Alcohol Consumption and the Impact of Lockdowns - A Study in Thailand

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ABSTRACT

The COVID-19 pandemic unveiled widespread alcohol consumption as a global coping mechanism for individuals facing fear, loneliness, and stress. The primary research goal is to address the gap concerning the link between COVID-19 lockdowns and alcohol consumption in Thailand. By employing a regression model rooted in economic demand theory which incorporates demographic variables, COVID-19 impacts, and seasonal variations, and utilizes data spanning 40 quarters from 2013 Q1 to 2022 Q4, key variables such as GDP, price, and population are found to significantly influence alcohol consumption. Notably, the study identifies a shift in alcohol from being an inferior to a normal good during the pandemic. This study shed light on the lasting consequences of lockdown-induced alcohol consumption on public health and support strategies for vulnerable populations. The findings contribute to a more comprehensive understanding of the enduring impact of lockdowns in Thailand and their association with the use of alcohol as a coping mechanism. These findings lay the groundwork for addressing public health challenges and designing targeted policy interventions to mitigate the long-term effects of increased alcohol consumption during lockdowns.

Keywords: Alcohol Consumption, Regression, Lockdowns, COVID-19

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Background and Significance of the Research Problem

When evaluating the well-being of societies, it's widely recognized that individuals employ various coping mechanisms to navigate the challenges of life. Among these mechanisms, alcohol consumption (ethyl alcohol) has emerged as a prevalent response to cope with fear, loneliness, and pervasive unease (Huang & Zhao, 2020; Sharma et al., 2020; Zhang et al., 2020). Notably, research by Galea et al. (2020) highlights a concerning association between substance use, including alcohol consumption, and the rise of mental and behavioral disorders such as depression and anxiety. Furthermore, Clay and Parker (2020) elucidate how impaired decision-making and physiological stress variations elevate the risk of stress-induced alcohol consumption.

Recent studies have painted a stark picture of elevated rates of depression, anxiety, sleep disturbances, harmful alcohol usage, and diminished mental well-being during the COVID-19 pandemic (Ahmed et al., 2020; Brooks et al., 2020; Cao et al., 2020; Glowacz & Schmits, 2020). The emergence of COVID-19 in Wuhan, Hubei province, China, and its rapid global dissemination as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) transformed it into the ubiquitous COVID-19 (NIH, 2020). Characterized by symptoms including fever, fatigue, dry cough, muscle pain, and shortness of breath (Chodkiewicz et al., 2020), this disease rapidly evolved into a pandemic, casting a daunting shadow over international public health (World Health Organization, 2020).

Governments worldwide responded with stringent public health measures aimed at curbing transmission (Rodriguez et al., 2020; Jacob et al., 2021). These measures, often involving stay-at-home orders and legislation that restricted personal freedoms, plunged populations into a maelstrom of fear and loneliness. It's reasonable to infer that this stressful environment triggered a significant surge in alcohol consumption.

During the COVID-19 pandemic, Nielsen's market research disclosed a staggering 55% increase in alcohol sales in the USA compared to pre-pandemic levels (Bremner, 2020). The International Wine and Spirits Registry (IWSR) reported a remarkable 2.0% surge in total beverage alcohol volume in the USA for 2020, marking the most substantial increase since 2002.

A recent Nanos poll unveiled that Canadians increased their alcohol consumption during the COVID-19 pandemic-related quarantine (Canadian Centre on Substance Use and Addiction, 2020). In the United Kingdom, Finlay and Gilmore (2020) documented a 67% spike in supermarket alcohol sales in 2020, surpassing the growth rate of overall supermarket sales.

A sobering editorial in the British Medical Journal warned that the repercussions of increased alcohol harm might reverberate through a generation. Emerging studies from various nations, including the USA (Rodriguez et al., 2020), Australia (Stanton, 2020), Germany (Anne, 2020), and Poland (Chodkiewicz et al., 2020), concur, revealing that one-fifth to one-quarter of adults increased their alcohol consumption, primarily due to psychological distress stemming from the perceived threat of COVID-19 (Chodkiewicz et al., 2020).

Numerous experts have postulated that the "social distancing," stay-at-home orders, and quarantine strategies employed by governments and health officials during the pandemic will inadvertently exacerbate mental health issues and substance abuse—a pattern observed in previous disasters (Holmes et al., 2020). A recent article in The Lancet underscored the gravity of alcohol use during this pandemic as a major public health concern (Clay & Parker, 2020). Furthermore, the World Health Organization (WHO) cautioned about the potential risks associated with increased alcohol consumption during social isolation, foreseeing a surge in alcohol use disorders in the future (Koopmann et al., 2020).

Thailand, like many other countries, enforced stringent measures such as lockdowns and "social distancing." From March 26, 2020, onwards, all non-essential workers were mandated to stay home and isolate from individuals outside their households. This led to the closure of usual venues for physical activity, including gyms and outdoor recreation facilities, thereby resulting in adverse changes in health behaviors, including alcohol consumption (Stanton, 2020). The pandemic was unequivocally perceived as a crisis by a substantial portion of the population, precipitating high levels of psychological stress (Chodkiewicz et al., 2020). Startling statistics from the Office of the Permanent Secretary, Ministry of Public Health (2021), reveal a 29% increase in pure alcohol consumption per capita per year in Thailand from 2018 to 2020, accompanied by a 100% surge in the number of new drinkers from 2017 to 2021 (Figures 1 and 2).

Due to an increase in alcohol consumption during social isolation in many countries, the World Health Organization (WHO) had warned the general public of the potential risks of increased alcohol consumption, which might result in a higher incidence of alcohol use disorders in future (Koopmann et al., 2020). Alcohol consumption has been identified as an important risk factor for chronic disease and injury. The effect of excess alcohol consumption on health is damaging, with an estimated 3.8% of all global deaths and 4.6% of global disability-adjusted life-years attributable to alcohol. Disease burden is closely related to average volume of alcohol consumption, and, for every unit of exposure, is strongest in poor people and in those who are marginalised from society. The costs associated with alcohol amount to more than 1% of the

gross national product in high-income and middle-income countries, with the costs of social harm constituting a major proportion in addition to health costs (Rehm et al., 2009). In terms of social problems from alcohol abuse, the study of Clark, Lesnick, and Hegedus (1997) showed that people with alcohol use disorders were 6 to 12 times more likely to have physical abuse. This study also explained that sexual abuse was 18 to 21 times more likely to happen with alcohol use disorders. Moreover, many other adverse life events were also significantly more common with alcohol abuse including having a close friend die, arguments within the family, and legal difficulties.
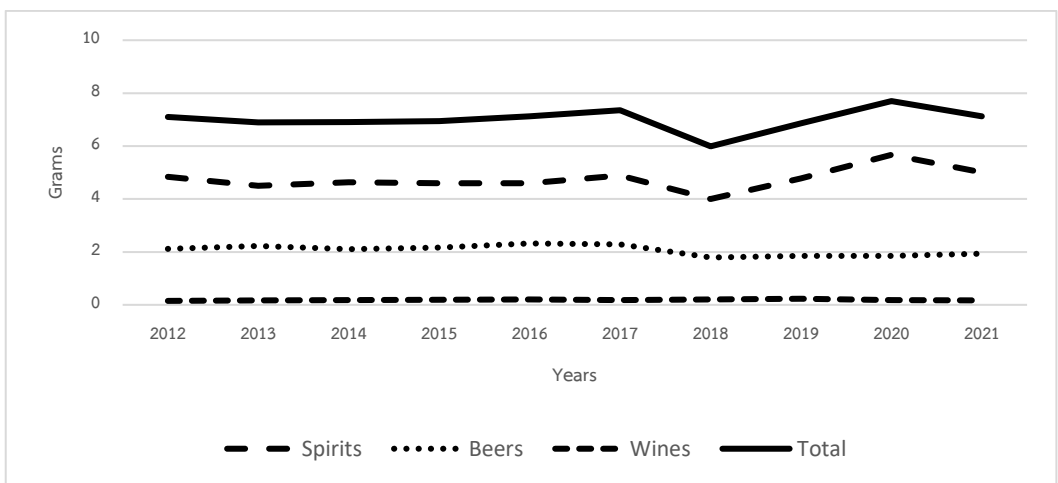

Figure 1 Annual Per Capita Pure Alcohol Consumption (Gram) in Thailand

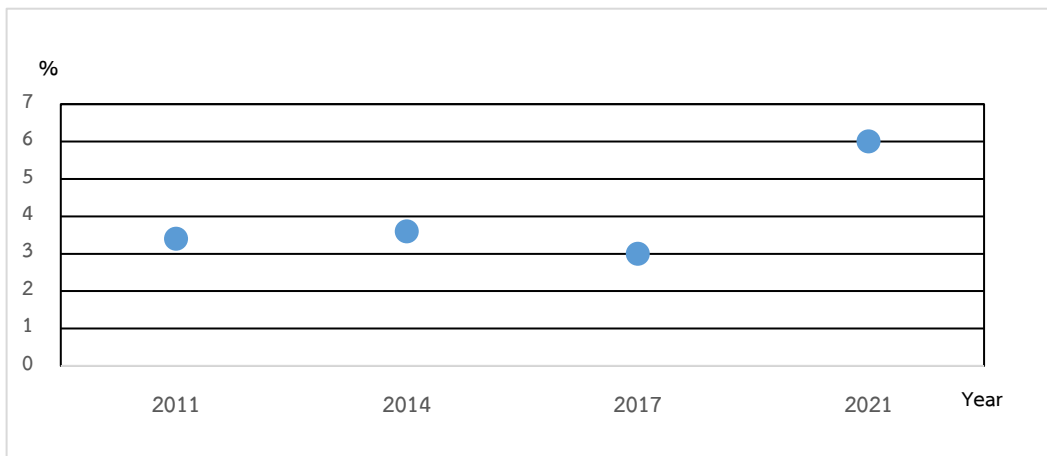Source: Office of the Permanent Secretary, Ministry of Public Health (2021)

Figure 2 Percentage Increase in New Drinkers in Thailand

Source: Office of the Permanent Secretary, Ministry of Public Health (2021)

While studies in several other countries confirm a robust link between COVID-19 lockdowns and increased alcohol consumption (e.g., Rodriguez et al., 2020; Stanton, 2020; Anne, 2020; Chodkiewicz et al., 2020), no such research has yet been conducted in Thailand.

There are some references on factors affecting alcohol consumption in Thailand. The following literature review provides insights into the factors influencing alcohol consumption in Thailand, drawing from research conducted between 2000 and the present day. The studies offer valuable perspectives on alcohol consumption patterns, policy measures, and associated problems in the Thai context. For instance, Pengpid and Peltzer (2012) revealed alcohol use and associated factors among adolescent students in Thailand. This study investigated alcohol use patterns among university students in Thailand. While focusing on a specific demographic group, it provides initial insights into drinking behavior in Thailand's educational institutions. Pramaunururut et. al. (2022) investigated the relationship between community involvement and alcohol use, this research explores how community factors may influence alcohol consumption in rural Thailand. It sheds light on the social aspects of drinking behavior.

While research on factors affecting alcohol consumption in Thailand is limited in the available literature, the studies presented here offer valuable contributions to understanding drinking behaviors, patterns, and associated challenges in various settings across the country. These findings may inform policy measures and interventions aimed at addressing alcohol-related issues in Thailand.

Therefore, the primary objective of this study is to address the factors that affect alcohol consumption in Thailand before and after COVID-19 pandemic. The findings will serve as a crucial resource for public health providers, shedding light on the potential enduring consequences of lockdown-induced alcohol consumption in Thailand and the pressing need to support vulnerable segments of the population. Moreover, the study's outcomes will enhance our comprehension of the long-term ramifications of the lockdown in Thailand and its nexus with alcohol consumption.

Research Objective

To investigate the factors that affect alcohol consumption in Thailand before and after COVID-19 pandemic.

Scope of the Research

This research focuses on alcohol consumption in Thailand, comparing consumption before and during the COVID-19 pandemic. The research considers secondary data in the form of quarterly statistics over the period 2013 Q1 to 2022 Q4, in total 40 quarters. The data were obtained from several sources and websites including the Bank of Thailand (BOT), the Office of the National Economic and Social Development Board (NESDB) and the National Statistical Office (NSO).

Literature on Factors that Affect Alcohol Consumption

Economic factors play a significant role in shaping alcohol consumption patterns. The price of alcoholic beverages, including taxes and pricing policies, is a critical economic factor influencing consumption. Higher prices and taxes tend to reduce alcohol consumption, while lower prices can lead to increased consumption (Chaloupka et.al., 2002; Wagenaar et.al., 2009). Furthermore, individual and household income levels impact the affordability of alcohol. Higher incomes generally lead to increased alcohol consumption, while lower incomes may limit consumption due to budget constraints (Bhattacharya & Chattopadhyay, 2017; Gallet, 2007).

The factor of economic growth casts a shadow over alcohol consumption trends. As a prevailing trend, individuals in developed nations tend to imbibe more than their counterparts in developing countries. However, the dynamics of globalization and increased trade can unexpectedly spark a surge in alcohol consumption in developing nations, amplifying the availability and accessibility of alcoholic beverages. The World Health Organization (WHO, 2007) suggests that "the general rule seems to be that alcoholic beverage consumption rises with improving economic circumstances." Adding empirical rigor to this assertion, Helble and Sato (2011) statistically quantify the nexus between economic growth and alcohol consumption. Their investigation scrutinizes whether GDP growth, in addition to unemployment as studied in previous research, stands as a pivotal driver of consumption. Their findings corroborate that GDP growth indeed wields a discernible influence on alcohol consumption, making consumption patterns predominantly procyclical a finding that harmonizes with existing research conducted at the national level. Additionally, their study reveals the intricacies of alcohol consumption changes, showing the relationship with average per capita income.

From the literature review, this study marks a significant extension of the analytical landscape by examining the uncharted territory that involves residual factors explaining

disparities in absolute alcohol consumption. This multifaceted exploration incorporates the year of the COVID-19 pandemic, the interplay between the mental well-being of the Thai populace, the shaping force of Government policies, and the dynamic influence of Thai festivals.

Hypotheses

This study formulates five hypotheses based on the following considerations:

1. GDP influences alcohol consumption in Thailand, following the normal good rule, where an increase in income leads to an increase in alcohol consumption.

2. Price influences alcohol consumption, following the law of demand, meaning that higher prices lead to reduced consumption.

3. Population influences alcohol consumption, meaning that an increase in the population leads to higher overall demand.

4. COVID-19 influences alcohol consumption, as during the COVID-19 pandemic, people tend to stay at home, and some may increase alcohol consumption to alleviate stress.

5. Seasonal factors influence alcohol consumption, with 2nd, 3rd and 4th quarters having lower alcohol consumption compared to the first quarter, mainly due to festive celebrations such as New Year and Chinese New Year.

Research Methodology

This section is divided into three parts. In the first part we describe the model specification that was used in the analysis. In the second part, we describe the model estimation that is used to frame the analysis.

Model Specification

The model for alcohol consumption in Thailand used in this research is a regression model based on the theory of demand in economics. Additionally, demographic variables, including the COVID-19 situation, have been incorporated into the model to reflect the impact on alcohol consumption, as well as seasonal variables. The conceptual framework of this empirical study is shown in Figure 3, and the explanatory variables were classified into three groups:
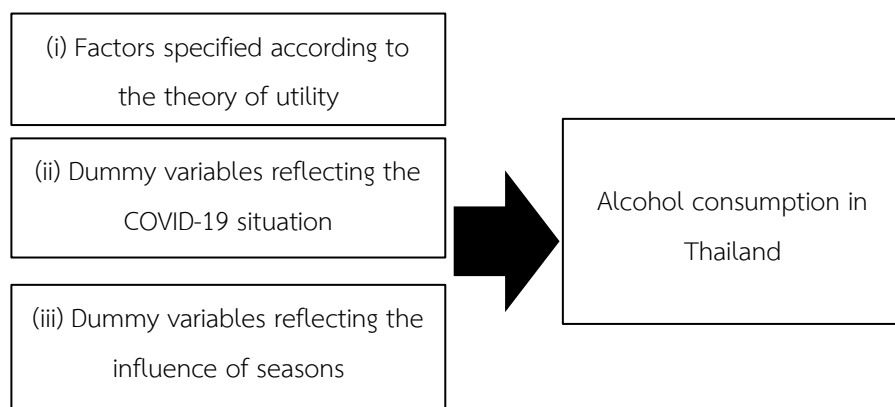
Figure 3 Conceptual framework

Source: Authors' Study

1. Factors specified according to the theory of utility.

- Income, which is represented by the real Gross Domestic Product (GDP) within the country, adjusted by removing the impact of price levels to reflect consumers' true purchasing power.

- Price, which is represented by the Consumer Price Index (CPI) of tobacco and alcoholic beverages.

- The population, as an aggregate demand variable, is the numerical representation of alcohol consumption of alcoholic beverages throughout the country, and thus, the population is included as an independent variable in the model.

2. Dummy variable reflecting the COVID-19 situation.

In the model, these variables are included both as an intercept and a slope dummy, interacting with GDP, as the researchers assume that the impact of GDP on demand is different before and during the COVID-19 period.

3. Dummy variables reflecting the influence of seasons.

- Considering each quarter

- Divided into 2nd, 3rd and 4th quarters, with the first quarter as the base group.

Model Estimation

The study utilizes multiple linear regression analysis to explore the relationship between independent variables and the dependent variable. Ordinary Least Squares (OLS) is employed to estimate the coefficients in the model. The functional form that was selected for this study was a log linear. With this form, the coefficients can be interpreted as the constant elasticity of

alcohol consumption with respect to each explanatory variable. Consequently, the final specification of the model was as follows:

$$\ln\left(alcohol_t\right) = \beta_0 + \beta_1 \ln\left(gdp_t\right) + \beta_2 \ln\left(price_t\right) + \beta_3 \ln\left(pop_t\right) + \beta_4\left(covid_t\right)$$
$$+ \beta_5\left(covid_t\right) \cdot \ln\left(GDP_t\right) + \beta_6 q2_t + \beta_7 q3_t + \beta_8 q4_t + \varepsilon_t$$

where:

$alcohol_t$ is the alcohol consumption in Thailand at period t (millions of baht)

gdp_t is the gross domestic product of Thailand at period t (millions of baht)

$price_t$ is consumer price index (CPI) of tobacco and alcoholic beverages at period t (2019=100)

pop_t is the population in Thailand at period t (people)

$covid_t$ is the dummy variable which is equal to 1 if the period t is during the COVID-19 pandemic

$q2_t$ is the dummy variable which is equal to 1 if the period t is in the second quarter of the year

$q3_t$ is the dummy variable which is equal to 1 if the period t is in the third quarter of the year

$q4_t$ is the dummy variable which is equal to 1 if the period t is in the fourth quarter of the year

ε_t is the stochastic disturbance term

Due to the limitations on data availability, it was not possible to find direct data on alcohol consumption. Therefore, we used data on alcohol consumption values that were adjusted by (divided by) the price, representing the following variables: consumer price index (CPI) of tobacco and alcoholic beverages. For the adjusted consumption figures to have the correct direction of movement, this study will remove the effect of the price level.

Results

In this section, the regression results using Ordinary Least Squares (OLS) are presented for the analysis to identify the determinants of alcohol consumption in Thailand, as shown in Table 1.

Table 1 Model Estimation of Alcohol Consumption in Thailand

Variables	Coefficient	t-Statistic	Expected signs
ln(gdp)	-0.7381	-1.7151*	+
ln(price)	-0.9955	-3.5454**	−
ln(pop)	6.4317	2.3855**	+
covid	-19.4654	-3.9605**	−
covid*ln(gdp)	1.3142	3.9523**	−
q2	-0.0927	-2.6619**	−
q3	-0.2368	-6.2424**	−
q4	0.0858	3.6053**	−
Constant	-94.1750	-2.0785**	n.a.
R-squared	0.9365 F-statistic		47.538**
Adjusted R-squared	0.9168 Durbin-Watson stat		2.0878

Notes: 1. The dependent variable in the model is ln(alcohol) as given by equation in model
estimation section.

2. The model is estimated by Ordinary Least Squares (OLS) method It has been tested
and solved various problems based on the main assumptions of using OLS to estimate
regression equations, including: multicollinearity, autocorrelation, and heteroscedasticity
including normality test and unit root test to ensure there is no spurious regression.

3. t-statistic is an individual significance test for each parameter

4. F-statistic is an overall significance test for the model

5. * significant at 10%, ** significant at 1%

Source: Authors' Study

According to Table 1, the coefficient of determination (R^2) of the model is equal to 0.9365, which is equivalent to 93.65%. This means that 93.65% of the variation in alcohol consumption in Thailand, as the dependent variable, can be empirically explained by the estimated model. However, the adjusted R-squared is slightly lower than R-squared due to the introduction of various independent variables, which leads to a decrease in degrees of freedom. In addition, the overall significance test at the 5% significance level shown by F-statistic indicates the acceptance of null hypothesis that all explanatory variables in the model can significantly help explain the alcohol consumption in Thailand simultaneously. An approximate model can be written as follows:

$$\ln(\hat{alcohol}) = -94.1750 - 0.7381 \ln(gdp) - 0.9955 \ln(price) + 6.4317 \ln(pop) \qquad (1)$$

$$(-2.0785)^{**} \qquad (-1.7151)^{*} \qquad (-3.5454)^{**} \qquad (2.3855)^{**}$$

$$-19.4654 \text{ covid} + 1.3142 \text{ covid} \cdot \ln(gdp) - 0.0927 \text{ q2} - 0.2368 \text{ q3} + 0.0858 \text{ q4}$$

$$(-3.9605)^{**} \qquad (3.9523)^{**} \qquad (-2.6619)^{**} \ (-6.2424)^{**} \ (3.6053)^{**}$$

Note: * significant at 10%, ** significant at 1%

The results show the individual significance of all explanatory variables, including dummy variables, at 1% level except ln(gdp) which is statistically significant at 10% level. Compared to the hypothesis, three significant variables show different signs of their coefficients from expected which are ln(gdp) covid*ln(gdp) and q4.

Discussion

From the estimated regression in the previous section, each explanatory variable in the model can be interpreted and discussed as follows:

Fundamentals Based on Demand Theory

1. GDP, representing the actual Gross Domestic Product of Thailand, serves as a proxy for income. The study has found that GDP significantly influences the quantity of alcohol consumption in Thailand, with statistical significance at the 0.10 significance level in the opposite direction. In this case, considering the period before the COVID-19 situation (where the term covid * ln(gdp) equals 0), the coefficient is -0.7381. This indicates that when GDP increases by 1%, it results in a 0.7381% decrease in alcohol consumption in Thailand. Furthermore, the elasticity of alcohol consumption with respect to income is -0.7381, implying that, before the COVID-19 situation, alcohol was classified as an Inferior good, consistent with the findings of the study by Volland (2012).

2. Price: In this research, the Consumer Price Index for tobacco and alcoholic beverages was used as a proxy for the price of alcoholic beverages. The study found that the price of alcoholic beverages significantly impacts the quantity of alcohol consumption in Thailand, with statistical significance at the 0.01 level in the opposite direction. The coefficient, which is -0.9955, indicates that when the price increases by 1%, it leads to a 0.9955% decrease in alcohol consumption in Thailand. This aligns with the Law of Demand, which states that as the price of a commodity rises, consumers tend to consume less of it. Furthermore, the price elasticity of alcohol consumption is -0.9955, illustrating the responsiveness of alcohol consumption quantity to changes in price.

3. Population (pop): Given that in this research, the utility of the product is characterized by aggregate demand, representing the total quantity of alcohol consumption by people across the country, the variable pop, indicating the population of Thailand, was included in the model. The study found that the population of Thailand significantly affects the quantity of alcohol consumption in the country, with statistical significance at the 0.01 level in the same direction as hypothesized. The coefficient, which is 6.4317, shows that when the population of Thailand increases by 1%, it leads to a 6.4317% increase in alcohol consumption in the country. This is consistent with the hypothesis and suggests that as the population of Thailand grows, alcohol consumption also increases by a significant amount.

4. COVID-19 Pandemic Situation: From the model specifications that include variables representing the COVID-19 pandemic situation, both in the form of an intercept and a slope dummy, the estimation results show that the "covid" variable is statistically significant at the 0.01 level for both the intercept and the slope dummy, specifically "covid" and "covid*ln(gdp)".

This indicates that the presence of the COVID-19 pandemic has a statistically significant impact on alcohol consumption in Thailand when considering both the period before COVID-19 and during the COVID-19 pandemic. As a result, two distinct models can be derived from this analysis:

Model 1 - Before COVID-19 Pandemic

This model represents alcohol consumption in Thailand before the COVID-19 pandemic and does not include the COVID-19 pandemic effect. It can be formulated as:

Model 2 - During COVID-19 Pandemic

This model represents alcohol consumption in Thailand during the COVID-19 pandemic and includes the COVID-19 pandemic effect, represented by the "covid" variable and its interaction with ln(gdp).

These two models allow for a comparative analysis of alcohol consumption patterns before and during the COVID-19 pandemic, considering the statistical significance of the COVID-19-related variables in affecting alcohol consumption.

By defining a model that adds COVID-19 pandemic variables to the characteristics of both intercept and slope dummy variables to compare alcohol consumption function between pre-COVID and during the COVID situation, the regression equation estimate showed that the COVID-19 variables were statistically significant at the level of 0.01 for both intercept and slope dummy, i.e. covid and covid*ln(gdp), respectively. The estimated model can be shown as follows:

1. Model in the pre-COVID-19 period: Replace covid = 0 in Equation (1) as follows:

$$\ln(\hat{alcohol}) \text{ before COVID-19} = -94.1750 - 0.7381 \ln(gdp) - 0.9955 \ln(price) \tag{2}$$
$$+ 6.4317 \ln(pop) - 0.0927\, q2 - 0.2368\, q3 + 0.0858\, q4$$

2. Model during COVID-19 situation: Replace covid = 1 in Equation (1) as follows:

$$\ln(\hat{alcohol}) \text{ during COVID-19} = (-94.1750 - 19.4654) + (1.3142 - 0.7381) \tag{3}$$
$$\ln(gdp) - 0.9955 \ln(price) + 6.4317 \ln(pop) - 0.0927\, q2 -$$
$$0.2368\, q3 + 0.0858\, q4$$

When considering Equations (2) and (3), it can be observed that both models reflect the impact of all independent variables similarly, except for the variable 'gdp.' This occurs because the models include a slope dummy generated by the interaction between the 'covid' variable and 'ln(gdp),' which explains the consumption of alcoholic beverages in the context of COVID-19 through the 'gdp' variable. In other words, the impact of 'gdp' on the quantity of alcohol consumption differs between the two scenarios.

From Equation (1), the coefficient of the 'gdp' variable is -0.7381. This implies that 'gdp' has an inverse effect on the quantity of alcohol consumption. When other factors are held constant, an increase of 1% in 'gdp' leads to a decrease of 0.7381% in alcohol consumption. Alternatively, it can be said that the elasticity of alcohol consumption with respect to 'gdp' is -0.7381.

On the other hand, when considering Equation (2), the coefficient of the 'gdp' variable is 1.3142 - 0.7381 = 0.5761. This means that 'gdp' has the same directional effect on the quantity of alcohol consumption. When other factors are held constant, an increase of 1% in 'gdp' results in an increase of 0.5761% in alcohol consumption. Alternatively, it can be said that the elasticity of alcohol consumption with respect to 'gdp' is 0.5761.

In summary, it can be observed that before COVID-19, GDP, which represents income, had an inverse effect on the quantity of alcohol consumption. This means that alcohol exhibited characteristics of an inferior good, as discussed in the section on the explanation of the 'gdp' variable earlier. However, during the COVID-19 situation, it was found that GDP had the same directional effect on the quantity of alcohol consumption. In other words, there was a shift in alcohol from being an inferior to a normal good during the pandemic.

This change can be attributed to the fact that during the pre-COVID period, consumers who regularly consumed alcohol, such as those who enjoyed socializing or relied on alcohol for emotional relief, had the freedom to allocate their spending or engage in various activities. With increasing income, they could alter their consumer behavior, shifting from alcohol

consumption to the consumption of other substitute products and engaging in alternative activities.

However, during the COVID-19 period, these consumers became more cautious and experienced periods of confinement and heightened vigilance in engaging in activities outside their homes. As a result, when their income increased, they were unable to find alternative activities to replace alcohol consumption, leading to an increase in the quantity of alcohol consumed.

5. Seasonal factors: In this study, three dummy variables are used to explain seasonal impact on alcohol consumption in Thailand which are 2nd quarter (q2), 3rd quarter (q3) and 4th quarter (q4) where the 1st quarter is base group. It can be seen from the estimated regression that q2, q3 and q4 can significantly explain alcohol consumption in Thailand in the negative, negative, and positive direction respectively. The coefficient of q2 (-0.0927) indicates that ln(alcoholq2) - ln(alcoholq1) = -0.0927 or alcoholq2 = ($e^{-0.0927}$)* alcoholq1 = 0.9115* alcoholq1. In the other word, the alcohol consumption in Thailand in 2nd quarter is less than in 1st by 8.85%. The reason may be because there are many celebrations and festivals in 1st quarter e.g., New Year, Chinese New Year and Valentine. Alcohol consumption was then so popular during that time.

For 3rd quarter, the coefficient of q3 (-0.2368) indicates that ln(alcoholq3) - ln(alcoholq1) = -0.2368 or alcoholq3 = ($e^{-0.23687}$)* alcoholq1 = 0.7891* alcoholq1. In the other word, the alcohol consumption in Thailand in 3rd quarter is less than in 1st by 21.09%. The reasons are similar to those in the second quarter, as follows: there are many celebrations and festivals in 1st quarter e.g., New Year, Chinese New Year and Valentine. Alcohol consumption was then very popular during that time.

For 4th quarter, the coefficient of q4 (0.0858) indicates that ln(alcoholq4) - ln(alcoholq1) = 0.0858 or alcoholq4 = ($e^{0.0858}$)* alcoholq1 = 1.08959* alcoholq1. In other words, the alcohol consumption in Thailand in 4th quarter is higher than in 1st by 8.96%. Furthermore, it is possible that towards the end of the year, there may be an increase in alcohol consumers for specific reasons due to a combination of various factors, beyond regular year-round consumption. For instance, it could be a period of social gatherings before long holidays for workers and company employees, who are looking to celebrate before another round of isolation or lockdowns. Additionally, the year-end often coincides with bonus payouts, which might lead to increased alcohol consumption as people have more disposable income.

This period may also involve stockpiling of products, resulting in higher purchase quantities without immediate consumption during that specific period.

Suggestions

Based on the findings of this study, some recommended government policies for addressing alcohol consumption and its associated challenges in Thailand are suggested:

1. Launch comprehensive public health awareness campaigns to educate the population about the risks associated with alcohol consumption, particularly during times of stress, such as the COVID-19 pandemic. These campaigns should target individuals dealing with fear, loneliness, and stress, emphasizing healthier coping mechanisms. Furthermore, strengthen mental health services and support networks to address the mental health implications of alcohol consumption. Invest in mental health awareness programs and initiatives to reduce the stigma surrounding mental health issues and encourage individuals to seek help when needed (Anderson et al., 2010).

2. Implement policies that consider the price elasticity of alcohol consumption (Elder et al., 2010). Gradually increase the prices of alcoholic beverages to discourage excessive drinking. Taxation on alcohol can be adjusted to achieve this goal while also generating revenue for public health programs.

3. Enforce stricter regulations on the sale and distribution of alcoholic beverages, especially during public health emergencies like the COVID-19 pandemic. Implement restrictions on alcohol sales during lockdowns and ensure that alcohol is not marketed as a solution to coping with stress. Additionally, develop targeted support programs for vulnerable populations, such as those with alcohol dependence, mental health disorders, and individuals affected by alcohol-related violence. Ensure that these populations have access to treatment and support services.

4. Evaluate the impact of COVID-19 policies on alcohol consumption patterns. Assess whether any policy changes during the pandemic have had unintended consequences on alcohol use and public health. Adjust policies accordingly based on these evaluations.

Future Research

Based on the findings of this study, there are directions of research that could be pursued and new studies that could help extend the current results and provide further clarity on the

relationship between alcohol consumption, public health, and the impact of external factors like the COVID-19 pandemic in Thailand.

1. Conduct longitudinal studies to track changes in alcohol consumption patterns in Thailand after the COVID-19 pandemic. This research could help determine whether the shifts observed during the pandemic are sustained or if there is a return to pre-pandemic consumption levels. In addition, undertake qualitative research to gain deeper insights into the coping mechanisms adopted by individuals during times of stress, including the COVID-19 pandemic. Explore the reasons behind alcohol use as a coping strategy and identify alternative, healthier coping mechanisms.

2. Evaluate the long-term mental health impact of increased alcohol consumption during the pandemic. Investigate the prevalence of mental health disorders, including depression and anxiety, among individuals who engaged in excessive drinking during the COVID-19 crisis. Moreover, compare the findings from Thailand with data from other countries that also experienced increased alcohol consumption during the pandemic. Assess whether similar patterns and factors influenced alcohol use in different regions and identify potential policy lessons.

3. Examine the cultural and social factors that influence alcohol consumption in Thailand, especially during times of crisis. Investigate how cultural norms and social networks contribute to drinking behavior and how these factors interact with economic and health-related influences.

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