

PETITION FOR RULEMAKING

This Petition for Rulemaking is hereby submitted to the Department of Environmental Protection (DEP), pursuant to Chapter 60 of Title 15 of the Rules of the City of New York. The petitioner looks forward to hearing from the DEP within the statutorily provided 60 days.

Petitioner name:

Nikita Bogdanov

Petitioner address:

[Hidden for privacy]

[Hidden for privacy]

[Hidden for privacy]

Petitioner email:

nmbogdan@alumni.stanford.edu

Petitioner phone number:

[Hidden for privacy]

Nikita Bogdanov

Date

1 Statement of Basis and Purpose of Proposed Rule

Publicly available data indicates that a mere ten companies are responsible for 25% of the idling tickets issued and 26% of the idling penalties imposed during the 2022 calendar year, between them accounting for more than \$1.7M in fines across more than 2,400 tickets.^{1,2} What's more—and crucially for the argument outlined below—these largest offenders are also among our state's and often our country's largest businesses. It is then of little surprise that despite the significant increase in enforcement activity caused by the popularization of the Citizens Air Complaint Program, for these biggest offenders, idling penalties represent simply a small cost of doing business.³ If enforcement is to have any meaningful deterrent effect on top offenders, the rules governing idling violations must undergo substantive revision. The potential for impact is large: given their outsized contribution to the pool of idling citations, New York City could realize a significant reduction in idling and idling pollution by deterring just the top ten offenders alone.⁴ But care is necessary in amending existing rules, in order to balance the need for deterrence with demands of fairness, among others. This petition outlines the central shortcomings of New York City's existing idling rules and puts forward data-driven recommendations to address them.

To begin with, to understand just how little incentive there is for the largest offenders to comply with New York City's idling laws, one need only compare the scale of their business operations to the scale of the idling fines at present imposed on them. For instance, consider Amazon.com, Inc., the single largest offender in 2022 and the largest offender in aggregate from 2020 through 2022. In 2022, Amazon recorded nearly \$514B in net sales, dwarfing the average \$1,118 it paid per idling violation that year and dwarfing the \$728k in imposed penalties.^{5,6} Similarly, Consolidated Edison, Inc., the second largest offender both in 2022 and in aggregate from 2020 through 2022, recorded \$16B in revenue in 2022 and paid on average \$686 per idling violation, totalling over \$400k in idling fines, of which it has paid only 51%.⁷ As a final example, Verizon Communications, Inc., the fourth largest offender in 2022 and the third largest offender in aggregate from 2020 through 2022, recorded revenue of nearly \$137B in 2022 and paid \$444 per idling violation for a total of over \$140k in fines.⁸

Put differently, between Amazon, Consolidated Edison, and Verizon, at best the average idling fine is *more than 20 million times smaller* than the offender's annual revenue. To put this into perspective, were speeding tickets priced similarly relative to individual pre-tax income, an individual making \$100k annually would pay on average *less than one cent* per speeding ticket—truly a small price to pay to shave two minutes off of one's morning commute.⁹

See [Figure 1](#) and [Table 1](#) for summary statistics for the top ten offenders of 2022, ranked by penalties imposed during the 2022 calendar year.

¹All figures cited herein are from data derived from NYC Open Data, pulled on May 5th, 2023 (see <https://data.cityofnewyork.us/City-Government/OATH-Hearings-Division-Case-Status/jz4z-kudi>). Figures do not include tickets issued under Section 24-163(f) (5,664 of a total of 85,940 tickets issued since 1995). Some respondent names have been standardized to combine, e.g., "AMAZON" and "AMAZON PRIME", or "MERCHANTS FLEET" and "MERCHANT'S FLEET". "Penalty imposed" date refers to the hearing date. All but 49 of some 48,000 entries with a non-zero penalty amount have both a hearing date and a violation date populated. Data analysis code is available on Github (see https://github.com/PlatosTwin/idling_petition/tree/main).

²For summary statistics for top offenders from 2020 through 2022, as well as detail on the distribution of idling tickets by offender, see [Appendix A](#).

³See [Appendix B](#) for more on the Citizens Air Complaint Program.

⁴It is difficult to estimate just how significant this reduction would be without knowing the total volume of idling emissions produced on, say, an annual basis.

⁵See [Amazon's 2022 Annual Report](#).

⁶Note that Amazon is responsible for a non-zero and possibly non-negligible proportion of tickets issued to Merchant's Fleet, from which Amazon leases many of its delivery vehicles. However, it is difficult if not impossible to assess the proportion of Merchant's Fleet tickets that in fact should have been issued to Amazon.

⁷See [Consolidate Edison's 2022 Earnings Report](#).

⁸See [Verizon's Q4 and 2022 Results](#).

⁹Indeed, at less than one cent per speeding ticket, shaving two minutes off of one's commute could even be quite profitable. An annual income of \$100k equates to roughly \$50 per hour or just over \$0.83 per minute. If you shave two minutes off of your morning commute by speeding, and then convert those time savings into earnings, you gross about \$1.67; after accounting for one photo-enforced speeding ticket, you net around \$1.66. Across 250 business days, less two weeks of vacation, in a year and being issued one photo-enforced speeding ticket per day, you can therefore make an additional \$412 per year.

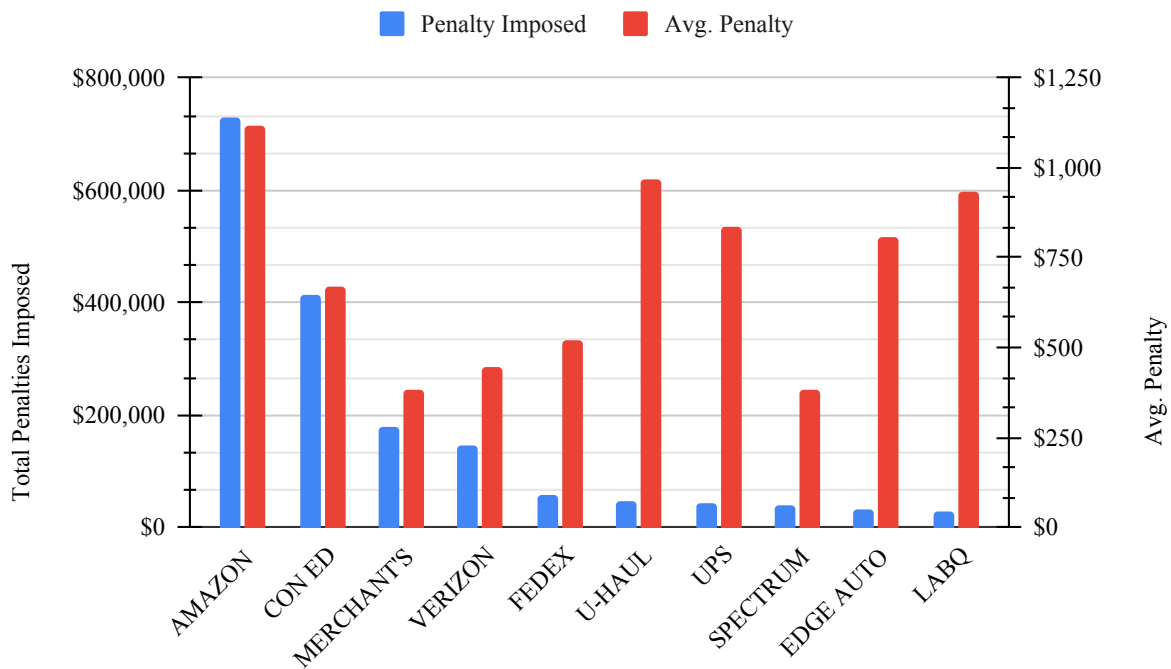


Figure 1: Total penalties imposed and average penalties for the top ten offenders as ranked by penalties imposed in 2022.

Respondent	Avg. Penalty (\$)	Penalty Imposed (\$)	Pct. of Total Penalty	Cum. Pct. Penalties	Amount Paid (\$)	Pct. Penalty Paid	Ticket Count	Pct. of Total Tickets	Cum. Pct. Tickets
AMAZON	1,118	728,140	11%	11%	716,697	98%	651	6%	6%
CON ED	668	414,330	6%	18%	210,443	51%	620	6%	12%
MERCHANT'S FLEET	381	177,440	3%	20%	177,055	100%	466	5%	17%
VERIZON	444	146,910	2%	22%	145,180	99%	331	3%	20%
FEDEX	520	56,650	1%	23%	25,150	44%	109	1%	21%
U-HAUL	966	45,400	1%	24%	17,735	39%	47	0%	23%
UPS	834	40,890	1%	25%	17,100	42%	49	0%	23%
SPECTRUM	381	38,450	1%	25%	37,625	98%	101	1%	22%
EDGE AUTO	806	31,430	0%	26%	1,905	6%	39	0%	24%
LABQ	935	28,050	0%	26%	0	0%	30	0%	25%

Table 1: 2022 summary data for the top ten offenders as ranked by penalties imposed in 2022.

If the City of New York and the Department of Environmental Protection are to fight air pollution from vehicle idling, they must have the tools not only to educate but also to deter—and one of the best methods of deterrence is economic disincentive in the form of increased penalties. While intended to deter the largest offenders in particular, the penalty increases proposed here will likewise serve to deter smaller offenders.

Prior to outlining this proposal's concrete recommendations, it is worth addressing that Sections 24-163 and 24-163(f) of the New York City Administrative Code apply to vehicles commercial and non-commercial alike. While on the surface this fact suggests that penalty increases should differentiate between commercial and non-commercial offenders, in practice the Citizens Air Complaint Program allows submissions for commercial vehicles only, and Sections 24-163 and 24-163(f) are seldom enforced against private vehicles otherwise. Indeed, from 2020 through 2022, a total of one idling summons was issued to parties readily identifiable as private individuals. In short, the current enforcement regime means that for all intents and purposes, New York City's idling laws are enforced against commercial vehicles only, at this time obviating the need to consider private individuals when developing rule amendments.

Broadly, there are two mechanisms available to increase penalties across the board at the same time as

focusing increases on repeat offenders: amending the penalty schedule, and amending the definition of subsequent offenses.¹⁰ This petition employs both; if adopted, the rule changes outlined below would:

1. Moderately increase penalties for first- and second-time violations;
2. Differentiate additionally between third to tenth and eleventh and subsequent violations;
3. Set substantial penalties for third to tenth violations and set even more significant penalties for eleventh and subsequent violations;
4. Redefine subsequent offenses to be at the level of *respondent* rather than at the level of *vehicle*.

Together, these four changes—below referred to as amendments (1), (2), (3), and (4)—are designed to achieve deterrence at the same time as meeting demands of what we might call *fairness in fines*. Specifically, a penalty schedule should not set penalties so low as to be fair to offenders with small-scale business operations yet have no deterrent effect on the those with expansive operations, nor should it set them so high as to deter offenders with large-scale operations yet cause an undue financial burden on those with minimal operations. Under amendments (1) - (4), the vast majority of low-grade repeat offenders (second-time or third- to tenth-time offenders) would be differentiated from so-called high-grade offenders, those with eleven or more violations, and only high-grade offenders would be subject to outsized penalties, more on which below.

Amendment (4) is additionally designed to accommodate common notions of what we term *fairness in punishment*. It shouldn't matter if a respondent's fleet numbers in the thousands or in the tens: if two respondents each receive ten idling citations, they should each receive the same number of first-time citations, second-time citations, and third and subsequent citations. At present, however, subsequent violations are defined at the level of vehicle rather than at the level of respondent, meaning that statistically, the size of a respondent's fleet will play a significant role in the number of repeat violations the respondent is issued given the same total ticket count. Specifically, for a given total ticket count, the larger a respondent's fleet the more first-time citations they will be issued, on average, prior to receiving a repeat citation.¹¹

To take a concrete if hypothetical example, assume that in New York City there are a total of 4,000 idling vehicles, and treat summonses as *random samples*. Now, say respondent A has a fleet of 1,500 idling vehicles and has received 28 first-time summonses; if issued summons number 29, there is only a 50% chance that this summons will be a repeat summons at the level of vehicle. Compare this to the situation that faces respondent B, with only 500 idling vehicles in their fleet. After 28 first-time summonses, if issued summons number 29, there is a 99.9% chance that this summons will be a repeat summons at the level of vehicle. In short, under the current definition of subsequent offenses, the larger one's fleet of idling vehicles, the greater one's cost savings for a given number of tickets—a clear affront to common notions of fairness in punishment. Redefining subsequent violations at the level of respondent addresses this affront directly.

Additionally, and as closely related to concerns regarding fairness in punishment, amendment (4) aligns the issuance of repeat violations to common notions of what we call *subsequent responsibility*. To take from the discussion just above, not only should two respondents who receive some same number of tickets *w* be issued the same number of first-time, second-time, and third-and-subsequent violations, they should be issued *exactly one* first-time citation, *exactly one* second-time citation, and *exactly w – 2* third-and-subsequent citations. In practice, however, of the 24,399 tickets issued from 2020 through 2022 under Section 24-163, only 7% were for repeat violations *at the level of vehicle* despite 69% of tickets being repeat tickets if subsequent violations are defined *at the level of respondent*.¹²

Amendment (4) will likely lead to a material increase in tickets for subsequent violations, so it is important to validate that the fairness in punishment gained of redefining subsequent violations at the level of respondent does not come at the expense of gains in fairness in fines. Fortunately, there is little reason

¹⁰An alternative to the proposal outlined below is to implement “day fines,” such that idling penalties would be based upon the average daily revenue of the offending commercial entity or the average daily income of the offending private individual—rather than being set at a fixed amount. As related, Council Member Justin Brannan has recently introduced legislation “to establish a pilot program to use day-fines for certain violations of local law” (see <https://on.nyc.gov/3VghwkV>).

¹¹See [Appendix C](#) for further detail on this point.

¹²See [Appendix D](#) for a modest qualification and [Table 3](#) for an adjacent but more granular view.

Violation	Number of Tickets (actual)	Pct. of All Tickets (actual)	Number of Tickets (revised def.)	Pct. of All Tickets (revised def.)
1st	22,710	93%	7,635	31%
2nd	1,133	5%	2,884	12%
3rd and subseq.	547	2%	13,880	57%
Unclassified	9	0%	0	0%

Table 2: Under the current definition of subsequent offenses, a business may receive many first-time citations prior to ever receiving a second- or third-time one, frustrating common notions of both fairness in punishment and subsequent responsibility.

to think that amendments (1) - (4) are incompatible. Specifically, under these amendments and at existing violation rates, the highest penalties would remain concentrated on the largest offenders: out of a total of 10,554 businesses, only 1,442 (14%) would be subject to second-time violations, only 1,275 (12%) would be subject to third- to tenth-time violations, and a mere 201 (2%) would be subject to the highest level of penalty.¹³ While these 201 businesses represent 2% of the total number of businesses fined between hearing years 2020, 2021, and 2022, they account for 33% of the ticket issued and 32% of the total penalties imposed during that time. Further, of these 201, the top ten on their own account for 17% of the tickets issued and penalties imposed during this period. Additional detail is available in [Table 3](#), where color coding represents the violation brackets proposed in this petition.

In short, coupling penalty schedule revisions with a redefinition of subsequent offenses at once serves to deter the largest offenders and to meet demands of fairness in fines, fairness in punishment, and subsequent responsibility.

Number of tickets	Number of respondents	Pct. of Tickets Issued
1	7,635	31%
2	1,442	12%
3	559	7%
4	284	5%
5	161	3%
6	103	3%
7	62	2%
8	43	1%
9	38	1%
10	24	1%
11-50	182	14%
51-250	13	4%
251-500	3	4%
501-750	0	0%
750+	3	12%

Table 3: Distribution of violation counts for summonses issued from 2020 through 2022.

Section one of this proposed rule would amend Subdivision 5 of Section 43-01 of Title 15 of the Rules of the City of New York to define repeat offenses for commercial vehicles at the level of US Department of Transportation (USDOT) number—rather than at the level of vehicle, as defined by license plate number. Complaints filed under the Citizens Air Complaint Program are already required to provide photo documentation that captures the idling vehicle’s USDOT number and legal business name or DBA as it appears on the USDOT registration, meaning no adjustments would be required to public-facing documents or instructions.

Section two of this proposed rule would amend Section 43-02 of Title 15 of the Rules of the City of New York to revise the existing Air Code Penalty Schedule to:

¹³Of course, if increased penalties work as intended, we would expect violation rates to decrease rather than to hold constant after the adoption of the amendments proposed in this petition, suggesting that the figures cited here (14%, 12%, and 2%) are more upper bounds than true expectations.

1. Increase fines for violations of both Section 24-163 (“Idling of motor vehicle engine more than three minutes”) and Section 24-163(f) (“Idling of motor vehicle engine more than one minute while adjacent to school”);
2. Differentiate first, second, third to tenth, and eleventh and subsequent offenses.

2 Proposed Amendments

New material is underlined; deleted text is in [] brackets.

Section 1. Subdivision 5 of Section 43-01 of Title 15 of the Rules of the City of New York is amended to read as follows:

5. Except in connection with violations of Section 24-163, a second or third offense means a violation of any section of the Air Code by the same respondent within two years of the date of occurrence of the prior violation, at the same premises (if premises-related), and involving the same equipment. In connection with violations of Section 24-163, a second or third or subsequent offense is a violation by the same respondent within three years of the date of occurrence of the prior violation(s), [and involving the same vehicle,] where the prior violation(s) was for a violation of Section 24-163. For non-commercial vehicles, subsequent violations are defined at the level of the vehicle, as identified by the license plate number. For commercial vehicles, as identified by registration with the US Department of Transportation (USDOT), subsequent violations are defined at the level of USDOT number, such that all vehicles sharing a given USDOT number are treated as a single entity for the purposes of counting violations.

Section 2. Section 43-02 of Title 15 of the Rules of the City of New York is amended by changing the entries for sections 24-163 and 24-163(f), as follows:

Section of Law	Violation Description	Compliance	1st Offense Stip. (\$)	1st Offense (\$)	Default Penalty (\$)	2nd Offense (\$)	2nd Offense Stip. (\$)	3rd [and Subseq.] to 10th Offense (\$)	3rd [and Subseq.] to 10th Stip. (\$)	11th and Subseq. Offense (\$)	11th and Subseq. Stip. (\$)
24-163	Idling of motor vehicle engine more than three minutes	N/A	N/A	[350] <u>750</u>	1 st : [1,000] <u>2,000</u> ; 2 nd : [1,500] <u>3,700</u> ; 3 rd [and subseq] to 10 th : [2,000] <u>6,900</u> ; 11 th and subseq: <u>24,000</u>	[440] <u>1,400</u>	N/A	[600] <u>2,600</u>	N/A	<u>9,000</u>	N/A
24-163(f)	Idling of motor vehicle engine more than one minute while adjacent to school	N/A	N/A	[350] <u>750</u>	1 st : [1,000] <u>2,000</u> ; 2 nd : [1,500] <u>3,700</u> ; 3 rd [and subseq] to 10 th : [2,000] <u>6,900</u> ; 11 th and subseq: <u>24,000</u>	[440] <u>1,400</u>	N/A	[600] <u>2,600</u>	N/A	<u>9,000</u>	N/A

Appendices

Appendix A Top Offender Summary Statistics

In this section we present not only summary statistics for top offenders but also a visualization of the distribution of the number of tickets across all offenders, using what is called a Lorenz curve, a tool that will be familiar to many students of wealth inequality. In addition to the Lorenz curve for our idling data, we show the Lorenz curve corresponding to perfect equality and that for the well known 80-20 Pareto distribution.¹⁴ The distribution of idling tickets is not quite 80-20—but neither is it close to equality: just 20% of respondents account for just over 60% of idling tickets, and just 30% of respondents account for about 70% of idling tickets. While a natural next step, we do not here investigate whether a power law offers the best fit to our data or to a part of it. That said, given the ubiquity of power law distributions, it would not be surprising were idling tickets distributed according to a power law; indeed, purely visually, the log-log rank/frequency plot in Figure 4 suggests that a power law is likely to fit beginning around the 200th rank.¹⁵

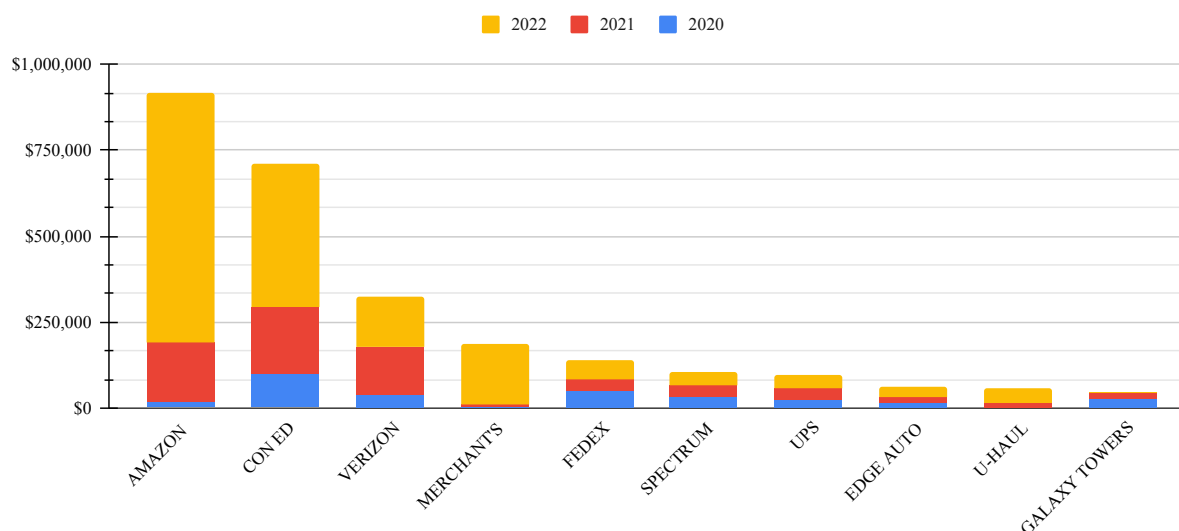


Figure 2: Penalties imposed by hearing year by offender for the top ten offenders as ranked by penalties imposed from 2020 through 2022.

¹⁴In a perfectly equal distribution, 10% of offenders are responsible for 10% of tickets, 30% for 30%, 60% for 60%, and so on.

¹⁵Log-log rank/frequency plots are constructed by ranking buckets by frequency count (in this case respondents by ticket count), ordering the list (in our case in descending order), and then plotting the resulting curve on a log-log plot. Because power law distributions take the form $p(x) = Cx^{-\alpha} \iff \ln p(x) = \alpha \ln(x) + C$, a linear trend on a log-log plot generally recommends investigating whether a power law is the best fit to the linear portion of the data.

Respondent	Penalty Imposed (\$)			Paid Amount (\$)			Number of Tickets		
	2020	2021	2022	2020	2021	2022	2020	2021	2022
AMAZON	20,250	170,700	728,140	20,900	208,160	716,697	30	169	651
CON ED	98,990	196,140	414,330	82,162	185,930	210,443	134	464	620
VERIZON	38,520	139,700	146,910	40,457	141,141	145,180	104	375	331
MERCHANT'S FLEET	0	9,200	177,440	0	8,450	177,055	0	17	466
FEDEX	51,150	32,850	56,650	24,475	23,155	25,150	75	74	109
SPECTRUM	32,980	34,290	38,450	32,980	34,395	37,625	93	95	101
UPS	22,440	33,540	40,890	28,228	40,745	17,100	23	38	49
EDGE AUTO	15,200	15,240	31,430	3,715	3,790	1,905	23	20	39
U-HAUL	2,100	10,800	45,400	2,870	9,275	17,735	6	29	47
GALAXY TOWERS INC	27,000	19,500	0	3,250	0	0	22	19	0

Table 4: Summary statistics for top ten offenders as ranked by penalties imposed from 2020 through 2022. Note that in some cases, respondents will have paid more than the amount of penalties imposed; this happens when respondents are assessed additional penalties or late fees, as “Paid Amount” includes additional fines and late fees, whereas “Penalty Imposed” includes only the original idling penalty.

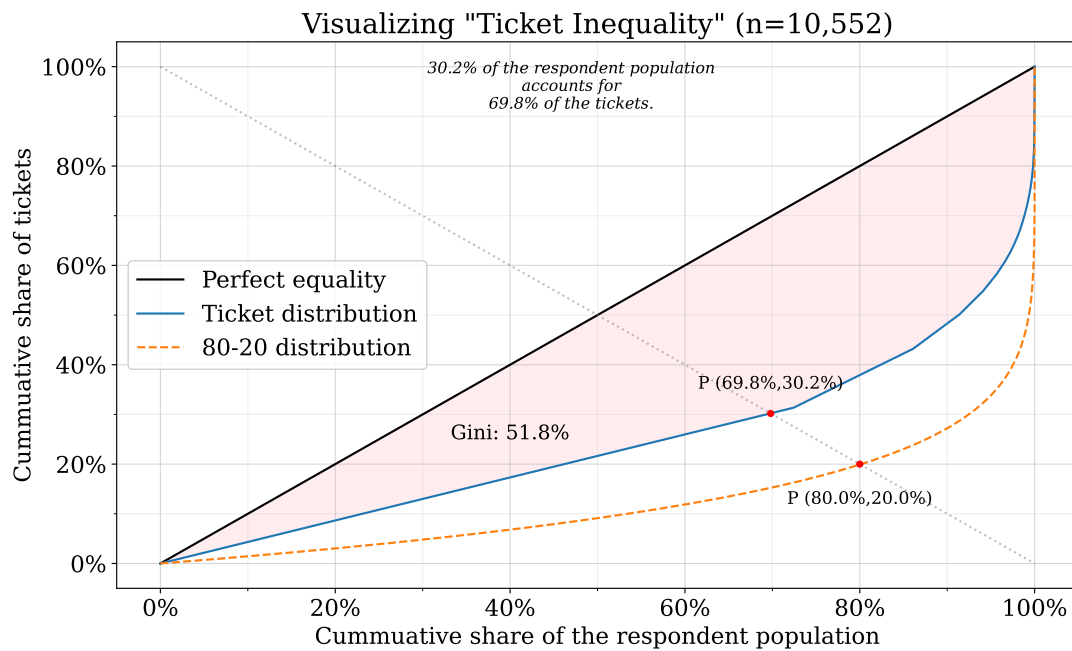


Figure 3: Lorenz curve for idling tickets issued from 2020 through 2022, along with lines for perfect equality and the ubiquitous 80-20 Pareto distribution. We can see that while idling tickets are not quite 80-20, there is still considerable concentration of tickets by respondent. For instance, 20% of respondents account for just over 60% of the tickets—and 30% of respondents account for about 70% of idling tickets.

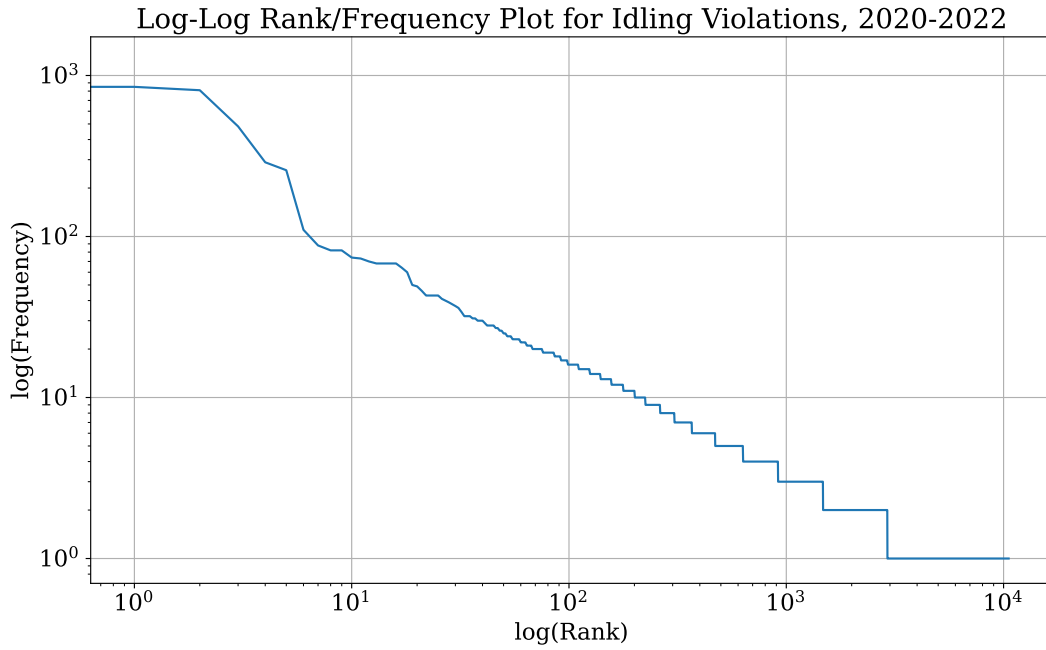


Figure 4: Log-log rank/frequency plot for idling tickets issued from 2020 through 2022. While we do not continue on to determine whether a power law provides the best fit to this data, qualitatively there is a change in character near the 200th rank, below which a power law seems particularly appropriate.

Appendix B Citizens Air Complaint Program Summary Statistics

Of the 24,399 tickets issued from 2020 through 2022, all but 70 are reliably attributable to the Citizens Air Complaint Program.¹⁶ Thus, while the summary statistics below include all 24,399 tickets, the data is for practical purposes reflective of tickets issued only through the Citizens Air Complaint Program.

¹⁶A ticket is said to be due to the Citizens Air Complaint Program if the lower-cased violation details for the ticket contain the word "citizen".

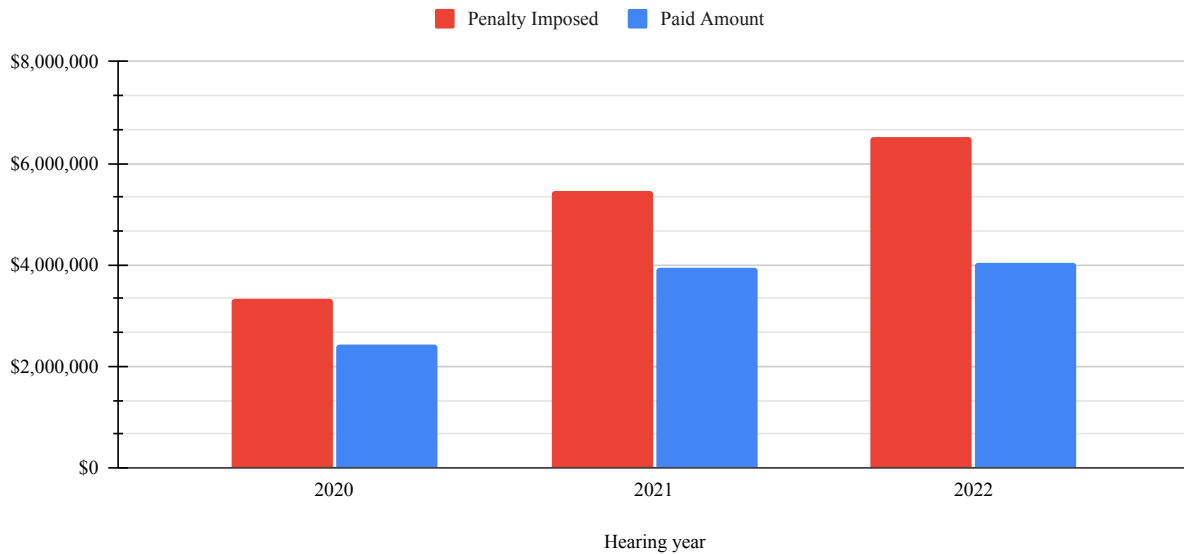


Figure 5: Penalties imposed versus paid from 2020 through 2022. Note that “Paid Amount” includes additional fines and late fees, whereas “Penalty Imposed” includes only the original idling penalty.

Hearing Year	Penalty Imposed (\$)	Paid Amount (\$)	Pct. Penalty Paid	Number of Tickets
2020	3,340,074	2,443,388	73%	5,406
2021	5,462,975	3,925,566	72%	8,816
2022	6,527,720	4,035,446	62%	10,177

Table 5: Summary penalty data from 2020 through 2022. Note that “Paid Amount” includes additional fines and late fees, whereas “Penalty Imposed” includes only the original idling penalty.

Appendix C The Probability of Repeat Violations

This appendix contains two sections. In [subsection C.1](#), we use the famed Birthday Problem to understand the degree to which repeat violations at the level of vehicle undercount repeat offenses relative to repeat violations defined at the level of respondent. In [subsection C.2](#) we engage invert the Birthday Problem to estimate the number of idling vehicles in the fleets of top offenders.

It is worth clarifying upfront that, while mathematically sound in idealized contexts, the results derived below should be interpreted with caution in all practical contexts, as it is almost certain that some necessary assumptions are in practice violated. For instance, both sections assume that each vehicle has the same probability of being issued a summons, a condition which in practice is no doubt violated to at least some degree. First, there are a finite number of citizens that participate in the Citizens Air Complaint Program, each having a finite amount of time to devote to recording idling violations. From this we can conclude that the probability of any given idling vehicle being issued a summons depends on the number of vehicles issued summonses prior to it. In fact, with each draw the probability of the next draw decreases, until eventually the probability of the next draw goes to 0, signifying that we have exhausted the finite reporting resource. Second, it is plausible that citizens favor certain areas over others, and that certain vehicles are dispatched to certain areas on a regular basis, making it further unlikely that each vehicle has an equal probability of being issued a summons. We leave it to the reader to identify yet further reasons our necessary assumption may not hold.

Moreover, in both sections we refer to the “population” of idling vehicles, or to subsets thereof, as if this were a straightforward concept when applied to idling vehicles. But idling vehicles are not like colored

marbles in an urn. Idling vehicles do not idle in one location continuously for years; rather more likely, they idle, move to another location, idle again, park overnight, then the following day repeat the same pattern of idling and moving. Moreover, from 2020 through 2022, fleet vehicles may have been rotated, license plates may have changed, company policies may have been made more or less strict, and drivers may have come and gone, all challenging the notion of “population” upon which the theories we employ rely.

C.1 Idling and the Birthday Problem

We can model the issuance of first-time versus subsequent summonses as a variation of the Birthday Problem, which will be familiar to any beginning student of probability. A common version of the Birthday Problem asks some variation on, “How many individuals must gather in a room in order for there to be at least a 50% chance that at least two of them have the same birthday?” The problem is easily reformulated as follows: “How many times must you sample, with replacement, from the set of integers from 1 to 365, inclusive, in order to have at least a 50% chance of picking at least one number twice?” Replace integers with vehicles, and the relevance to the context of idling becomes clear.

Figure 6 below shows the number of summonses W (samples with replacement) required to bring the likelihood of a repeat summons *at the level of vehicle* (repeat draw) to at least 50%, plotted as a function of the total population of idling vehicles N . For instance, if the total number of idling vehicles in New York City is $N = 4,000$, we can see that we require $W = 75$ summonses for the chance of at least one of them being issued to the same vehicle to be at least 50%.

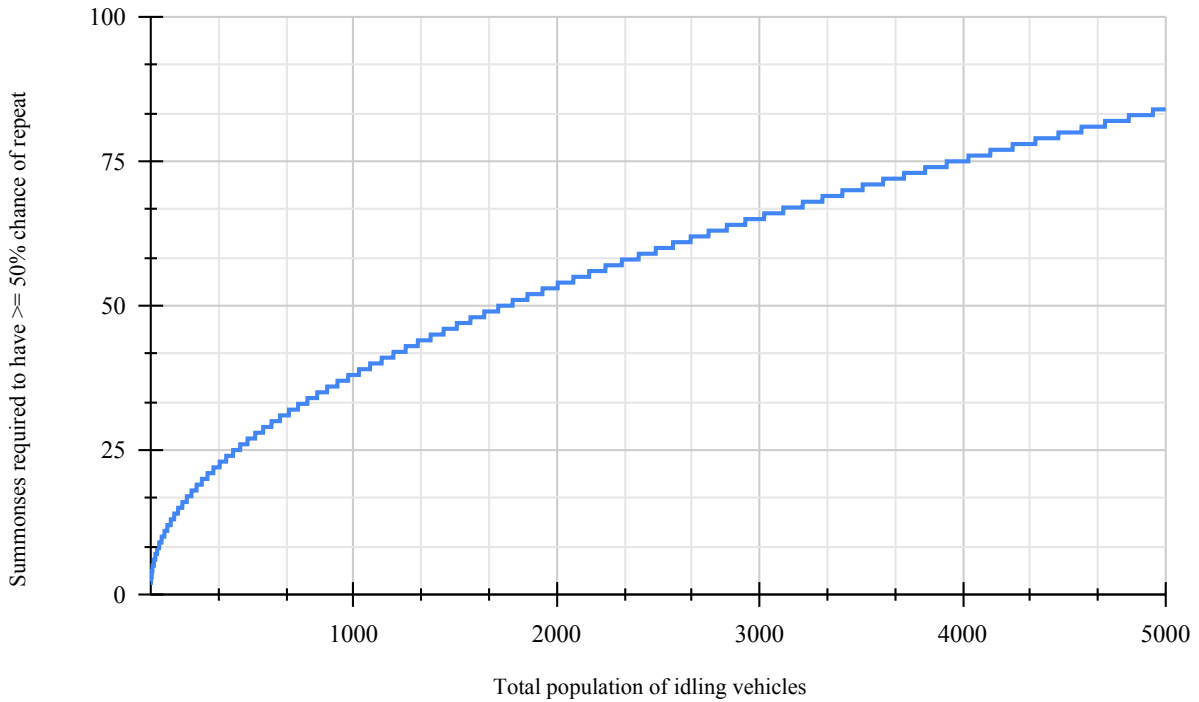


Figure 6: The number of summonses required to have at least a 50% chance of issuing at least one repeat summons, as a function of the total population of idling vehicles.

Now, in the above example 75 represents the requisite number of summonses given that the *total population* of vehicles that are idling during the sampling period is 4,000. Of course, the figure of interest to us is not W but rather the corresponding number w given the number of idling vehicles n in a *given respondent's* fleet. Fortunately, to find w , we need only recognize that $w \propto n$; a little reflection then reveals that the

constant of proportionality must be $\frac{W}{N}$, which recall is fixed as soon as we set N .¹⁷ We can then use this proportion to find w given a value for $n \leq N$ as follows:

$$w = \lceil n \cdot \frac{W}{N} \rceil.$$

$\frac{W}{N}$ is plotted as a function of N in Figure 7. To take an example of using this proportion, let $N = 4,000$ and for some respondent A let $n = 1,500$. Then we can find w as:

$$w = \lceil 1500 \cdot \frac{75}{4000} \rceil = \lceil 28.125 \rceil = 29.$$

So, focusing on respondent A, under the current definition of subsequent offenses and letting $N = 4,000$, after issuing 28 *first-time summonses* to respondent A, were you to issue summons number 29, you would have *only a 50% chance* of issuing that summons for a repeat violation. Under the definition proposed in this petition, after issuing *one first-time summons* to *any* business, were you to issue a second summons to that same business, you would have a *100% chance* of issuing it for a repeat violation.

In general, define N , n , W , and w as before, and let p denote the desired minimum probability of a repeat draw, which above we have set to 50%. With a little manipulation, we can use the Taylor series expansion of the exponential function to arrive at the following approximation for w :

$$w \approx \lceil n \cdot \frac{\sqrt{-2N \ln(1-p)}}{N} \rceil.$$

¹⁷This assumes that we already know p , the desired minimum probability of a repeat draw. If p is yet to be determined, then the proportion $\frac{W}{N}$ will be fixed as soon as we choose N and p . More on the general formulation follows in the coming paragraphs.

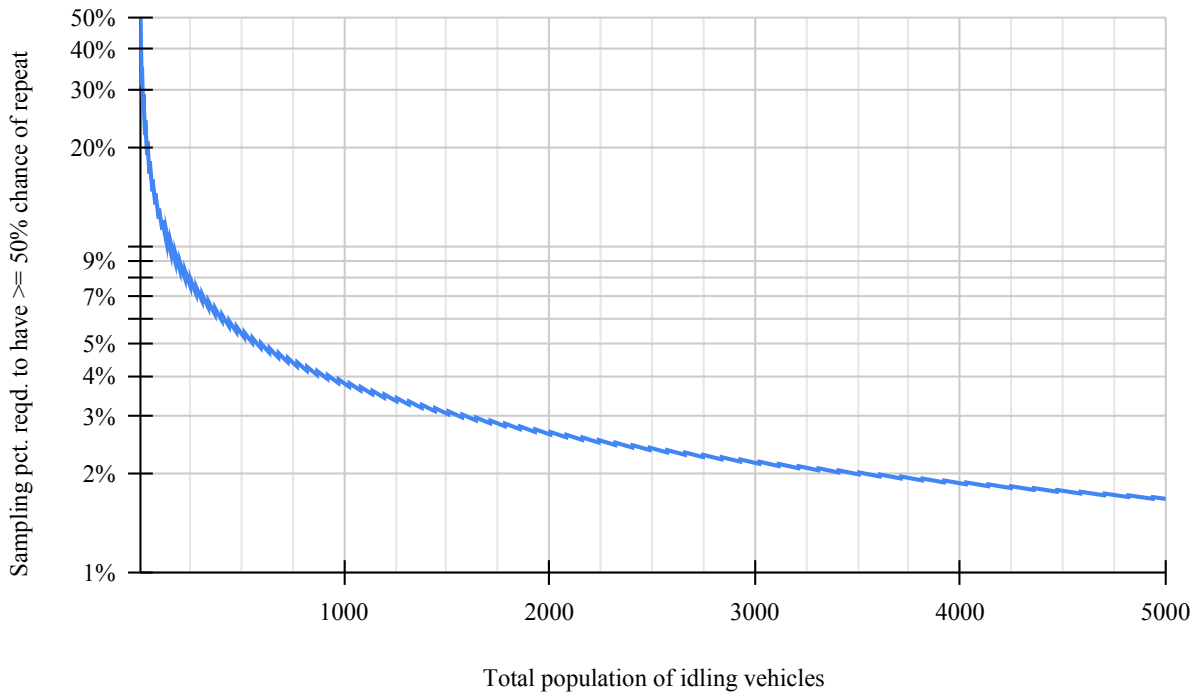


Figure 7: For any number of idling vehicles n in a given fleet, as a function of the total population of idling vehicles N , where $n \leq N$, the number of summonses as a percentage of n required to have at least a 50% chance of issuing at least one repeat summons, shown for $10 \leq N \leq 5,000$. For instance, for a total idling population of 2,000, the corresponding percentage is 2.65%. For any subset of these 2,000 vehicles, then, you must issue summonses numbering at least 2.65% of the size of the subset to have at least a 50% chance of issuing a repeat summons. So, for a subset of 1,000 vehicles, you would need to issue $\lceil 1,000 \cdot 2.65\% \rceil = \lceil 26.5 \rceil = 27$ summonses.

C.2 Inverting the Birthday Problem

In subsection C.1, given the total number of idling vehicles, we calculate the number of summonses required to bring the likelihood of a repeat summons at the level of vehicle to at least 50%. In this section, we tackle the inverse problem: we are interested in finding the total number of idling vehicles that will maximize the likelihood of selecting k unique vehicles across m samples, where we can find k and m from the same publicly available idling citation data used throughout this petition. When calculated for a given respondent, this figure serves to estimate n , the total number of idling vehicles in that respondent's fleet, which we can then use to arrive at a value for w provided we know N .¹⁸ Estimates of n are presented in Table 6 for the top ten offenders ranked by penalties imposed from 2020 through 2022. Note that complete license plate information is unavailable for about 25% of tickets, meaning that the population estimates presented in the table below are perhaps better interpreted as lower bounds.

It is worth noting that while the publicly available idling citation data used herein allows us to estimate the total number of *idling* vehicles in a given respondent's fleet, and from a collection of these figures to estimate the total number of idling vehicles in general, it *does not* allow us to estimate the *overall* number of vehicles in a fleet (nor, it should go without saying, in general).

¹⁸The inverse Birthday Problem is variously called the Coupon Collector's Problem or the capture-recapture problem. The approach used to estimate populations herein is due to a derivation by Rebecca Langford (<https://sites.google.com/site/rbeeman976/home/collector>).

Respondent	Number of Tickets (complete plates)	Unique Vehicles	Pct. Unique	Pop. Estimate (lower bound)	Number of Tickets (incomplete plates)
AMAZON	800	262	33%	277	50
CON ED	1,004	547	54%	733	214
VERIZON	678	351	52%	451	132
MERCHANT'S FLEET	480	88	18%	88	3
FEDEX	209	147	70%	277	49
SPECTRUM	214	155	72%	311	75
UPS	88	73	83%	225	22
U-HAUL	76	72	95%	687	6
EDGE AUTO	62	51	82%	151	20
GALAXY TOWERS INC	38	9	24%	9	3

Table 6: For the top ten offenders by penalties imposed from 2020 through 2022, we can estimate the total number of idling vehicles in a given respondent's fleet knowing the total number of tickets issued and the total number of unique vehicles cited.

Appendix D Enforcement Lapses

It is accurate to say that of the 24,399 tickets issued from 2020 through 2022, only 7% were issued as repeat tickets under the existing definition of subsequent offenses. However, due to dysfunctional enforcement, this figure is in fact an underestimate of the number of repeat offenses at the level of vehicle during this time period.

As one example ahead of presenting aggregate statistics, one truck with Florida license plate 15AAIW was cited 22 times between 6/2/2021 and 3/13/2022. And yet, across these 22 times, it was issued a first-time fine *almost every single time*, excepting on 2/27/2022 and 3/6/2022. Alarming, after being issued its first repeat violation, this truck was then cited for a first-time violation twice on 3/5/2022 and once again on 3/13/2022.

In aggregate, based on the 18,344 tickets with complete license plate information, from 2020 through 2022 there were 2,573 vehicles with more than one violation each, between them accumulating 7,536 tickets. From these numbers alone, and assuming a properly functioning enforcement organ, we would expect approximately 2,573 tickets (34%) for first-time violations, 2,573 tickets (34%) for second-time violations, and 2,390 tickets (32%) for third-time and subsequent violations. Instead, we find the actual distribution weighted heavily toward first-time tickets, as shown below in Table 7. Including all 18,344 tickets with complete license plate information yields Table 8, which is similarly if somewhat less skewed toward first-time tickets.

Fine Type	Actual Number of Tickets	Pct. of Total	Expected Number of Tickets	Expected Pct. of Total
First	6,323	84%	2,573	34%
Second	730	10%	2,573	34%
Third & subseq.	481	6%	2,390	32%
Uncategorized	2	0%	0	0%
Total	7,536	100%	7,536	100%

Table 7: Tickets by fine type for the 2,573 vehicles that from 2020 through 2022 had more than one ticket each. The expected number of tickets is approximated by assuming complete enforcement fidelity: each of the 2,573 vehicles is issued one and only one first-time ticket and each is thereafter issued one and only one second-time tickets; all tickets following that are tickets for third and subsequent violations. Note, however, that in practice most tickets are issued for first-time violations, indicating serious lapses in enforcement.

While we can only speculate as to the exact nature of the dysfunction causing this lapse in enforcement, based on official statements from the Citizens Air Complaint Program, it appears that dysfunctional enforcement is a conscious choice. The program lists the following Frequently Asked Question on its website: "Should I note in my comments if there is a second or third offense and provide the previous summons numbers?" And it provides the following response: "Yes, it is beneficial to DEP to see that notation as well as the summons numbers for DEP to conduct further review. If the information is not provided, DEP will

Fine Type	Actual Number of Tickets	Pct. of Total	Expected Number of Tickets	Expected Pct. of Total
First	16,806	92%	13,381	73%
Second	1,016	6%	2,573	14%
Third & subseq.	518	3%	2,390	13%
Uncategorized	4	0%	0	0%
Total	18,344	100%	18,344	100%

Table 8: Tickets by fine type for all 18,344 vehicles with complete license plate information that from 2020 through 2022 had one or more tickets each. Though the gap between 92% and 73% is indicative of lapses in enforcement, [Table 7](#) is more appropriate for gauging enforcement fidelity, given that it presents data only for vehicles that were issued at least two tickets; in the present table, percentages are heavily influenced by the large number of vehicles that were issued only one ticket.

be unable at this time to submit the summons as a second or third offense” (emphasis added).¹⁹ In other words, the government body that submits summonses openly acknowledges that it will not access its own data to ensure that it issues the appropriate type of summons—and instead offloads the burden of fact-finding onto citizens. Humbly, the petitioner could within a single day set up a simple website for DEP officials to check whether vehicles have been issued summonses prior. Of course, if the amendments proposed here go into effect, there will be no further need of checking for repeat violations at the level of vehicle.

In any case, based on the analysis presented in this section, the proportion of tickets issued for repeat violations at the level of vehicle should be closer to 27%—rather than the actual 7%.²⁰ Outside of lowering the cost of non-compliance and therefore compromising the already minimal deterrent effect of New York City’s idling laws, this lapse in enforcement has material financial implications for the City of New York, which due to these enforcement inefficiencies has by one measure lost \$610,000 in penalties from 2020 through 2022 alone.²¹

As to the effect of the difference between 7% and 27% on the argument presented in this petition, we can say confidently that it is immaterial. For while the absolute size of the gap between 27% and 69% is smaller than that between 7% and 69%, the argument presented in [section 1](#) turns not on the size of this gap but rather on the claim that the current definition of subsequent offenses frustrates common notions of fairness in punishment and common notions of subsequent responsibility.

For additional summary statistics relating to ticket counts, vehicles, and unique vehicles, see [Table 9](#).

¹⁹See <https://on.nyc.gov/3pltpKr> for all program FAQs and responses. Site accessed 5/8/2023.

²⁰Note that this percentage is based on tickets with complete license plate information only, or about 75% of all tickets.

²¹This figure represents the difference between the expected and actual penalty totals assuming current penalty amounts of \$350, \$440, and \$650—and therefore excluding default penalty amounts. In practice, from 2020 through 2022, 39% of all tickets with complete license plate information, and 39% of all tickets generally, were issued for default penalties: \$1,000, \$1,500, or \$2,000.

Vehicle State	Number of Tickets	Unique Vehicles	Pct. Unique	Penalty Imposed (\$)
NY	12,198	9,148	75%	7,504,095
NJ	3,753	2,661	71%	2,490,200
FL	732	143	20%	585,350
IN	477	395	83%	266,590
PA	196	168	86%	130,330
IL	174	145	83%	106,810
TX	116	98	84%	85,130
CT	91	84	92%	50,300
AZ	89	87	98%	63,000
MD	81	62	77%	53,110
OK	61	56	92%	40,940
TN	40	37	93%	26,440
NC	33	28	85%	22,540
GA	30	26	87%	22,050
WI	30	28	93%	22,200
Total	18,344	... 13,383	73%	11,628,865

Table 9: The top 15 states ranked by the number of tickets issued from 2020 through 2022 to vehicles registered in that state. Of a total of 24,399 tickets issued during this time period, the data set utilized here did not allow for the extraction of complete license plate information for 6,055; the total values in this table therefore consider only those 18,344 tickets with complete license plate information.