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From Perception to Action: The Influence of Distrust in Government on Panic Buying in the COVID-19 Era

By EMRE SARI *

This research explores the complex dynamics of panic buying during the COVID-19 pandemic. Using a comprehensive cross-sectional dataset from an online survey conducted in Türkiye, I employ the control function approach to examine the psychological and societal effects of the pandemic. The results show a strong positive association between the perceived adequacy of government protective measures and panic buying behavior. Moreover, the study uncovers the mediating role of individual anxiety levels in this association, highlighting the complexity of this behavior. These findings underscore the need to consider psychological components when developing crisis management strategies, particularly in health emergencies.

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I. Introduction

Since the outbreak of the COVID-19 pandemic, there has been increased interest in how governments manage global health crises, particularly the public health crisis's impact on public sentiment and overall societal health outcomes. In an era of global health crises, the interaction between government responses to problems and public sentiment stands out as a particularly interesting area of study. The central role of governments in preventing, controlling, and mitigating public health threats is undeniably critical, especially given the financial pressures and urgent need for optimal investment in human capital and social infrastructure (Soumahoro, 2020). The case of Türkiye during the COVID-19 pandemic provides a unique context for exploring this interaction, as the government faced the task of navigating the public health agenda among various societal and economic pressures.

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As [Chua et al. \(2021\)](#) say, the COVID-19 pandemic has sparked an unprecedented wave of panic buying worldwide, exemplifying a collective behavior in which consumers excessively stockpile goods due to a perceived shortage. Panic buying, a phenomenon of over-stocking triggered by stressful events, can lead to shortages, increase public anxiety, and even undermine public trust in leaders ([Arafat et al., 2020b](#); [Chua et al., 2021](#); [Taylor, 2021](#)).

[Taylor \(2021\)](#) describes that as anxious individuals began to panic-buy by hoarding supplies and images of empty shelves and conflict circulated online, more people were compelled to shop for fear of missing out. Suggestions for the community to accumulate supplies instigated a cycle where a subset of particularly anxious individuals started over-purchasing. This, in turn, initiated a domino effect of anxiety-driven purchases among the general population. This cycle of perceived shortages causing actual shortages has been temporarily remedied by policies such as purchase restrictions and public shaming, only to be replayed as panic rears its head. Besides, [Arafat et al. \(2020b\)](#) highlight some of the underlying psychological mechanisms that have been explored and include perceived scarcity of needed items, a way to gain control, feelings of uncertainty and insecurity, group behavior, primitive instincts, the influence of the media, and a lack of trust in authority figures.

The importance of government trust has a long-standing recognition, tracing back at least 2,500 years when Confucius observed that a successful rule is based on weapons, food, and trust ([Newton et al., 2018](#)). This political trust, which comprises citizens' confidence in their government's performance, the perceived credibility of the government, the political system, and fellow citizens, holds significant sway on public compliance during crises ([Han et al., 2023](#); [Kang et al., 2023](#)). As such, it is imperative to comprehend the association between the perception of government protection during public health crises and its relationship with behaviors such as panic buying. [Han et al. \(2023\)](#) demonstrate the correlation between high trust in the government's handling of COVID-19 and the adoption of health behaviors like handwashing and social distancing. Similarly, [Kang et al. \(2023\)](#) examine political trust as a mediator between risk perception and pandemic-related behaviors such as preventive measures and hoarding.

In light of the recent pandemic, the roles that governments play in public health crises have gained heightened attention during the recent pandemic. However, the exact dynamics of panic buying behavior remain unclear. This study provides the first analysis of panic buying during the pandemic, focusing on the causal relationship with public perceptions of the adequacy of government in protecting personal and public health. It investigates how public distrust of the government can trigger panic buying. The primary research question is: 'What is the effect of distrust in government, as reflected in panic buying behavior, on public sentiment?' This study also assesses the influence of anxiety levels during the COVID-19 pandemic on this relationship, leading to the secondary research question: 'How do anxiety levels mediate the relationship between government distrust and panic buying?' By exploring these related questions, I aim to explore the linkages between pandemic progression, perceived government protection, and public sentiment during a global health crisis. This exploration seeks to contribute to broader

discussions on governmental responses to public health emergencies and the societal repercussions thereof.

The Subjective Expected Utility (SEU) model, introduced by [Savage \(1951\)](#), has been a cornerstone in understanding decision-making under uncertainty. The model posits that individuals assess the subjective probability of an event occurring and then multiply this by the subjective utility (benefit) they would receive if the event occurred ([Cerreia-Vioglio et al., 2013](#); [Fischhoff et al., 1983](#)). The decision with the highest expected utility is then chosen. This model provides a theoretical lens through which to understand individuals' decision-making process when faced with a perceived threat, such as the COVID-19 pandemic. Notably, this model has been applied to various high-stakes scenarios such as nuclear deterrence strategies ([Kang & Kugler, 2023](#)), climate change response actions ([Heal & Millner, 2014](#)), and even financial investment behavior during economic downturns ([Li & Peter, 2021](#)). For COVID-19, [Alpergin \(2022\)](#) is the first study that uses the SEU for the risk perception of the pandemic and consumption changes of individuals. While applying the SEU model in understanding panic buying during pandemics is not widely studied, this research proposes to bridge that gap.

In addition to other previous studies, this study presents three key contributions to the field. Firstly, the research provides robust empirical evidence that the perception of government protection measures has a significant positive relationship with panic buying behavior, and also anxiety mediates the relationship between the perception of government protection measures and panic buying. Secondly, it expands the existing body of knowledge with data derived from Türkiye during the COVID-19 pandemic, providing insights that can inform and enhance global understandings and responses to panic buying behaviors. Thirdly, it employs a robust methodological approach using instrumental variable methods (specifically the control function approach) to account for potential endogeneity and utilizes mediation analysis to quantify the relationships among perceived government protection, individual anxiety, and the extent of panic buying. These contributions provide invaluable insights for governments, public health officials, and academics worldwide in managing and understanding public behaviors during health crises.

A. Government responses to the COVID-19 pandemic in Türkiye

The novel coronavirus disease (COVID-19), first detected in Wuhan, China, spread rapidly across continents. By early 2020, it had reached Europe Union (EU). Europe's COVID-19 surveillance, initiated on January 27, 2020, found 47 cases across nine countries by February 21. The late detection of significant clusters in Germany and France increased cases to 4,250 by March 5 ([Spiteri et al., 2020](#)). The arrival of the COVID-19 in Türkiye brought with it a wave of uncertainty and apprehension. Türkiye, geographically bridging Europe and Asia, soon confronted the same invisible enemy.

Even before the first COVID-19 case was detected in Turkey, the government proactively formed the Coronavirus Scientific Committee within the Ministry of Health. The Committee promptly formulated guidelines for healthcare professionals, initiated a comprehensive public information campaign on COVID-19, and introduced safety measures including thermal cameras at airports and closures of public spaces, schools, and non-

essential businesses. Simultaneously, foreseeing the potential economic fallout, the Central Bank launched preemptive measures to buffer the national economy. This approach epitomizes a comprehensive government strategy balancing both public health and economic stability amid the crisis (Sari et al., 2022).

Yet, despite these comprehensive efforts, the COVID-19 epidemic significantly influenced the Turkish population's emotional and behavioral patterns, the analysis of which forms the core focus of this study. Amidst this evolving crisis, the Turkish government managed to maintain healthcare accessibility, which could have influenced public perception of the government's protective capability and, in turn, their behavior and mental health (Altindag et al., 2022). Also, the evolving pandemic scenario in the EU, a region closely linked with Türkiye, could have influenced Turkish public sentiment and behavioral responses.

II. Data

This study utilizes a cross-sectional dataset collected during the COVID-19 pandemic via an online survey undertaken by Sari et al. (2022) to explore the psychological and social impacts of the pandemic.

The survey was administered during the first year of the COVID-19 pandemic in Türkiye, from April 13, 2020, to November 25, 2020. The data was divided into two distinct periods to discern patterns related to different phases of the pandemic. The first period, from April 13 to May 23, 2020, corresponds with the early stages of the pandemic when initial responses were being formed. The second period, from July 20 to November 25, 2020, represents the latter part of the year, following the summer period (see, Figure 1). This later period is characterized by a temporary decrease in cases, followed by a sharp increase in infections, reflecting the subsequent resurgence of the virus. These timeframes were selected to capture the evolving nature of the pandemic and its psychological and social effects on individuals over time. Therefore, I created a variable to control these temporal differences between the two periods, providing a more nuanced understanding of the variables and relationships under study.

The survey engaged participants from all provinces across Türkiye, with a significant portion (58%) from the three major metropolitan areas of Istanbul, Ankara, and Izmir. To account for potential regional differences, a dummy variable indicating whether participants reside in these metropolitan areas was created. The sample population accurately reflects the adult population of Türkiye within a margin of error of 2% and a confidence level of 95%. This implies that the survey findings are a robust indicator of the broader adult population's behaviors and attitudes during the pandemic Sari et al. (2022)

Panic buying is the outcome variable (Arafat et al., 2020a). This behavior can disrupt and magnify crisis-related difficulties, such as supply chain disruptions and economic instability. Studying panic buying allows us to explore the intersecting realms of psychology, economic behavior, and risk perception. It also helps us understand the influences on this behavior, including perceptions of government protection and individual anxiety levels, which are important for managing crisis responses. To minimize social desirability bias, in line with Kassas & Nayga (2021), Sari et al. (2022) used the phrase 'stocking

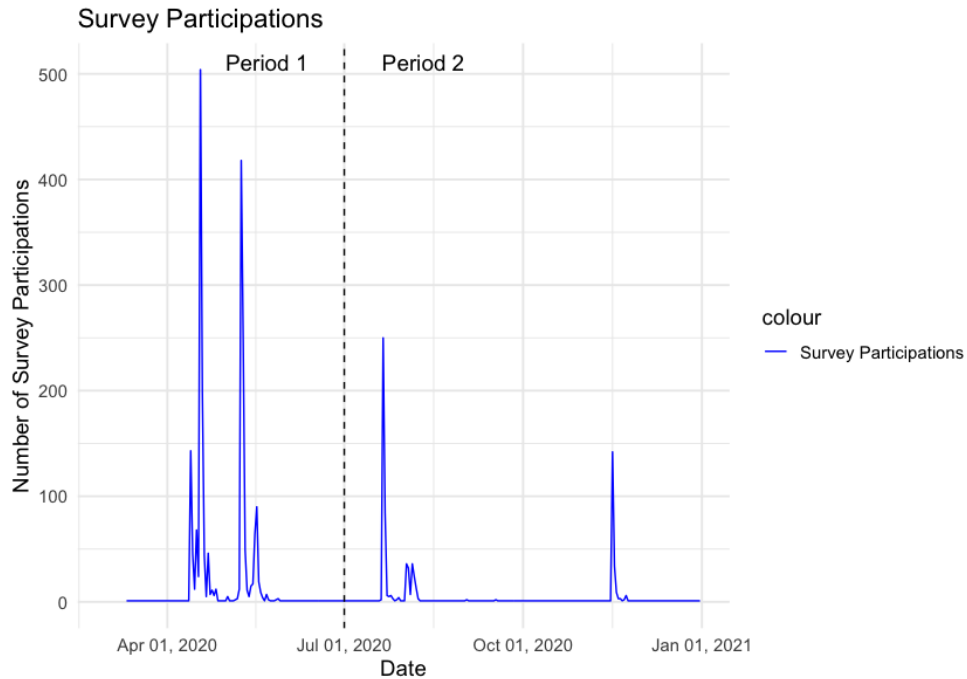


FIGURE 1. TEMPORAL DISTRIBUTION OF SURVEY PARTICIPATION DURING THE FIRST YEAR OF THE COVID-19 PANDEMIC IN TÜRKIYE.

Note: This graph illustrates the number of survey participations throughout two distinct periods during the first year of the COVID-19 pandemic in Türkiye. Period 1 (April 13 to May 23, 2020) represents the initial stages of the pandemic, while Period 2 (July 20 to November 25, 2020) denotes the latter part of the year following the summer period. The dashed line indicates the division between these two periods. It is noteworthy that survey participation rates varied across these periods, reflecting the evolving dynamics of the pandemic and potentially affecting the population's responses. The time-specific variation was controlled using a dummy variable in the analyses.

up' instead of 'panic buying' in the survey. The survey question was, "Do you stock for one or more products? (In order to save more than you need for a later time)" with a "yes" or "no" response option. 34.3% admitted to this behavior, with this proportion rising to 37% among those distrusting government actions. Refer to [Table 1](#) for detailed summary statistics for each variable.

This study evaluated the participants' perception of government protection during the COVID-19 crisis as a treatment variable by asking: "Do you think the government adequately protected your personal safety and public health during the COVID-19 crisis?" Responses on a 5-point Likert scale ranged from strong agreement to strong disagreement. For efficiency in analysis, I categorized responses into two groups: those expressing trust and distrust in the government (e.g., "I don't think so" and "I definitely don't think so"). This binary categorization suggests a direct relationship between perceptions of government protection and study outcomes, enhancing the modeling process efficiency. Trust in the government can lower perceived goods shortage probability, while

TABLE 1—SUMMARY STATISTICS BY PERCEPTIONS OF GOVERNMENT PROTECTION.

Variables	Trust in government (1)		Distrust in government (2)		Difference in means (1) – (2)
	Mean	SE	Mean	SE	
<i>Outcome</i>					
Panic buying behavior	0.29	0.45	0.37	0.48	-0.083***
<i>Mediator</i>					
State-Trait Anxiety Inventory Score	46.21	4.40	49.02	4.86	-2.815***
<i>Demographic</i>					
Age	30.40	11.57	27.59	9.71	2.813***
Gender	0.60	0.49	0.68	0.47	-0.084**
Marital status	0.33	0.47	0.21	0.41	0.124***
<i>Socioeconomic characteristics</i>					
Education level	0.32	0.47	0.29	0.45	0.031*
Monthly net income	1.91	1.13	1.74	1.16	0.167***
Ability to work from home	0.39	0.49	0.43	0.49	-0.034*
<i>Health characteristic</i>					
COVID-19 diagnosis in household	0.03	0.17	0.04	0.21	-0.015**
Number of observations	964		1886		

This table provides the descriptive statistics, separately for groups perceiving government protection and categorized by trust and distrust in the government. Overall minimum State-Trait Anxiety Inventory Score is 36 and maximum is 63; minimum age is 18 and maximum age is 65 and older. For gender, reference group is male participants. For marital status, reference group is not married ones. Column (1) comprises those who exhibit trust in the government and serves as the "control" group. Conversely, column (2) consists of individuals displaying distrust in the government, serving as the "treatment" group. Column (3) represents the mean value differences between groups, i.e., those who trust the government (column (1)) and those who distrust it (column (2)). A negative value indicates a higher mean for the distrust group, while a positive value signifies a higher mean for the trust group. Independent sample t-test p-values for mean differences are denoted as follows:

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.

distrust may increase, impacting panic buying behavior. As per Table 1, 66.2% of participants expressed distrust in the government when surveyed.

The State-Trait Anxiety Inventory score (hereafter anxiety level) is used as a mediator to capture the role of individual anxiety levels in shaping responses to the pandemic, particularly panic buying behavior (Arafat et al., 2020c). Increased anxiety during public health crises may drive certain responses, such as excessive stockpiling of goods (Taylor, 2021). High anxiety levels might amplify the perceived benefit (or utility) of panic buying, as hoarding supplies could give a sense of security and control in uncertain times. By introducing the anxiety level variable, I can more accurately measure the influence of anxiety on the relationship between public distrust of government and panic buying. This insight allows for a more nuanced understanding of panic buying behavior during

the pandemic and suggests potential intervention points for managing such responses (Chua et al., 2021).

Following Islam et al. (2021), socioeconomic aspects like education level (categorized as "high" for those with a bachelor's degree or higher and "low" for those with a two-year degree or lower) and monthly net income are considered as control variables. The ability to work from home, health, and household characteristics (including any official COVID-19 diagnosis), along with age, gender, and marital status (Kang et al., 2023; Yildirim et al., 2021), are also included in the analysis.

III. Empirical Methodology

I use the Subjective Expected Utility (SEU) model as a theoretical foundation to analyze the probability of panic buying behavior. In the SEU model, an agent chooses among different actions based on the expected utility of each action, where the expected utility is the sum of the utilities of all possible outcomes of the action, each weighted by the subjective probability of that outcome. In this analysis, the probability of panic buying behavior (Y_i) can be seen as the decision to be made. Each action, then, corresponds to either engaging in panic buying behavior or not engaging in it.

I model the probability of panic buying behavior as follows:

$$(1) \quad Y_i = \beta_0 + \beta_1 \cdot G_i + \beta_2 \cdot A_i + \beta_3 \cdot X_i + t_i + p_i + \varepsilon_i$$

where Y_i is equal to 1 if the individual i has engaging in panic buying behavior for one or more products, and 0 if they have not. G_i indicates whether individual i expressed a lack of trust in the government's ability to adequately protect their personal safety and public safety during the COVID-19 crisis (1 for distrust, 0 for trust), as a perception of government protection. The SEU model component of subjective probability is represented by G_i that the individual assigns to the potential outcomes. The utility component of the SEU model is represented by the continuous variable A_i , which stands for the anxiety level of individual i based on the State-Trait Anxiety Score. A higher score indicates a higher level of anxiety, which can be interpreted as the disutility or negative utility associated with engaging in panic buying. X_i is a vector of control variables such as gender, age, marital status, education level, ability to work from home, and the presence of a COVID-19 diagnosis in the household. t_i represent the period of the survey; t_i equals 1 if individual i participated the survey after July 20, 2020, and zero otherwise. p_i represents whether the individual i resides in one of the three largest metropolitan provinces. To assess the effects of the perceived government protection and anxiety level on the decision to engage in panic buying, I examine the coefficients β_1 and β_2 in the empirical model, respectively. β_1 captures the effect of the lack of trust in the government on the probability of engaging in panic buying behavior, while β_2 captures the impact of anxiety level. While a probit model could be used for a binary outcome variable, I employ a linear probability model with Ordinary Least Square (OLS) following the precedent of prior research (Angrist & Pischke (2009), p.77; Wooldridge (2010), p. 454). The consis-

tent results across both models lend robustness to my findings in stepwise manner (see Appendix [Table A.1](#) and [Table A.2](#)). In addition, I use heteroskedasticity-robust standard errors ([Wooldridge \(2010\)](#), p. 454) to account for the possibility of heteroskedasticity.

A. Addressing endogeneity: Using an instrumental variable to measure the perception of government protection

To mitigate potential endogeneity and establish valid causal estimates, this study adopts a control function approach using an instrumental variable ([Angrist & Pischke, 2009](#); [Wooldridge, 2015](#)). These measures ensure the robustness and reliability of our non-linear outcome analysis in the context of panic buying and perceived government protection. Therefore, I address potential biases, such as reverse causation or unobserved confounders, which could compromise the analysis ([Coe et al., 2023](#); [Liu, 2022](#)).

Identifying a valid instrumental variable is important. Similarly, following [Alpergin \(2022\)](#) strategy, I chose the daily cumulative COVID-19 per million case rate in EU countries on survey dates as the instrument. This choice is based on the assumption that the EU's COVID-19 case rates can indirectly sway panic buying behavior in Türkiye by influencing perceptions of government protection measures. Rising EU cases may cast doubt on the effectiveness of Türkiye's government, potentially triggering panic buying. This IV is considered exogenous, not directly impacted by individual behaviors in Türkiye, or correlated with unobserved factors affecting panic buying. It is linked with perceptions of government protection without being associated with the outcome equation's error term. Support for this choice comes from research indicating that pandemic severity significantly influences perceptions of government protection and trust ([Petherick et al., 2021](#); [Zhai et al., 2022](#)).

In accordance with established econometric criteria ([Stock et al., 2002](#); [Angrist & Pischke, 2009](#); [Wooldridge, 2010](#)), I conducted a series of tests to substantiate the empirical strategy and to validate the chosen instrument - cumulative COVID-19 cases in the EU. The testing process included checking the relevance, exogeneity, and exclusion restriction of the instrument. In particular, I checked the correlation between the selected instrument and the endogenous variable, verified the independence of the instrument from the error term of the outcome equation, and examined whether the influence of the instrument on panic buying behavior was solely through its effect on perceived government protection. To further strengthen the credibility and robustness of my findings, sensitivity analyses were conducted, thereby contributing valuable insights to the literature on crisis behavioral responses.

B. Estimation strategy: Control function approach

Given the binary nature of the outcome variable and its frequent distribution in the tails, I adopt a non-linear model and use a control function approach for my main specification, specifically the Two-Stage Residual Inclusion (2SRI) method ([Cameron & Trivedi, 2005](#); [Coe et al., 2023](#); [Guo & Small, 2016](#); [Terza et al., 2008](#); [Wooldridge, 2015](#)). I selected this method over Two-Stage Least Squares (2SLS) for several reasons: the presence of

endogenous regressors in the model, the non-linear nature of the model, and the flexibility provided by 2SRI in addressing these issues. The 2SRI method is well-suited for this analysis. It effectively transforms endogenous treatments into exogenous variables in the second-stage estimating equation. This is done without the restrictive exclusions often needed in 2SLS methods (Wooldridge, 2015). In the first stage of the 2SRI, which involves a probit model, the exogenous variation introduced by the excluded instrumental variable provides independent variation in the residuals from a reduced form (Coe et al., 2023). These residuals then serve as my control functions in the second stage. For robustness, I cross-verify the 2SRI results with 2SLS outcomes, despite the first stage in the 2SRI method involving a probit model, in contrast to the linear estimation of 2SLS.

The first stage equation is the following probit equation:

$$(2) \quad G_i = \Phi(\alpha_0 + \alpha_1 \cdot Z_i + \alpha_2 \cdot D_i + t_i + p_i)$$

Here, G_i represents the perception of government protection of individual i , as a treatment. Z_i represents the cumulative confirmed COVID-19 cases in European Union countries at the date of the individual i survey participation. D_i represents the vector of individual demographic controls, such as age, gender, and marital status. t_i and p_i are same as explained above. In all models, I use heteroskedasticity-robust standard errors (Wooldridge (2010), p. 454).

To mitigate potential bias, I follow the guidance of Basu et al. (2018) and Wooldridge (2015), by calculating generalized residuals from the estimated coefficients in the first stage. This computation yields a residual denoted as \hat{u}_i . Importantly, this generated residual is then incorporated into the second-stage OLS regression, as detailed below:

$$(3) \quad Y_i = \gamma_0 + \gamma_1 \cdot A_i + \gamma_2 \cdot G_i + \gamma_3 \cdot X_i + t_i + p_i + \hat{u}_i + v_i$$

where the variables are the same as described above.

C. Estimation strategy: Mediation analysis

Building on the aforementioned strategy, I further examine the role of anxiety level as a mediator in the relationship between the perception of government protection and panic buying behavior. To investigate this, I model anxiety level (A_i) as a function of the treatment variable and control functions:

$$(4) \quad A_i = \delta_0 + \delta_1 \cdot G_i + \delta_2 \cdot X_i + t_i + p_i + \hat{u}_i + v_i$$

This auxiliary regression is designed to reveal any indirect effects that the perception of government protection might have on panic buying behavior, mediated through its influence on individual anxiety levels. To quantify these effects, I employ a mediation analysis with structural equation modeling (SEM) and using Sobel's product of coefficients method (Günzler et al., 2013; Imai et al., 2010; Sobel, 1982). Researchers widely employ this approach in the existing literature to study the relationship between trust in government and behaviors associated with pandemics (e.g., Chua et al. (2021); Han et al.

(2023); Islam et al. (2021); Kang et al. (2023); Milaković (2021)) emphasize that SEM presents a conceptual framework for comprehensively examining the intricate and evolving connections among observed and unobserved variables. The indirect effect estimated in this context quantifies how much the perception of government protection influences panic buying behavior via changes in anxiety levels. Additionally, I calculate the total effect, encapsulating both the direct and indirect effects of government protection perception on panic buying. To ensure the robustness of these estimates, I use a Monte Carlo simulation with 10,000 replications to compute standard errors for the indirect effect. Monte Carlo methods are particularly beneficial for complicated calculations like this one, offering accurate empirical estimates of standard errors and thus strengthening the credibility of my findings (Imai et al., 2010).

The indirect and total effects are calculated using Sobel's method. This involves multiplying the partial regression coefficient of A_i on Y_i (notated as γ_1) with the coefficient of G_i (δ_1). The equations are represented as follows:

$$(5) \quad \text{Indirect Effect} = \gamma_1 \cdot \delta_1$$

$$(6) \quad \text{Total Effect} = \delta_1 + \gamma_1 \cdot \delta_1$$

IV. Results

A. First-stage and validity of the instrumental variable

To assess the validity of the instrument used in the analysis, I present the results of the first-stage regressions in Table 2, based on Equation 2. Additionally, Appendix Table A.3, I provide the results of the first-stage regression with the inclusion of control variables.

The first step in evaluating the instrumental variable, represented by cumulative COVID-19 cases in the EU, is to examine its relevance. An instrument should demonstrate a significant correlation with the endogenous explanatory variable (Wooldridge, 2010), which is the perception of government protection treated as a form of treatment. In the first-stage regression, the instrument exhibits a statistically significant correlation with the endogenous variable (perception of government protection) with a p-value of less than 0.001. This strong evidence confirms the relevance of the chosen instrument.

To further assess the relevance of the instrument, I conduct an F-test assuming the instrument to be irrelevant in explaining the endogenous treatment variable. The resulting F-test statistic of 24.65 is considerably large, accompanied by a low p-value, providing substantial evidence to reject the null hypothesis. These results strongly support the relevance of cumulative COVID-19 cases in the EU. Additionally, I observe a non-zero covariance of -0.714 between the instrument and the residuals of the first-stage regression. This covariance indicates that the instrument is indeed relevant, as it accounts for the variability in the endogenous variable.

Next, I examine the exogeneity of the instrument to ensure that it does not directly influence panic buying behavior except through its effect on the perception of government

protection. To examine this, I conduct a regression analysis of panic buying behavior on the cumulative COVID-19 cases in the EU. The results confirm that the instrument is exogenous, indicating no direct correlation with individuals' panic buying behavior.

By establishing the relevance and exogeneity of the instrument, I utilize the control function approach to obtain more accurate estimates of the causal relationship between the perception of government protection measures and panic buying behavior. This approach contributes to a robust analytical framework for understanding public behavior during the COVID-19 pandemic.

TABLE 2—FIRST-STAGE PROBIT REGRESSION AND VALIDITY OF THE INSTRUMENTAL VARIABLE.

	<i>Dependent variable: Panic buying behavior</i> Probit
Cumulative COVID-19 cases in EU (IV)	0.00004*** (0.00001)
F-test (on IV)	24.646***
Cov(IV, \hat{u}_i)	-0.714
Covariates	Yes
Period	Yes
Living in the metropolitan province	Yes
Observations	2,850

The instrumental variable, cumulative COVID-19 cases in the European Union (EU), is used to examine its validity in explaining the endogenous treatment variable, perception of government protection. The F-test and covariance between the instrumental variable and the residuals are reported to assess the relevance of the instrumental variable. Standard errors shown in parentheses.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.

B. Effect of distrust in government measures on panic buying behavior

Table 3 details the results obtained from estimating Equation 3 using three different approaches, each depicted in their respective column: the control function approach (2SRI) in column (1), the instrumental variable approach (2SLS) in column (2), and the Naïve OLS in column (3). In the 2SLS model, the perception of government protection variable is replaced with its fitted value derived from a first-stage probit regression, aiming to tackle potential endogeneity. The Naïve OLS model presents the results from Equation 1. Detailed results are presented in Appendix Table A.4

In column (1), the perception of government protection demonstrates a significant positive relationship with panic buying behavior, with a coefficient of 0.344. This indicates that individuals' subjective expectations of the effectiveness of government protection measures affect their decisions. Meanwhile, the 2SLS estimates, which use an instrumented perception of government protection, offer further robustness checks to the anal-

ysis. It upholds the key finding of a positive relationship between government trust and panic buying. As a result, individuals who perceive government protective measures as inadequate may anticipate a greater likelihood of supply chain disruptions or shortages. It may lead them to panic-buying as a strategy to secure access to essentials and maximize their utility. This finding is consistent across all three of the models.

The Naïve OLS model, while yielding a smaller coefficient of 0.074 for the perception of government protection, supports the positive correlation found in the 2SRI method. However, it may underestimate the magnitude of this effect due to potential endogeneity issues, highlighting the value of the 2SRI approach.

The Durbin-Wu-Hausman and Wooldridge test statistics add to the confidence in these results. These test statistics reinforce the validity of the instrumental variable used and the control function approach adopted. These statistically significant results ($p - value < 0.01$) provide robust evidence that the instrument does not simply replicate unobserved factors but serves as a valid source of exogenous variation. Furthermore, the non-significant placebo test result ($p - value = 0.992$) assures that the instrument is not spuriously related to the outcome of interest, thus reinforcing the validity of the 2SRI estimates and the soundness of the overall model construction.

Across all models, anxiety level stands out as a significant predictor of panic buying behavior. This consistent finding underlines the importance of psychological factors in understanding panic buying, confirming its robustness irrespective of the model used.

C. *Mediating role of anxiety in the relationship between perception of government protection and panic buying*

Further explaining the pathway through which perception of government protection influences panic buying behavior, the mediation analysis uncovers both direct and indirect effects. The results are presented in [Table 4](#), while [Figure 2](#) illustrates the graphical depiction of these results. For an in-depth understanding of [Equation 3](#) outcomes, refer to [Appendix Table A.5](#).

Firstly, the average indirect effect of 0.0701 indicates that perception of government protection indirectly influences panic buying behavior via individual anxiety levels. That is, a change in individuals' perceptions about the effectiveness of government protection can indirectly alter their panic buying behavior by first influencing their anxiety levels. This indirect route accounts for about 16.91% of the total effect, further substantiating the role of anxiety as a significant mediator in the relationship between the perception of government protection and panic buying. So, this result suggests that individuals' perceptions and emotional states (in this case, anxiety) influence their decision-making process. Higher anxiety levels can lead to an increased perception of risk, altering the individual's subjective probability estimation regarding the possibility of future shortages, thus promoting panic buying. Moreover, if individuals perceive government protection measures as ineffective, they may also experience heightened anxiety due to increased awareness of the crisis's severity, which could then encourage panic buying.

On the other hand, the average direct effect of 0.3445 suggests that even after considering its influence on anxiety levels, the perception of government protection still directly

TABLE 3—EFFECTS OF GOVERNMENT PROTECTION PERCEPTION AND ANXIETY LEVELS ON PANIC BUYING BEHAVIOR: COMPARATIVE ESTIMATES FROM CONTROL FUNCTION, INSTRUMENTAL VARIABLE, AND OLS MODELS.

	<i>Dependent variable: Panic buying behavior</i>		
	2SRI (1)	2SLS (2)	OLS (3)
Perception of government protection	0.344* (0.198)		0.074*** (0.019)
State-Trait Anxiety Inventory Score	0.008*** (0.002)	0.010*** (0.002)	0.008*** (0.002)
Perception of government protection - instrumented		0.329* (0.198)	
Covariates	Yes	Yes	Yes
Period	Yes	Yes	Yes
Resident status	Yes	Yes	Yes
Residuals (\hat{u}_i)	Yes		
Observations	2,850	2,850	2,850
R ²	0.044	0.039	0.043
Durbin-Wu-Hausman test	695.823***		
Wooldridge test statistic	99.284***		
Placebo test result (p-value)	0.992		

Column (1) presents the control function approach results. Column (2) shows the result from the instrumental variable approach. Column (3) presents the Naïve OLS results. The presented coefficients result from estimates of a binary outcome model, where the dependent variable, panic buying behavior, is a dichotomous representation of the occurrence or non-occurrence of panic buying. Perception of government protection is also a binary indicator capturing the respondents' trust in government measures to combat the crisis, while the perception of government protection (instrumented) represents the fitted values from the first-stage regression in Equation 1. Anxiety level reflects a continuous score from the State-Trait Anxiety Inventory. All models control for a set of covariates, time periods, and residential status (metropolitan or not). The Durbin-Wu-Hausman test and Wooldridge test statistics further validate the instrumental variable used in the model. Standard errors shown in parentheses.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.

affects panic buying behavior. This implies that beyond merely affecting anxiety levels, individuals' trust or distrust in government protective measures could directly impact their propensity to engage in panic buying. Taken together, the total effect of the perception of government protection on panic buying behavior, combining both the indirect and direct effects, is 0.4146. This highlights that individuals' subjective expectations, perceptions, and emotional states play critical roles in their decision to engage in panic buying. This aligns with the SEU model's prediction that individuals decide by weighing the expected utility based on their subjective views and emotional states.

Overall, the results suggest that individuals' panic buying behavior is not purely irrational but could be a rational response based on their subjective perceptions and ex-

TABLE 4—MEDIATION ANALYSIS: DIRECT, INDIRECT, AND TOTAL EFFECTS OF PERCEPTION OF GOVERNMENT PROTECTION ON PANIC BUYING.

<i>Dependent variable: Panic buying behavior</i>	
Coefficient (p-value; CI)	
Average indirect effect	0.0701 ^{***} (0.0293; 0.12)
Average direct effect	0.3445 [*] (-0.0407; 0.73)
Total effect	0.4146 ^{**} (0.0293; 0.80)
Proportion mediated	0.1691 ^{**} (0.0446; 1.01)
Observations	2,850

The average indirect effect refers to the influence of the perception of government protection on panic buying mediated by the anxiety level. The average direct effect refers to the influence of the perception of government protection on panic buying without the mediating factor. The total effect is the sum of the average direct and indirect effects and indicates the overall impact of the perception of government protection on panic buying. The proportion mediated quantifies the extent to which the effect of perception of government protection is mediated by anxiety.

^{***} Significant at the 1% level.

^{**} Significant at the 5% level.

^{*} Significant at the 10% level.

pectations under uncertain conditions brought about by the COVID-19 pandemic. It is a strategy to maximize their expected utility by ensuring access to necessities amidst perceived shortages and high anxiety levels.

D. Sensitivity tests

The mediation analysis can be influenced by the potential existence of an unmeasured confounder affecting the relationship between the mediator and the outcome. This concern arises due to an important assumption in mediation analysis known as sequential ignorability. This assumption posits that, after accounting for other variables, both the mediator and the outcome are independent of the treatment assignment, effectively treating it as if it were random (Cox et al., 2013; Imai et al., 2010; Zhang et al., 2016). The validity of this assumption is critical for isolating causal effects in the analysis. However, unmeasured confounding variables could challenge this assumption, prompting the need for a sensitivity analysis. To thoroughly assess this, I conducted a sensitivity analysis using 10,000 simulations. This sensitivity analysis examines the robustness of the results against any potential violations of the sequential ignorability assumption. Such analyses are particularly valuable in determining the extent to which unmeasured confounders may significantly impact the outcomes of both the average direct and indirect effect (VanderWeele, 2016). Within the context of the structural equation model (SEM),

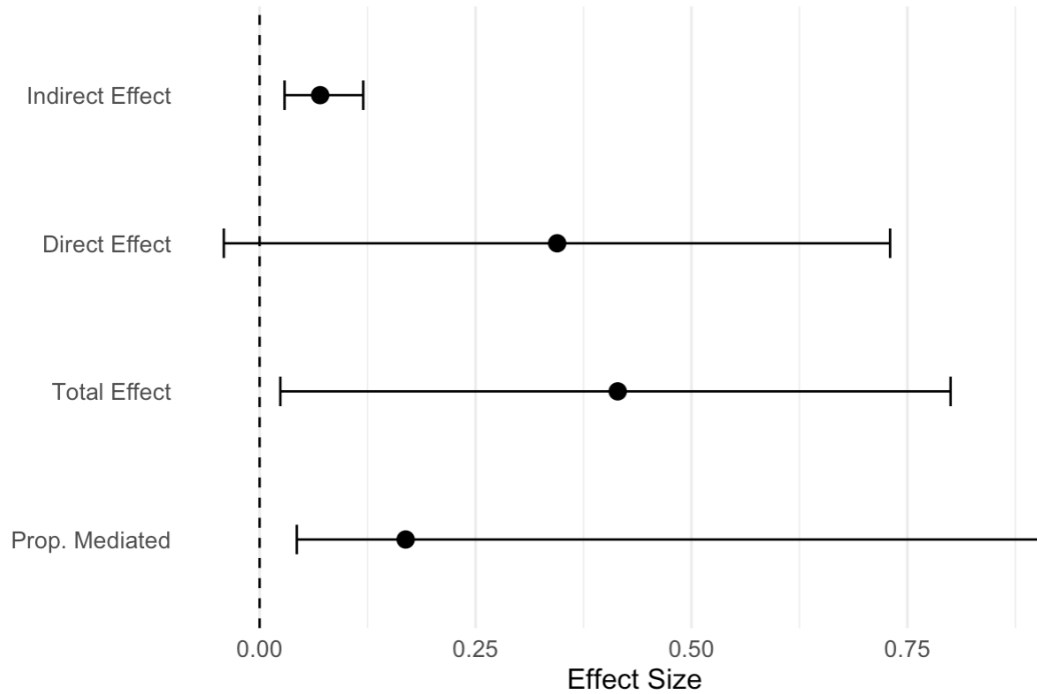


FIGURE 2. GRAPHICAL REPRESENTATION OF MEDIATION EFFECTS.

Note: The figure illustrates the average indirect effects, average direct effects, total effects, and proportion mediated. The effects shown here are derived from a mediation analysis. This process examines the way people's perceptions of government protection measures influence panic buying behavior, taking into account an indirect effect from anxiety levels and other covariates. The point estimates are based on 10,000 bootstrap simulations. Error bars indicate the 95% confidence intervals for each effect. A value of zero effect is represented by the vertical dashed line.

a sensitivity analysis is based on the correlation between the residuals of the mediator (\hat{v}_i) and the outcome (\hat{u}_i), denoted by ρ .

$$(7) \quad \rho \equiv \text{cor}(\hat{v}_i, \hat{u}_i)$$

Figure 3 illustrates that the original finding of a positive average indirect effect under the sequential ignorability assumption remains robust unless ρ exceeds 0.1. The confidence interval solely covers the zero value when ρ is between 0.05 and 0.1, demonstrating that sampling variability does not substantially affect the result. For ρ above 0.1, model sensitivity and overfitting risk increase. We chose 10,000 simulations for robust parameter space sampling, balancing computational feasibility and thoroughness.

Likewise, the conclusion regarding the average direct effect's direction under the sequential ignorability assumption is maintained unless ρ falls below -0.35. This resilience affirms the original finding of a significant direct effect of the perception of government protection on panic buying behavior. The average direct effect of the perception

of government protection on panic buying behavior remains robust against potential unmeasured confounding variables, sustaining its significance down to a ρ of -0.35. In summary, these results imply that the indirect and direct effect of the perception of government protection on panic buying behavior is relatively stable.

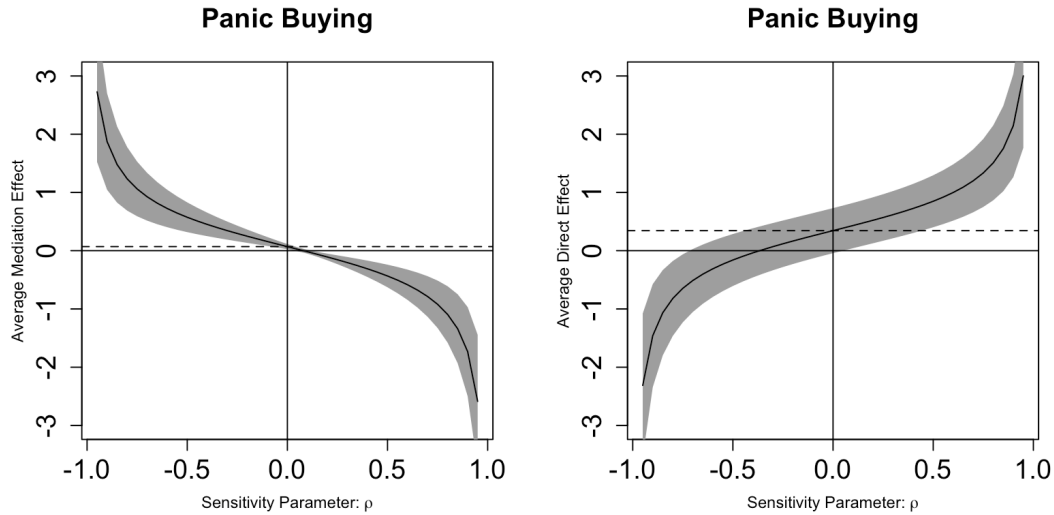


FIGURE 3. SENSITIVITY ANALYSIS PLOTS FOR THE AVERAGE INDIRECT AND DIRECT EFFECTS ON PANIC BUYING BEHAVIOR.

Note: The graphs illustrate the estimated average indirect effect (left side) and average direct effect (right side), along with their 95% confidence intervals. The solid line represents the estimated average effects at different values of ρ . The dashed lines indicate the point estimate of the indirect and direct effects when ρ equals 0. The gray region represents the 95% confidence interval for each average effect at each value of ρ .

V. Discussion

In the face of crises such as the COVID-19 pandemic, understanding public perceptions of governmental measures and their subsequent behaviors is necessary to managing unintended consequences like panic buying. This study offers insights into these perceptions and behaviors, finding a significant positive relationship between the perception of government protection measures and panic buying. The study also shows that anxiety mediates this relationship, suggesting that the psychological impact of public perception of governmental measures plays a role in crisis management.

The results of this study offer several key findings and insights. First and foremost, the results provide robust empirical evidence that perception of government protection measures significantly influences panic buying behavior. These results present an alternative view, reframing our understanding from the vantage point of trust. They underscore that an elevated level of trust in the effectiveness of government measures can act as

a deterrent for panic buying. This indicates the substantial impact that public trust in governmental public health crisis management can have on individual behavior. This highlights the need for future studies to explore the impact of public trust in government responses on behavioral outcomes during crises. Similarly, [Islam et al. \(2021\)](#) show that scarcity messages by policymakers, marketing managers, the World Health Organization (WHO), and non-governmental organizations positively related to perceived arousal, ultimately leading to impulsive and obsessive buying. [Kassas & Nayga \(2021\)](#) provide evidence that the infectiousness of COVID-19 was positively correlated with the importance of panic buying, while trust in government efforts to address COVID-19 was negatively correlated with the timing of panic buying decisions.

A second key finding from our research offers an intricate perspective on the role of anxiety: it serves as a mediator between the perception of government protection measures and panic buying. This highlights how distrust in government protective measures, channeled through anxiety levels, influences individuals' panic buying behavior. Therefore, the government should consider the psychological impact of the perception of the public on their measures and actions when managing crises. [Arafat et al. \(2020a\)](#) study show that the factors responsible for panic buying extracted from media reports include psychological factors such as anxiety reduction, lack of trust, and government actions. Besides, [Gette et al. \(2021\)](#) provide evidence of the importance of anxiety levels, which is related to protective measures such as social distancing and indoor and outdoor mask use.

Applying the SEU model ([Savage, 1951](#)), provides a theoretical foundation to interpret these findings. Based on individuals' subjective expectations and their perception of utility ([Fischhoff et al., 1983](#)), the model elucidates the panic buying behavior observed in this study. Particularly, the perception of government protection measures and anxiety level are two pivotal factors that sway an individual's subjective expectations ([Botzen et al., 2022](#); [Strong et al., 2023](#); [Tyler et al., 1986](#)), thereby altering the perceived utility of certain actions such as panic buying. In other words, if people perceive the government's protective measures as inadequate and experience heightened anxiety, they subjectively expect worse outcomes ([Molnar & Loewenstein, 2022](#)), inflating the perceived utility of panic buying to buffer against the potential adverse consequences ([Starcke & Brand, 2016](#)). Therefore, the SEU model can effectively elucidate the observed panic buying behavior in this study.

Comparatively, other research on panic buying during the COVID-19 pandemic has focused on the influences and outcomes of this behavior across various contexts. Our study adds to this body of knowledge by offering insights into the specific effects of government protection measures and anxiety on panic buying. For instance, [Islam et al. \(2021\)](#) presented a multi-country study during the pandemic's peak, which emphasized that fear and panic transcended national borders, leading to similar panic-buying behaviors globally. [Kassas & Nayga \(2021\)](#) examine behavioral factors behind panic buying in US households. They focus on panic buying of common food and non-food items, including consumers' need for control, perceptions of wise decision-making, concerns about scarcity, and the desire to minimize trips to the grocery store. While investigating

key behavioral motivations for panic buying, their study does not extensively explore how public sentiment toward government actions might influence these behaviors. Also, [Chen et al. \(2022\)](#) develop a model to quantify individual buying behavior and the emergence of group panic buying. While their study recognized the role of government intervention, it does not scrutinize the public's perception of the state's protection efforts and how this perception might affect individual and collective behavior.

The implementation of the control function approach proves pivotal in this study. By utilizing this method, I address potential endogeneity issues and accurately estimate the causal relationship between the perception of government protection measures and panic buying. Finally, while this study is conducted in Türkiye, the results have broader implications. Panic buying is a global phenomenon observed in many countries during the COVID-19 pandemic. Thus, the findings of this study may provide insights for policymakers in other countries as well.

A. *Policy implications and limitations*

This study underscores the policy relevance of public perceptions of government protection measures and mental health considerations during crises. Firstly, governments should prioritize transparent, regular, and consistent communication to foster positive perceptions and reduce panic buying. In addressing scarcity perceptions, policymakers can consider strategies that carefully balance supply and demand without inadvertently creating other problems, such as shadow economy. Furthermore, it is essential to break self-perpetuating fear cycles, like the toilet paper hoarding during COVID-19, by assuring the public of crisis management strategies ([Islam et al., 2021](#); [Taylor, 2021](#)). Secondly, given anxiety's mediating role in panic buying, governments should incorporate mental health strategies in crisis management. Such strategies could encompass psychological support, mental health briefings, and access to mental health resources, as supported by [Taylor \(2021\)](#).

Despite providing valuable insights, our study also carries limitations. I focus on the COVID-19 pandemic in Türkiye using the SEU model, which might not account for potential irrationality, cultural variations, social influences, or media impact. Moreover, this research design does not capture temporal changes in panic buying behavior, suggesting a need for longitudinal studies. While I address anxiety's mediating role, other psychological factors warrant investigation in future research. Lastly, despite my methodological precautions, unobserved variables or errors might influence my results, underscoring the need for further validation through different methods or data sources.

VI. Conclusion

This study sheds light on the complex interplay between public perceptions of government protective measures, individual anxiety levels, and the likelihood of panic buying in Türkiye in the midst of the global public health crisis caused by the COVID-19 pandemic. Moreover, a key finding of this research is the profound influence of public trust in government protection measures on panic buying, establishing a significant positive correlation between these two variables. Equally important is the evidence that individual

anxiety levels, likely amplified in response to the perceived ineffectiveness of government protective measures, serve as a significant predictor and mediator of panic buying behavior. The application of the subjective expected utility model enhances our understanding of these relationships, focusing on individuals' subjective expectations and the perceived utility of actions during a crisis.

This study suggest that more research is required to delve deeper into the complexities of panic buying behavior. Variables such as cultural differences, social influence, and media coverage could significantly impact this behavior and deserve further investigation. The effectiveness of diverse government strategies in managing panic buying behavior also warrants exploration. In the face of future crises, policymakers need to comprehend the factors driving panic buying behavior to devise effective strategies.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used Grammarly and OpenAI in order to improve the readability and language of the manuscript. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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APPENDIX

APPENDIX

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From Perception to Action:

*The Influence of Distrust in Government on Panic Buying in
the COVID-19 Era*

by

Emre Sari

Tromsø/Norway

July, 2023

TABLE A.1—EFFECTS OF GOVERNMENT PROTECTION PERCEPTION AND ANXIETY LEVELS ON PANIC BUYING BEHAVIOR: OLS MODELS.

Variables	<i>Dependent variable: Panic buying behavior</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
Perception of government protection	0.083*** (0.019)	0.065*** (0.019)	0.073*** (0.019)	0.070*** (0.019)	0.069*** (0.019)	0.074*** (0.019)
State-Trait Anxiety Inventory Score		0.007*** (0.002)	0.007*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)
Gender			0.044** (0.018)	0.038* (0.019)	0.038** (0.019)	0.033* (0.019)
Age			0.001 (0.001)	-0.0001 (0.001)	-0.0001 (0.001)	-0.0005 (0.001)
Marital status			0.093*** (0.026)	0.089*** (0.026)	0.089*** (0.026)	0.088*** (0.025)
Education level				-0.057*** (0.019)	-0.058*** (0.019)	-0.063*** (0.020)
Monthly net income				0.013 (0.008)	0.013 (0.008)	0.013 (0.008)
Ability to work from home				-0.060*** (0.018)	-0.061*** (0.018)	-0.064*** (0.018)
COVID-19 diagnosis in household					0.113** (0.045)	0.140*** (0.046)
Survey period						-0.093*** (0.020)
Living in major cities						0.061*** (0.018)
Constant	0.287*** (0.015)	-0.015 (0.088)	-0.131 (0.098)	-0.119 (0.100)	-0.108 (0.100)	-0.136 (0.100)
Observations	2,850	2,850	2,850	2,850	2,850	2,850
R ²	0.007	0.011	0.020	0.030	0.032	0.043

The table demonstrates the stepwise process of building an OLS model. Initially, the treatment variable, Perception of government protection, is included. Subsequently, the mediator, referred to as anxiety level or State-Trait Anxiety Inventory Score, is introduced. Next, demographic, socioeconomic, and health characteristics are incorporated into the model. Finally, the variables related to survey period and living in major cities are included. The reported coefficients are estimated using robust standard errors shown in parentheses. This stepwise approach provides insights into the incremental effects of the variables on the outcome variable, enabling a comprehensive understanding of the factors influencing panic buying behavior.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.

TABLE A.2—EFFECTS OF GOVERNMENT PROTECTION PERCEPTION AND ANXIETY LEVELS ON PANIC BUYING BEHAVIOR: AVERAGE MARGINAL EFFECTS FROM PROBIT MODELS.

	<i>Dependent variable: Panic buying behavior</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
Perception of government protection	0.083*** (0.018)	0.066*** (0.019)	0.073*** (0.019)	0.072*** (0.019)	0.071*** (0.019)	0.076*** (0.019)
State-Trait Anxiety Inventory Score		0.007*** (0.002)	0.007*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.009*** (0.002)
Gender			0.044** (0.019)	0.039* (0.020)	0.039* (0.020)	0.035* (0.020)
Age			0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)
Marital status			0.095*** (0.027)	0.092*** (0.027)	0.092*** (0.027)	0.091*** (0.027)
Education level				-0.058*** (0.020)	-0.060*** (0.020)	-0.064*** (0.020)
Monthly net income				0.013 (0.008)	0.013 (0.008)	0.013 (0.009)
Ability to work from home				-0.062*** (0.019)	-0.063*** (0.019)	-0.067*** (0.019)
COVID-19 diagnosis in household					0.116** (0.049)	0.146*** (0.050)
Survey period						-0.094*** (0.020)
Living in major cities						0.063*** (0.018)
Constant	-0.206*** (0.015)	-0.511*** (0.088)	-0.631*** (0.099)	-0.619*** (0.101)	-0.610*** (0.102)	-0.643*** (0.102)
Observations	2,850	2,850	2,850	2,850	2,850	2,850
Akaike Inf. Crit.	3,647.165	3,637.035	3,616.290	3,593.199	3,589.112	3,560.908

The table demonstrates the stepwise process of building an Probit model, and presented the average marginal effects. The reported coefficients are estimated using standard errors shown in parentheses. This stepwise approach provides insights into the incremental effects of the variables on the outcome variable, enabling a comprehensive understanding of the factors influencing panic buying behavior. Average marginal effect results are inline with OLS models. Standard errors shown in parentheses.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.

TABLE A.3—FIRST-STAGE PROBIT REGRESSION AND VALIDITY OF THE INSTRUMENTAL VARIABLE IN DETAIL.

	<i>Dependent variable: Perception of government protection</i>	
	<i>First-stage model</i>	<i>Average Marginal Effects</i>
	<i>Probit</i>	
	(1)	(2)
Cumulative COVID-19 cases in the EU	0.00004*** (0.00001)	0.00001*** (0.000)
Gender	0.150*** (0.053)	0.055*** (0.020)
Age	-0.007** (0.003)	-0.002** (0.001)
Marital status	-0.254*** (0.069)	-0.094*** (0.026)
Survey period	0.028 (0.067)	0.010 (0.024)
Living in major cities	-0.032 (0.050)	-0.012 (0.018)
Constant	0.464*** (0.096)	0.168*** (0.035)
Observations	2,850	2,850

The instrumental variable, cumulative COVID-19 cases in the European Union (EU), is used to examine its validity in explaining the endogenous treatment variable, perception of government protection. The F-test and covariance between the instrumental variable and the residuals are reported to assess the relevance of the instrumental variable. Demographic characteristics are incorporated into the model. Besides, the variables related to survey period and living in major cities are included. Standard errors shown in parentheses.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.

TABLE A.4—EFFECTS OF GOVERNMENT PROTECTION PERCEPTION AND ANXIETY LEVELS ON PANIC BUYING BEHAVIOR IN DETAIL: COMPARATIVE ESTIMATES FROM CONTROL FUNCTION, INSTRUMENTAL VARIABLE, AND OLS MODELS.

	<i>Dependent variable: Panic buying behavior</i>		
	2SRI (1)	2SLS (2)	OLS (3)
Perception of government protection	0.344* (0.198)		0.074*** (0.019)
Perception of government protection - instrumented		0.329* (0.198)	
State-Trait Anxiety Inventory Score	0.008*** (0.002)	0.010*** (0.002)	0.008*** (0.002)
Gender	0.019 (0.022)	0.017 (0.022)	0.033* (0.019)
Age	0.0003 (0.001)	0.0003 (0.001)	-0.0005 (0.001)
Marital status	0.113*** (0.031)	0.114*** (0.032)	0.088*** (0.025)
Education level	-0.062*** (0.020)	-0.066*** (0.020)	-0.063*** (0.020)
Monthly net income	0.013 (0.008)	0.012 (0.008)	0.013 (0.008)
Ability to work from home	-0.064*** (0.018)	-0.063*** (0.018)	-0.064*** (0.018)
COVID-19 diagnosis in household	0.127*** (0.047)	0.127*** (0.047)	0.140*** (0.046)
Survey period	-0.113*** (0.025)	-0.113*** (0.025)	-0.093*** (0.020)
Living in major cities	0.064*** (0.018)	0.065*** (0.018)	0.061*** (0.018)
First-stage residuals	-0.272 (0.198)		
Constant	-0.320* (0.168)	-0.389** (0.167)	-0.136 (0.100)
Observations	2,850	2,850	2,850
R ²	0.044	0.039	0.043

Column (1) presents the control function approach results. Column (2) shows the result from the instrumental variable approach. Column (3) presents the Naïve OLS results. The presented coefficients result from estimates of a binary outcome model, where the dependent variable, panic buying behavior, is a dichotomous representation of the occurrence or non-occurrence of panic buying. Perception of government protection is also a binary indicator capturing the respondents' trust in government measures to combat the crisis, while the perception of government protection (instrumented) represents the fitted values from the first-stage regression in Equation 1. Anxiety level reflects a continuous score from the State-Trait Anxiety Inventory. All models control for a set of covariates, time periods, and residential status (metropolitan or not). The Durbin-Wu-Hausman test and Wooldridge test statistics further validate the instrumental variable used in the model. Standard errors shown in parentheses.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.

TABLE A.5—EFFECTS OF GOVERNMENT PROTECTION PERCEPTION ON ANXIETY LEVELS IN DETAIL.

<i>Dependent variable: State-Trait Anxiety Inventory Score</i>	
OLS	
Perception of government protection	8.514 ^{***} (1.921)
Gender	1.146 ^{***} (0.212)
Age	-0.026 ^{**} (0.012)
Marital status	0.028 (0.307)
Education level	-0.335 [*] (0.192)
Monthly net income	-0.257 ^{***} (0.081)
Ability to work from home	0.800 ^{***} (0.178)
COVID-19 diagnosis in household	0.932 ^{**} (0.453)
Survey period	-0.170 (0.245)
Living in major cities	-0.405 ^{**} (0.176)
First-stage residuals	-6.195 ^{***} (1.930)
Constant	42.887 ^{***} (1.421)
Observations	2,850
R ²	0.145

This table presents results from , which is the estimation of State-Trait Anxiety Inventory Score. This models control for a set of covariates, time periods, and residential status (metropolitan or not). Standard errors shown in parentheses.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.