

Anti-Price Gouging Laws and PPE Availability During the COVID-19 Pandemic in the United States

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ABSTRACT: During the COVID-19 pandemic, severe shortages of personal protective equipment (PPE) placed significant strain on healthcare systems across the United States. At the same time, most U.S. states enacted anti-price gouging laws in response to health care emergencies, raising concerns about unintended effects on the availability of essential supplies such as PPE. This study examines the association between the enforcement of anti-price gouging laws and PPE availability in the United States in 2020. It is hypothesized that the activation of anti-price-gouging laws was associated with lower reported PPE availability, consistent with economic arguments that price constraints during sudden demand shocks reduce incentives for rapid supply expansion and reallocation. Using a quantitative observational design, the study analyzes aggregated national PPE shortage indicators and state-level cumulative PPE request data derived from publicly available reports. PPE availability patterns are examined across states based on enforcement status and relative strictness of price-gouging provisions. The findings show a complicated relationship between anti-gouging laws and PPE availability, since the raw and normalized request counts produced different trends among states. Although causality is not implied, the findings provide empirical evidence on how emergency price regulations coincided with PPE availability during the early pandemic period.

KEYWORDS: Economics, Microeconomics, COVID-19, Price Controls, Personal Protective Equipment.

■ Introduction

In 2020, during the COVID-19 pandemic, widespread shortages of PPE placed considerable strain on the U.S. healthcare systems.¹ For example, “87% of nurses reported having to reuse a single-use disposable mask or N95 respirator.”² After March 18, 2020, when COVID-19 was officially declared a national emergency, anti-price gouging laws were activated by 37 states in response to the pandemic.³ These laws restrict sharp price increases during periods of crisis to protect consumers from exploitation.⁴ While this is the intention, economic theory suggests that price constraints during sudden demand shocks are likely to affect supply incentives and product availability by weakening price signals that would otherwise encourage rapid reallocation and expansion of supply.

Many standard models say that prices serve as signaling mechanisms that encourage resources to be allocated to where demand is highest. In these models, price increases may encourage producers and suppliers to expand output or redirect goods to regions with shortages. They add that when prices are constrained artificially, shortages are likely to occur due to supply failing to adjust to the boost in demand.⁵ On the other hand, some argue that anti-price-gouging laws are justified on ethical grounds because sharp price increases during emergencies may undermine equity and limit access to essential goods for disadvantaged populations.⁶ Besides ethical aspects, some perspectives in political economy also highlight aspects related to how markets, during crises, may be influenced because of aspects like institutional capacity, as well as issues of bargaining position regarding prices.^{7,8} Notably, the majority of existing

literature explores price controls in general market settings rather than in emergencies, which creates uncertainty in the topic about how such laws function under severe conditions. Previous studies have also found that price gouging regulations were related to economic/behavioral outcomes during COVID-19, like increased social contacts through search behavior in commercial spaces.⁹ Other literature also looks into shortages of other essential goods during a similar time period, but fails to address the shortages of PPE specifically, despite PPE being central to healthcare and worker safety during the pandemic.¹⁰ Therefore, this paper aims to examine the relationship between the regulation of anti-price gouging laws enforced during the initial stages (2020) of COVID-19 and the availability of PPE during the outbreak in the U.S. This paper is a contribution to the general scholarly debate around the regulation of emergencies by offering state-level findings on the link between anti-price gouging enforcement and the association of PPE with the COVID-19 demand shock. Given the limited pre-pandemic PPE availability data, this study focuses on variation in reported shortages during the early phase of the COVID-19 pandemic.

Anti-price-gouging laws are a key policy used by U.S. states in response to supply shocks, so understanding the effects of these laws during health emergencies is critical. The COVID-19 pandemic exposed severe vulnerabilities in medical supply chains, with PPE shortages directly affecting healthcare workers' safety. Data collected from July 28, 2020, indicated that hundreds of medical workers in the U.S. died due to COVID-19, while many more got other sicknesses because

of it. This emphasizes the vital role of PPE in the healthcare sector by highlighting the “exposure to the virus” due to the shortage.² The healthcare supply chain has continued to be an area of concern throughout the COVID-19 pandemic, with hospitals experiencing issues with getting PPE, even one year into the crisis.¹¹ Additionally, a five-week study shared that from their sample, “46.5% of facilities lacked PPE and/or staff.”¹² When well-meaning price controls unintentionally impact the supply side during times of crisis, policymakers might be forced to reconsider the nature of these laws during emergency scenarios. Furthermore, little empirical evidence exists regarding the mechanisms of anti-price-gouging laws during times of severe demand shocks.¹³ Moreover, state-level differences in PPE shortage data can result from other COVID-19-related factors, like hospital density, population size, or access to procurement strategies, rather than just from the legal enforcement of price regulations. This study suggests that the enforcement of anti-price gouging laws during COVID-19 is associated with reduced short-run reported availability of PPE in 2020, measured by reported shortages and fulfillment delays. However, because the analysis is observational and descriptive, it cannot establish causality.

■ Methods

This study uses a quantitative descriptive research design with the use of secondary data to explore the relationship between the enforcement of the anti-price gouging laws in the U.S and reported PPE availability during the early stages of the COVID-19 pandemic. Moreover, the study combines temporal (August-September versus October-December 2020) as well as cross-sectional (state-level) comparisons for the analysis. The study is observational and analyzes existing real-world data without manipulating prices, policies, or supply conditions.

PPE availability data were primarily obtained from compilations of publicly available supply-chain reports by Get Us PPE.¹⁴ While some of the underlying sources incorporated into the dataset originate from prior empirical or experimental studies, the present analysis uses only aggregated outcome measures and does not retain the original experimental structure. The data combines information from healthcare providers regarding these shortages, order fulfillment delays, and other unmet demand for PPE. The study analyzes data submitted between August 2020 and December 2020, which includes information on the severity of shortages and state-level information on requests and availability. This time period was selected specifically because the Get Us PPE reporting during this period provides consistent national coverage and captures the persistence of the shortages during the first year of the pandemic. Data on the enforcement of anti-price gouging laws in U.S. states were obtained from accessible state statutes and executive orders, which were supplemented by publicly available legal analyses and policy summaries.¹⁵⁻¹⁷

States were categorized depending on whether anti-price-gouging restrictions had been activated during the research period and the strictness of those laws. The strictness of the anti-price gouging laws in this study was measured

qualitatively through several factors, including low price increases, inclusion of basic commodities, severity of penalties, and enforcement intensity, among others. States were characterized as “strict” when the laws contained several restrictive provisions simultaneously, including low permissible price increases, wide product coverage, and large penalties, while states with fewer of these characteristics were termed as relatively less strict. The data on these factors were also derived from state statutes and summarized in publicly available legal analyses.¹⁸⁻²⁰ Although such a classification is not a numerical index for strictness, certain comparisons can still be made between the more and less restrictive states.

PPE availability was proxied using quantitative indicators derived from the Get Us PPE dataset, including the number of reported PPE shortage incidents, reported fulfillment delays, and the frequency of unmet PPE requests. Since there was variability in PPE requests between states, the cumulative PPE requests intensity was also categorized so that there is a better comparison between states with different enforcement intensities. The primary independent variable was the presence of anti-price gouging enforcement, operationalized as a binary indicator (1 = enforcement active following an emergency declaration; 0 = no active enforcement).

The analytical framework treats anti-price gouging enforcement as the independent variable and PPE availability indicators as dependent variables. It treats price gouging enforcement as a policy constraint on prices, with the intensity of PPE request serving as a proxy measure of unmet demand. The analysis will be descriptive, focusing on correlating differences in PPE shortages across states with price-gouging enforcement and states without such enforcement. In order to assess the differences in the request intensity of PPE, the states were grouped based on ranges of PPE requests: 0-99, 100-199, 200-299, 300-399, 400-499, and 500+. Variation over time following the COVID-19 emergency declaration in the U.S was used to document the national severity and persistence of PPE shortages during the study period. In addition, the strictness of anti-price gouging laws was used to examine whether more restrictive enforcement states were associated with higher reported shortage intensity compared to more flexible regulatory structures. Therefore, the analysis shows associations rather than causality.

Data for PPE requests and shortage data are subject to reporting limitations. This is due to submissions to public reporting platforms being voluntary and uneven across time periods and states as well. Therefore, the dataset is likely to underestimate the true demand during peak periods because the dataset might not take into account all PPE shortages and other reported figures. In addition, even the reporting intensity itself may be related to the size of the healthcare systems in the states, meaning that more requests may be due to better reporting networks as opposed to a shortage of PPE. Given this variation, the analysis relies on reported PPE shortage indicators and percentage-based measures rather than population-normalized rates. Because of this, the analysis looks into patterns and associations rather than exact levels of PPE availability.

To address the potential influence of state size on raw request counts, PPE requests were also normalized by dividing each state's cumulative request count by its estimated number of healthcare workers (in thousands), as reported by the U.S. Bureau of Labor Statistics Occupational Employment Statistics (2020), and multiplying by 100 to yield a rate of PPE requests per 100,000 healthcare workers. This normalization accounts for the fact that larger states with larger healthcare workforces will generate more absolute requests regardless of shortage severity, and allows for a more equitable cross-state comparison of request intensity.

In addition to the descriptive analysis, an Ordinary Least Squares (OLS) regression was estimated to examine the association between enforcement status and normalized PPE request intensity while controlling for key confounders. The dependent variable was PPE requests per 100,000 healthcare workers. The independent variable of interest was enforcement status, operationalized as a binary dummy variable (1 = active enforcement; 0 = no active enforcement). Control variables were included to account for three potential confounders identified by the study's design limitations: (1) COVID-19 cumulative case rate per 100,000 population through December 2020, obtained from the Centers for Disease Control and Prevention,²¹ to control for pandemic severity; (2) the natural log of state population (U.S. Census 2020),²² to control for state size; and (3) healthcare worker density, defined as healthcare workers as a percentage of state population, to control for the scale of each state's health services infrastructure. This model does not demonstrate causality since the observational design prevents causal inference, but it does allow for a more rigorous descriptive assessment of the enforcement-shortage association while holding key confounders constant.

■ Results and Discussion

This section presents descriptive and correlational results on PPE availability during 2020.

The analysis focused on the indicators of the availability of PPE during the period when the enforcement of anti-price-gouging policies was active among US states. The data were collected in aggregate form and were submitted between August and December 2020. The data were collected at the state level where applicable. Additionally, the data highlight the trends of PPE shortages as well as the unmet requests over time. It also shows the comparison between states that had active enforcement of anti-price gouging laws and those that did not.

National PPE Shortage Trends (August–December 2020):

Before examining policy-related differences across states, national PPE shortage trends are summarized in Table 1 to establish the broader supply environment during the study period.

Table 1: National PPE shortage indicators reported in the United States, August–December 2020.

Time period	Reported % facilities with no PPE supply	Cumulative PPE requests (March-month)	Reported % unmet PPE requests (cumulative)	Reporting months
Aug-Sep 2020	77%-80%	16,404 - 16,654	~88%	August, September
Oct-Dec 2020	63%-70%	16,808 - 19,981	>85%-88%	October, November, December

Table 1 presents the cumulative PPE shortage indicators that were reported by Get Us PPE between August and December of 2020. Throughout this study period, a clearly high proportion of reporting facilities indicated having no available PPE supply. However, the reported percentages did decline modestly over time. Even with this decline, the cumulative unmet PPE request rates remained above 85% throughout the study period. The total cumulative PPE requests increased across reporting months, therefore reflecting sustained demand during the pandemic. These indicators collectively suggest that PPE scarcity remained an issue in late 2020 as well, which provides a baseline context to interpret variations in request intensity between states.

PPE Request Intensity by Enforcement Status:

Table 2: Distribution of U.S. states by cumulative PPE request category and anti-price gouging enforcement status.

PPE Request Category (Cumulative)	Enforcement States (1)	Non-Enforcement States (0)
0-99	6	7
100-199	10	2
200-299	5	1
300-399	3	1
400-499	3	1
500+	10	1
Total states	37	13

Table 2 shows that enforcement states are overrepresented in the higher PPE request categories. Enforcement states have 10 states among the 500+ requests per state category, while only one non-enforcement state is represented in that same category. Furthermore, non-enforcement states are represented almost entirely within the 0-99 requests per state category. The size of the enforcement states' healthcare workforce is substantially larger than that of non-enforcement states, however. Thus, it is likely that this raw distribution of PPE requests in Table 2 reflects a bias towards overestimating the PPE shortage in enforcement states relative to non-enforcement states.

To address this, Table 3 presents the distribution of states when the number of PPE requests is normalized by the size of each state's healthcare workforce. The mean value for PPE requests per 100,000 healthcare workers is calculated using 2020 Bureau of Labor Statistics data on healthcare employment.²³

Table 3: Distribution of U.S. states by normalized PPE request intensity (per 100,000 healthcare workers) and enforcement status.

Requests per 100,000 Healthcare Workers	Enforcement States (1)	Non-Enforcement States (0)
0-49	0	2
50-99	7	2
100-149	20	4
150-199	10	0
200+	0	5
Mean (SD)	129.8 (36.9)	339.9 (423.5)

The results of this calculation reveal that the distribution of request rates per 100,000 healthcare workers differs from that in Table 2. Most notably, the mean request rate for non-enforcement states is 339.9 per 100,000 healthcare workers, compared with 129.8 per 100,000 healthcare workers for enforcement states. Furthermore, a two-sample t-test reveals that these differences in mean request rates are statistically significant ($t = -3.04$, $p = 0.004$). These results help explain the differences in Table 2: the non-enforcement states with the highest PPE request rates include small states like Rhode Island, Delaware, and New Hampshire, each of which has a relatively low healthcare workforce by state standards.

These results are important for recognizing the confound between population and healthcare workforce sizes in the raw data presented in Table 2. Thus, PPE requests per 100,000 healthcare workers are a more accurate data point for enforcement and non-enforcement states than raw PPE requests per state.

To determine whether the association between enforcement status and PPE request intensity remains after adjusting for key confounders, an ordinary least squares (OLS) regression was performed with PPE requests per 100,000 healthcare workers as the dependent variable. The results are presented in Table 4.

Table 4: OLS regression results: PPE requests per 100,000 healthcare workers on enforcement status and controls (N = 50 states).

Variable	Coefficient	Std. Error	t-statistic	p-value
Intercept	-23.25	554.75	-0.04	0.967
Enforcement (dummy)	-269.00	116.44	-2.31	0.026*
COVID cases per 1,000/100k	-10.67	34.93	-0.31	0.761
Log(Population)	39.45	48.64	0.81	0.422
Healthcare worker density (%)	36.06	116.09	0.31	0.758
R ²	0.183			
Adjusted R ²	0.110			

The enforcement coefficient is negative and statistically significant ($\beta = -269.00$, $p = 0.026$). Controlling for pandemic severity, state population, and healthcare personnel density, there were 269 fewer PPE requests per 100,000 healthcare personnel in enforcement states than in non-enforcement

states. This result is consistent with the normalized descriptive findings in Table 3 and implies that the raw trend in Table 2 was mainly caused by the variation in the size of the states.

There is moderate explanatory power of the regression model (adjusted $R^2 = 0.110$) with all control variables being nonsignificant. This result is expected given a small sample ($n = 50$) and high diversity across states within the country. The coefficient on the COVID case severity variable is statistically insignificant, meaning that the difference in normalized requests cannot be explained solely by pandemic severity. It is important to consider these conclusions cautiously as they may be affected by several factors. In particular, an observational study design allows making inferences about possible unobserved factors that might be influential in the relationship in question. These include, for instance, state-level purchasing capability, density of hospitals, and reporting structure.

Accordingly, these findings do not establish a causal relationship between anti-price gouging enforcement and PPE availability, but offer a more methodologically rigorous descriptive assessment than the raw request counts alone.

Variation in PPE Requests by Strictness of Anti-Price Gouging Laws:

Within enforcement states, PPE request intensity varied by the relative strictness of anti-price-gouging laws. Among the 7 states that were classified as having stricter regulations, 4 of these states fell into the 500+ category, whereas 1 fell into the 400-499 category. This suggests that stricter regulatory environments were more frequently associated with the highest levels of reported PPE request intensity. Therefore, states classified as having stricter regulations were more frequently represented in higher cumulative PPE request categories, including the 300+ and 500+ groups. These differences are descriptive and reflect observed variation within the enforcement group.

Beyond the differences between active enforcement and non-enforcement states, additional variation in PPE request intensity could be seen within the active enforcement states, primarily due to the design of anti-price gouging provisions. States that were classified as having stricter regulations, such as low price increase thresholds or substantial penalties, were more frequently represented in higher cumulative PPE request categories than those with more flexible laws and standards. While the noted patterns are descriptive, they suggest that, rather than the enforcement status alone, legal design features could also be a factor that is related to differences in reported supply constraints in response to extreme demand shocks. This is an important observation because it implies that regulatory intensity may shape the degree to which price adjustments are constrained during emergencies.

These patterns, however, may also reflect other state-level differences like COVID-19 case severity, hospital density, population size, procurement strategies, and reporting intensity rather than the laws themselves.

Interpretation Through Economic Theory:

The findings of the study indicate a clear association between the enforcement of anti-price gouging laws and reported PPE shortages during 2020, during the COVID-19 pandemic in the U.S. Specifically, states with active enforcement were disproportionately represented in higher cumulative PPE request categories compared to states without active enforcement. It could be seen in the results that states that had active enforcement of these laws had a higher number in the higher cumulative PPE request categories compared to the states with no active enforcement. These specific state-level patterns occurred within a broader and pervasive PPE shortage nationwide, which suggests that the differences across the policy environments come under the sustained supply constraints as a whole rather than isolated disruptions. Even a year into the COVID-19 pandemic, supply chain shortages and demand surges for PPE continued to be a problem.¹¹ Moreover, national surveys, like one conducted by the APIC, confirmed PPE supply shortages in the U.S. during the COVID-19 pandemic, supporting that the high levels of unmet demand observed in this study were not just due to reporting.²⁴

The observed correlation is consistent with key economic frameworks that emphasize the role of prices as signals for allocating scarce resources during times of sudden demand shocks. When prices are constrained, suppliers would be less incentivized in the short run to either expand production, enter markets, or quickly reallocate resources towards specific goods and services that are facing shortages. In the context of the pandemic, where PPE demand rose sharply, and supply chains faced significant production constraints and logistical disruptions, restrictions on price adjustments may have contributed to shortages, which were expressed through unmet requests rather than higher prices.^{25,26} From this perspective, anti-price-gouging laws may reduce the effectiveness of market coordination during emergency resource distribution as they reduce the potential for profits to incentivize rapid scaling and allocation. This mechanism is, however, only theoretical within the context of this study, as the descriptive method does not allow for direct measurement.

Ethical and Political Economy Considerations:

At the same time, these findings should not be interpreted as a normative critique of anti-price-gouging laws. Such regulations are usually justified on ethical grounds related to issues of fairness and equity, especially in situations where emergency goods are being supplied. The fear that price gouging could deny vulnerable groups access to certain goods has been a key factor in justifying price gouging restrictions.^{6,27} Additionally, some researchers believe that emergency markets could also be subject to panic buying, information asymmetries, and bargaining power imbalances, suggesting the price increases observed might not necessarily lead to efficiency and equilibrium.²⁸ This implies that, in such situations, alternative non-price systems to ensure the availability of critical products during a crisis may be necessary.

Alternative Explanations and Study Limitations:

In this study, several limitations should be acknowledged. Shortage and request data for PPE were collected from voluntary reporting platforms, which might not reflect actual shortage and request numbers and might have some inconsistencies in terms of reporting patterns across states and time. There might have been differences in population, healthcare facilities, pandemic spread, and timings of outbreaks, which could have also affected demand for PPE, irrespective of the price-gouging policies. These factors suggest that enforcement status may be correlated with underlying structural differences that also influence PPE availability, making it difficult to isolate the role of anti-price-gouging laws. Furthermore, considering the fact that the study is based on an observational cross-sectional design and does not involve randomization or pre-interventional baselines, it cannot support causal claims even if statistical tests were applied. Associations may result from hidden confounders, without a need for an actual causative role played by anti-price-gouging intervention measures. Therefore, the results should be interpreted as indicative associations rather than definitive estimates of policy effects. In the current study, partial correction for these confounders has been achieved by means of standardizing with respect to the number of healthcare workers and OLS regression analysis, controlling for the severity of COVID-19 cases, state population, and healthcare workers' density. At the same time, some additional variables, such as the development of procurement systems at the state level, political economy, and voluntary reporting, have yet to be considered. Further research could focus on panel regressions and differences in differences using variations within states and between times.

Implications and Directions for Future Research:

Despite these limitations, this study can be seen as a contribution to empirical literature as it offers a descriptive relationship between emergency enforcement of price gouging and the availability of PPE during an unprecedented public health crisis. It stresses the need to examine how regulatory interventions may interact with supply-side incentives and distribution constraints during emergencies, not just theoretically or normatively, but also empirically. These findings can be used as a guide for future evaluations of emergency price regulations by emphasizing the value of taking into account supply-side considerations as well as consumer protection objectives. More broadly, the research contributes to the policy debate by suggesting that emergency market interventions may need to be accompanied by additional measures, including coordination of procurement efforts, the provision of rapid production scaling subsidies, or increases in strategic stocks, in order to alleviate shortages and protect consumers. The study also shows the value of making use of real-world data on shortages and requests as a way of evaluating emergency policies, which provides a foundation for future research aimed at finding out mechanisms by which emergency policies interact with the supply chain and impact access to essential medical products like PPE.

■ Conclusion

This study aimed to explore the association between anti-price gouging enforcement and PPE supply, as indicated by PPE availability reports, during the early phase of the COVID-19 pandemic in the United States. Using aggregated U.S. shortage indicators and state-level cumulative PPE requests, the study found that although states implementing an active policy of price-gouging enforcement appeared to be more likely to be found among the high raw PPE requests, the opposite situation occurred when taking into account the number of healthcare personnel. States with an enforcement policy demonstrated significantly fewer requests for personal protective equipment per 100,000 healthcare personnel compared to states without any enforcement policies (129.8 vs. 339.9; $p=0.004$). This effect was confirmed by the results of OLS regression analysis. Moreover, there was evidence of differences within states with anti-price-gouging enforcement itself, showing a relation to the legal design of the policies classified by their strictness, implying that the structure of price-gouging provisions may also be relevant to reported supply outcomes.

While the study did not establish causal effects, the outcomes contribute to the literature by providing descriptive, empirical evidence on the association between emergency price regulation and PPE supply during a large-scale health crisis. By focusing on state-level variation during an extreme demand shock, this analysis extends the existing debates over price controls beyond purely theoretical and opinion-based discussions. It points out the need to understand the significance of assessing emergency market interventions in real-life contexts, where ethical goals such as consumer welfare need to be traded off with the need to ensure that adequate supplies of critical goods are maintained. This may be of use to policymakers and researchers dealing with future health crises, where they may benefit from combining price controls with other supply-side policies and monitoring of critical health resources.

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