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Central Banks' Responses to COVID-19 in ASEAN Economies*

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Abstract: *The effect of the COVID-19 pandemic on public health, social life, economic conditions, and financial markets has been significant for Association of Southeast Asian Nations (ASEAN) economies. The main objective of this study is to understand the response of central banks to COVID-19 in 10 ASEAN economies, i.e., Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. In this study, panel data as well as time-series data have been used to see the impact of COVID-19 on macroeconomic variables and financial variables. The period of the study ranges from 23 January 2020 to 11 December 2020. The first part of the study shows the trend analysis of macroeconomic variables of ASEAN economies and a descriptive analysis of various measures taken by the central banks of ASEAN economics. Further, a comparative analysis of monetary measures with advanced countries is depicted. Further, empirical findings of ARCH and GARCH indicate that recent as well as past COVID-19 news has a significant impact on stock market volatility in select ASEAN countries.*

Keywords: COVID-19, ASEAN, ARDL, Volatility Model and Central Bank

JEL Classification: E52, E58, E63 & I18

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1. Introduction

The COVID-19 pandemic and the subsequent lockdowns have put Association of Southeast Asian Nations (ASEAN) economies into recession along with the global economy. If considered from the demand side, lockdowns have led to low consumer spending. On the supply side, containment zone policies by different governments have lowered production activities (Kimura, 2020; and Felipe et al., 2020). The impact of COVID-19 on public health, social life, economic conditions, and financial markets has been enormous (Barrero et al., 2020). The world economy, still recovering from the slowdown since 2008, has been severely impacted. The implications of this pandemic depend on how long the lockdown measures will continue, their impact on various sectors, and the speed at which economic activity will return to normalcy (Haas et al., 2020; Weder, 2020). The uncertainty of its duration, the absence of universal vaccinations, and the start of the second wave in most European countries have perplexed policymakers when initiating measures to contain the risks of the pandemic on the economy (Barrios and Hochberg, 2020).

The Spanish Flu pandemic of 1918 lasted nearly 18 months at a time when the world was yet not so highly integrated. In contrast, COVID-19 has occurred when the global economy is highly integrated and the spillovers amongst countries are significantly large. The current pandemic has impacted different economies in a distinct pattern given the process of lock-down measures followed by almost all countries. Wage cuts and layoffs have reduced the income of the workforce, especially for informal labourers (Campello et al., 2020.) This has resulted in falling demand, further exacerbated by physical distancing measures. Further, this has led to a build-up of the risk of delinquency on mortgages and consumer credit. Businesses have continued to face reduced cash flows. With uncertainty dominating the business sphere, liquidity remains a concern across households and corporate players, preventing financial markets from functioning properly. In financial markets, participants continue to face bursts of volatility (BIS, 2020).

Central banks were quick to respond to the pandemic by initiating both conventional and unconventional measures. Conventional monetary policy can mitigate downward pressure in the economy as long as the interest rate is flexible

(Dave et al., 2020). The large-scale asset purchases by government facilities could help contain a downward spiral **(**Caballero and Alp, 2020). But given the constraint of low interest rates already prevailing globally since 2008, monetary authorities had to resort to unconventional measures. The central banks also supported national governments in expansionary fiscal policy measures in the form of tax cuts and higher government spending to support aggregate demand and employment.

The global financial crisis and the COVID-19 pandemic have shifted the focus to modern monetary theory, which involves expanding budgets significantly even if it requires using the money-creation capacity of the central bank. The most important aspect of this strategy is the interest-free financing of government activity, which does not add to debt or lead to inflation.

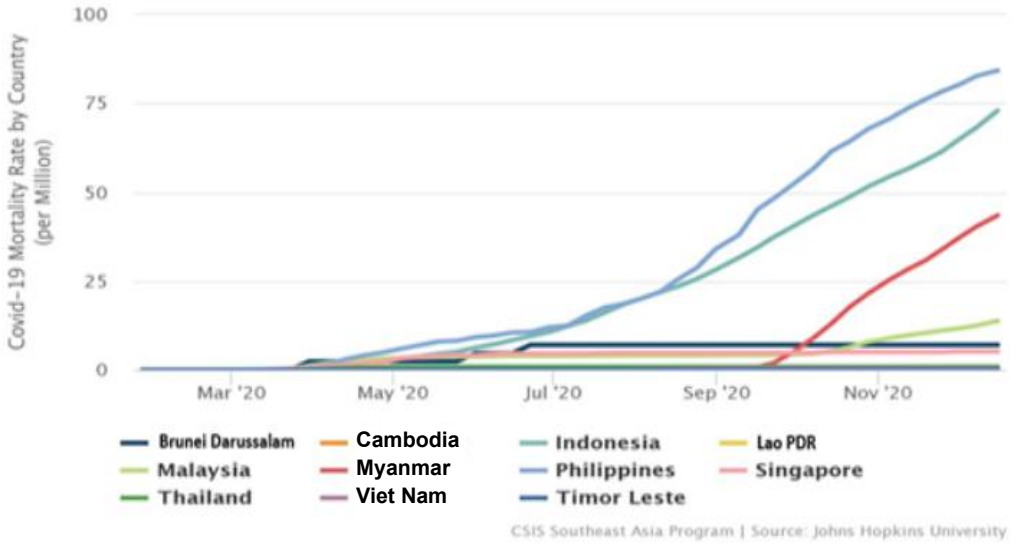
The responses of ASEAN Member States (AMS) – namely, Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam – comprised of a wide spectrum of measures to counter the spread of the pandemic. The initiatives generally followed the trend in advanced countries facilitated by joint action initiatives by multilateral agencies like the International Monetary Fund (IMF) and Bank for International Settlements (BIS). The reaction of central banks to the COVID-19 pandemic in ASEAN economies was smooth and forceful, deploying policy tools within weeks, with the prime focus on ensuring adequate liquidity, smooth credit access, and financial stability. The monetary policy initiatives included low interest rates along with reduced reserve requirements and the purchase of government bonds has constituted another key rescue measure (ASEAN, 2020). On the fiscal side, stimulus measures comprised of tax breaks, subsidies, targeted support and cash assistance, and moratoriums on loan payments and pension contributions. As the world pursues policies looking to restore economic activity amid the uncertainty looming over the coverage of vaccines and their efficiency, the impact of this unprecedented shock is expected to have serious long-term implications. The most daunting and immediate task for policy practitioners is to restore the confidence of stakeholders, which calls for a collective effort to leverage technologies and digital trade, strengthening safety nets by mobilising resources from both the fiscal and monetary fronts (Kimura, 2020).

The primary objective of the study is to assess the response of central banks to COVID-19 in the 10 ASEAN economies. The study is organised into eight sections. In Section 2, the trend patterns of COVID-19 in ASEAN economies are briefly discussed. A review of the literature is presented in Section 3. The trends of macroeconomic variables and central bank responses in ASEAN economics are depicted in Section 4. A comparative analysis of monetary measures in advanced versus ASEAN countries is briefly discussed in Section 5. The empirical estimation is presented in Section 6. The conclusion and recommendations are in Sections 7 and 8. In Appendix 1, some initiatives by multilateral agencies are presented.

2. Trend and Patterns of COVID-19 in ASEAN Economies

The pattern of the death rate per million people in Southeast Asia during 20 February–11 December 2020 shows a rising trend (Figure 1). It indicates that the death rate was highest in the Philippines (84.20), followed by Indonesia (68.18), Myanmar (43.45), Malaysia (13.75), Brunei (7), Singapore (5.17), Thailand (0.86), and Vietnam (0.37). There were zero deaths due to COVID-19 in the Lao PDR, Timor-Leste, and Cambodia.

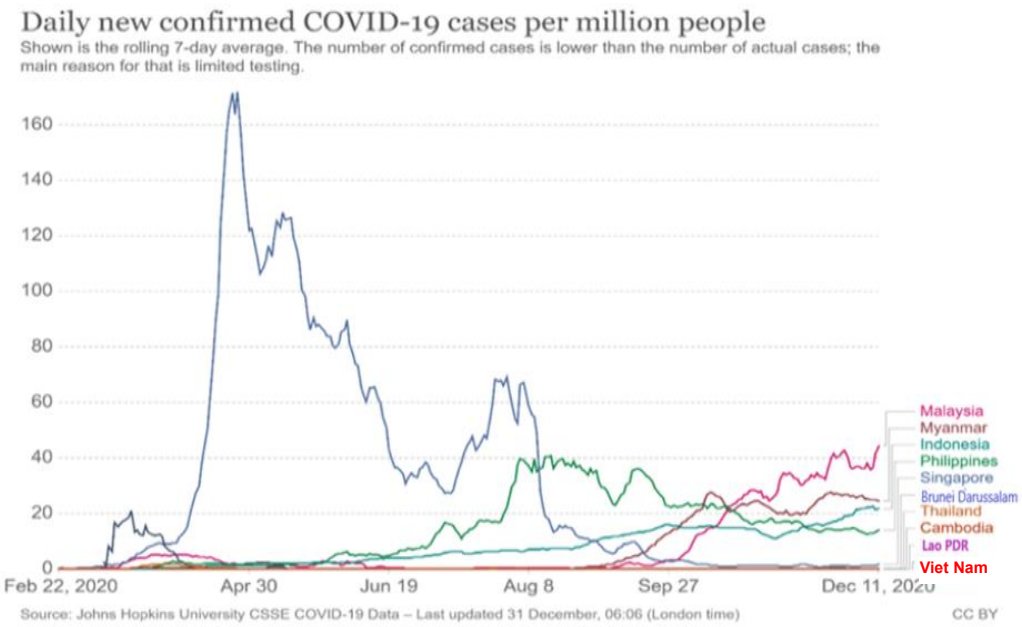
Figure 1: Pattern of the COVID-19 Death Rate in Southeast Asia



Source: Centre for Strategic and International Studies (CSIS) Southeast Asia Program, John Hopkins University.

The pattern of daily new confirmed COVID-19 cases per million in Southeast Asia during 20 February–11 December 2020 is mixed. Figure 2 shows that the number of confirmed new cases per million people was highest in Malaysia (44.46), followed by Myanmar (24.53), the Philippines (13.94), Indonesia (21.71), Singapore (1.54), Brunei (0.33), Thailand (0.25), Vietnam (0.04), Cambodia (0.10), and the Lao PDR (0.04).

Figure 2: Daily New Confirmed COVID-19 Cases

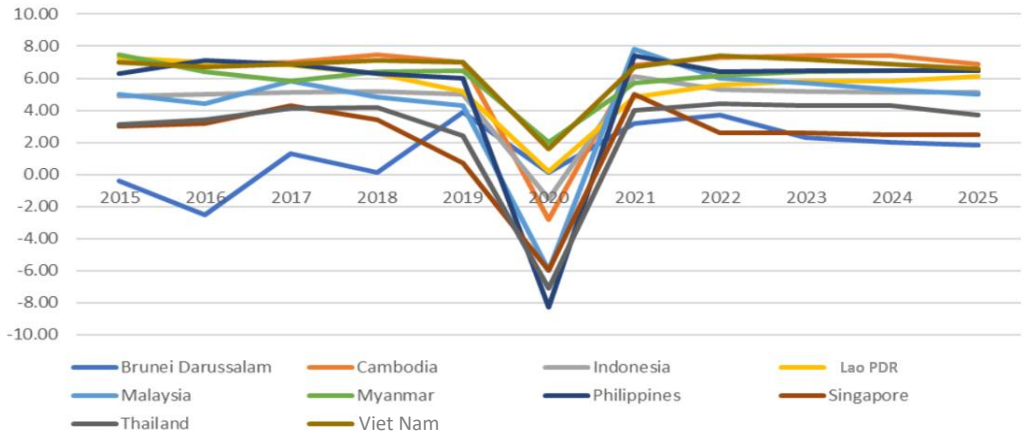


Source: Centre for Strategic and International Studies (CSIS) COVID-19 Data, Southeast Asia Program, John Hopkins University.

The growth pattern in all countries was severely impacted due to COVID-19 (Figure 3). This is the reason why central banks across the world are trying to generate aggregate demand by pumping more money into the economy with the help of monetary policy to reduce financial stress.

Figure 3: Real GDP Growth Projection by the IMF in ASEAN Countries

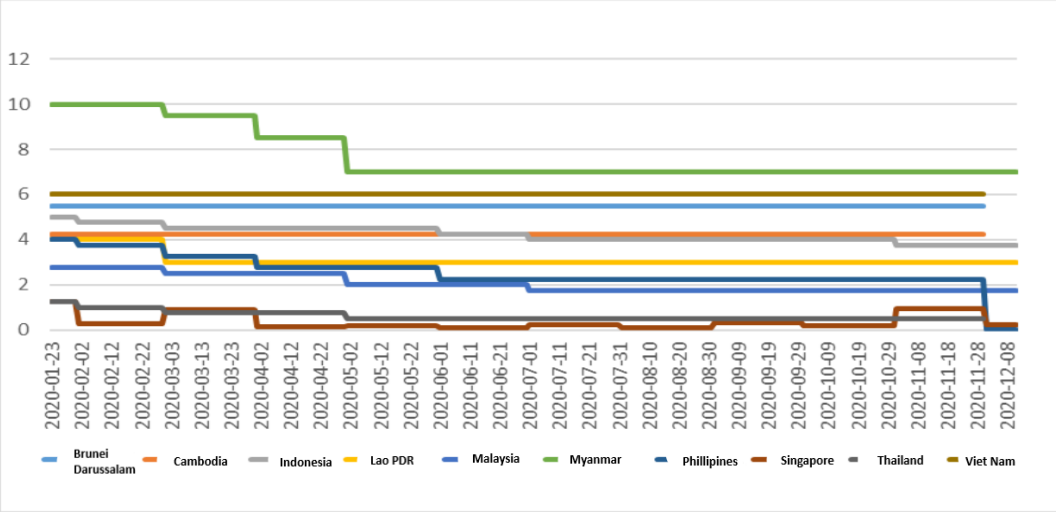
(annual % change)



Source: International Monetary Fund (IMF), Regional Economic Outlook.

Figure 4 shows the pattern of policy rates in ASEAN economies. In terms of the change in policy rates, the net response across the Southeast Asian region has been mixed, with countries like Vietnam, Brunei, and Cambodia maintaining the status quo at 6%, 5.5%, and 4.25%, respectively. On the other hand, the Central Bank of Myanmar slashed its interest rates by the highest margin of 300 bps between January 2020 and December 2020. Central banks in Indonesia, the Philippines, the Lao PDR, Malaysia, and Thailand also responded with interest rate cuts of 125 bps, 175 bps, 100 bps, 100 bps and 75 bps, respectively. Further, in the case of Singapore, the trend was mixed with periodic hikes and cuts. Overall, interest rates in Singapore went up from 125.8 bps to 237 bps (January–December 2020).

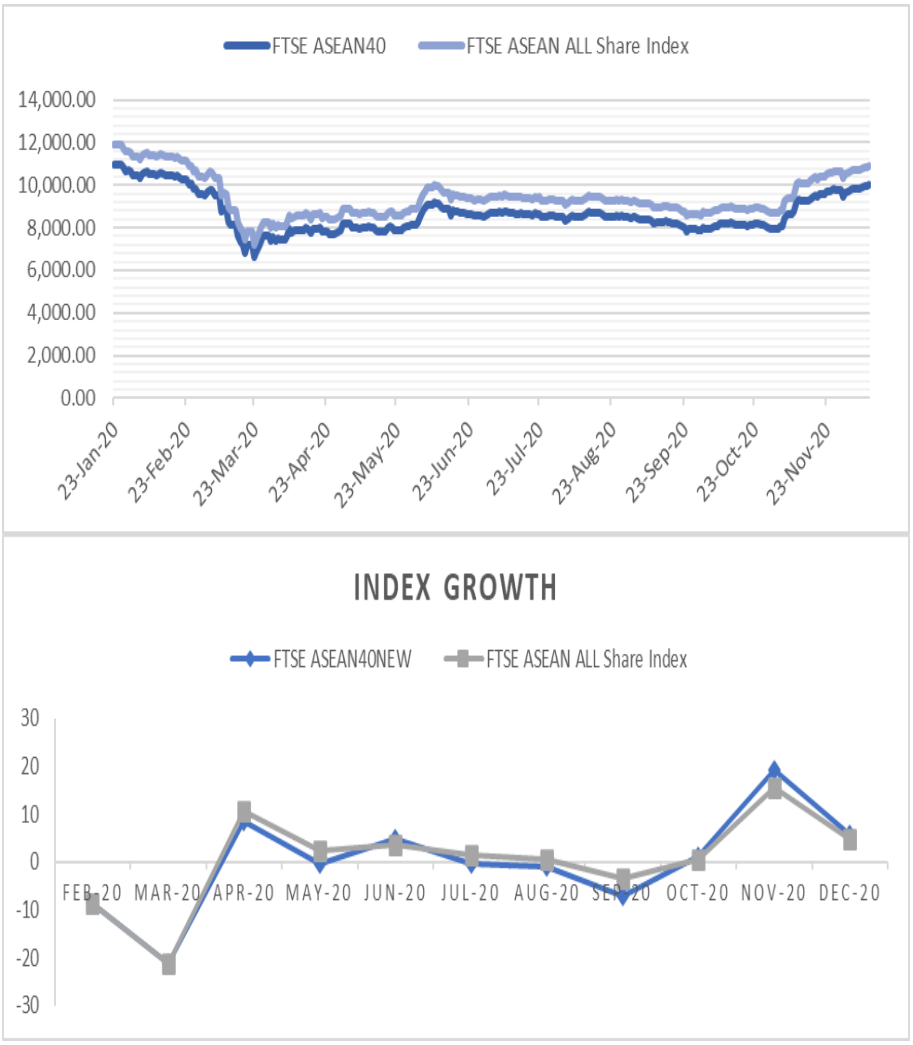
Figure 4: Movement of Policy Rates in ASEAN Economies



Source: respective central bank of each country.

Further, the stock market of ASEAN was also impacted. Figure 5 shows that the FTSE Russell Index contracted sharply with the onset of the pandemic, with a gradual recovery in the first quarter of 2020. From the third quarter onwards, there was a contraction in annual returns. The FTSE ASEAN Index Series represents stocks from the seven leading ASEAN financial markets: Bursa Malaysia, Hanoi Stock Exchange, Ho Chi Minh Exchange, Indonesia Stock Exchange (IDX), Philippine Exchange, Singapore Exchange (SGX), and Stock Exchange of Thailand

Figure 5: Movement of FTSE ASEAN Index Series



Notes: calculated using the price on the last date of the previous month as the base.
The FTSE ASEAN All-Share Index reflects the movement of large-, mid-, and small-cap ASEAN companies in terms of performance, from seven leading ASEAN financial markets: Bursa Malaysia, Hanoi Stock Exchange, Ho Chi Minh Exchange, Indonesia Stock Exchange, the Philippine Stock Exchange, Singapore Stock Exchange and the Stock Exchange of Thailand.
The FTSE ASEAN 40 index is constructed to reflect the output of the largest businesses in the markets of the ASEAN region.
Source: FTSE Russell, ASEAN Exchanges.

The decline in economic growth and the impact on financial markets led to fiscal and monetary policy announcements in ASEAN Member States during the COVID-19 pandemic (Table 1). Fiscal and monetary policies supplemented each other in successfully mitigating the impact of COVID-19 on the real economy.

Table 1: Fiscal and Monetary Policy Situation in ASEAN Economies

Country	Fiscal Stimulus Package								Monetary and Financial Sector Policy	
	Overall fiscal measures	Health system measures	Income support measures for individuals and households, excluding tax and contribution changes	Tax and contribution policy changes	Public sector subsidies to firms	Deferral of taxes and social security contributions and bringing-forward expenditure within current fiscal year	Public sector loans or capital injections to firms	Loan guarantees by the state, benefiting private borrowers	Monetary policy	Prudential regulation
Brunei Darussalam	✔	✔		✔	✔	✔	✔		✔	✔
Cambodia	✔	✔	✔	✔	✔		✔		✔	✔
Indonesia	✔	✔	✔	✔		✔			✔	
Lao PDR	✔	✔		✔		✔	✔		✔	✔
Malaysia	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Myanmar	✔	✔	✔			✔	✔		✔	✔
Philippines	✔	✔	✔		✔	✔	✔		✔	✔
Singapore	✔	✔	✔		✔	✔	✔		✔	
Thailand	✔	✔	✔	✔	✔	✔	✔		✔	✔
Viet Nam	✔	✔	✔	✔	✔	✔	✔		✔	✔

Source: OECD Country Policy Tracker (as of 4 May 2020).

Table 1 highlights the mix of monetary and fiscal responses in the ASEAN region. All the economies responded in terms of monetary and health system measures. Income support measures in terms of tax exemptions were missing in the case of the Lao PDR and Brunei. Tax policy changes were made in the entire region, except for Myanmar, the Philippines, and Singapore. Further, in terms of credit guarantees from governments to private stakeholders, the response remained limited to Malaysia. In general, the central banks across the entire ASEAN region have responded with monetary policy measures by slashing the interest rates to record low levels.

3. Literature Review

The response of central banks to the COVID-19 pandemic has been swift in terms of speed and scope. For the ASEAN region, in order to have sustainable economic recovery and financial stability in the region, Asakawa (2020) emphasised five key issues, i.e. market confidence via macroprudential policy frameworks and the provisioning of adequate liquidity; debt sustainability via fiscal consolidation; local capital market development for mobilising regional financial resources; regional financial safety nets; and increased use of local currencies for trade and financial transactions in the ASEAN region to contain the exchange rate pressures. These would require both the fiscal and monetary authorities to work in synchronisation. The initial response across the countries primarily focused on easing the financial stress on business entities and allied institutions by ensuring smooth credit access to the private sector (Harjes et al., 2020). The preliminary evidence also supports the notion that the response of central banks to COVID-19 had positive outcomes, especially in terms of supporting real economic activity during the episode of distress (Mosser, 2020). Further, a study by Fleming (2020) underlined that in response to economic fallout, the central banks launched a set of programmes to address the real and financial distress triggered by the pandemic. Broadly, the response by the central banks can be classified under three heads i.e. monetary policy, liquidity provision, and the targeted credit programmes to help the stakeholders in the non-financial sector.

The monetary policy response to the pandemic has been in terms of sharp policy rate cuts in almost every central bank. Whilst in advanced economies, where the interest rates were already at the zero lower bound, unconventional instruments like asset purchase programmes were introduced. These programmes helped to contain the costs of financial expansion (Cavallino and Fiore, 2020). In the emerging market economies, a mix of both conventional and unconventional instruments was used, with many central banks deploying unconventional tools for the first time.[1]

With economies having policy rates well above the lower bound, policy rate cuts might not yield desirable outcomes. This is because the emerging market economies have greater fragilities compared to their advanced counterparts. This can have serious implications in the form of heightened capital outflows and the depreciation of the local currencies and lead to a spike in risk anchoring the inflation expectations (Hofman, Nier, and Kamber, 2020).

As the lender of last resort to the financial system, another key policy of the central banks has been to ensure adequate access to liquidity. Liquidity strains can potentially lead to bankruptcies amongst solvent firms and have implications for long-term growth. Within weeks of the virus spread, changes to nearly all lending programmes were introduced in both advanced and emerging market economies. For example, on 12 March, the European Central Bank launched unlimited long-term refinancing operations for banks at reduced borrowing rates by 50 bps, and later in April, additional pandemic emergency repo operations through September 2020 (Mosser, 2020). Similarly, in the ASEAN economies, measures were directed to support households and non-financial corporations with smooth credit access in the long term.

Another set of measures to address the risks posed by the pandemic were the targeted credit programmes, which varied across countries, with uncertainty looming over their effectiveness. These have been specifically designed to ensure job security, support small businesses and household finances, and ensure access to public health services until the pandemic is contained. The access to finance via

[1]For example, the central banks of Canada, Australia, New Zealand, Sweden, the United Kingdom, Japan, and the European Central Bank (Mosser, 2020).

such programmes has been through firms, municipalities, governments (local/central), and directly or indirectly to households. The outcome of such interventions across the counties is similar to what a fiscal intervention would do.

In terms of extending the support to financial markets, the aid provided to money, securities, and forex markets is grounded in the mandated policy targets, which include price and financial stability as prime objectives (IMF, 2020a). The cross-country experiences of central bank support comprised of monetary policy easing via reductions in interest rates, easing of both short- and long-term funding in the markets, and easing the stress in securities markets and forex markets. The immediate intervention by the majority of central banks across all three categories was directed to ensure the easing of stress in short-term funding markets followed by monetary easing and forex markets. The intervention by advanced economies was less compared to that in emerging and lower-income countries (IMF, 2020b).

On the macroprudential policy front, the relaxation of macroprudential tools can limit the amplified impact of the shock on the real economy, especially on credit and output (IMF, 2020c). With better capitalised banks compared to during the global financial crisis, the monetary response across the central banks has been in the form of relaxing reserve requirements to limit liquidity pressures on commercial banks, as well as relaxing sectoral tools, especially for the household and business units.

4. Trends of Macroeconomic Variables and Central Banks Responses in ASEAN Economies

The following section briefly summarises the country-specific trends in policy rates, inflation, exchange rates, short-term rates, one-year deposit rates, exports, imports, and the money supply in ASEAN economies. Table 2 describes the key objectives of ASEAN central banks.

Table 2: Policy Objectives of Central Banks in ASEAN Countries

No.	Country	Key Objectives	Framework/Regime
1	Brunei Darussalam	To issue Brunei dollar Sukuk, monitoring, collecting and disseminating data and information relating to pertinent aspects of Brunei Darussalam's economy	Currency board arrangement (with Singapore dollar)
2	Cambodia	To maintain price stability in order to facilitate economic development	Inflation targeting
3	Indonesia	Maintaining rupiah stability, inflation targeting and exchange rate management	Inflation targeting
4	Lao PDR	To maintain a stable kip price and exchange rate and maintain a low inflation rate	Inflation targeting
5	Malaysia	To promote maximum sustainable growth in an environment of price stability	Inflation anchoring
6	Myanmar	To maintain price stability and exchange rate management	Monetary targeting
7	Philippines	To maintain price stability by promoting a low and stable inflation conducive to balanced and sustainable growth	Inflation targeting
8	Singapore	To maintain price stability, ensuring sustainable growth	Managing trade-weighted exchange rate
9	Thailand	To maintain price stability alongside preserving economic growth and financial stability	Flexible inflation targeting
10	Vietnam	Ensuring the stability of the currency value by controlling the inflation rate, supporting growth at a reasonable level	Inflation targeting

Source: Authors' compilation from the various central banks of ASEAN countries.

Central banks have played a critical role in ensuring sound financial conditions in response to the pandemic, averting a catastrophic downturn (IMF, 2020c). The COVID-19 pandemic resulted in unprecedented lockdowns worldwide without any direct linkage with the banking sector in terms of origin. But the slowdown in the economies had to impact the profitability of commercial banks. Fortunately, the banks were well capitalised and, therefore, prepared to tackle the financial threats of the pandemic unlike during the global financial crisis. Further, in terms of understanding the impact or severity of the ongoing pandemic, there are challenges in encompassing uncertainty in outcomes and, therefore, difficulties in framing policy. In terms of intervention, the global financial crisis, having its origins in the financial system, was more responsive to the monetary authorities' interventions. The COVID-19 pandemic is not so easy and, therefore, requires a more coordinated response from fiscal and monetary authorities.

The ASEAN Member States organised a series of meetings, including with external partners like the United States (US), China, and the European Union to discuss the best practices in dealing with the pandemic to have a collective approach. On the diplomatic front, the pandemic challenged ASEAN's central role in regional affairs by cancelling several key ASEAN meetings including the ASEAN-US Summit scheduled for 14 March 2020 and the 36th ASEAN Summit scheduled for 6–9 April 2020 in Vietnam. Later in a virtual summit, the member states instituted the ASEAN COVID-19 fund and a dedicated regional reserve of medical supplies to coordinate the spread of the pandemic.

Djalante et al. (2020) analysed the response of ASEAN economies to COVID-19 using policy analysis, underscoring the lack of an integrated response across the region in the earlier phases of the pandemic. Realising the significance of a coherent response, ASEAN reconvened and utilised existing regional health mechanisms to have a coherent response to the pandemic. The following section provides a summary of the country-specific responses to COVID-19.

Table 3: Amount of Monetary Support Across ASEAN

No.	Country	Total Package in US$ Million	% of GDP (2019)	% of Regional Total Package	Package Per Capita in US$
1	Brunei Darussalam	318	2.66	0.07	734
2	Cambodia	2210	8.27	0.51	134
3	Indonesia	115,334	10.90	26.43	426
4	Lao PDR	30	0.16	0.001	4
5	Malaysia	91,950	25.87	21.07	2877
6	Myanmar	98	0.13	0.02	1
7	Philippines	35,971	9.77	8.24	332
8	Singapore	89,141	23.35	18.13	15629
9	Thailand	84,091	15.96	19.27	12207
10	Vietnam	26,967	10.30	6.18	279

Note: Funding includes that from both central banks and governments.
Source: Asian Development Bank (2020a).

Table 3 highlights the amount of monetary support provided across the Southeast Asian region. In terms of the percentage share in total support, Indonesia has received the highest regional package with a 26.43% share, followed by Malaysia (21.07%), Thailand (19.27%), Singapore (18.1%), the Philippines (9.77%), and Vietnam (6.18%). The Lao PDR accounted for the lowest share given its small size. The per capita package was highest for Singapore at US$15,629.

4.1. Brunei Darussalam: Macroeconomic variable trend analysis

The macroeconomic variables for Brunei Darussalam in Table 4 show the trends in the policy rate, inflation, exchange rate, one-year deposit rate, exports, imports, and money supply during January–December 2020.

Table 4: Brunei Darussalam's Trend Analysis

Period	Inflation (%)	Policy Rate (%)	Exchange Rate (per US$)	One-year Deposit Rate (%)	Exports (YoY %)	Imports (YoY %)	Money Supply (US$ billion)
Jan-20	1.09	5.5	1.3575	0.80	25.62	25.74	11.078
Feb-20	1.44	5.5	1.3701	0.78	59.74	15.58	10.579
Mar-20	1.63	5.5	1.4112	0.77	20.78	-13.81	10.684
Apr-20	1.94	5.5	1.4218	0.62	-2.83	-1.2	10.902
May-20	2.52	5.5	1.4133	0.51	20.48	-23.57	11.883
Jun-20	2.55	5.5	1.4004	0.47	-15.29	-0.03	10.585
Jul-20	1.98	5.5	1.3881	0.40	-24.19	96.22	10.732
Aug-20	2.11	5.5	1.3678	0.41	-9.59	88.48	11.137
Sep-20	1.54	5.5	1.3694	0.31	-3.45	35.26	11.107
Oct-20	NA	5.5	1.3601	0.31	NA	NA	11.472
Nov-20	NA	5.5	1.3579	NA	NA	NA	NA
Dec-20	NA	5.5	1.3355	NA	NA	NA	NA

Source: Department of Economic Planning and Development, Ministry of Finance and Economy, Brunei Darussalam.

Brunei Darussalam experienced a rise in the growth of inflation from January 2020 to June 2020, followed by a declining trend. In comparison, it rose to 2.11% in August and gradually experienced a falling rate in September 2020, with the new estimates hitting 1.54% in September 2020. Throughout the year, the policy rate was steady at 5.5%. In December 2020, Brunei's exchange rate against the US dollar averaged 1.3355(B$/US$), compared to 1.3575 B$/US$ in January 2020. A sharp reduction in the growth rate of the one-year deposit rate was recorded from 0.80% in January 2020 to 0.31% in October 2020.

Brunei's export growth rate hit its highest point of 59.74 in February 2020 and a record low of -24.19% in July 2020 during the COVID-19 period. Likewise, in July 2020, the country's import growth rate hit its peak point of 96.22% and faced a low of -23.57% in May 2020. Finally, Brunei's money supply growth rate was highest at 11.47% in October 2020 against a low of 10.58% in June 2020.

4.2. Brunei Darussalam's central bank response during COVID-19

The immediate interim measures announced at the pandemic's outset were directed to provide relief to sectors under severe stress. These were effective from 1 April onwards, providing 6 months of deferment of principal repayments of financing loans for the tourism, hospitality, restaurants, and air-transport sectors. The deferment was also extended to importers of food and medical supplies. Additionally, all bank fees related to trade and the payment of transactions in the affected sectors were given a waiver for 6 months. The Ministry of Finance and Economy (MOFE) announced additional measures amounting to B$250 million, with a deferment on principal payments of financing or credit for all sectors, and restructuring/deferment on personal loans, like that of automobiles, for a period of less than 10 years. Coupled with initial fiscal assistance, the total value of the economic stimulus package stood at a total of B$450 million, i.e. 3.2% of GDP. MOFE announced a special $400 monthly allowance for healthcare workers, including doctors, nurses, volunteers, hospital cleaners, and security guards.

4.3. Cambodia: Macroeconomic variable trend analysis

Table 5 presents the macro variables for Cambodia.

Table 5: Cambodia's Trend Analysis

Period	Inflation (%)	Policy Rate (%)	Exchange Rate (per US dollar)
Jan-20	3.58	4.25	4,045.68
Feb-20	2.65	4.25	4,074.63
Mar-20	2.84	4.25	4,051.36
Apr-20	1.92	4.25	4,064.35
May-20	2.37	4.25	4,110.27
Jun-20	3.22	4.25	4,109.39
Jul-20	3.12	4.25	4,103.47
Aug-20	2.4	4.25	4,108.96
Sep-20	2.86	4.25	4,099.46
Oct-20	NA	4.25	4,084.63
Nov-20	NA	4.25	4,063.82
Dec-20	NA	NA	4,049.39

Note: Data on the one-year deposit rate, exports, imports, and the money supply are not available for Cambodia.
Source: National Bank of Cambodia.

The Cambodian economy witnessed a cyclical movement in inflation growth. Overall, the trend remained positive, with the highest growth of 3.58% in January 2020, then gradually a declining trend with the latest figures reported at 2.86% in September 2020. On the contrary, the policy rate was constant at 4.25% throughout the year.

4.4. Cambodia's central bank response during COVID-19

The National Bank of Cambodia (NBC) implemented four measures to improve liquidity in the banking system early on in the crisis: (i) delaying additional increases in the capital Conservation Buffer; (ii) cutting the interest rate of its Liquidity Providing Collateralized Operations (LPCOs), decreasing banks' funding costs in the domestic currency; (iii) cutting the interest rate on Negotiable Certificates of Deposit (the collateral for LPCOs), to encourage banks to disburse loans; and (iv) lowering the required reserves that banking and financial institutions must maintain at the NBC both for the local (riel) and foreign currencies (US dollar). In November, the NBC announced keeping the reserve requirement on hold at 7% both for the riel and the US dollar until the end of March 2021. The NBC has also issued guidelines to allow financial institutions loan restructuring for borrowers experiencing financial difficulties (but still performing) in priority sectors (tourism, garments, construction, transportation, and logistics) temporarily by the end of this year. In November, the NBC announced it would extend the forbearance by another 6 months to the end of June 2021, taking account of the adverse impacts from the recent nationwide flooding, in addition to the COVID-19 shock. The government allocated between US$800 million and US$2 billion to address the economic impacts of COVID-19, allowing only legally registered and formally verified small and medium-sized enterprises (SMEs) as potential beneficiaries. This left 95% of Cambodian SMEs excluded from the relief measures. In addition, US$1.2 billion was allocated by the government for COVID-19 recovery, of which US$564 million was for health and social assistance, and US$600 million was for economic support via credit support to SMEs. Another US$100 million was set aside for job training for suspended workers. An extension of the tax holiday was also provided for locally registered airlines and tourism-

related businesses through September 2020. Further, the government approved US$22 million in loans under its SME Co-Financing Scheme.

4.5. Indonesia: Macroeconomic variable trend analysis

Indonesia's macro trends are presented in Table 6.

Table 6: Indonesia's Trend Analysis

Period	Inflation (%)	Policy Rate (%)	Exchange Rate (per US dollar)	One-year Deposit Rate (%)	Exports (YoY %)	Imports (YoY %)	Money Supply (US$ billion)
Jan-20	2.68	5.00	13,732.22	4.25	-2.80	-4.9	7.11
Feb-20	2.98	4.75	13,776.15	4	9.94	-7.35	7.86
Mar-20	2.96	4.50	15,194.57	3.75	-2.62	-2.86	12.06
Apr-20	2.67	4.50	15,867.53	3.75	-6.92	-18.59	8.55
May-20	2.19	4.50	14,906.19	3.75	-29.13	-42.22	10.36
Jun-20	1.96	4.25	14,195.15	3.5	2.09	-6.39	8.21
Jul-20	1.54	4.00	14,582.41	3.25	-10.08	-32.56	10.54
Aug-20	1.32	4.00	14,724.50	3.25	-8.17	-24.18	13.33
Sep-20	1.42	4.00	14,847.95	3.25	-0.84	-18.88	12.39
Oct-20	1.44	4.00	14,758.57	3.25	-3.48	-26.91	12.5
Nov-20	1.59	3.75	NA	3	9.54	-17.45	12.23
Dec-20	1.68	3.75	NA	NA	NA	NA	NA

Note: The interest rate is the short-term lending interest rate of the Bank Indonesia at which it lends to commercial banks with insufficient liquidity during a period of reserve requirement adjustment.
Source: Bank Indonesia and Central Bureau of Statistics, Indonesia.

There was a continuous policy rate cut in Indonesia from January 2020 to December 2020 by 1.25 percentage points, from 5% to 3.75%. The rate of inflation in January 2020 was 2.68%, and this increased to 2.98% in February 2020. Later, there was a continuous decline and it reached 1.68% in December 2020. In addition, the deposit rate was reported at 3.0% in November 2020 from 4.25% in January 2020.

Export growth during the financial year, 2020-21 reached its highest point of 9.94% in February 2020 and a record low of -29.13% in May 2020. The import growth rate reached its lowest point of -42.22% in May 2020. Finally, Indonesia's money supply increased to US$13.33 billion in August 2020 from US$7.11 billion in January 2020.

4.6. Indonesia's central bank response during COVID-19

In response to the pandemic, there was a continuous reduction in the policy rate by Bank Indonesia (BI) to 3.75% in November 2020. Additionally, the bank announced measures to ease liquidity by lowering the reserve requirements for commercial banks and increasing the repo and reverse repo operations (up to 12 months). In order to maintain financial stability, a presidential decree has expanded BI's authority. To limit the stock market volatility, a new share buyback policy that allows listed companies to repurchase their shares without prior shareholders' meetings has been introduced, along with limits on the decline in stock prices. BI has been actively intervening in the forex market and in the domestic government bond market to ensure stability in the markets and the financial system. Further, the stimulus package includes measures to lift restrictions on imports and exports, aiming to ease the global supply-chain disruptions caused by the virus (Olivia et al., 2020).

In terms of an economic response, the government announced a stimulus package worth US$725 million on 25 February 2020. This fiscal package was targeted to support the tourism, aviation, and property industries. Further, an allocation of $324 million was made for low-income households. The first two fiscal packages amounted to Rp33.2 trillion, i.e. 0.2% of GDP. In addition to this, the government announced an additional package of Rp405 trillion (2.6% of GDP) on 31 March 2020.

4.7. Lao PDR: Macroeconomic variable trend analysis

The macro variables for the Lao PDR are presented in Table 7.

Table 7: Lao PDR's Macroeconomic Trend Analysis

Period	Inflation (%)	Policy Rate (%)	Exchange Rate (per US dollar)
Jan-20	6.94	4	8,884.53
Feb-20	6.24	4	8,892.67
Mar-20	6.14	3	8,909.25
Apr-20	5.84	3	8,962.73
May-20	5.46	3	8,989.33
Jun-20	5.28	3	9,016.49
Jul-20	5.12	3	9,046.67
Aug-20	5.84	3	9,076.39
Sep-20	4.63	3	9,170.89
Oct-20	2.84	3	9,237.41
Nov-20	3.63	3	9,272.54
Dec-20	NA	3	9,279.34

Note: The policy rate is based on less than 1-week interest rates.
Source: Bank of the Lao PDR and Lao Statistics Bureau.

As shown in Table 7, inflation in the Lao PDR followed a mixed trend from the onset of the pandemic until August 2020, with inflation of 5.84% and then a steep decline to 2.84% and finally picking up in November 2020 to 3.63%. The Lao PDR's policy rate was its highest at 4% in February 2020, then maintained a constant rate of 3% throughout the financial year 2020–2021.

4.8. Lao PDR's central bank response during COVID-19

The Bank of the Lao PDR reduced its reserve requirement by slashing the rate by 200 bps from the existing 10% to 8% on foreign exchange and 100 bps on the local currency. A new credit policy was introduced with the aim of restructuring debt and easing credit access for businesses. Further, directions have been given for widening the credit policy coverage to non-banking financial institutions, including

microfinance, savings and credit unions, leasing companies, and pawnshops. For the external sector, the country continues to manage the exchange rate under a crawling peg.

On the fiscal front, KN30 billion has been allocated for rescue measures directed at prevention and control. Further, an additional budgetary allocation of KN23.98 billion was made to procure protective and medical equipment. Part of the funds has been raised via public campaigns, and as of 1 June 2020, KN17 billion in cash and KN85.5 billion in kind had been raised (IMF, 2020b). Further, a 10-point stimulus package has been endorsed by the cabinet, including establishing a dedicated task force for COVID-19 rescue and relief operations. The government assured 6% compensation for the salaries of workers participating in the social security scheme for the months of May and June 2020. Additionally, the government announced tax exemptions for both civil servants and employees of the private sector with income levels below KN5 million per month for 3 months. Tourism and allied businesses were deferred from filing tax returns and the submission of annual financial reports for the year 2019. The government has also approved a cut in administrative expenses by at least 30% of the annual budget for ministries and 10% for the local authorities to meet the revenue shortfall for rescue and relief measures.

4.9. Malaysia: Macroeconomic variable trend analysis

Table 8 shows the trends in the macroeconomic variables for Malaysia.

Table 8: Malaysia's Trend Analysis

Period	Inflation (%)	Policy Rate (%)	Exchange Rate (per US dollar)	One-year Deposit Rate (%)	Exports (YoY %)	Imports (YoY %)	Money Supply (US$ billion)
Jan-20	1.57	2.75	4.07	4.63	-1.61	-2.46	3.82
Feb-20	1.32	2.75	4.16	4.59	11.73	10.29	3.71
Mar-20	-0.16	2.50	4.29	4.40	-4.64	-1.8	3.76
Apr-20	-2.89	2.50	4.34	4.26	-24.05	-7.79	4.52
May-20	-2.88	2.00	4.33	4.00	-25.74	-30.52	4.86
Jun-20	-1.89	2.00	4.27	3.89	9.09	-7.7	6.05
Jul-20	-1.31	1.75	4.26	3.70	4.88	-6.42	6.53
Aug-20	-1.39	1.75	4.18	3.64	-2.66	-6.55	6.9
Sep-20	-1.39	1.75	4.14	3.64	14.80	-3.75	6.75
Oct-20	-1.47	1.75	4.15	NA	0.33	-5.61	5.63
Nov-20	-1.72	1.75	4.11	NA	4.45	-9.34	5.61
Dec-20	NA	1.75	4.03	NA	NA	NA	NA

Source: Bank Negara Malaysia and Department of Statistics, Malaysia.

Malaysia witnessed an overall decreasing trend in inflation from 1.57% in January 2020, then falling to -2.89% in April 2020. The central bank policy rate was set at 1.75% in December 2020, compared with 2.75% in January and February 2020. Further, the exchange rate was highest at RM4.33 per US dollar in May 2020 against a low value of RM4.03 per US dollar in December 2020 during the financial year 2020–2021. The deposit rate was reported at 4.63% in January 2020 as compared to the low value of 3.64% in August and September 2020. Finally, the Malaysian money supply growth rate was highest at 6.75% in September 2020 against a low of 3.71% in February 2020.

During the financial year 2020–2021, the export growth rate of Malaysia reached its highest point of 14.80% in September 2020 against a low of -25.74% in May 2020. Similarly, the import growth rate was 10.29% in February 2020 compared to -30.52% in May 2020. To ensure adequate liquidity, the money supply increased from $3.82 billion to $6.9 billion between the period January–August 2020.

4.10. Malaysia's central bank response during COVID-19

From the monetary standpoint, Bank Negara Malaysia (BNM) trimmed the overnight policy rate in three consecutive meetings of the monetary policy committee, on 3 March, 5 May, and 7 July. The policy response was directed at controlling the market volatility and disruptions in March and to gradually support the growth objective and subdue inflationary pressures.

To support deferment and restructuring, BNM announced the temporary easing of regulatory and supervisory compliance to banks. Further, Securities Commission Malaysia and Bursa Malaysia called off short-selling, waived off fees for capital market-licensed entities. In the real estate sector, stamp duty was exempted under the Home Ownership Campaign for properties valued in the range of RM300,000–RM2.5 million until the end of fiscal year 2020. For individuals who lost their jobs in 2020, a loan moratorium for 3 months was provided by the banks.

In terms of economic relief from the fiscal front, the government approved RM6 billion (0.4% of GDP) on 27 February 2020, comprising temporary tax and social security relief, cash transfers to affected sectors, and rural infrastructure spending, etc. Further, in the second phase of the stimulus package, RM25 billion (1.7% of GDP) was released on 27 March 2020 (IMF, 2020a). On 6 April 2020, a third stimulus package was announced amounting to RM10 billion (0.7% of GDP), which comprised grants for micro, small, and medium-sized enterprises (MSMEs), wage subsidies, and discounts foreign workers' fees. Further, on 5 June 2020, a fourth stimulus package was announced worth RM2 billion. This comprises extending wage subsidy schemes, hiring and training subsidies, and supporting digitisation and additional tax relief.

4.11. Myanmar: Macroeconomic variable trend analysis

Table 9 shows the trends in the macro variables for Myanmar.

Table 9: Myanmar's Trend Analysis

Period	Inflation (%)	Policy Rate (%)	Exchange Rate (per US dollar)	Exports (YoY %)	Imports (YoY %)	Money Supply (US$ billion)
Jan-20	9.09	10.00	1,469.28	-6.37	30.67	43.54
Feb-20	8.36	10.00	1,448.64	9.72	21.26	44.75
Mar-20	6.61	8.50	1,402.00	-6.63	41.11	46.11
Apr-20	5.24	8.50	1,423.89	-0.80	-18.33	45.97
May-20	4.20	7.00	1,404.71	-23.25	-13.34	46.74
Jun-20	4.15	7.00	1,396.37	-10.91	-7.69	48.13
Jul-20	1.70	7.00	1,371.75	8.99	-8.13	49.63
Aug-20	1.84	7.00	1,358.4	-2.08	-0.68	51.95
Sep-20	2.03	7.00	1,322.46	NA	NA	55.26
Oct-20	1.50	7.00	1,293.4	NA	NA	56.30
Nov-20	0.97	7.00	1,469.28	NA	NA	NA
Dec-20	NA	NA	NA	NA	NA	NA

Source: Central bank of Myanmar and Ministry of Planning and Finance.

In Table 9, Myanmar's policy rate was observed at 7.0% in November 2020, declining from a high of 10.0% in February 2020. Myanmar witnessed an overall decreasing trend in inflation from January to July 2020, with the highest inflation in January of 9.09% and the lowest at 1.50% in October 2020. Finally, in November 2020, it reached its lowest level of 0.97%. Both import and export growth witnessed sluggish growth during the period of January–December 2020. In order to ensure liquidity in the financial system, there has been a continuous surge in the money supply as well. It increased from US$43.54 billion (in January 2020) to US$56.30 billion (as of October 2020).

4.12. Myanmar's central bank response during COVID-19

In terms of the economic response from the fiscal front, revenue measures comprised exemptions and subsidies on electricity charges and deferment in filing tax returns for businesses and personal income until December 2020. The expenditure measures consisted of procuring the necessary medical equipment and allied materials for upgrading the facilities and capacity of hospitals, spending

MK268 billion on building renovation works. Also, cash transfers both in cash and kind were made for the most vulnerable of the population, amounting to MK325 billion. Further, dedicated expenditure programmes for agriculture and the rural sector were initiated worth MK93 billion.

To support small businesses, the Myanmar Economic bank established a COVID-19 fund to provide support for SMEs and the tourism sector via soft loans. Further, an allocation of MK600 billion was made for the farmers. The government also announced up to a 50% guarantee on new loans made by private banks for enterprises that do not benefit from the government's COVID-19 fund. In order to protect the interests of labourers, the social security board approved paying 40% of the salaries of insured workers as assistance to support their families.

On the monetary and macro-financial front, the central bank of Myanmar responded by slashing interest rates by 50 bps on 12 March and by 100 bps on 24 March. Further, from 1 May 2020 onwards, a reduction of 150 bps was announced. To ensure adequate liquidity, the bank halted deposit auctions. The reserve requirement was also lowered to 3.5% from 5% on 9 April 2020. The central bank also extended the compliance date for prudential regulations by 3 years to the end of August 2023 to enable support from the banking system for economic recovery. In forex management, the kyat was allowed to flexibly adjust with limited intervention based on rules during episodes of excessive volatility.

4.13. Philippines: Macroeconomic variable trend analysis

Table 10 shows the macro variables for the Philippines.

Table 10: The Philippines' Trend Analysis

Period	Inflation (%)	Policy Rate (%)	Exchange Rate (per US dollar)	One-year Deposit Rate (%)	Exports (YoY %)	Imports (YoY %)	Money Supply (US$ billion)
Jan-20	2.93	4	50.83	3.5	9.37	-2.85	11.11
Feb-20	2.59	3.75	50.74	3.25	2.84	-11.62	10.14
Mar-20	2.51	3.25	50.90	2.75	-24.67	-26.21	12.77
Apr-20	2.17	2.75	50.73	2.25	-49.86	-65.26	15.76
May-20	2.08	2.75	50.55	2.25	-26.87	-40.55	16.31
Jun-20	2.50	2.25	50.09	1.75	-12.50	-23.09	14.53
Jul-20	2.74	2.25	49.46	1.75	-9.14	-23.78	13.81
Aug-20	2.40	2.25	48.84	1.75	-12.80	-21.28	13.81
Sep-20	2.32	2.25	48.50	1.75	2.85	-15.31	12.41
Oct-20	2.48	2.25	48.48	1.75	-1.17	-18.76	12.09
Nov-20	3.30	2	48.25	1.5	3.00	-18.90	12.9
Dec-20	3.52	2	48.06	1.5	NA	NA	NA

Source: Bangko Sentral ng Pilipinas and Philippine Statistics Authority.

The Philippines' policy rate was set at 2% in December 2020, compared with 4% in January 2020. During the 2020–2021, the Philippines witnessed its highest inflation rate of 3.52% in December 2020 against a low at 2.08% in May 2020. The deposit rate was at a high of 3.5% in January 2020 compared to a low value of 1.5% in December 2020.

4.14. The Philippines' central bank response during COVID-19

In response to the pandemic, Banko Sentral ng Pilipinas (BSP) reduced policy rates by 175 bps cumulatively, and the reserve requirement ratio was slashed by 200 bps on 3 April 2020. To ensure adequate liquidity in the financial system, the central bank purchased government securities in the secondary market. In order to support the government's programme for COVID-19 rescue and relief measures, BSP purchased ₱300 billion with government securities via a repurchase agreement with the government in September. In October, a fresh advance was approved,

amounting to ₱540 billion by the central bank. Further, ₱20 billion as the dividend was approved for the government by BSP, an exception to the BSP's newly amended charter. In the forex market, BSP relaxed reporting and documentary compliance rules for forex operations from 27 March 2020.

The key interventions from the fiscal side comprised of a fiscal package worth ₱595.6 billion (approximately 3.1% of 2019 GDP) for the vulnerable population. This comprised a cash aid programme amounting to ₱205 billion for 18 million households and social protection measures for workers, including migrants, worth ₱58 billion. For the medical response, ₱58 billion was approved by the government. Further, in terms of assistance to MSMEs, special microfinance and loan restructuring provisions were made.

4.15. Singapore: Macroeconomic variable trend analysis

Table 11 shows the trends of the macroeconomic variables for Singapore.

Table 11: Singapore's Trend Analysis

Period	Inflation (%)	Policy Rate (%)	Exchange Rate (per US dollar)	Exports (YoY %)	Imports (YoY %)	Money Supply (US$ billion)
Jan-20	0.75	1.64	1.35	4.52	6.6	5.8
Feb-20	0.40	1.25	1.39	-8.79	-0.87	6.3
Mar-20	-0.04	0.26	1.41	-2.41	-1.23	6.77
Apr-20	-0.74	0.08	1.42	-12.88	-12.47	9.89
May-20	-0.84	0.13	1.41	-18.10	-21.31	9.53
Jun-20	-0.54	0.17	1.39	-10.69	-15.69	10.98
Jul-20	-0.41	0.10	1.38	-8.76	-10.17	12.17
Aug-20	-0.40	0.21	1.36	-1.72	-8.74	11.49
Sep-20	-0.01	0.08	1.36	-5.56	-3.96	10.88
Oct-20	-0.22	0.31	1.36	-7.58	-9.02	12.65
Nov-20	-0.10	NA	1.35	-6.43	-8.29	12.58
Dec-20	NA	NA	1.33	NA	NA	NA

Note: The one-year deposit rate was not available for Singapore.
Source: Monetary Authority of Singapore and Department of Statistics, Singapore.

The Singapore policy rate was set at 0.31% in October 2020, compared with 0.08% in September 2020. The Monetary Authority of Singapore provides a monthly overnight rate. The policy rate of Singapore was 1.64% at its highest in January 2020, compared with a 0.08% growth rate at its lowest in April 2020. During the above-mentioned period, the highest inflation growth rate was 0.75% in January 2020, compared to the minimum value of -0.84% in May 2020. Similarly, the exchange rate was highest at 1.42% in April 2020 against the lowest value of 1.35% in January 2020.

The export growth rate of Singapore achieved its highest point of 4.52% in January 2020 against the lowest value of -18.10% in May 2020. Similarly, the import growth rate was 6.6% at its highest in January 2020 compared to -21.31% at its lowest in May 2020. Finally, Singapore's money supply increased to US$12.65 billion in October 2020 against US$5.8 billion in January 2020.

4.16. Singapore's central bank response during COVID-19

The Monetary Authority of Singapore (MAS) welcomed the immediate measures and announcements made by commercial banks and insurance companies to help customers whilst complying with prudential risk assessments. The MAS also established a US$60 billion[2] swap facility with the Federal Reserve via weekly auctions.

The MAS announced a relief package for SMEs to meet immediate liquidity needs. The MAS announced US$94.53 million in support for strengthening financial technology capabilities. The announcement of the second package extended the reach of relief for borrowers. The MAS directed locally incorporated banks to cap total dividends per share to 60% of the FY2019 level, providing an option to receive dividends in shares instead of cash. Later, finance companies were directed to incorporate a cap in their dividends per share at 60% of the 2019 level. The MAS introduced a new term facility offering funds in 1-month and 3-month tenors, complementing the existing overnight facility. The MAS and the financial industry extended support for individual small enterprises with deferrals to repay loans until 2021. Singapore initially managed to contain the spread of COVID-19

[2] US$1 = S$1.32 has been used for the conversions.

by widespread testing, contact tracing, and well-enforced quarantines. But it experienced a sharp increase in infections in April 2020, primarily emerging from foreign dormitories. The government intensified its efforts to limit the spread at the local level. From August 2020 onwards, the reported trends have shown significant success in containing transmission and flattening the curve.

The first response as part of rescue and relief measures was announced on 18 February 2020 with the government allocating US$4.4. billion for relief efforts to support business units and provide tax relief to workers. The second tranche of stimulus measures, termed the 'Resilience Budget', was announced on 26 March, amounting to US$33 billion. It was directed to help the sectors that were hardest hit by the pandemic by providing cash payouts to self-employed and specific sectors. On 6 April 2020, a third round of stimulus, called the 'Solidarity Budget', was proposed to provide wage subsidies and relief funds for the self-employed. Further, from 24 April onwards, the population above the age of 21 was credited an amount of US$424 each.

The fourth stimulus, titled the 'Fortitude Budget', worth US$23.2 billion, was announced to support the businesses and workers affected by the closure of borders and social distancing measures. Over the months of June and July, the Tourism Board of Singapore launched marketing campaigns to promote domestic tourism with an investment of $33 million. Also, the Singapore Business Federation and Workforce Singapore launched multiple skill-based training programs for mid-career job seekers and new graduates. The recent rescue and relief efforts have been targeted to support sectors like construction, food, retail and arts. The aviation sector has also been allocated additional relief worth US$141.41 million. In October, more than 89,000 people received support grants for COVID-19 from the government, i.e. US$604.97 per month for 3 months, for permanent residents. From December onwards, a COVID-19 grant worth US$700 per month was assured by the authorities for 3 months during 2021. From the monetary intervention side, the MAS welcomed the immediate measures and announcements made by the commercial banks and insurance companies to help customers while complying with prudential risk assessments (Suan, 2020).

4.17. Thailand: Macroeconomic variable trend analysis

Table 12 shows the trend in macroeconomic variables for Thailand.

Table 12: Thailand's Trend Analysis

Period	Inflation (%)	Policy Rate (%)	Exchange Rate (per US dollar)	Exports (YoY %)	Imports (YoY %)	Money Supply (US$ billion)
Jan-20	1.05	1.25	30.47	-4.56	-15.51	3.73
Feb-20	0.73	1.00	31.23	-8.02	-9.2	3.22
Mar-20	-0.53	0.75	32.09	3.87	6.2	7.7
Apr-20	-2.98	0.75	32.61	5.33	-15.24	9.33
May-20	-3.43	0.50	32.08	-20.87	-33.01	10.74
Jun-20	-1.57	0.50	31.14	-22.96	-18.21	10.93
Jul-20	-0.98	0.50	31.41	-11.61	-26.59	11.38
Aug-20	-0.49	0.50	31.19	-5.42	-17.54	10.55
Sep-20	-0.70	0.50	31.37	-2.23	-7.59	9.73
Oct-20	-0.49	0.50	31.24	-4.51	-12.36	9.29
Nov-20	-0.40	0.50	30.16	-0.65	1.98	10.08
Dec-20	NA	NA	NA	NA	NA	NA

Note: The one-year deposit rate was not available for Thailand.
Source: Bank of Thailand and Ministry of Commerce, Thailand.

It can be observed that there was a continuous policy rate cut in Thailand from January 2020 to May 2020. The inflation growth was measured at -0.4% in November 2020, compared with a rate of 1.5% in January 2020.

4.18. Thailand's central bank response during COVID-19

In response to the pandemic, from the monetary and macro-financial perspective, the policy rate was trimmed by 75 bps as of 5 November 2020. Further, to support businesses, the Bank of Thailand (BOT) extended soft loans to financial institutions, amounting to B500 billion for lending to SMEs. The government covers the first 6 months of interest and guarantees up to 60%–70% of the total amount. Further, relaxation has been provided for debt restructuring with SME

clients. Thailand adopted preemptive measures against non-performing Loans (NPL) in the form of interest reduction and extension of payment periods. The government also declared another scheme where the government would pay off three consecutive installments from 12 installments in a year. It also exempted penalty charges levied on SMEs during the pandemic period. The above temporary arrangements were named Troubled Debt Restructuring (TDR).

The BOT has intervened in the external sector to avoid market volatility by injecting liquidity, allowing for the exchange rate adjustment. The overall response has been relatively good in terms of immediate rescue and relief measures. The country quickly imposed a lockdown with effective testing and contact tracing given the resilient healthcare system. After more than 3 months without any cases from local transmission, a new case was reported on 3 September. The economy was projected to face the worst economic consequences in the region due to its significant reliance on tourism and exports. This has further aggravated the pro-democracy protests across cities like Bangkok calling for an emergency order. There has been a significant trade-off between political priorities and the response to public health in the past few months. The economy is being reopened in a phased manner.

The government approved a fiscal package in three phases worth B1.5 trillion, i.e. 9.6% of GDP. This comprised expenditure on healthcare and assistance to labourers and businesses affected by the pandemic. Further, tax exemptions, deferral of credit dues, subsidies for tourists, and soft loans for SMEs have been extended. From the monetary and macro-financial perspective, the policy rate was trimmed by 75 bps as of 5 November 2020.

4.19. Vietnam: Macroeconomic variable trend analysis

Table 13 reveals the macro trend variables for Vietnam.[3]

[3] One year deposit rate was not available.

Table 13: Vietnam's Macroeconomic Trend Analysis

Period	Inflation (%)	Policy Rate (%)	Exchange Rate (per US dollar)	Exports (YoY %)	Imports (YoY %)	Money Supply (US$ billion)
Jan-20	6.43	4.00	23,164.20	-17.04	13.17	12.11
Feb-20	5.40	4.00	23,218.20	51.21	28.09	12.44
Mar-20	4.87	3.50	23,223.42	5.45	4.43	12.23
Apr-20	2.93	3.50	23,241.40	-13.79	-9.95	11.57
May-20	2.40	3.00	23,256.52	-12.37	-22.22	11.49
Jun-20	3.17	3.00	23,235.92	5.35	6.07	11.68
Jul-20	3.39	3.00	23,222.55	8.47	-2.51	11.96
Aug-20	3.18	3.00	23,209.00	7.14	1.58	NA
Sep-20	2.98	3.00	23,206.84	16.57	12.57	NA
Oct-20	2.47	2.50	23,197.22	12.21	9.24	NA
Nov-20	1.48	2.50	23,176.67	10.72	15.69	NA
Dec-20	0.19	2.50	23,153.56	17.62	22.7	NA

Note: The one-year deposit rate was not available for Vietnam.
Source: State Bank of Vietnam and General Statistics Office, Vietnam.

There was a continuous policy rate cut in Vietnam from January 2020 to December 2020. During this period, the State Bank of Vietnam lowered its overall policy rates by 1.50%, from 4.00% in January 2020 to 2.50% in December 2020. The inflation rate also experienced a declining trend from January 2020 at 6.43% to May 2020 at 2.40%. It then started increasing up to August 2020. Finally, it witnessed a declining trend from September 2020 to December 2020.

The export growth rate of Vietnam witnessed a high point of 51.21% in February 2020 against the lowest value of -17.04% in January 2020. Similarly, the import growth rate was 28.09% in February 2020 compared to -22.22% in April 2020. Finally, Vietnam's money supply experienced a rise from US$12.44 billion in February 2020 against US$11.49 billion in May 2020.

4.20. Vietnam's central bank response during COVID-19

In response to the pandemic, the State bank of Vietnam trimmed policy rates by 50 bps in October 2020, following the two previous cuts by 50 bps each on 13 March and 13 May. The cap on short-term deposit rates was reduced by 0.25 bps, whilst the priority sector lending rates were reduced by 50 bps. With mounting pressure on the local currency in the forex market, the State Bank of Vietnam announced an intervention in the currency markets on 23 March to smooth excessive exchange rate volatility.

The initial response to the pandemic was effective in limiting transmission until a second wave emerged from the city of Da Nang. In terms of the policy response, the government introduced a fiscal stimulus amounting to D284 trillion (3.6% of GDP) to support the economy. Furthermore, the government offered a deferral in filing tax returns along with land rental charges.

4.21. Cross-country analysis

The country-wise measures adopted in response to the pandemic are summarised in Table 14. In the case of Brunei, direct, long-term lending worth US$318 million was extended. This included direct lending to businesses, households, and state/local/regional governments, and forbearance. For Cambodia, the support remained limited via government and foreign aid amounting to US$572 million. Indonesia received liquidity support along with measures to boost credit creation, direct long-term lending, and equity support amounting to US$77,404 million. Further, the central bank financed the government with US$51,915 million in support. In the case of the Lao PDR, Vietnam, Brunei, and Cambodia, the central bank financing was not there. The central bank financed the government in Singapore, Thailand, and the Philippines with US$36,710 million, US$3,114 million, and US$31,864 million, respectively. Credit creation measures were missing in Brunei, Cambodia, Singapore, and Vietnam, whilst direct long-term lending was not there in Cambodia and the Lao PDR only. Singapore and Malaysia have also offered assistance internationally amounting to US$10,020 million and US$15 million, respectively.

Table 14: Country-wise Monetary Measures Taken in Response to the Pandemic (in US$ million)

No.	Measure	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Philippines	Singapore	Thailand	Vietnam
1	Liquidity support			14,638		10,382	5,200	2,823		
2	Credit creation			16,453	22	11,639	2,357		26,473	
3	Direct long-term lending	318		45,753		25,199	560	20,967	14,015	860
4	Equity support			559		279		3,741		292
5	Government support for income/revenue		210	38,930	7	24,428	13,526	51,589	43,603	12,902
6	Budget reallocation			12,008			5,230	5,647		
7	Central bank financing government			51,915			31,864	36,710	3,114	
8	International assistance received		362	138,652	107	3,015	4,924	60,000	1,507	420
9	International assistance provided					15		10,020		
10	No breakdown		2,000			8,848				

Source: Asian Development Bank (ADB 2020a) (as of 8 February 2021).

5. Comparative Analysis of Monetary Measures in Advanced versus ASEAN Countries during COVID-19

Since the start of the COVID-19 infection, both advanced and ASEAN countries shifted their approach towards accommodative monetary policy and started reducing policy rates as well as the required reserve ratio, distributed funds to enhance lending to affected firms, and allowed temporary suspensions of loan repayments.

The reduction in policy rates was observed in advanced as well as ASEAN countries (already discussed in the previous section). For example, the Bank of England reduced its bank rate to 0.1% by a cumulative 65 basis point cut, and the Reserve Bank of New Zealand from March 2020 onwards kept the official cash rate unchanged until the present at 0.25%.

On the liquidity front, the central banks of advanced economies, like the European Central Bank, announced a new liquidity facility that contains a series of non-targeted Pandemic Emergency Longer-Term Refinancing Operations, whereas the Bank of England started a Contingent Term Repo Facility to complement the bank's current sterling liquidity facilities. To support liquidity, the Reserve Bank of Australia also conducted one-month and three-month repo operations daily. On the other hand, the MAS in March 2020 announced the establishment of a US$60 billion swap facility with the US Federal Reserve that has provided about US$22 billion to banks for use in Singapore and the region, and it has further been extended until the end of March 2021. Further, to enhance proper access to liquidity facilities for strengthening banking sector resilience, the MAS introduced a new MAS Singapore dollar term facility to provide Singapore dollar funds for the tenure of 1 month and 3 months. The bank of Indonesia started daily repo auctions and enlarged the maximum duration for repo and reverse repo operations up to 12 months. They also increased FX swap auctions frequency for 1-, 3-, 6- and 12-month tenors from 3 times per week to daily auctions. To improve liquidity in the banking system in Cambodia, the central bank delayed an additional rise in the Capital Conservation Buffer as well as lowered the interest rate in its Liquidity Providing Collateralised Operations. The Central Bank of Myanmar paused deposit auctions to balance adequate liquidity in the interbank market.

To support consumers in advanced countries, the Reserve Bank of New Zealand has temporarily removed its mortgage loan-to-value ratio and plans to reinstate it from March 2021. In ASEAN countries, the banking industry in Malaysia provided a targeted loan payment moratorium extension up to 30 September 2020, whereas banks in Vietnam introduced a credit package of D300 trillion at lower interest rates, which has supported more than 1.25 million customers with outstanding loans of nearly D2,450 trillion by rescheduling repayments, reducing the interest on existing debts, as well as extending new loans. They also started reducing interest rates on Negotiable Certificates of Deposit to encourage banks to disburse loans. Brunei started deferring principal amounts on personal loans and updated the outstanding credit card balance to loans for up to 3 years for individuals affected in the private sector (IMF, 2020a).

To boost the banking sector, various relief measures were announced by the BSP, including a relaxation in compliance reporting, penalties on required reserves and single borrower limits for a temporary period, easier access to the BSP's rediscounting facility, as well as the relaxation of prudential regulations regarding marking-to-market debt securities. To support SME's, the Federal Reserve introduced the Main Street Lending Program so that small and mid-sized businesses can purchase new or expanded loans, whereas the Reserve Bank of New Zealand introduced 6-month principal and interest repayment deferrals as support. On the other hand, soft loans amounting to B500 billion are provided by the Bank of Thailand to financial institutions for on-lending to SMEs as well as a 6-month loan payment holiday to support SMEs (IMF, 2020b).

To support the initiatives of the ASEAN countries, multilateral agencies have assisted many countries (Appendix 1)

6. Empirical Estimation: Data and Methodology

The empirical study used data collected from Our World in Data, the central banks of 10 ASEAN countries, and the FTSE ASEAN Index Series. The study includes 10 ASEAN countries, namely Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. The

period of the study ranges from 23 January 2020 to 11 December 2020. The variables related to COVID-19 in ASEAN countries, such as total cases (TC), total new cases (TNC), total deaths (TD), and total new deaths (TND), were collected from Our World in Data. Further, exchange rate (ER), inflation (IN), policy rate (PR), deposit rate (DR), and money supply (MS) data have been collected from various central banks of ASEAN countries. Similarly, the financial variables for the ASEAN Daily Stock Index (ASI), Open Stock Index (OSI), High Stock Index (HSI), and Low Stock Index (LSI) have been gathered from FTSE ASEAN Index Series, i.e. Bursa Malaysia, Hanoi Stock Exchange, Ho Chi Minh Exchange, Indonesia Stock Exchange, the Philippine Stock Exchange, Singapore Stock Exchange, and the Stock Exchange of Thailand. In this study, panel data as well as time-series data have been used to see the impact of COVID-19 on macroeconomic variables and financial variables. Panel data has been used to see the impact of COVID-19 on the exchange rate (ER), inflation (IN), policy rate (PR), deposit rate (DR), and money supply, whereas time series data has been used to see the impact of COVID-19 on the FTSE ASEAN stock indices.

6.1. Econometric model specification for the panel data analysis

This study conducted tests for unit roots to examine the stationarity properties of the panel data series variables in the analysis. Unit root tests were carried out with the help of Levin Lin and Chu (LLC), Im-Pesaran-Shin (IPS), and the Breitung test. The study also employed a panel autoregressive distributed lag (ARDL) test to see the long-run and short-run relationships between the total number of cases and the exchange rate (ER), inflation (IN), policy rate (PR), deposit rate (DR), and money supply.

6.2. Results and discussion

Table 15 shows the descriptions of the variables used in our study to understand the impact of COVID-19 on macroeconomic variables.

Table 15: Description of Variables

Variable	Abbreviation	Unit	Source
Total cases	TC	Number of individuals	Our World in Data
Total new cases	TNC	Number of individuals	Our World in Data
Total deaths	TD	Number of individuals	Our World in Data
Total new deaths	TND	Number of individuals	Our World in Data
Exchange rate	ER	US$	Various central banks of ASEAN economies
Inflation	IN	Index number	Various central banks of ASEAN economies
Policy rate	PR	Percentage	Various central banks of ASEAN economies
Deposit rate	DR	Percentage	Various central banks of ASEAN economies
Money supply	MS	US$ billion	Various central banks of ASEAN economies

Source: Our World in Data, and various central banks of ASEAN economies.
Table 16 shows the correlation matrix of the variables used in this study for the panel data analysis.

Table 16: Correlation Matrix

	TC	TNC	TD	TND	ER	IN	PR	DR	MS
TC	1								
TNC	0.8393	1							
TD	0.9405	0.8660	1						
TND	0.7770	0.8674	0.8595	1					
ER	0.0262	0.0583	0.1154	0.1408	1				
IN	-0.001	-0.0295	0.0157	0.0078	0.3145	1			
PR	-0.081	-0.0472	0.0087	0.0354	0.4569	0.3570	1		
DR	0.1067	0.1413	0.1752	0.210	0.0237	-0.073	0.2940	1	
MS	0.1946	0.1854	0.2003	0.1771	0.2618	0.6370	0.5187	0.0694	1

Source: Authors' calculations.

The results of the long-run and short-run coefficients of the panel autoregressive distributed lag (PARDL) model for the panel of 10 ASEAN economies are reported in Table 17.

Table 17. Results of Panel ARDL Estimation

Dependent Variable: Total Number of COVID-19 Cases				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
	Long-run Equation			
ER	0.12*	0.03	4.01	0.00
IN	0.78*	0.04	19.5	0.00
PR	-0.01*	0.00	-4.21	0.00
DR	-3.13*	8.00	-5.27	0.00
MS	4.03*	8.13	4.57	0.00
	Short-run Equation			
ECM (-1)	-0.45**	0.24	-2.27	0.03
ΔlnER	0.22**	0.05	2.54	0.01
ΔlnIN	047**	0.26	2.16	0.03
ΔlnPR	-0.01**	0.01	-2.15	0.04

ΔlnDR	-4.68	694.72	-0.89	0.28
ΔlnMS	1.37	798.26	0.85	0.40
C	6.52**	161.05	2.48	0.03
Mean dependent var.	0.05	S.D. dependent var		0.05
S.E. of regression	0.02	Akaike info criterion		-4.35
Sum-squared residual	0.03	Schwarz criterion		-3.20
Log likelihood	534.13	Hannan-Quinn criterion		-4.12

Note: * and ** show 1% and 5% levels of significance, respectively.
Source: Authors' calculations.

The policy rate (PR) and deposit rate (DR) have a negative and significant association, as expected, with the total number of COVID-19 cases. This can be primarily attributed to the lockdown measures enforced in the ASEAN economies as the reported infections grew. To boost the economy, generally, policy rates were immediately reduced. As credit off-take reduced, deposit rates were reduced. These measures as well as the slowdown in global growth led to a fall in cross-border capital flows, especially in terms of investment, an immediate surge in demand for essentials, which triggered inflation and, further, the accommodative stance of central banks with drastic policy rate cuts added to the increase in the money supply. The result reveals that the exchange rate, inflation, and money supply are related positively to the total number of COVID-19 cases in the long-run. This can be attributed to the approach by monetary authorities to ensure adequate liquidity in the financial system of ASEAN economies. The decline in policy rate changes is in line with efforts to revive the economy after the lockdown. Whilst observing the coefficients of the short-run panel ARDL, the results report that in the short run, the coefficient of ECM shows a negative and significant connection with the total number of COVID-19 cases.

6.3. Econometric model specification for the time series analysis

Total number of COVID-19 cases and the number of deaths are added to make daily time series data from 23 January 2020 to 11 December 2020. Further, financial variables from the FTSE ASEAN Index for time series daily data such as the Daily-Stock Index (ASI), Open Stock Index (OSI), High Stock Index (HSI) and Low Stock Index (LSI) were collected for 23 January 2020 to 11 December 2020. This

study conducted tests for unit roots to examine the stationarity properties of the time series variables in the analysis. Unit root tests were carried out with the help of Dicky-Fuller (DF), Augmented Dickey-Fuller (ADF), and the Phillips–Perron (PP) tests. Further, this study employed vector autoregression (VAR) to know the impact of deaths and new cases on ASEAN stock markets. The HSI been used to indicate stock market performance in the FTSE ASEAN stock market. Autoregressive conditional heteroscedasticity (ARCH) and generalised autoregressive conditional heteroscedasticity (GARCH) models have been used to estimate the volatility in ASEAN stock markets. Finally, a Glosten-Jagannathan-Runkle (GJR)-GARCH model has been adopted to estimate the impact of negative news on the stock markets.

6.4. Results and discussion

The description of the variables used in our study to understand the impact of COVID-19 in ASEAN countries is presented in Table 18.

Table 18: Description of Variables

Variable	Abbreviation	Unit	Source
Total cases	TC	Numbers of individuals	Our World in Data
Total new cases	TNC	Numbers of individuals	Our World in Data
Total deaths	TD	Numbers of individuals	Our World in Data
Total new deaths	TND	Numbers of individuals	Our World in Data
ASEAN Daily Stock Index	ADSI	Index number	FTSE ASEAN Index Series
Open Stock Index	OSI	Index number	FTSE ASEAN Index Series
High Stock Index	HIS	Index number	FTSE ASEAN Index Series
Low Stock Index	LSI	Index number	FTSE ASEAN Index Series

Source: Our World in Data and FTSE ASEAN Index Series.

The correlation matrix of the variables taken in this study for the time series analysis is presented in Table 19.

Table 19: Correlation Matrix

	TC	TNC	TD	TND	ADSI	OSI	HIS	LSI
TC	1							
TCN	0.9224	1						
TD	0.9991	0.9288	1					
TDN	0.8331	0.9030	0.8408	1				
ADSI	0.2797	0.1642	0.2669	0.0778	1			
OSI	0.2547	0.1428	0.2418	0.0573	0.9914	1		
HIS	0.2576	0.1381	0.2438	0.0497	0.9959	0.9972	1	
LSI	0.2788	0.1714	0.2668	0.0871	0.9961	0.9942	0.9939	1

Source: Authors' calculations.

Before the application of volatility modelling, this study applied a unit root test for all the variables taken into consideration for analysis. Table 20 shows that the variables TNC, TND, DASI, OSI, HSI and LSI are stationary at I(1), whereas TC and TD are stationary at I(2).

Table 20: Unit Root Results of the Daily Data

No.	Variable	DF Test			ADF Test			PP Test			Order of Stationarity
		At Level	At First Difference	At Second Difference	At Level	At First Difference	At Second Difference	At Level	At First Difference	At Second Difference	
1	TC	1.87	1.59	11.60*	0.39	2.55	11.57*	2.21	8.29*	-	I(2)
2.	TNC	1.59	11.60*	-	2.55	11.57	-	8.29*	-	-	I(1)
3.	TD	1.12	2.73***	11.84*	0.41	3.15***	12.25*	0.36	15.40*	-	I(2)
4.	TND	2.73***	11.84*	-	3.15***	12.25*	-	15.40*	-	-	I(1)
5.	ADSI	0.79	4.91*	-	2.14	5.15*	-	2.11	17.84*	-	I(1)
6.	OSI	0.94	4.60*	-	2..20	4.65*	-	2.07	16.85*	-	I(1)
7.	HSI	0.90	4.11*	-	2.56	4.35*	-	2.01	14.68*	-	I(1)
8.	LSI	0.98	4.59*	-	2.28	4.89*	-	2.13	14.80*	-	I(1)

Note: * and ** show 1% and 5% levels of significance, respectively.
Source: Authors' calculations.

Table 21 shows the empirical findings of the VAR model, which shows that the highest stock index return of a particular day was affected by its past values for the highest stock index return and the past values of the total number of new cases, as well as the total number of new deaths.

Table 21: Estimates of the VAR Model

Variable	HSI	TNC	TND
HSI_{t-1}	0.1791* (0.0557) [3.2154]	-0.0167 (0.0114) [-1.4649]	-0.1243* (0.0214) [-5.8084]
HSI_{t-2}	0.0081* (0.0023) [3.5217]	-0.2378* (0.0519) [-4.5818]	-0.2378* (0.0214) [-11.1121]
TCN_{t-1}	0.4594* (0.0310) [14.8193]	0.2345* (0.0405) [5.7901]	0.4426* (0.0563) [7.8614]
TCN_{t-2}	0.1815* (0.0556) [3.2643]	0.0798* (0.0115) [6.9391]	0.2765* (0.0346) [7.9913]
TND_{t-1}	0.4445* (0.0519) [8.5645]	0.3478* (0.0580) [5.9965]	0.3376* (0.0575) [5.8713]
TND_{t-2}	0.2437* (0.0543) [4.4880]	0.0078 (0.0114) [0.6842]	0.2798 (0.0487) [5.7453]
Constant	432.9950* (67.8696) [6.3798]	6.9763* (1.5655) [4.4562]	2.6754 (1.5969) [1.6753]
R Squared	0.9820	0.9592	0.8378
Adjusted R Squared	0.9816	0.9584	0.8347
F Statistic	285.8876	270.3853	270.3188
Akaike Information Criterion (AIC)	7.3736	15.9546	9.7652
Schwarz Information Criterion (SIC)	7.4559	16.0369	9.8474

Note: * and show 1% and 5% levels of significance. Standard errors are in ( ), and t-statistics are in [ ].
Source: Authors' calculations.

In order to understand the impact of recent and past news of COVID-19 in ASEAN countries, this study used ARCH and GARCH models (Table 22). The results indicate that recent as well as past COVID-19 news have a significant impact on stock market volatility in ASEAN countries. Further, the addition of the ARCH and GARCH effects is close to 1 (0.9023), which denotes that it will take a long time to recover from the current shocks to the stock market caused by COVID-19. The coefficient of persistence close to 1 (0.90) shows that the impact of the recent shocks in the stock market caused by deaths during COVID-19 may not be over in a short period, but will continue for a long time. Thus, it can be concluded that volatility may persist for a long time.

Table 22: Results of the GARCH (1,1) Model with New Cases and New Deaths

	Coefficient	**P-value**
Conditional Mean Equation (μ)	0.4971	0.025*
Conditional Variance Equation (ρ)	0.8679	0.032*
ARCH Effect (γ)	0.3456	0.0001*
GARCH Effect (λ)	0.5567	0.0032*
Persistence (γ+λ)	0.9023	
TNC	0.4365	0.0051*
TND	0.6789	0.0278**

Note: * and ** show 1% and 5% levels of significance.
Source: Authors' calculations.

TNC and TND positively impact ASEAN stock market volatility, which implies that investors were unable to adjust their portfolios due to the global impact of the COVID-19 pandemic. During the pandemic time, it has been observed that there is volatility clustering in the ASEAN stock market. Further, in order to capture the leverage effect, this study has employed the GJR-GARCH model (1,1) (Table 23).

Table 23: Results of the GJR-GARCH Model with New Cases and New Deaths

	Coefficient	P-value
Conditional Mean Equation (μ)	0.3251	0.0047*
Conditional Variance Equation (ρ)	0.8964	0.0256**
Leverage Effect (δ)	0.6789	0.0045*
ARCH Effect (γ)	0.3676	0.0067*
GARCH Effect (λ)	0.5811	0.0003*
Persistence (γ+λ)	0.9487	
TNC	0.6752	0.03457**
TND	0.5678	0.0004*

Note: * and ** show 1% and 5% levels of significance.
Source: Authors' calculations.

Table 23 indicates that TNC and TND increased volatility in the selected ASEAN stock markets. The coefficient of the leverage effect is 0.6789, which is significant. The coefficient of persistence at 0.9487 shows that the impact of bad news will continue to affect the stock market for a long time. This finding is analogous to Yousef (2020) and Jelilov et al. (2020).

7. Concluding Remarks

This study divides its analysis into three parts. The first part shows the trend analysis of macroeconomic variables of ASEAN economies and descriptive analysis of various measures taken by the central banks of those economies. In the second part of the study, an impact analysis carried out to see the relationship between the number of COVID-19 cases and the policy rate, one-year deposit rate, exchange rate, and money supply. The results reveal that the exchange rate, inflation, and money supply affect the total number of COVID-19 cases in the long run. However, the policy rate and deposit rate have a negative and significant association with the total number of COVID-19 cases. This can be primarily attributed to lockdown measures enforced in the ASEAN economies as the reported infections

grew. These led to a fall in cross-border capital flows, especially in terms of investment, an immediate surge in demand for essentials, which triggered inflation, and, further, the accommodative stance of central banks with drastic policy rate cuts added to increase the money supply. In the third part of the analysis, the study included data on six ASEAN countries, namely Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam, to examine the impact of deaths and new cases on the selected ASEAN stock markets. The empirical findings indicate that the highest stock index return of a particular day is affected by the past values of the total number of new cases as well as the total number of new deaths. Further, the empirical findings indicate that recent as well as past COVID-19 news have a significant impact on stock market volatility in selected ASEAN countries. Finally, the GJR-GARCH results indicate that TNC and TND augmented volatility in the selected ASEAN stock markets and, hence, there is a long-run impact of bad news on the stock market. There are negative shocks in the form of an increasing number of TNC and TND, which disturbed the asset returns of the selected ASEAN stock markets.

8. Policy Suggestions

The lessons learned from the response of central banks in ASEAN economies to the pandemic can provide forward guidance to policy practitioners and for developing international macro policy coordination, which would be significant in the exit strategy from the crisis. Based on the study's findings, the central banks of ASEAN countries should take all possible measures to maintain sufficient liquidity in the system to mitigate the serious impacts of COVID-19. Further, the central banks should continue to monitor and take initiatives to reduce uncertainty and financial stress. From the monetary and macro-financial perspective, the focus should remain on ensuring adequate access to liquidity in the economies, extending necessary credit support to all the sectors and stakeholders. In terms of complying with mandated objectives, the central banks across ASEAN economies should continue to work in synchronization with fiscal authorities.

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Appendix 1

Financial Aid Provided by Multilateral Agencies to ASEAN Countries

1. Brunei Darussalam

In terms of the actual package per capita, Brunei, initially received US$742 from the Asian Development Bank (ADB 2020 b) but later did not receive any assistance as it has not had any new cases or infections for the last 235 days and is practically a green country.

2. Cambodia

Under the Greater Mekong Subregion Health Security Project, ADB provided a loan amount worth US$0.27 million in February 2020. For regional support to overcome the COVID-19 burden, ADB provided a grant of US$1.78 million in April 2020. The amount of US$0.15 million was approved for policy advice for COVID-19 economic recovery in Southeast Asia in April 2020 and for strengthening the enabling environment for disaster risk financing; ADB granted US$0.13 million in September 2020. Further, the World Bank approved US$20 million in credit for the Cambodia COVID-19 Emergency Response Project in April 2020 as part of the first tranche of emergency support operations through a dedicated fast-track COVID-19 facility (loan). Also, the loan amount of US$14 million in H-EQIP project funds was allocated through a Contingency Emergency Response Component to purchase ambulances and medical equipment and to quickly develop national laboratory capacity to rapidly respond to the COVID-19 pandemic. On 29 May 2020, the World Bank also approved US$15 million in credit from the International Development Association for the Cambodia Strengthening Pre-Service Education System for Health Professionals Project to strengthen Cambodia's pre-service education system for health professionals to improve the quality of care for better health outcomes.

3. Indonesia

ADB approved a US$3 million grant under the COVID-19 Emergency Response to finance the procurement of testing kits and other goods and services for frontline health workers and the general population in March 2020. ADB approved a US$1.5 billion loan to support the Government of Indonesia's efforts to alleviate the impact of COVID-19 on public health, livelihoods, and the economy. To enhance job quality, a US$100,000 grant was approved by ADB and US$15 million in loans was granted to support farmers. Further to enhance competitiveness and resilience through quality infrastructure, ADB provided a grant of US$90,000 in November 2020. To support Indonesia's Social Assistance System and COVID-19 response, a loan amount of US$700 million was granted to Indonesia by the World Bank on 15 May 2020. On 22 May 2020, a US$250 million World Bank loan for Indonesia's Emergency Response to COVID-19 Program was granted, and on 22 June 2020, a US$250 million loan was granted from the Asian Infrastructure Investment Bank co-financed with the World Bank under the COVID-19 Crisis Recovery Facility for Indonesia.

4. Lao PDR

ADB initially provided a grant of US$1.03 million in May 2020 to the Lao PDR and later increased the amount to US$1.14 million in January 2021. Under the Greater Mekong Subregion Health Security Project, ADB initially provided a loan amount worth US$0.6 million in January 2020, and later increased the amount to US$0.86 million in June 2020. The World Bank's Regional Vice-Presidency of the East Asia and Pacific Region approved US$18 million for the Lao PDR in April 2020 to help the country respond to the COVID-19 pandemic. The Lao PDR COVID-19 Response Project supports preparedness and emergency response activities, including infection prevention and control, case detection and contact tracing, case management, and risk communication. It also supports the upgrading of surveillance capacity and the skills of healthcare workers.

5. Malaysia

Under the Supply Chain Finance Programme, ADB granted US$2.73 million in April 2020, which was later increased to US$18.5 million in January 2021. Further, to enhance competitiveness and resilience through quality infrastructure in Malaysia, US$0.09 million in loans was provided in November 2020, and later this amount was increased to US$0.11 million in December 2020. The United States through the US Agency for International Development will provide health assistance in response to COVID-19 amounting to US$1 million, and Migration and Refugee Assistance humanitarian assistance to support COVID-19 response efforts for refugees and asylum seekers in Malaysia amounting to US$0.2 million.

6. Myanmar

Under the Greater Mekong Subregion Health Security Project, ADB initially provided a loan amount worth US$500,000 in January 2020, and later additional financing of US$30 million was added in October 2020. A grant of US$0.21 million was provided through the Due Diligence and Capacity Development of Trade Finance Program Banks in July 2020. To reform the transport sector, a loan of US$0.27 million was also granted in July 2020. To support microfinance and lending partner financial institutions, a grant of US$0.16 million was provided in September 2020. For promoting transformative gender equality agenda in Asia and the Pacific, the loan amount sanctioned was US$0.05 million (ADB, 2020). The World Bank approved a US$50 million credit for the Myanmar COVID-19 Emergency Response Project in May 2020 as part of its global emergency support operations through a dedicated fast-track COVID-19 facility. The World Bank also approved US$350 million in credit from the International Development Association to increase the output and efficiency of power generation and improve the resilience of Myanmar's electricity system to climate change and disasters; and US$110 million in additional financing for the Essential Health Services Access Project, implemented nationwide since 2015. In addition, in June 2020, the IMF approved US$356.5 million in emergency assistance for Myanmar under the Rapid Credit Facility and the Rapid Financing Instrument to support the government's COVID-19 Economic Relief Plan that aims at minimising the pandemic's impact by

stimulating the economy and boosting expenditures, especially on health and social safety nets. The IMF has approved the second emergency financial assistance equivalent to about US$350 million under the Rapid Credit Facility and the Rapid Financing Instrument in January 2021.

7. Philippines

For regional support to overcome the COVID-19 burden in the Philippines, ADB initially provided a grant of US$1.14 million to the Philippines in April 2020, and later increased the amount to US$2.9 million in January 2021. Under the COVID-19 Active Response and Expenditure Support Program, ADB provided a loan of US$1.5 billion to the Philippines as well as a US$200 million loan under the Social Protection Support Project in April 2020. For promoting digital finance solutions for inclusive finance amongst partner financial institutions in the Philippines, a US$100,000 grant was provided in July 2020. To enhance the health sector, a loan of US$125 million was approved under the Health System Enhancement to Address and Limit COVID-19 Project. Under the Supply Chain Finance Program, ADB granted US$20,000 to the Philippines as part of the Capacity Development for the Supply Chain Finance Program in October 2020. Further, to enhance competitiveness and resilience through quality infrastructure in ASEAN countries, ADB provided a grant of US$90,000 to the Philippines in November 2020. In the education sector, a loan of US$1.18 million was approved under the Secondary Education Support Program in December 2020.

In April 2020, the World Bank approved a US$500 million loan for Third Disaster Risk Management Development Policy as well as a US$100 million World Bank loan for the Philippines – COVID-19 Emergency Response Project and in May 2020, US$500 million from the World Bank for the Philippines Emergency COVID-10 Response Development Policy Loan. In December 2020, the World Bank approved two projects to support the Philippines' pandemic recovery efforts: US$600 million for the Promoting Competitiveness and Enhancing Resilience to Natural Disasters Development Policy Loan for competitiveness-enhancing reforms and US$300 million for the Additional Financing for KALAHI-CIDSS National Community Driven Development Project for community-initiated responses to the impact of COVID-19.

8. Singapore

In terms of the package per capita, Singapore received US$12,200 from ADB in June 2020.

9. Thailand

For regional support to overcome the COVID-19 burden in Thailand, ADB provided a grant of US$500,000 in April 2020 and an additional US$1.80 million for country support to address COVID-19 and other communicable diseases. Under the Active Response and Expenditure Support Program loan, ADB granted US$1.5 billion in June 2020. Under the Supply Chain Finance Program, ADB granted US$20,000 loan in October 2020. Further, to enhance competitiveness and resilience through quality infrastructure in ASEAN countries, ADB provided a grant of US$90,000 to Thailand in November 2020. Again, Thailand received US$6.5 million in grants for health and humanitarian assistance from the United States Agency for International Development.

10. Vietnam

For regional support to overcome the COVID-19 burden in Vietnam, ADB provided a grant of US$500,000 in April 2020. Under the Greater Mekong Subregion Health Security Project, ADB initially provided a loan amount worth US$500,000 to Vietnam in February 2020. A grant of US$70,000 was also provided for the Due Diligence and Capacity Development of Trade Finance Program Banks in July 2020. Further, to enhance competitiveness and resilience through quality infrastructure in ASEAN countries, ADB provided a grant of US$90,000 to Vietnam in November 2020. Under the Supply Chain Finance Program, ADB granted a US$1.06 million loan to Vietnam in December 2020. Later, to support Women-led Small and Medium-sized Enterprises in Vietnam, a grant of US$5 million was made in December 2020.

In addition, Vietnam received a US$1 million grant from the United Nations COVID-19 Response and Recovery Funds for mitigating the impact of COVID-19 on the most vulnerable groups and supporting more resilient policies and systems. The World Bank granted US$6.2 million to strengthen Vietnam's COVID-19 efforts under the Pandemic Emergency Financing Facility in July 2020.

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