT |
| BURGLARY | THEFT |
| BURGLARY-SECURE PARKING-RES | THEFT |
| CAR PROWL | CAR |
| COUNTERFEIT | NA |
| DISORDERLY CONDUCT | NA |
| DISPUTE | NA |
| DISTURBANCE | NA |
| DUI | NA |
| ELUDING | NA |
| EMBEZZLE | NA |
| ESCAPE | NA |
| FALSE REPORT | NA |
| FIREWORK | NA |
| FORGERY | NA |
| FRAUD | NA |
| HOMICIDE | NA |
| ILLEGAL DUMPING | NA |
| INJURY | NA |
| LIQUOR VIOLATION | NA |
| LOST PROPERTY | NA |
| MAIL THEFT | THEFT |
| NARCOTICS | NA |
| OBSTRUCT | NA |
| OTHER PROPERTY | THEFT |
| PICKPOCKET | THEFT |
| PORNOGRAPHY | NA |
| PROPERTY DAMAGE | NA |

| | |
|--------------------------|---------|
| PROSTITUTION | NA |
| PUBLIC NUISANCE | NA |
| PURSE SNATCH | NA |
| RECKLESS BURNING | NA |
| RECOVERED PROPERTY | NA |
| ROBBERY | ROBBERY |
| SHOPLIFTING | THEFT |
| STOLEN PROPERTY | THEFT |
| THEFT OF SERVICES | NA |
| THREATS | NA |
| TRAFFIC | NA |
| TRESPASS | NA |
| VEHICLE THEFT | CAR |
| VIOLATION OF COURT ORDER | NA |
| WARRANT ARREST | NA |
| WEAPON | NA |

SFO Crime Category to Type Mapping

| | |
|-----------------------------|---------|
| ARSON | NA |
| ASSAULT | NA |
| BRIBERY | NA |
| BURGLARY | THEFT |
| DISORDERLY CONDUCT | NA |
| DRIVING UNDER THE INFLUENCE | NA |
| DRUG/NARCOTIC | NA |
| DRUNKENNESS | NA |
| EMBEZZLEMENT | NA |
| EXTORTION | NA |
| FAMILY OFFENSES | NA |
| FORGERY/COUNTERFEITING | NA |
| FRAUD | NA |
| GAMBLING | NA |
| KIDNAPPING | NA |
| LARCENY/THEFT | THEFT |
| LIQUOR LAWS | NA |
| LOITERING | NA |
| MISSING PERSON | NA |
| NON-CRIMINAL | NA |
| OTHER OFFENSES | NA |
| PORNOGRAPHY/OBSCENE MAT | NA |
| PROSTITUTION | NA |
| ROBBERY | ROBBERY |
| RUNAWAY | NA |

| | |
|-----------------|-------|
| SECONDARY CODES | NA |
| STOLEN PROPERTY | THEFT |
| SUICIDE | NA |
| SUSPICIOUS OCC | NA |
| TRESPASS | NA |
| VANDALISM | NA |
| VEHICLE THEFT | CAR |
| WARRANTS | NA |
| WEAPON LAWS | NA |

Pivot Tables by Crime Type, City, and Hour

a) relative values as used by the charts

| Type | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Grand Total |
|-------------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| CAR | 5.75 % | 3.2 0% | 2.4 1% | 1.47% | 1.1 1% | 1.2 3% | 1.7 6% | 1.9 3% | 3.0 4% | 3.0 2% | 3.1 2% | 2.6 6% | 3.9 0% | 3.4 7% | 3.0 7% | 4.0 1% | 4.5 6% | 5.4 3% | 6.7 9% | 6.7 4% | 7.5 5% | 7.8 6% | 8.8 2% | 7.1 1% | 100.00 % |
| Seattle | 6.26 % | 3.3 3% | 2.5 3% | 1.52% | 1.1 4% | 1.2 8% | 1.7 8% | 1.9 8% | 2.9 2% | 2.9 5% | 3.2 2% | 2.7 5% | 3.7 7% | 3.5 4% | 3.0 7% | 3.9 4% | 4.4 5% | 5.1 1% | 6.3 2% | 6.6 2% | 7.3 0% | 8.1 3% | 8.9 6% | 7.1 4% | 100.00 % |
| SFO | 3.36 % | 2.5 9% | 1.8 3% | 1.22% | 0.9 7% | 0.9 7% | 1.6 8% | 1.6 8% | 3.6 1% | 3.3 6% | 2.6 4% | 2.2 3% | 4.5 3% | 3.1 0% | 3.0 5% | 4.3 2% | 5.0 9% | 6.9 2% | 9.0 0% | 7.3 2% | 8.7 5% | 6.6 1% | 8.1 9% | 6.9 7% | 100.00 % |
| ROBBERY | 7.76 % | 7.6 6% | 5.0 8% | 4.60% | 3.5 4% | 1.6 3% | 2.3 0% | 1.2 5% | 2.1 1% | 2.2 0% | 2.1 1% | 2.8 7% | 4.8 9% | 3.4 5% | 2.2 0% | 3.8 3% | 4.3 1% | 3.1 6% | 5.0 8% | 5.0 8% | 4.8 9% | 6.6 1% | 7.1 8% | 6.2 3% | 100.00 % |
| Seattle | 8.56 % | 8.1 5% | 4.6 2% | 5.16% | 4.0 8% | 1.4 9% | 2.3 1% | 1.0 9% | 1.6 3% | 1.7 7% | 2.1 7% | 2.8 5% | 4.0 8% | 3.5 3% | 1.7 7% | 4.4 8% | 4.7 6% | 2.4 5% | 5.0 3% | 5.1 6% | 4.7 6% | 6.9 3% | 7.3 4% | 5.8 4% | 100.00 % |
| SFO | 5.84 % | 6.4 9% | 6.1 7% | 3.25% | 2.2 7% | 1.9 5% | 2.2 7% | 1.6 2% | 3.2 5% | 3.2 5% | 1.9 5% | 2.9 5% | 6.8 2% | 3.2 5% | 3.2 5% | 2.2 7% | 3.2 5% | 4.8 7% | 5.1 9% | 4.8 7% | 5.1 9% | 5.8 4% | 6.8 2% | 7.1 4% | 100.00 % |
| THEFT | 5.10 % | 2.3 4% | 1.6 3% | 1.43% | 1.1 0% | 1.0 6% | 1.4 5% | 2.3 1% | 3.5 7% | 3.6 2% | 4.1 6% | 4.5 4% | 6.5 1% | 4.9 0% | 5.0 9% | 5.5 4% | 5.5 9% | 6.8 0% | 7.0 6% | 6.2 2% | 5.9 2% | 5.1 1% | 4.9 5% | 4.0 1% | 100.00 % |
| Seattle | 6.31 % | 2.2 3% | 1.7 4% | 1.85% | 1.4 8% | 1.3 8% | 1.8 9% | 2.9 2% | 4.5 2% | 4.0 9% | 4.4 8% | 4.6 6% | 7.5 3% | 5.1 1% | 5.1 4% | 5.6 5% | 5.4 6% | 6.7 2% | 5.6 6% | 4.9 9% | 4.8 0% | 4.0 8% | 4.0 9% | 3.2 3% | 100.00 % |
| SFO | 3.73 % | 2.4 7% | 1.5 1% | 0.95% | 0.6 9% | 0.7 0% | 0.9 6% | 1.6 1% | 2.5 0% | 3.0 9% | 3.8 1% | 4.4 0% | 5.3 6% | 4.6 6% | 5.0 3% | 5.4 1% | 5.7 4% | 6.9 0% | 8.6 3% | 7.5 9% | 7.1 8% | 6.2 7% | 5.9 3% | 4.8 8% | 100.00 % |
| Grand Total | 5.41 % | 2.8 1% | 2.0 1% | 1.54% | 1.1 8% | 1.1 4% | 1.5 9% | 2.1 4% | 3.3 4% | 3.3 7% | 3.7 4% | 3.8 3% | 5.5 5% | 4.3 6% | 4.2 9% | 4.9 5% | 5.1 9% | 6.2 1% | 6.9 0% | 6.3 6% | 6.4 6% | 6.1 1% | 6.3 7% | 5.1 6% | 100.00 % |

b) absolute values

| Type | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Grand Total |
|-------------|------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------------|
| CAR | 647 | 360 | 271 | 165 | 125 | 138 | 198 | 217 | 342 | 340 | 351 | 299 | 439 | 390 | 345 | 451 | 513 | 611 | 764 | 759 | 850 | 885 | 993 | 800 | 11253 |
| Seattle | 581 | 309 | 235 | 141 | 106 | 119 | 165 | 184 | 271 | 274 | 299 | 255 | 350 | 329 | 285 | 366 | 413 | 475 | 587 | 615 | 678 | 755 | 832 | 663 | 9287 |
| SFO | 66 | 51 | 36 | 24 | 19 | 19 | 33 | 33 | 71 | 66 | 52 | 44 | 89 | 61 | 60 | 85 | 100 | 136 | 177 | 144 | 172 | 130 | 161 | 137 | 1966 |
| ROBBERY | 81 | 80 | 53 | 48 | 37 | 17 | 24 | 13 | 22 | 23 | 22 | 30 | 51 | 36 | 23 | 40 | 45 | 33 | 53 | 53 | 51 | 69 | 75 | 65 | 1044 |
| Seattle | 63 | 60 | 34 | 38 | 30 | 11 | 17 | 8 | 12 | 13 | 16 | 21 | 30 | 26 | 13 | 33 | 35 | 18 | 37 | 38 | 35 | 51 | 54 | 43 | 736 |
| SFO | 18 | 20 | 19 | 10 | 7 | 6 | 7 | 5 | 10 | 10 | 6 | 9 | 21 | 10 | 10 | 7 | 10 | 15 | 16 | 15 | 16 | 18 | 21 | 22 | 308 |
| THEFT | 1026 | 471 | 328 | 287 | 222 | 213 | 292 | 464 | 718 | 728 | 838 | 913 | 1309 | 986 | 1024 | 1114 | 1125 | 1369 | 1420 | 1251 | 1192 | 1028 | 997 | 807 | 20122 |
| Seattle | 672 | 237 | 185 | 197 | 157 | 147 | 201 | 311 | 481 | 435 | 477 | 496 | 801 | 544 | 547 | 601 | 581 | 715 | 602 | 531 | 511 | 434 | 435 | 344 | 10642 |
| SFO | 354 | 234 | 143 | 90 | 65 | 66 | 91 | 153 | 237 | 293 | 361 | 417 | 508 | 442 | 477 | 513 | 544 | 654 | 818 | 720 | 681 | 594 | 562 | 463 | 9480 |
| Grand Total | 1754 | 911 | 652 | 500 | 384 | 368 | 514 | 694 | 1082 | 1091 | 1211 | 1242 | 1799 | 1412 | 1392 | 1605 | 1683 | 2013 | 2237 | 2063 | 2093 | 1982 | 2065 | 1672 | 32419 |