HOUSEHOLD CONSUMPTION EXPENDITURE IN THAILAND DURING THE FIRST COVID-19 LOCKDOWN

*Oudom Hean and Nattanicha Chairassamee**

The COVID-19 pandemic has been particularly challenging to developing countries, such as Thailand. Although the country has managed to control the outbreak relatively well, changes in the consumer spending behaviour could affect the whole economy. In this study, household consumption expenditure in Thailand during the first COVID-19 lockdown is examined by using descriptive and empirical analyses. The findings of this study indicate that total consumption declined drastically during the first two quarters of 2020. Consumer spending on services dropped significantly during that time, but spending on non-durable goods, durable goods and housing-related expenses increased. These expenditure patterns are similar to those in developed countries in which consumers increased their spending on at-home activities, but reduced their expenditures outside the home.

JEL classification: O11, O15, O57

Keywords: household, consumption expenditure, developing countries, COVID-19 pandemic, Thailand

* Oudom Hean, College of Business and the Challey Institute for Global Innovation and Growth, North Dakota State University, United States of America (email: oudom.hean@ndsu.edu; ORCID: 0000-0001-5903-2742); Nattanicha Chairassamee, corresponding author, Department of Economics, Kasetsart University, Thailand (email: nattanicha.chai@ku.th; ORCID: 0000-0001-9663-2878).

I. INTRODUCTION

The unprecedented COVID-19 pandemic has been a challenge to mankind. Many countries around the world have had to impose economic lockdowns in order to curb the spread of the virus. Despite the resulting economic uncertainty, governments have been mandating that their citizens stay home. These COVID-19-related policies, while affecting the world economy, are particularly challenging for developing countries, where a large number of their populations live in poverty.

In the present paper, the effect of the first COVID-19 lockdown on aggregated household consumption expenditure in Thailand is examined.[1,2] Consumer spending based on total consumption, non-durable goods, durable goods and housing-related expenses, services, and other expenditures are analysed. The findings indicated that total consumption had declined drastically during the lockdown, resulting from a significant drop in spending on services, including restaurants, hotels, transportation, recreation, and culture, because these activities were restricted. On the other hand, consumers increased their spending on durable goods, non-durable goods, and housing-related expenses.[3]

This study is intended to explore the economic impact of the COVID-19 lockdown on private consumption, which is a key measure of consumer well-being, but has not received full consideration in the literature. It provides estimated effects of the lockdown, which can be used to forecast consumption and economic declines for future containment policies. These estimates are also helpful in assessing the magnitudes of the stimuli needed to revitalize the economy. In addition, some light is shed on industries heavily affected by this demand shock by disaggregating consumption expenditure into different components. The selection of Thailand was because of three particular reasons. First, Thailand is a developing country. Most studies covering the topic of this paper focus on developed economies, such the United States of America or European countries. This study provides insights into consumer behaviour during the pandemic and policy implications in other developing countries, especially in Asia and the Pacific. Second, because the economy of Thailand depends heavily on the service sector, the economic lockdown is likely to have had a significant impact on consumer behaviour. Third, the Government of Thailand collects detailed data on consumption expenditure, which are usually unavailable in less-developed countries.

---

[1] "The first COVID-19 lockdown", "lockdown", and "stay-at-home order" are used interchangeably in this paper.

[2] According to the United Nations and Oxford Policy Management (2020) and Djalante and others (2020), the first lockdown in Thailand was categorized as a partial lockdown, as people were required to stay at home only at night, and travel across provinces was strictly restricted.

[3] Durable goods and housing-related expenses include furniture and furnishings, household equipment, and electricity, while non-durable goods consist of foods, beverages, and clothing.

In the service sector, employment rates and gross domestic product (GDP) values are concentrated in food production and accommodations, and in related activities, such as the wholesale and retail industries. While the Government has been making efforts to reduce poverty, the poverty rate in Thailand remains high, approximately 10 per cent in 2018 (World Bank, 2020a).

During the COVID-19 pandemic, the Government of Thailand implemented strict policies to reduce the viral spread, including a partial stay-at-home order and a prohibition on incoming international flights. The non-agricultural sector, which accounts for approximately 50 per cent of total employment (Bank of Thailand, 2020), and more than 90 per cent of total output (Office of the National Economic and Social Development Council, 2020a), was severely hit by these policies, especially the tourism sector. As a result, the poverty rate and job losses most likely increased sharply during the containment policies. World Bank (2020a) projected that the number of people earning less than $5.50 daily potentially doubled to 9.7 million in the second quarter of 2020, compared to the first quarter of 2020. To support vulnerable populations and firms, the Government introduced COVID-19 response packages, which amounted to 12.9 per cent of GDP (World Bank, 2020a). These packages mainly included cash transfers to low-income families, regional infrastructure projects, tax relief, and debt restructuring. In addition, the Bank of Thailand established a fund to stabilize the corporate bond market and to fund soft loans to small- and medium-sized enterprises.

Although Thailand has managed to control the pandemic during the initial stages, the findings of the study show that the expenditure patterns of Thai consumers are similar to those in developed countries.[4] During the first lockdown, households increased their spending on at-home activities and reduced their spending on activities outside their homes. Similar to these findings, Chen, Qian and Wen (2020) show that services, dining, entertainment, and travel were the most severely affected industries in China during a COVID-related lockdown in that country. These demand shocks from the COVID-19 pandemic and the lockdown could harm the economy and employment (del Rio-Chanona and others, 2020).

This study is related to previous studies on the economic effects of natural disasters. Notably, however, consumers may respond differently to different types

[4] Examples of works studying the effects of COVID-19 on consumer spending in developed countries are Abraham and Arnoldsen (2020), Baker and others (2020), Goolsbee and Syverson (2020), and Andersen and others (2020).

of disasters. Most research on the economic effects of natural disasters and other external shocks, especially those in developing countries, focuses on economic growth, and the findings are mixed (Cuaresma, Hlouskova and Obersteiner, 2008; Noy and Vu, 2010).[5] For example, Skidmore and Toya (2002) and Loayza and others (2012) find that natural disasters have positive effects on human capital accumulation, total factor productivity and economic growth. On the other hand, Strobl (2012) finds that hurricane strikes have a significant negative impact on the output produced in the Central American and Caribbean subregions, while Raddatz (2007) finds that external shocks have a small economic effect in low-income countries. Shabnam (2014), who studies the effect of flooding on GDP growth around the world, shows that the number of people affected by this disaster has a significant effect on GDP per capita growth; the death toll, however, has no significant effect on economic growth.

Other studies focus on the effects of natural disasters on the productivity and survival of firms. The findings in this strand of the literature are also mixed. De Mel, McKenzie and Woodruff (2011) find that the 2004 tsunami in Sri Lanka significantly affected firms by reducing their profits, sales, and capital stock. Similarly, Cole and others (2013) and Tanaka (2015) find that the 1995 Kobe earthquake had negative effects on employment growth and gross value added. In contrast, Leiter, Oberhofer and Raschky (2009) find that European firms affected by major floods in 2000 were able to expand their total assets and employment faster than unaffected firms; these findings are consistent with the creative destruction hypothesis. Similarly, Hosono and others (2016) find evidence supporting the creative destruction hypothesis. Their study, which is on the Kobe earthquake, shows a higher investment in the affected area, compared to the unaffected regions (Hosono and others, 2016).

This paper is also related to the emerging literature focusing on the effects of the COVID-19 pandemic on consumer well-being. This strand of the literature is growing at an incredible speed. Martin and others (2020) calibrate a model to predict the impacts of the pandemic on household consumption and poverty in the San Francisco Bay area. They project that in the absence of social protection programmes, and with a three-month shelter-in-place period, the poverty rate would increase by approximately 9 per cent, from 17.1 per cent, and lower-income people would suffer the most (Martin and others, 2020). However, they also show that with unemployment insurance and the Coronavirus Aid, Relief, and Economic Security (CARE) Act stimulus package,[6] the increase in the poverty rate would be close to zero. Baker and others (2020) find that families, especially those with lower incomes, greater income reductions, and

[5] As this strand of the literature is vast, only a few selected studies are mentioned in this paper.

[6] For more details of the U.S. CARE Act, see https://home.treasury.gov/policy-issues/coronavirus/about-the-cares-act.

lower levels of liquidity, are very responsive to the stimulus payments provided by the Government of the United States of America. They observe that households quickly spent about 25 per cent to 35 per cent of stimulus payments during the first 10 days after receiving them (Baker and others, 2020). Using high-frequency data, Andersen and others (2020) show that a lockdown imposed during the COVID-19 pandemic in Denmark had reduced aggregated consumption by 27 per cent and find that the reduction in expenditure was especially large for individuals who lost jobs due to the crisis. Similarly, Chen, Qian and Wen (2020) find that expenditures on goods and services in China dropped significantly during the beginning of the pandemic, with the service, restaurant, entertainment, and travel sectors suffering the most.

Examples of other topics covered in papers on effects of the COVID-19 pandemic are industrialization of developing countries (Sato, 2021), global value chains (Hayakawa and Mukunoki, 2021), economic and social activities (Keola and Hayakawa, 2021), and financial markets (Hoshikawa and Yoshimi, 2021).

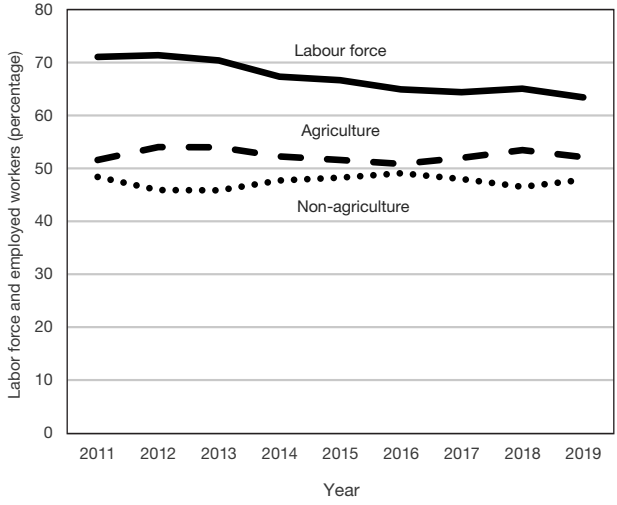
The rest of the paper is structured as follows. Section II presents stylized facts of economy of Thailand, especially during COVID-19, while section III contains a discussion on the data set and provides a descriptive analysis of consumption expenditure in Thailand. Sections IV and V include explanations on the empirical strategy and estimated results. To test the robustness of the baseline results, Section VI provides a sensitivity analysis. Finally, sections VII and VIII contain policy insights and conclusions, respectively.

II. BACKGROUND OF THE ECONOMY OF THAILAND

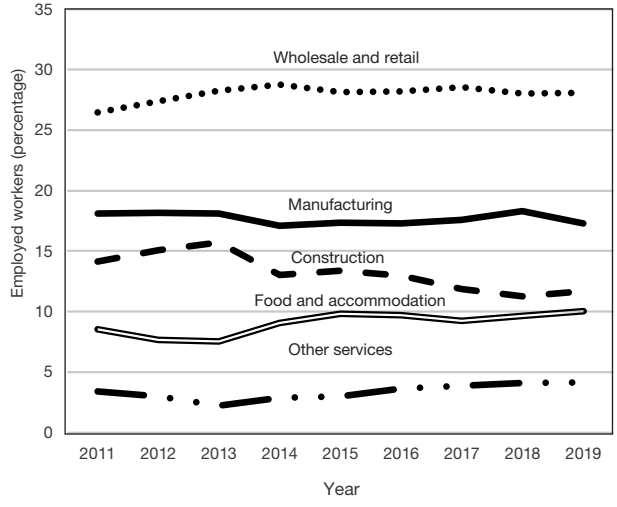
Figure 1a shows that the labour force rate in Thailand declined from 71 per cent to 63 per cent between 2011 and 2019. The employment rates for the non-agricultural sector were slightly lower than those for the agricultural sector, which indicates the important roles played by both sectors in the country's employment. As shown in figure 1b, employment in the non-agricultural sector has been more concentrated in the wholesale and retail industries; these industries are progressively employing more workers over time. The employment rates in foods and accommodations, and other services, have also increased. By contrast, the percentages of workers in manufacturing and construction have decreased since 2011.

Figure 1. Labour force and employment of Thailand

(a) Labour force rates and percentages of employed workers by sector



(b) Percentage of workers employed in the non-agricultural sector



Source: Bank of Thailand (2020).

Even though the agricultural sector has employed about 50 per cent of the total labour force, this sector's contribution to the country's economic growth is small and declining. Figure 2a shows that while total output in Thailand has grown steadily, the value of the agricultural output has been relatively stable. Accordingly, the percentage of the country's GDP resulting from the agricultural sector has been decreasing over time; the contribution made by this sector to the economy declined by approximately 2 per cent between 2011 and 2019. On the other hand, the economy has increasingly relied on non-agricultural industries. As shown in figure 2a, the non-agricultural sector generally accounted for more than 95 per cent of the total output during that time.

Figure 2b shows that the gross output in food production and accommodations, and financial and insurance activities in Thailand steadily increased by approximately 2 per cent from 2011 to 2019. This is unsurprising, because the tourism industry has grown rapidly, attracting tourists from all around the world. Consequently, non-manufacturing industries including food, accommodation, wholesale, and retail industries, have increasingly become key driving forces of the country's economic growth. By contrast, the manufacturing industry has been declining. The gross output in the manufacturing industry dropped by approximately 4 per cent from 2011 to 2019 (figure 2b), while employment in this industry declined by almost 1 per cent during the same period (figure 1b).

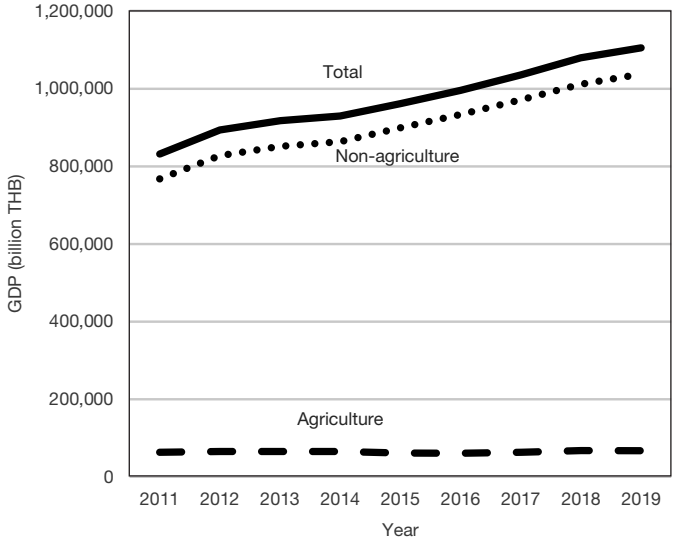
Given the importance to the Thai economy of the non-agricultural sector, the Government of Thailand has been increasingly promoting non-agricultural firms by offering, for example, tax exemption and other tax incentives for foreign investors, which motivates Thai workers to work in the non-agricultural sector.

The poverty rate in Thailand has declined significantly, but despite this, many families and individuals are still living in poverty. Figures 3a and 3b show that the individual and the household poverty rates decreased by about 50 per cent from 2011 to 2019.[7] By 2019, the overall poverty rate was approximately 6 per cent. The poverty rate in rural areas is higher than that in urban areas; however, the differential between the rural and urban poverty rates has decreased. It remains to be seen whether the rural and urban poverty rates will continue to converge when they are measured during and after the COVID-19 pandemic era.

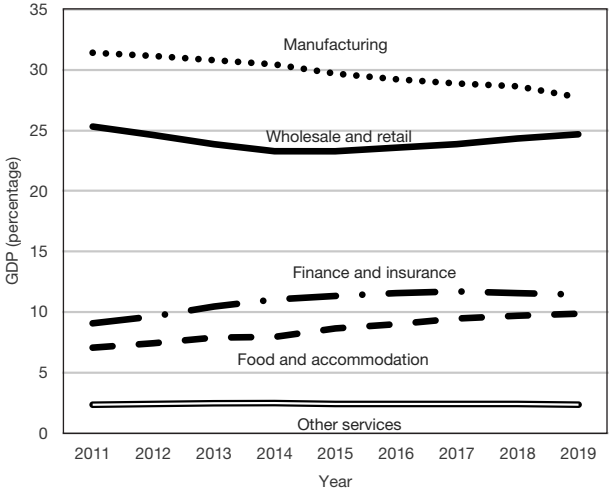
[7] The poverty line in Thailand was approximately $80 per person per month in 2011 and increased to $89.78 per person per month in 2018 (Office of the National Economic and Social Development Council, 2020b). This is calculated based on the Thai–U.S. exchange rate as of 12 December 2020, which was 30.186 Thai baht per 1 United States dollar.

Figure 2. Gross domestic product values by sector of Thailand

(a) Seasonally adjusted GDP by sector (billion Thai baht)



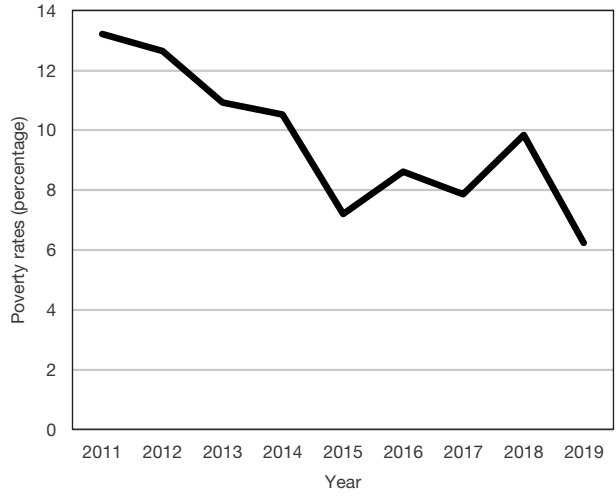
(b) Percentage of GDP in non-agricultural industries



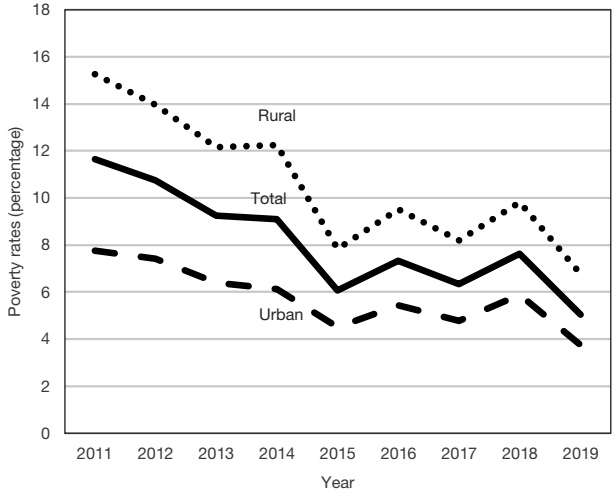
Source: Office of the National Economic and Social Development Council (2020a).

Figure 3. Poverty rates in Thailand

(a) Individual poverty rates



(b) Household poverty rates by area



Source: Thailand, National Statistical Office (2020).

Due to the COVID-19 pandemic, on 21 March 2020, the Government of Thailand imposed a partial lockdown in Bangkok. This caused migratory workers to move from Bangkok to their hometowns. Reacting to a high infection rate, on 26 March 2020, the Government ordered a partial lockdown in the whole country, including staying at home, no trips across provinces, no international or domestic flight arrivals, and no group gatherings. This lockdown order was relaxed in May 2020.

In the early stages, Thailand was able to control the spread of the COVID-19 pandemic relatively well. As of 15 November 2020, the country had approximately 3,900 cases and 60 related deaths.[8] Nevertheless, there are economic consequence due to the restrictions.

Strictly implementing the lockdown quickly raised the unemployment rate in Thailand, from 1.03 per cent in March 2020 to 2.15 per cent in July 2020 (Bank of Thailand, 2020). The World Bank (2020a) forecasts that Thailand may have suffered from a GDP contraction of 8.3 per cent by the end of 2020, which could perhaps be the highest decline in GDP attributed to the COVID-19 virus among the countries in East Asia and the Pacific. The tourism and the manufacturing industries were most likely severely affected. Given the importance of the non-agricultural sector to employment and economic growth, the ongoing pandemic could lead to increased job loss and heightened poverty.

To stimulate the economy, the Government of Thailand has been implementing policies, such as stimulus checks for low-income individuals, corporate loans, regional infrastructure projects, tax relief, and debt restructuring. To alleviate unemployment, the Government has also hired recent college graduates. Starting in October 2020, the Government relaxed the international flight restrictions to resuscitate the tourism industry and the economy.

III. DATA AND DESCRIPTIVE ANALYSIS

For this study, quarterly individual consumption expenditure of households from the Office of the National Economic and Social Development Council is used. This consumption spending is obtained through the expenditure approach. All data are seasonal-adjusted and inflation-corrected by chained volume measures (with 2002 as the reference year). Data from the first quarter of 2011 to the second quarter of

[8] As of 29 November 2021, Thailand had approximately 2 million confirmed COVID-19 cases and 20,000 related deaths. Those high numbers were due to the COVID-19 second wave in December 2020, leading to the second partial lockdown in July 2021. The second lockdown completely ended in September 2021. Currently, the new confirmed COVID-19 cases are less than 10,000 cases per day (Department of Disease Control, 2021).

2020 were selected. The data on COVID-19 cases are sourced from Roser and others (2020). Table 1 provides descriptive statistics for the data.

Table 1. Descriptive statistics

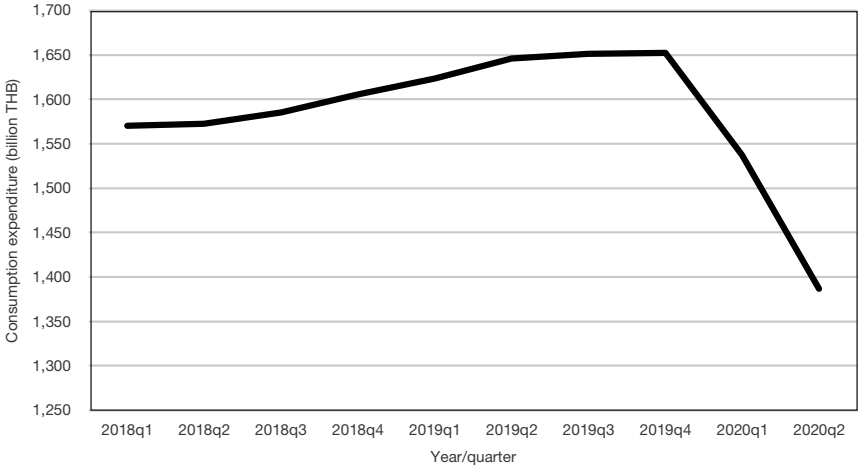
Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Total consumption	38	1 416.779	140.22	1 154.477	1 652.435
Food and non-alcoholic products	38	235.79	11.829	222.099	262.257
Alcohol and tobacco	38	51.005	2.011	46.368	55.295
Clothing	38	73.937	2.946	61.918	78.555
Utilities	38	158.06	17.321	128.204	188.416
Furniture	38	76.056	5.544	65.873	86.402
Health	38	82.950	10.007	67.880	105.120
Transportation	38	195.352	21.165	141.992	227.638
Communication	38	57.096	8.462	41.752	69.759
Recreation	38	100.893	16.891	72.455	125.393
Restaurants and hotels	38	226.47	44.961	154.781	308.691
Education	38	23.657	1.777	20.939	26.849
Miscellaneous	38	163.419	28.077	115.686	200.606
Confirmed COVID-19 cases	38	46.605	287.294	0	1 771

Source: Office of the National Economic and Social Development Council (2020a). All expenditures are expressed in billion Thai baht. Confirmed COVID-19 cases are the number of confirmed COVID-19 patients at the beginning of each quarter.

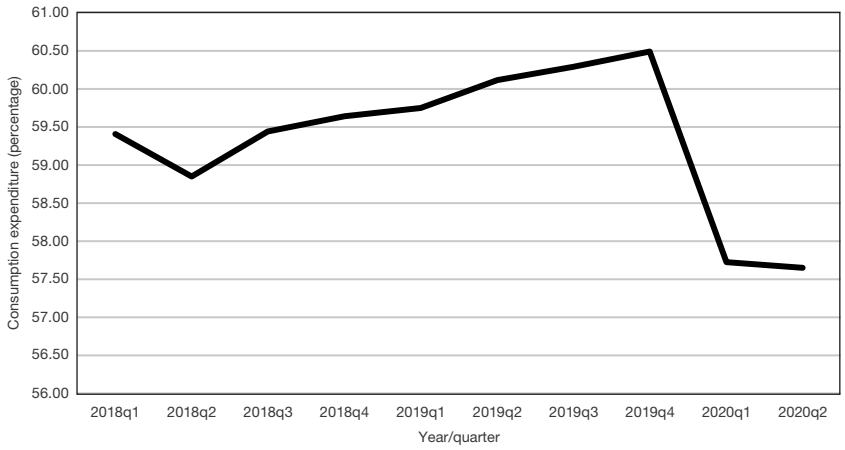
Figure 4 shows total household consumption expenditure in Thailand. One key observation from the figure is a significant decline of approximately 16 per cent in consumer spending in the second quarter of 2020, relative to the total consumption expenditure in the last quarter of 2019. In the second quarter of 2020, consumption as a percentage of GDP dropped to 57.6 per cent. These figures indicate that individuals and households were strongly affected by the economic crisis induced by the COVID-19 lockdown.

Figure 4. Individual consumption expenditure of households in Thailand

(a) Seasonally adjusted consumption expenditure (billion Thai baht)



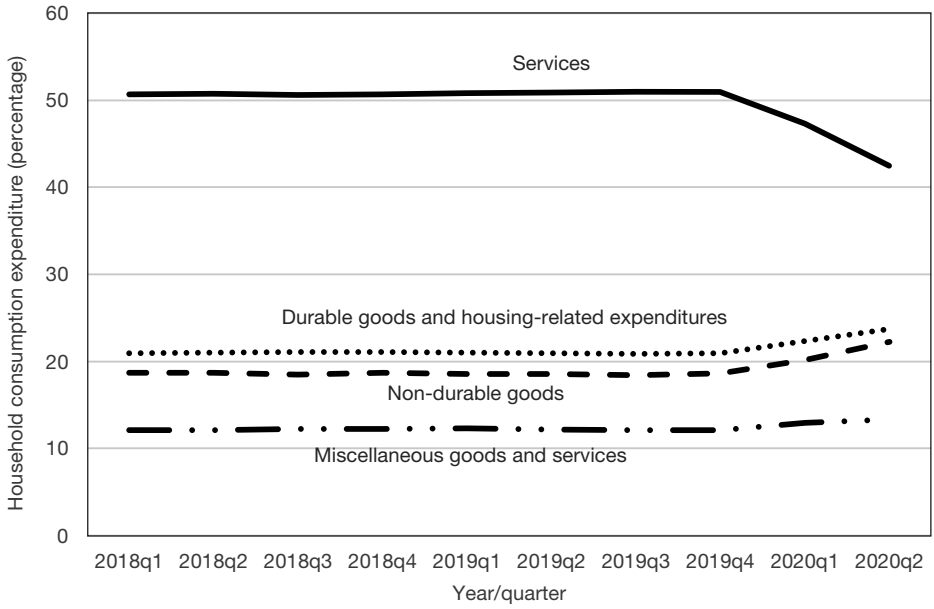
(b) Consumption expenditure (percentage of GDP)



Source: Office of the National Economic and Social Development Council (2020a).

Figure 5 shows household consumption expenditure by components, namely non-durable goods, durable goods and housing-related expenses, services and miscellaneous spending. In this study, non-durable goods consist of food, beverages, tobacco products, clothing, and footwear. Durable goods and housing-related expenditures are housing, water, electricity, gas, and other fuels and furnishings, household equipment, and the routine maintenance of the house. Spending on services covers health, transportation, communication, education, recreation and culture, and restaurants and hotels.

Figure 5. Household consumption expenditure by component



Source: Office of the National Economic and Social Development Council (2020a).

As shown in figure 5, expenditures on all goods, but not on services, moderately increased. The percentage of spending on non-durable goods reached approximately 22 per cent in the second quarter of 2020, while the durable goods expenditure and housing-related spending grew to almost 24 per cent. The increased spending on non-durable goods could have been due to the hoarding of essential goods, such as food and other staples. Meanwhile, during the stay-at-home order, individuals increased their housing-related expenses, such as utility usage. These consumption patterns are very similar to what has been observed in developed countries, such as the United States (Federal Reserve Bank of St. Louis, 2020; Kang and Gasparro, 2020).

On the other hand, the service sector has been significantly affected by the pandemic lockdown; consumer spending on services declined drastically, to approximately 42 per cent. This represents an 8.5 per cent drop relative to the spending on services in the last quarter of 2019. The empirical analysis for the study of this paper indicates that the first COVID-19 lockdown significantly affected specific Thai industries, such as restaurants and hotels. In developed nations, these industries have also suffered similar economic consequences.

Overall, these results are in line with the behaviour of consumers in developed countries. Consumers in Thailand, and in most developed countries, increased their spending during the lockdown on at-home activities, such as cooking, entertainment, and home improvement (Baker and others, 2020). In contrast, due to the lockdown, consumers reduced their spending on out-of-home activities, including traveling, dining in restaurants, and recreational activities (Andersen and others, 2020; Baker and others, 2020; Goolsbee and Syverson, 2020).

IV. THE IMPACT OF THE COVID-19 LOCKDOWN ON CONSUMPTION EXPENDITURE: EMPIRICAL MODEL

To estimate the effect of the COVID-19 pandemic on consumption, the following ordinary least square (OLS) regression specification is applied:

$$Consumption_t = \beta_0 + \beta_1 Restriction_t + \beta_2 GDP_{t-1} + \beta_3 COVID19_t + t + \epsilon_t , \quad (1)$$

where $Consumption_t$ - represents seasonal-adjusted and inflation-corrected consumption expenditure (in billion Thai baht) at time t. Consumption components are also analysed to understand the heterogeneity in consumers' spending. That is, studying these components provides information on how consumers managed their budgets during this economic crisis. In this case, $Consumption_t$ is an expenditure in the consumption component as a percentage of total consumption at date t. By expressing consumption as a share of total expenditure, how consumers allocated their budgets during the pandemic is effectively analysed.

$Restriction_t$ is an indicator variable representing the period of partial economic lockdown. As the lockdown was an economic shock, it could be considered as an exogenous shock, similar to other natural disaster shocks (Martin and others, 2020). The pre-lockdown period extends from 2011 to 2019, while the lockdown period covers the first and second quarters of 2020. Accordingly, the study provides estimates of the short-run effects of the pandemic lockdown on consumption expenditure in Thailand.

One-quarter-lagged, seasonal-adjusted, and inflation-corrected GDP (in billion Thai baht) are controlled. By controlling GDP, it is possible to interpret the estimated coefficient of the variable in regression model (1) as the impact of the pandemic lockdown on consumption, holding income fixed. As a robustness check, the two-quarter-lagged GDP is controlled, and the estimated coefficients of the variable $Restriction_t$ in this analysis resembles the baseline estimates. Finally, to capture pre-existing trends of household expenditure, the linear time trend in the regression specification is controlled.

The estimated effects of the lockdown policies could be downward biased when households voluntarily reduce spending on out-of-home activities due to the fear of the spread of COVID-19 virus. These estimates are also downward biased when the Government of Thailand implements stimulus packages in response to increased viral transmission. Accordingly, the estimates are the lower bounds. To reduce this downward bias, in the specification, confirmed COVID-19 cases in Thailand are controlled. $COVID19_t$ is the number of cumulative COVID-19 cases at the beginning of each quarter. However, as shown in the sensitivity analysis, using the number of reported cases in the middle of each quarter does not significantly change the baseline estimates.

To reiterate, the variable of interest is $Restriction_t$, which captures the effect of the pandemic lockdown on consumption spending, holding income fixed. Additionally, the effects of the lockdown on household budget allocation are analysed by studying consumption components expressed as percentages of the total expenditure on consumption. In the future, it would be interesting to study the consumption expenditure using disaggregated data. By employing individual-level data, one could attempt to disentangle two channels: first, the limited access to services and goods due to the lockdown; second, the reduction in income due to the pandemic. Unfortunately, in the case of Thailand, these data are not widely available and time sensitive. Future studies could focus on this issue, once the data are available.

V. THAILAND CONSUMPTION EXPENDITURE DURING THE COVID-19 LOCKDOWN: EMPIRICAL FINDINGS

Table 2 presents the estimated effects of the lockdown on consumption expenditure in Thailand and the estimated coefficient of other variables in regression specification (1) are shown in table A.1 of appendix A. As shown in column (1), the estimated impact of the lockdown on total spending on consumption is extensive. The lockdown reduced the country's total consumption by more than THB117 billion ($3.8 billion), which

accounted for 7.11 per cent of the fourth quarter spending on total consumption in 2019.[9] Notably, however, the economic lockdown affected consumption components unevenly.

Table 2. Consumption expenditure in Thailand during the COVID-19 lockdown

	Total consumption	Non-durable goods	Durable goods and housing	Services	Miscellaneous
	(1)	(2)	(3)	(4)	(5)
Restriction$_t$	-117.54***	2.39***	1.42***	-4.03***	0.07
	(7.10)	(0.34)	(0.07)	(0.29)	(0.20)
Controls					
GDP$_{t-1}$	Yes	Yes	Yes	Yes	Yes
COVID19$_t$	Yes	Yes	Yes	Yes	Yes
Linear trend	Yes	Yes	Yes	Yes	Yes
Observations	37	37	37	37	37
R-squared	0.97	0.91	0.86	0.91	0.97

Notes: Newey-West standard errors are in parentheses. Each component is expressed as a percentage of the total household expenditure. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

Columns (2) to (5) of table 2 show the estimated effects of the lockdown on consumption components as percentages of total consumption. These components are non-durable goods; durable goods and housing-related expenditure; services; and miscellaneous spending. While the estimated effects of the lockdown on the spending on services are significantly negative, the estimated effects of the COVID-19 lockdown on expenditures of other components, including non-durable goods, durable goods, and housing-related expenses, are positive.

Because of the lockdown, non-durable expenditure was significantly increased, by approximately 2.4 per cent. Table 3 shows that among non-durable goods, consumers predominantly increased their spending on food and non-alcoholic drinks. As a result of the lockdown, the expenditure on these goods increased by approximately 2 per

[9] The seasonal-adjusted, inflation-corrected, total consumer spending in the last quarter of 2019 was THB1.652 trillion.

cent. Additionally, the spending on alcoholic beverages and tobacco was roughly stable; during the lockdown household spending on these goods increased by 0.43 per cent. On the other hand, the findings indicate that the lockdown had a significant effect on the percentage of household spending on clothing and footwear. Figure B.1, in appendix B, shows that total household spending on clothing and footwear declined by approximately THB16 billion in the first two quarters of 2020. These spending patterns are consistent with the scenario that consumers stockpiled food and non-alcoholic beverages during the pandemic; similar pandemic-related hoarding was observed in the United States and in European countries (Kang and Gasparro, 2020). In contrast, the lockdowns and working from home lowered the demand for new clothing.

Table 3. Expenditures on household consumption: components (percentage of total household spending)

	Food and non-alcoholic products (1)	Alcohol and tobacco (2)	Clothing (3)	Utility (4)	Furniture (5)	Health (6)
$Restriction_t$	1.83*** (0.21)	0.43*** (0.05)	0.14 (0.09)	0.90*** (0.04)	0.52*** 0.06)	0.68*** (0.04)
Controls						
GDP_{t-1}	Yes	Yes	Yes	Yes	Yes	Yes
$COVID19_t$	Yes	Yes	Yes	Yes	Yes	Yes
Linear trend	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37	37	37	37	37	37
R-squared	0.88	0.95	0.89	0.91	0.67	0.89

Notes: Newey-West standard errors are in parentheses. Each component is expressed as a percentage of total household expenditure. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01. Table A.2 in appendix A shows estimated coefficients of other variables presented in regression specification (1).

Due to the lockdown, the expenses for durable goods and housing-related spending increased by approximately 1.4 per cent. Table 2 and figure B.2 in the appendix provide detailed information about expenditures on durable goods and housing-related expenses. Unsurprisingly, household utility expenses increased substantially during the stay-at-home order. Spending on furniture and home improvement grew slightly in the first quarter of 2020, but it declined in the second quarter. In developed

countries, such as the United States, spending on durable goods, especially home improvement, substantially increased, as the lockdowns and working from home motivated individuals to upgrade their homes (Carpenter, 2020).

Table 4. Expenditures on household consumption: components (percentage of total household spending)

	Transportation	Communication	Recreation	Restaurants and hotels	Education
	(1)	(2)	(3)	(4)	(5)
$Restriction_t$	0.04	0.14***	-0.06	-4.95***	0.11***
	(0.26)	(0.04)	(0.12)	(0.18)	(0.02)
Controls					
GDP_{t-1}	Yes	Yes	Yes	Yes	Yes
$COVID19_t$	Yes	Yes	Yes	Yes	Yes
Linear trend	Yes	Yes	Yes	Yes	Yes
Observations	37	37	37	37	37
R-squared	0.63	0.83	0.85	0.94	0.64

Notes: Newey-West standard errors are in parentheses. Each component is expressed as a percentage of total household expenditure. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01. Table A.3 in appendix A shows estimated coefficients of other variables presented in regression specification (1).

Finally, expenditures for services declined drastically during the pandemic lockdown. Column (4) in table 2 shows that the lockdown reduced spending on services by about 4 per cent. Particularly, as presented in table 4, the effect of the lockdown on the household expenditure for hotels and restaurants is about -5 per cent. Additionally, figure B.3 in appendix B shows that the decline in total service spending also comes from decreases in the total expenditures for transportation, recreation and cultural activities.

To reiterate, tourism and the related service industries play an important role in the economy of Thailand and households' sources of income. During the lockdown, expenditures on restaurants and hotels, transportation, and recreation and cultural activities declined drastically. Even in the second quarter of 2020, during which the Government of Thailand lessened the lockdown restrictions, expenditures in these industries were still very low.

VI. SENSITIVITY ANALYSIS

A sensitivity analysis was conducted by adding the second-quarter-lagged GDP into regression specification (1). The results, shown in appendix C, are similar to those of the baseline estimates. Finally, the number of COVID-19 cases reported in the middle of each quarter was used, instead of those cases reported at the beginning of each quarter. Under this scenario, the estimates reported in appendix D resemble the baseline results.

VII. POLICY INSIGHTS

Similar to other countries, the Government of Thailand has been implementing stimulus packages to stimulate the economy, such as providing low-interest loans to small and medium-sized enterprises and cash handouts to workers not covered by social security, temporary workers, contract workers and self-employed persons. Moreover, it is investing in infrastructure and creating jobs.

The first individual stimulus packages were launched in March 2020. The individual financial support was perceived to have had a positive impact on consumer spending. Bui and others (2020) find that the fiscal stimulus was more likely to have immediately increased consumption of durable goods by 13 per cent and raised the probability of future consumption by 6 per cent.[10] The findings from this study are consistent with Bui and others (2020), which shows that Thai household consumption in durable goods did not decrease during the lockdown. Bui and others (2020), however, find that fiscal stimulus could temporarily boost the economy, which is consistent with the report of the United Nations and Oxford Policy Management (2020).

Additionally, the Government initiated the half-half co-payment stimulus programme in October 2020, which was intended to stimulate consumer spending during the pandemic. In the first round of the programme, under the co-payment programme, the Government subsidized half of the purchases made by registered individuals at small shops. Purchases were allowed up to a maximum of THB150 per person per day, with the total subsidy capped at THB3,000 per person for the duration of the programme. According to a report by the Fiscal Policy Office (2020), of the THB502.9 million in total spending, 259.4 million was spent by registered consumers, while the Government shelled out THB243.5 million. The average daily spending was THB234 per transaction. While the results of this study show that expenditures in durable and

[10] Bui and others (2020) carried out a survey in May 2020 to collect the individual consumption data of 713 respondents. Perhaps, due to the small number of observations, their estimated individual consumption was higher than the estimated from this study.

non-durable goods were not negatively affected by the lockdown, this Government programme could sustain high expenditures for these particular goods. Accordingly, spending on durable and non-durable goods could remain highly elevated after the lockdown.

In Thailand, moreover, tourism and the related service industries play an important role in the economy and households' sources of income. During the lockdown, expenditures on restaurants and hotels, transportation, and recreation and culture declined significantly. Even in the second quarter of 2020, during which the Government lessened the lockdown restrictions, expenditures in these industries were still very low.

To boost domestic tourism and related service activities, the Government allocated THB20 billion to implement stimulus tourism packages called "We Travel Together". It paid 40 per cent of the total travel cost, including airfare, for Thais who enrolled in the programme, with a fifteen-night limit for each person. On top of that, the Government provided a free THB600 to THB900 voucher for each enrolled person to spend at restaurants and retail shops per night.

Even though the Government relaxed the stay-at-home order and implemented stimulus packages, the number of local visitors in 2020 was still far lower than in 2019. The Thailand's Ministry of Tourism and Sports (2020) reports that the number of Thai visitors sharply decreased by more than 70 per cent from May to June 2020, compared to the same period in the previous year. The stimulus tourism packages could partially alleviate the impact of the pandemic by generating revenue of approximately THB360 billion to 620 billion (Krungthai Compass, 2020), but this amount is only 3.7 to 6.4 per cent of the estimated total revenue from foreign visitors in 2020 (Krungthai Compass, 2020). Moreover, local visitors were disproportionately concentrated in certain provinces, while other provinces continued to suffer from the contraction in tourism (Krungthai Compass, 2020). Relaxing the international flight arrivals and the creation of travel zones in some provinces of Thailand are expected to help alleviate the contraction. In Phuket province, for example, the Government has implemented the travel zones, called "sandbox programme," since July 2021. During the first two months of this programme, there were approximately 26,400 tourist arrivals and could generate THB163 billion (Chuenniran, 2021).

The findings of this study are consistent with the World Bank (2020a; 2020b), which indicates that the economy of Thailand could be severely affected by the lockdown and the overall pandemic situation due to the following reasons: the economy relies heavily on the service sector, particularly foreign tourism; the Government's tourism stimulus packages cannot compensate for the economic decline resulting from the prohibition on all international arrivals in air travel; concern about COVID-19 infection

is the main cause for the reduction in domestic tourism (Kasikorn Research Center, 2020); Thais tend to be cost-conscious about their spending (Sachamuneewongse, 2020); and a high proportion of Thais pay attention to products' prices and believe that they need to be proactive about financial planning (Sachamuneewongse, 2020). Taken together, all of these reasons could present obstacles to government efforts to stimulate the economy through consumer spending.

The findings of this study indicate that, during the COVID-19 lockdown, the spending of Thais increased for non-durable goods, durable goods and housing-related expenses. During this first lockdown period, these expenditure patterns are similar to those in developed countries, where consumers increased their spending on at-home activities but reduced their expenditures outside the home. The economy of Thailand is reliant on the service sector and is negatively affected by a prolonged border closure. COVID-19 testing, vaccination passports, and travel bubbles could be effective ways to curb the spread of the virus and keep the economy open safely.

VIII. CONCLUSIONS

Thailand was relatively successful in controlling the spread of the COVID-19 pandemic during the initial stages; however, the pandemic has not spared its economy. As a developing country with many households living in poverty, this pandemic is significantly affecting economic growth and individual welfare.

In this paper, the effect of the COVID-19 pandemic on household consumption spending in Thailand is examined. How the lockdown policies affect total consumption, non-durable goods, durable goods and housing-related expenses, and services is analysed. The findings indicate that during the first pandemic lockdown, total consumption dropped dramatically; the estimated effect of the pandemic on total consumption was approximately THB177 billion, which amounted to 7.11 per cent of the last quarter expenditure of 2019 total consumption. This decline in total consumption comes from a substantial dip in the spending on services, including restaurants, hotels, transportation, recreation and cultural activities. In contrast, the findings show that households increased their spending on durable goods, non-durable goods and housing-related expenses. These spending patterns are consistent with those found in developed countries, where households increased their spending on at-home activities but reduced out-of-home expenditures.

The economy of Thailand has been strongly dependent on the service industries, which have been significantly affected by the pandemic. Many households were put at risk by the lockdown and could fall into poverty. To resuscitate the economy, the Government has implemented policies targeting the service sector. Facing low

demand for domestic travel, it has decided to open the borders to foreign tourists, to boost tourism activities overall. Moreover, the Government has also offered stimulus packages for domestic visitors, such as subsidies for hotel rooms. It remains to be seen whether this implementation will reduce the impacts of the pandemic on employment and spur an economic recovery. It also remains to be seen whether Thailand can escape this global economic crisis, and whether the consumption of services will rebound.

While this study focuses on the impact of the initial lockdown on consumption expenditure in Thailand, there are other several interesting issues. Future research could be conducted to analyse the impact of the lockdowns on consumption spending over the medium-to-long term. Additionally, the degree of the lockdown could differentially affect consumption behaviour; therefore, it is important to compare the effects of partial and complete lockdowns. Also of note, in this paper, aggregated data are used to study consumption expenditure in Thailand. However, it would be interesting to study consumer behaviour in less-developed countries using individual-level data. Finally, it would also be interesting to examine the impacts of fiscal stimuli on the economy and labour markets over the short-to-long term.

REFERENCES

Abraham, Mark, and Aaron Arnoldsen (2020). BCG consumer spend pulse #1: COVID-19 impact on US vs. Seattle, 15 March. Available at www.linkedin.com/pulse/covid-19-impact-us-vs-seattle-consumer-spend-mark-abraham/?trackingId=0UwE%2B2ZGEXoMP7hXmREQ6Q%3D%3D.

Andersen, Asger, and others (2020). Consumer responses to the COVID-19 crisis: evidence from bank account transaction data. Center for Economic Behavior and Inequality. Working Paper, 18/20. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3609814.

Baker, Scott, and others (2020). Income, liquidity, and the consumption response to the 2020 economic stimulus. Working Paper, No. 27097. National Bureau of Economic Research. Available at www.nber.org/papers/w27097.

Bank of Thailand (2020). Employment of Thailand by industries, 21 May. Available at www.bot.or.th/App/BTWS_STAT/statistics/BOTWEBSTAT.aspx?reportID=638&language=th.

Bui, Dzung, and others (2021). The effects of fiscal policy on households during the COVID-19 pandemic: evidence from emerging economies. MAGKS Joint Discussion Paper Series in Economics, No. 20-2021. Marburg, Germany: Phillips University-Marburg.

Carpenter, Julia (2020). Home-improvement stocks stay the course amid nesting during COVID-19. *The Wall Street Journal,* 21 August. Available at www.wsj.com/articles/home-improvement-stocks-stay-the-course-amid-nesting-during-covid-19-11598011211.

Chen, Haiqiang, Wenlan Qian, and Qiang Wen (2020). The impact of the COVID-19 pandemic on consumption: learning from high frequency transaction data. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3568574.

Chuenniran, Achadthaya (2021). Phuket Sandbox generates B1,634m in two months. *Bangkok Post,* 5 September. Available at www.bangkokpost.com/business/2176731/phuket-sandbox-generates-b1-634m-in-two-months.

Cole, Matthew, and others (2013). Natural disasters and plant survival: the impact of the Kobe earthquake. RIETI Discussion Paper Series, 13-E-063. Available at www.rieti.go.jp/jp/publications/dp/13e063.pdf.

Cuaresma, Jesús, Jaroslave Hlouskova, and Michael Obersteiner (2008). Natural disasters as creative destruction? Evidence from developing coutries. *Economic Inquiry,* vol. 46, No. 2, pp. 214-226.

del Rio-Chanona, R. Maria, and others (2020). Supply and demand shocks in the COVID-19 pandemic: an industry and occupation perspective. *Oxford Review of Economic Policy,* vol. 36 (Supplement_1), pp. S94-S137.

De Mel, Suresh, David McKenzie, and Christopher Woodruff (2011). Enterprise recovery following natural disasters. *The Economic Journal,* vol. 122, No. 559. pp. 1-28.

Department of Disease Control (2021). Corona virus disease (COVID-19). Available at https://ddc.moph.go.th/viralpneumonia/eng/index.php.

Djalante, Rivanti, and others (2020). COVID-19 and ASEAN responses: comparative policy analysis. *Progress in Disaster Science,* vol. 8, pp. 1-12.

Federal Reserve Bank of St. Louis (2020). Consumption of goods and service during the COVID-19 recession. The FRED® blog, 10 August. Available at https://fredblog.stlouisfed.org/2020/08/consumption-of-goods-and-services-during-the-covid-19-recession/.

Fiscal Policy Office (2020). News from the Ministry of Finance: the co-payment stimulus program No. 116/2563. Available at www.xn--42caj4e6bk1f5b1j.com/announcement (In Thai).

Goolsbee, Austan, and Chad Syverson (2020). Fear, lockdown, and diversion: comparing drivers of pandemic economic decline 2020. Working Paper, No. 27432. National Bureau of Economic Research. Available at www.nber.org/papers/w27432.

Hayakawa, Kazunobu, and Hiroshi Mukunoki (2021). Impacts of COVID-19 on global value chains. *The Developing Economies,* vol. 59, No. 2, pp. 154-177.

Hoshikawa, Takeshi, and Taiyo Yoshimi (2021). The effect of the COVID-19 pandemic on South Korea's Stock Market and exchange rate. *The Developing Economies,* vol. 59, No. 2, pp. 206-222.

Hosono, Kaoru, and others (2016). Natural disasters, damage to banks, and firm investment. *International Economic Review,* vol. 57, No. 4, pp. 1335-1370.

Kang, Jaewon, and Annie *Gasparro (2020).* Some grocers bring back purchase limits as COVID-19 cases rise. *The Wall Street Journal,* 13 November. Available at www.wsj.com/articles/some-grocers-bring-back-purchase-limits-as-covid-19-cases-rise-11605263401.

Kasikorn Research Center (2020). Domestic travel market in the final stretch of 2020; Thais have travel plans but also worry over COVID-19, the economy and politics. Current Issue, No. 3512. Available at https://kasikornresearch.com/en/analysis/k-econ/business/Pages/z3152--Thai-Travel.aspx.

Keola, Souknilanh, and Kazunobu Hayakawa (2021). Do lockdown policies reduce economic and social activities? Evidence from NO2 emissions. *The Developing Economies,* vol. 59, No. 2, pp. 178-205.

Krungthai Compass (2020). Travel behaviors in Thailand during COVID-19 Available at https://krungthai.com/Download/economyresources/ EconomyResourcesDownload_31_08_63.pdf (In Thai).

Leiter, Andrea, Harald Oberhofer, and Paul Raschky (2009). Creative disasters? Flooding effects on capital, labour and productivity within European firms. *Environmental and Resource Economics,* vol. 43, pp. 333-350.

Loayza, Normal, and others (2012). Natural disasters and growth: going beyond the averages. *World Development,* vol. 40, No. 7, pp. 1317-1336.

Martin, Amory, and others (2020). Socio-economic impacts of COVID-19 on household consumption and poverty. *Economics of Disasters and Climate Change,* vol. 4, pp. 453-479.

Noy, I., and T. B. Vu (2010). The economics of natural disasters in a developing country: the case of Viet Nam. *Journal of Asian Economics,* vol. 21, No. 4, pp. 345-354.

Office of the National Economic and Social Development Council (2020a). Gross domestic product chain volume measures. Available at www.nesdc.go.th/nesdb_en/main.php?filename=national_account.

_____ (2020b). Poverty line. Available at http://social.nesdc.go.th/SocialStat/StatReport_Final.aspx?reportid=854&template=2R1C&yeartype=M&subcatid=59.

Raddatz, Claudio (2007). Are external shocks responsible for the instability of output in low-income countries? *Journal of Development Economics,* vol. 84, No. 1, pp. 155-187.

Roser, Max, and others (2020). Coronavirus pandemic (COVID-19). Available at https://ourworldindata.org/coronavirus.

Sachamuneewongse, Siriporn (2020). Survey finds shifts in spending habits. *Bangkok Post,* 21 May. Available at www.bangkokpost.com/business/1921904/survey-finds-shifts-in-spending-habits.

Sato, Hitoshi (2021). Industrialization of developing economies in the global economy with an infectious disease. *The Developing Economies,* vol. 59, No. 2, pp. 126-153.

Shabnam, Nourin (2014). Natural disaster and economic growth: a review. *International Journal of Disaster Risk Science,* vol. 5, pp. 157-163.

Skidmore, Mark, and Hideki Toya (2002). Do natural disasters promote long-run growth? *Economic Inquiry,* vol. 40, No. 4, pp. 664-687.

Strobl, Eric (2012). The economic growth impact of natural disasters in developing countries: evidence from hurricane strikes in the Central American and Caribbean regions. *Journal of Development Economics,* vol. 97, No. 1, pp. 130-141.

Tanaka, Ayumu (2015). The impacts of natural disasters on plants' growth: evidence from the Great Hanshin-Awaji (Kobe) earthquake. *Regional Science and Urban Economics,* vol. 50, pp. 31-41.

Thailand, Ministry of Tourism and Sports (2020). Tourism statistics 2020. Available at www.mots.go.th/more_news_new.php?cid=592.

Thailand, National Statistical Office (2020). Revenue and household expenditure. Available at http://statbbi.nso.go.th/staticreport/page/sector/en/08.aspx.

United Nations, and Oxford Policy Management (2020). Social impact assessment of COVID-19 in Thailand. Available at www.unicef.org/thailand/media/5071/file/Social%20Impact%20Assessment%20of%20COVID-19%20in%20Thailand.pdf.

World Bank (2020a). *Thailand Economic Monitor June 2020: Thailand in the Time of COVID-19.* Washington, D.C.

_____ (2020b). The World Bank in Thailand: overview. Available from www.worldbank.org/en/country/thailand/overview.

APPENDICES

Appendix A

Table A.1. Thailand consumption expenditure during the COVID-19 pandemic

	Total consumption (1)	Non-durable goods (2)	Durable goods and housing (3)	Services (4)	Miscellaneous (5)
$Restriction_t$	-117.54***	2.39***	1.42***	-4.03***	0.07
Controls	(7.10)	(0.34)	(0.07)	(0.29)	(0.20)
GDP_{t-1}	0.4**	-0.004	-0.004***	0.009**	-0.003
	(0.170)	(0.00311)	(0.00110)	(0.003)	(0.003)
$COVID19_t$	-0.0754***	0.001***	0.0007***	-0.002***	-1.07e-05
	(0.00844)	(0.000157)	(5.56e-05)	(0.0002)	(0.0001)
Linear trend	6.68*	-0.10	0.06**	-0.01	0.14**
	(3.34)	(0.07)	(0.02)	(0.08)	(0.05)
Observations	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

Table A.2. Expenditures on household consumption: components (percentage of total household spending)

	Food and non-alcoholic products	Alcohol and tobacco	Clothing	Utilities	Furniture	Health
	(1)	(2)	(3)	(4)	(5)	(6)
$Restriction_t$	1.829***	0.429***	0.135	0.901***	0.522***	0.680***
	(0.208)	(0.0536)	(0.0941)	(0.0360)	(0.0577)	(0.0386)
GDP_{t-1}	-0.00223	0.00110***	-0.000501	-0.003***	-0.000554	-0.001***
	(0.00218)	(0.000349)	(0.00108)	(0.000643)	(0.000610)	(0.000304)
$COVID19_t$	0.00110***	-2.33e-05	-9.23e-05*	0.00067***	2.80e-05	0.0005***
	(0.000112)	(1.68e-05)	(5.33e-05)	(3.23e-05)	(3.07e-05)	(1.55e-05)
Linear trend	-0.0476	-0.0208***	-0.0343	0.0697***	-0.00566	0.0304***
	(0.0499)	(0.00626)	(0.0209)	(0.0133)	(0.0129)	(0.00686)
Observations	37	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

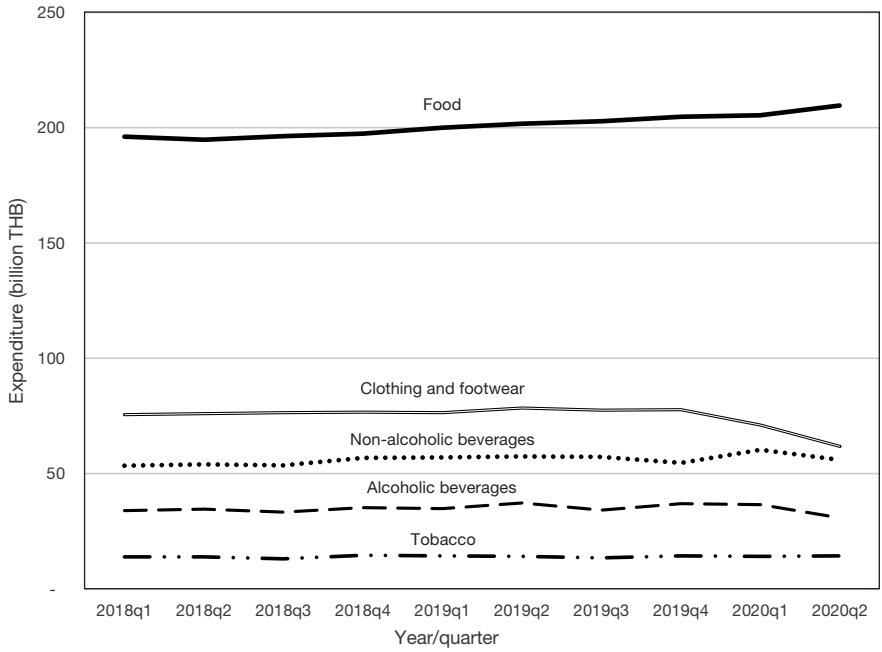
Table A.3. Expenditures on household consumption: components (percentage of total household spending)

	Transportation	Communication	Recreation	Restaurants and hotels	Education
	(1)	(2)	(3)	(4)	(5)
$Restriction_t$	0.0373	0.144***	-0.0568	-4.946***	0.110***
	(0.261)	(0.0400)	(0.122)	(0.180)	(0.0189)
GDP_{t-1}	0.0140***	-0.00218**	0.000787	-0.00196	-0.000282
	(0.00483)	(0.000920)	(0.00112)	(0.00204)	(0.000240)
$COVID19_t$	-0.000615**	0.000196***	-0.00113***	-0.00141***	6.52e-05***
	(0.000245)	(4.53e-05)	(5.54e-05)	(9.88e-05)	(1.24e-05)
Linear trend	-0.311***	0.0591***	0.0263	0.185***	0.00122
	(0.105)	(0.0174)	(0.0221)	(0.0364)	(0.00559)
Observations	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

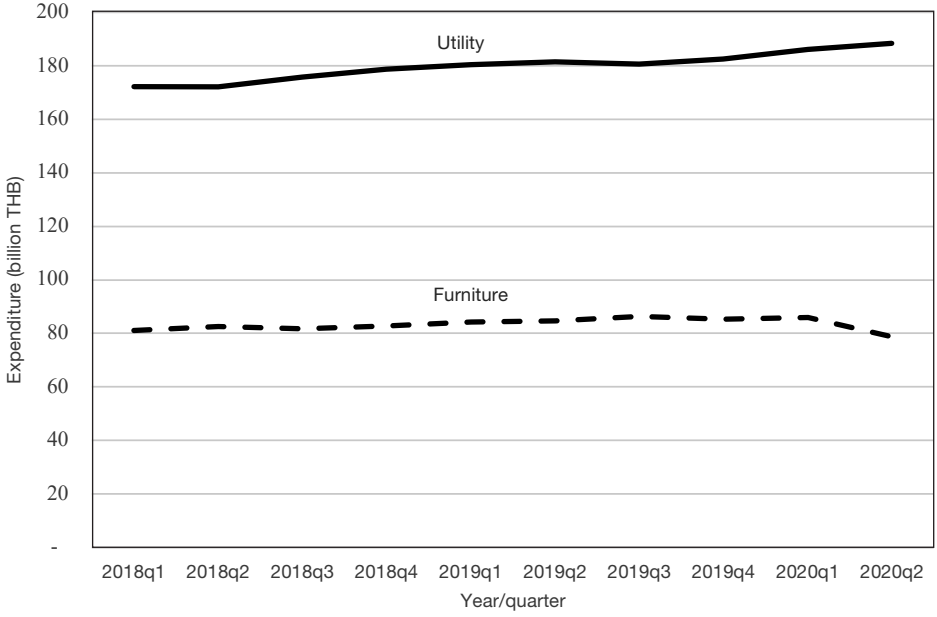
Appendix B

Figure B.1. Expenditure on non-durable goods (billion Thai baht)



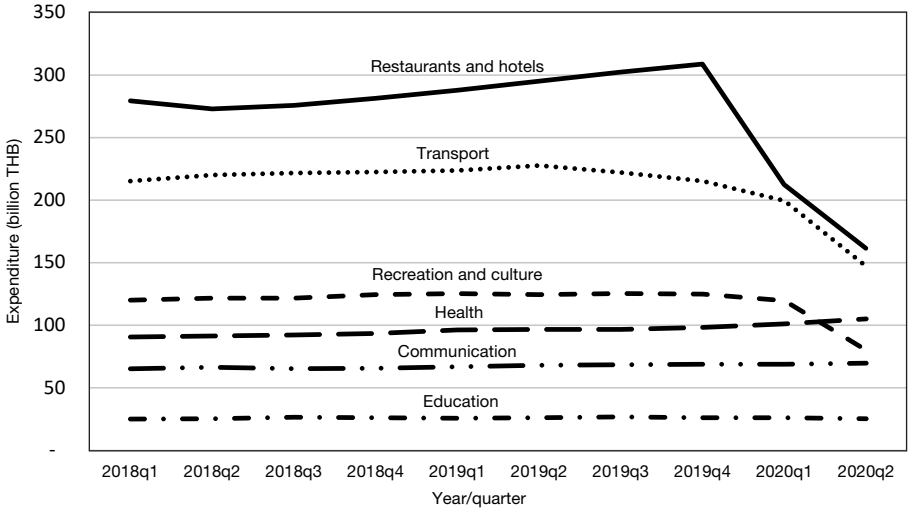
Source: The Office of the National Economic and Social Development Council (2020a).

Figure B.2. Expenditure on durable goods and housing-related expenses (billion Thai baht)



Source: The Office of the National Economic and Social Development Council (2020a).

Figure B.3. Expenditure on services (billion Thai baht)



Source: The Office of the National Economic and Social Development Council (2020a).

Appendix C

Table C.1. Thailand consumption expenditure during the COVID-19 pandemic

	Total consumption (1)	Non-durable goods (2)	Durable goods and housing (3)	Services (4)	Miscellaneous (5)
$Restriction_t$	-119.2***	2.306***	1.468***	-4.007***	0.124
	(8.042)	(0.325)	(0.0923)	(0.304)	(0.210)
GDP_{t-1}	0.301*	-0.00475***	-0.00289***	0.00863***	-0.00239
	(0.161)	(0.00168)	(0.000846)	(0.00238)	(0.00260)
GDP_{t-2}	0.119	-0.000291	-0.00249***	0.00312*	-0.00155
	(0.0792)	(0.00232)	(0.000709)	(0.00174)	(0.00266)
$COVID19_t^{middle}$	-0.0759***	0.000934***	0.000711***	-0.0024***	1.39e-05
	(0.00759)	(0.000113)	(4.36e-05)	(0.000126)	(0.000127)
Linear trend	5.273*	-0.0732	0.0910***	-0.0656	0.154**
	(2.910)	(0.0759)	(0.0223)	(0.0651)	(0.0607)
Observations	36	36	36	36	36

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

Table C.2. Expenditures on household consumption: components (percentage of total household spending)

	Food and non-alcoholic products (1)	Alcohol and tobacco (2)	Clothing (3)	Utility (4)	Furniture (5)	Health (6)
$Restriction_t$	1.695***	0.430***	0.115	0.880***	0.539***	0.619***
	(0.193)	(0.0586)	(0.0902)	(0.0409)	(0.0722)	(0.0308)
GDP_{t-1}	-0.00283**	-0.00108***	-0.000840	-0.0029***	4.21e-05	-0.0019***
	(0.00123)	(0.000341)	(0.000707)	(0.000645)	(0.000447)	(0.000464)
GDP_{t-2}	-0.000337	-9.76e-05	0.000144	-0.000832*	-0.00166**	0.00140***
	(0.00140)	(0.000322)	(0.000809)	(0.000474)	(0.000718)	(0.000324)
$COVID19_t$	0.000649***	-1.46e-05	-6.6e-05**	0.0004***	1.99e-05	0.0003***
	(4.94e-05)	(1.07e-05)	(2.53e-05)	(1.81e-05)	(1.67e-05)	(1.33e-05)
Linear trend	-0.0252	-0.0191**	-0.0290	0.0756***	0.0154	0.0158*
	(0.0526)	(0.00898)	(0.0249)	(0.0123)	(0.0183)	(0.00887)
Observations	36	36	36	36	36	36

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

Table C.3. Expenditures on household consumption: components (percentage of total household spending)

	Transportation	Communication	Recreation	Restaurants and hotels	Education
	(1)	(2)	(3)	(4)	(5)
$Restriction_t$	0.124	0.151***	0.0268	-4.857***	0.0951***
	(0.236)	(0.0450)	(0.117)	(0.185)	(0.0152)
GDP_{t-1}	0.0138***	-0.00182**	0.000906	-0.00191	-0.000465**
	(0.00402)	(0.000845)	(0.000867)	(0.00154)	(0.000209)
GDP_{t-2}	0.00300	-0.000554	-0.000244	-0.000748	0.000266**
	(0.00184)	(0.000481)	(0.000918)	(0.00173)	(0.000127)
$COVID19_t$	-0.000350***	0.000126***	-0.00068***	-0.00087***	3.64e-05***
	(0.000119)	(2.63e-05)	(3.29e-05)	(5.40e-05)	(6.78e-06)
Linear trend	-0.372***	0.0620***	0.0286	0.200***	3.03e-05
	(0.0820)	(0.0198)	(0.0328)	(0.0510)	(0.00578)
Observations	36	36	36	36	36

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

Appendix D

Table D.1. Thailand consumption expenditure during the COVID-19 pandemic

	Total consumption (1)	Non-durable goods (2)	Durable goods and housing (3)	Services (4)	Miscellaneous (5)
$Restriction_t$	-112.3***	2.324***	1.375***	-3.866***	0.0729
	(6.793)	(0.332)	(0.0699)	(0.284)	(0.203)
GDP_{t-1}	0.348**	-0.00383	-0.00397***	0.00906**	-0.00333
	(0.170)	(0.00311)	(0.00110)	(0.00343)	(0.00316)
$COVID19_t^{middle}$	-0.0459***	0.000601***	0.000423***	-0.0015***	-6.50e-06
	(0.00513)	(9.54e-05)	(3.38e-05)	(0.000107)	(9.21e-05)
Linear trend	6.682*	-0.103	0.0640**	-0.00867	0.144**
	(3.337)	(0.0679)	(0.0235)	(0.0777)	(0.0529)
Observations	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

Table D.2. Expenditures on household consumption: components (percentage of total household spending)

	Food and non-alcoholic Products (1)	Alcohol and tobacco (2)	Clothing (3)	Utilities (4)	Furniture (5)	Health (6)
$Restriction_t$	1.752***	0.431***	0.141	0.855***	0.520***	0.645***
	(0.204)	(0.0537)	(0.0936)	(0.0347)	(0.0569)	(0.0380)
GDP_{t-1}	-0.00223	-0.00110***	-0.000501	-0.0034***	-0.000554	-0.0013***
	(0.00218)	(0.000349)	(0.00108)	(0.0006)	(0.000610)	(0.00030)
$COVID19_t$	0.000671***	-1.42e-05	-5.62e-05*	0.0004***	1.71e-05	0.0003***
	(6.80e-05)	(1.02e-05)	(3.24e-05)	(1.96e-05)	(1.87e-05)	(9.43e-06)
Linear trend	-0.0476	-0.0208***	-0.0343	0.0697***	-0.00566	0.0304***
	(0.0499)	(0.00626)	(0.0209)	(0.0133)	(0.0129)	(0.00686)
Observations	37	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

Table D.3. Expenditures on household consumption: components (percentage of total household spending)

	Transportation	Communication	Recreation	Restaurants and hotels	Education
	(1)	(2)	(3)	(4)	(5)
$Restriction_t$	0.0800	0.130***	0.0213	-4.848***	0.105***
	(0.247)	(0.0387)	(0.120)	(0.179)	(0.0183)
GDP_{t-1}	0.0140***	-0.00218**	0.000787	-0.00196	-0.000282
	(0.00483)	(0.000920)	(0.00112)	(0.00204)	(0.000240)
$COVID19_t$	-0.000374**	0.000119***	-0.0007***	-0.0009***	3.97e-05***
	(0.000149)	(2.75e-05)	(3.37e-05)	(6.01e-05)	(7.55e-06)
Linear trend	-0.311***	0.0591***	0.0263	0.185***	0.00122
	(0.105)	(0.0174)	(0.0221)	(0.0364)	(0.00559)
Observations	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.