Thought: Speeding Quotas In Austin, Texas

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ThoughtBurner

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This is the last post I'll make about speeding, I swear (for now). You can read about the *__driver's problem__* or about the *__government's problem__* in my earlier posts about speeding. I wanted to share one more interesting discovery I had made while investigating common speeding myths – hopefully it will help you better optimize you speeding behavior. I investigate the claim that the City of Austin Police use speeding ticket quotas, and how to optimally adjust your behavior to account for the effects of these possible quotas.

TRAFFIC QUOTA BEHAVIOR IN AUSTIN POLICE

I have often heard from friends and family that you shouldn't speed at the end of the month because police officers will be trying to finish their month's quota of speeding tickets. Also, apparently there were a few police forces around the country that got caught using speeding ticket quotas in the past, including cities in Texas[i]. Even though speeding ticket quotas are illegal in Texas[ii], it may be the case that police departments have implicit quotas or "performance standards" that effectively create the same behavior that we would expect from explicit quotas.

The assertions, then, are that 1) police are required, either explicitly or implicitly, to give out a certain number of speeding tickets each month and 2) as each month comes to an end, police give out more tickets to make sure that they meet their quota.

Rather than continuing to speculate, I turned to the data. Using the City of Austin's open data website[iii], I gathered the details of every traffic violation given out by city police in fiscal year 2013-2014 (data available at the end of this post). After removing all non-speeding traffic violations, there were 67,606 tickets given out for a number of different types of speeding violations:

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. tab Description

              Description │    Freq.     Percent       Cum.

 FAILED TO CONTROL SPEED — POSTED │     100        0.15       0.15
 FAILED TO CONTROL SPEED — URBAN  │       9        0.01       0.16
              IMPRUDENT SPEED     │      38        0.06       0.22
         SPEEDING — 30 MPH ZONE   │   4,127        6.10       6.32
           SPEEDING — AIRPORT     │      14        0.02       6.34
SPEEDING — CITY WORK ZONE — NO WORKERS │ 275       0.41       6.75
SPEEDING — CITY WORK ZONE— WORKERS PR.. │ 238      0.35       7.10
      SPEEDING — POSTED CITY STREET │ 17,338       25.65      32.75
SPEEDING — POSTED—CITY STREET — LESS .. │   40      0.06       32.81
         SPEEDING — SCHOOL ZONE   │   2,925        4.33       37.13
        SPEEDING — STATE HIGHWAY  │  34,624       51.21       88.35
SPEEDING — STATE HIGHWAY  — LESS THAN.. │  420      0.62       88.97
SPEEDING — STATE WORK ZONE — NO WORKERS │ 5,482     8.11       97.08
  SPEEDING — STATE WORK ZONE — WORKERS  │ 1,975     2.92      100.00
    SPEEDING STATE WORK ZONE WORKERS    │     1     0.00      100.00

                        Total │  67,606      100.00
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Figure 1: Description Of All Speeding Violations In Austin, Texas Fiscal Year 2013-2014

This amounts to about 1 for every 4,700 Austinites, or 185 speeding tickets every day on average. Included in the data set is the date of each violation, which is exactly what we need to test whether police actually try to catch more speeders at the end of each month, as we might suspect.

First, I simply plotted the *average* number of speeding tickets for each day of the month and looked to see if it increased as the end of each month draws near. If more tickets were given out at later days of the month, it would provide suggestive evidence of quota behavior in Austin police. Here are the results:
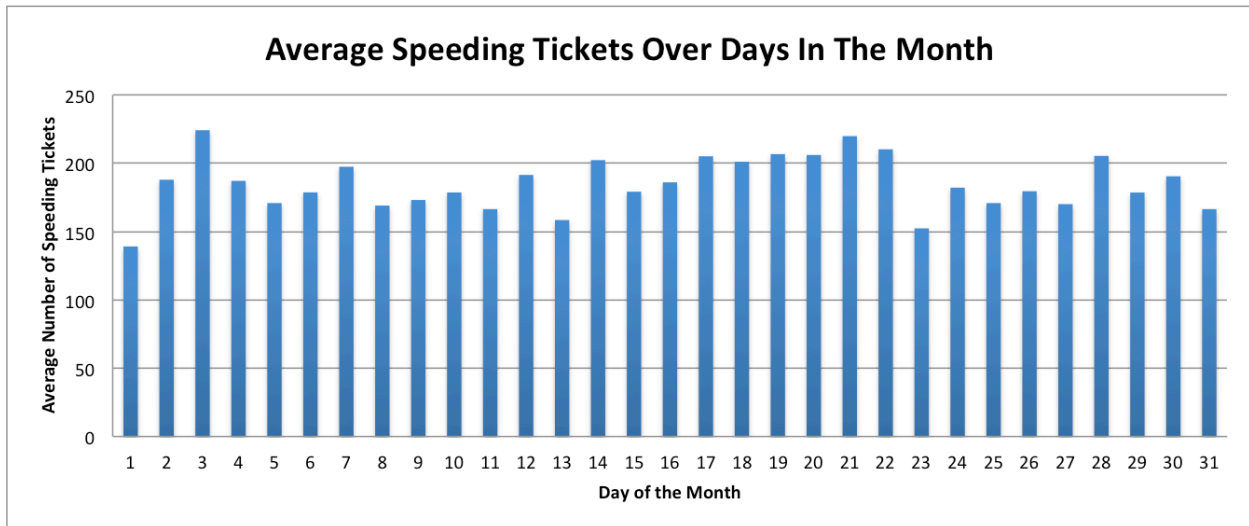

Figure 2: Average Speeding Tickets Given Out On Each Day Of The Month

It looks to me like the number of tickets given out actually *decreased* as the month came to an end. Visually, it doesn't appear like there are quotas – most days, police gave out between 150 and 200 tickets with no clear increase as the month came closer to an end. It was a bit suspicious to me, however, that there seemed to be a higher-than-average number of tickets given out between the 14th and 22nd of the month, with a sudden and somewhat lasting decrease starting on the 23rd...

I was also worried that there might be day of the week effects – maybe the police department had certain days of the week where all of the cops would spend a large part of their time trying to catch speeders in the city. To visually test for this, I plotted the total number of tickets given out on each day of the week:
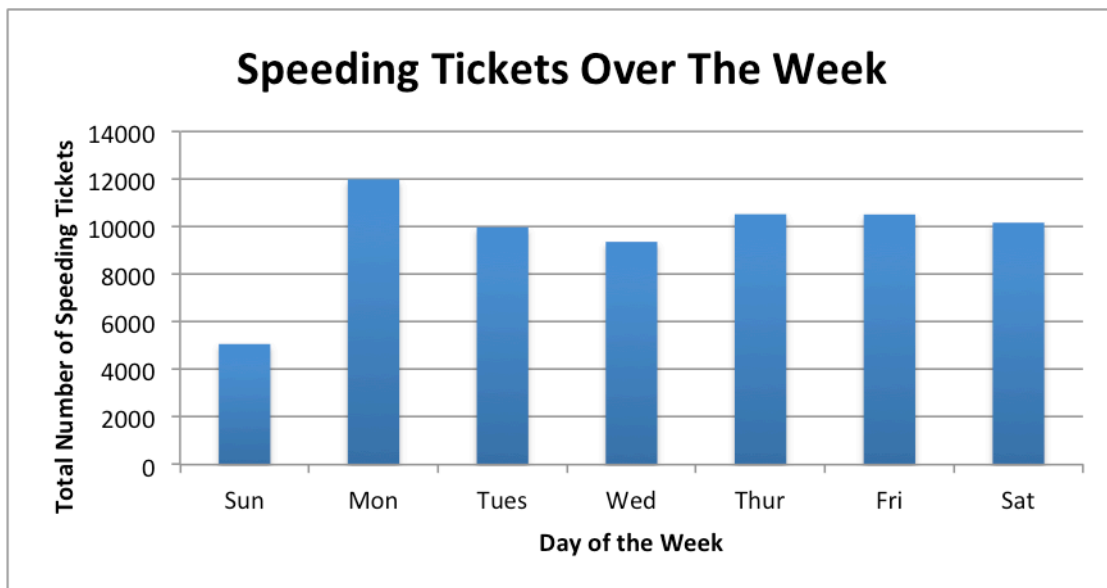
Figure 3: Speeding Tickets Given Out On Each Day Of The Week

While there appeared to be no single days where police gave out more tickets (except maybe Monday?), it looks like police gave out far fewer tickets on Sundays compared to other days. Because of this pattern, I decided to add in controls for day of the week *and* day of the month effects just to be safe.

First, I calculated the average number of tickets given out on each day-of-week-day-of-month combination. For example, there were three Tuesdays that were also the first day of a month in fiscal year 2013-2014, and there were a total of 373 tickets given out on those three days, which made for an average of 124.33 tickets on Tuesday-the-1sts. Using these calculated averages, I ran a regression of average number of tickets on day of the month and day of the week controls:

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Linear regression                                    Number of obs =      216
                                                     F( 7,   208) =    19.95
                                                     Prob > F      =   0.0000
                                                     R-squared     =   0.2980
                                                     Root MSE      =   61.401
```

Average	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
DayofMonth	-.2471464	.4201529	-0.59	0.557	-1.07545	.5811577
Sun	-99.3871	12.76935	-7.78	0.000	-124.561	-74.21316
Mon	39.1828	19.12475	2.05	0.042	1.479602	76.88599
Tues	-12.54301	15.74019	-0.80	0.426	-43.57377	18.48775
Wed	-18.81891	13.8399	-1.36	0.175	-46.10336	8.465536
Thur	-2.956989	13.9905	-0.21	0.833	-30.53834	24.62436
Fri	1.827957	14.77779	0.12	0.902	-27.3055	30.96141
Sat	0	(omitted)				
_cons	202.7608	11.82231	17.15	0.000	179.4539	226.0677

Figure 4: Regression Of Average Number Of Tickets On Day Of Month With Day Of Week Controls

The regression results confirm what we suspected from the visual inspection of the data. As the day of the month increases (as we get closer to the end of each month), there was no significant effect on the average number of tickets police gave out (negative, insignificant coefficient for *DayofMonth*). On Sundays, cops gave out about 100 tickets *less* than on Saturday (Saturday is the comparison day since it was dropped) and the effect is highly significant (coefficient on *Sun*). Also, cops gave out about 40 tickets *more* on Mondays, and this effect is marginally significant as well (coefficient on *Mon*)[iv]. Because there is no information about the number of people who drive on each day of the week, we can't tell if these day of the week effects are because cops act differently or because people drive differently over the course of a week. For example, if half as many people drive on Sundays then that could explain why we see about half as many tickets.

While the day of the month variable was insignificant in the regression above, it doesn't necessarily rule out the possibility of speeding ticket quotas. It just means that there probably aren't ticket quotas due *at the end of each month*. If Austin City police had to meet their quotas by the middle of every month – maybe by the 22nd, for example – then the regression above wouldn't be able to detect the expected pattern in the average number of speeding tickets given out.

To test for quotas that are "due" on different days of the month, I created artificial "quota months" where the suspected due date of the quota was made to be the last day of the month. For example, there was visual suggestive evidence that the 22nd might be the last day of a quota, so I changed the 22nd to be the last day of the month (31st), the 23rd to be the first day of the month (1st), and so on for each day of the month. Using the new, modified dates as the day of the month variable, I

reran the regression with controls to see if the pattern of the average number of tickets given out conformed to expected quota behavior for any of the hypothetical quota months (i.e. if there was an increase in tickets towards the end of the new quota months). I actually did this for each possible monthly quota due date, but rather than showing you all 31 regression results I put them in a nifty little table that summarizes the important parts:

Suspected End Date	Effect Size (Tickets)	p-value
1	-0.719	0.075
2	-0.596	0.137
3	-0.129	0.749
4	-0.085	0.831
5	-0.088	0.826
6	0.064	0.873
7	0.021	0.958
8	-0.263	0.533
9	-0.380	0.382
10	-0.479	0.284
11	-0.728	0.112
12	-0.805	0.086
13	-0.989	0.037
14	-0.740	0.129
15	-0.722	0.147
16	-0.603	0.239
17	0.191	0.716
18	0.252	0.632
19	0.322	0.541
20	0.863	0.098
21	1.136	0.028
22	1.434	0.005
23	1.018	0.048
24	0.862	0.088
25	0.648	0.188
26	0.424	0.376
27	0.275	0.556
28	0.229	0.614
29	-0.075	0.865
30	-0.087	0.840
31	-0.247	0.557

The suspected end date column indicates by which day of the month I am assuming police officers had to complete their speeding ticket quota. For example, the expected end date of 22 means that I assume that police officers had to reach their quota by the end of the 22nd of each month. The

effect size column indicates how big the effect is *if* I was correct about the quota end date. So, if I was right that the quota was due on the 22nd, then police gave out 1.434 more tickets on average for each day closer to the 22nd (starting from the 23rd of the month before). The highlighted rows are statistically significant effects at the 5% level.

The 21st, 22nd, and 23rd are all prime suspect dates for a quota end date. If the City of Austin police force is using a quota system, police most likely need to meet their quota by one of these dates. The 13th is essentially the least likely quota end date – if this were the actual quota end date, then police would actually be giving out about 1 ticket (significantly) *less* per day as their quota end date drew closer, which we think doesn't really make sense.

I want to be careful with interpreting the results – this does not *prove* that police officers are using quotas, it just suggests that *if* they are, then their quotas are probably due between the 21st and 23rd of each month. The assumptions are: police officers do in fact have quotas, *and* police "procrastinate" in the sense that they wait until the quota end date is close to finish collecting their quota. Given that these are true, *then* we would see a higher number of tickets given out as the quota end date approaches. A higher, significant effect size means that police more strongly follow this expected behavior given that the suspected end date is in fact when a monthly quota is due. The effect size, then, is sort of like the "chance that the quota ends on that date". Keeping this interpretation in mind, it becomes clear that if a quota exists then it's probably needs to be met sometime between the 21st and 23rd of each month, and almost definitely is not due around the 13th. This is apparent visually as well:
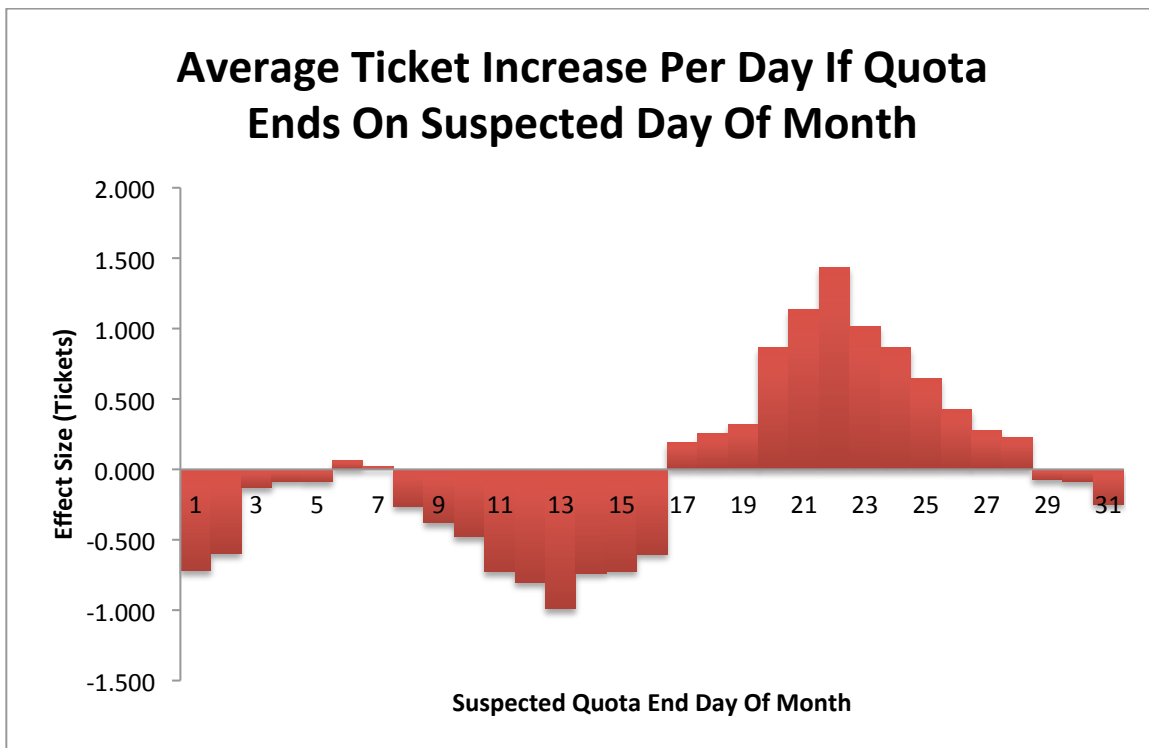

Figure 5: Effect Size For Each Suspected Quota End Date

Another word of caution: As I mentioned before, I could not control for the number of drivers on each day. While I can't think of a reason why more people would drive (or be more likely to speed) on these days of the month (and therefore more tickets would be given out), we can't rule out the possibility that driver behavior is causing the trend rather than police quota behavior.

Last, I just want to point out that even if we were right about the existence of speeding quotas *and* police behavior *and* the day that quotas were due (the 22[nd], say), the effects are rather small – only about 1.5 tickets more per day *out of all police officer and drivers*. There are 2,300 police officers in Austin[v] and the city has a population of 885,400[vi], so 1.5 more tickets a day is a practically small effect.

Caveats aside, according to the best evidence I have, it appears that Austin police *do not* give out more tickets at the end of each month. Rather, they give out more tickets *during the 3[rd] week of each month*, between the 15[th] and 22[nd]. *If* speeding ticket quotas do exist, explicitly or implicitly, then they are most likely to be due around the 22[nd] of each month. For all of you drivers out there who are worried about the increased probability that you will get a speeding ticket due to ticket quotas, you should all speed a little less during the 3[rd] week of each month, and maybe a little more during the last week. Also, there seems to be some evidence that you are less likely to get a ticket on Sundays, and more likely to get a ticket on Mondays.

Which means that Sunday-the-23[rd]s are probably the best days to speed, from the driver's point of view. The most recent Sunday-the-23[rd] (that I have data for) was in March of 2014, and only 32 speeding tickets were given out. Compare that to the Austin City average of 185 tickets per day. August 23, 2015 is the next Sunday that is also the 23[rd] of the month – this day would probably give you the best chance to speed without getting caught. Monday-the-22[nd]s would probably be the day you would be most likely to get a speeding ticket – June 22[nd], 2015 is the next of these. Make sure you plan your speeding accordingly.

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[i] http://blog.motorists.org/if-you-didnt-believe-ticket-quotas-existed-before-you-will-now/
[ii] http://www.statutes.legis.state.tx.us/Docs/TN/htm/TN.720.htm (see Sec. 720.002. PROHIBITION ON TRAFFIC-OFFENSE QUOTAS.)
[iii] https://data.austintexas.gov/
[iv] An F-test on the day-of-the-week coefficients show that the average number of tickets given out on Tuesday through Saturday are not significantly different. This test and its results are included in the Stata .do file.
[v] http://www.austintexas.gov/department/police
[vi] http://quickfacts.census.gov/qfd/states/48/4805000.html