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# INFLATION: Challenges and Threats to Economic Growth in ASEAN

*Inpong Louangrath*
*International College, Bangkok University*

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**Abstract**

The purpose of this paper is to examine the threats and challenges of inflation faced by the ASEAN economies. The data used in this study included historical data of inflation rates, GDP growth, and exchange rates. The sample size came from 550 weeks of weekly exchange rate. This paper employed autoregressive model to obtain predictive functions of inflation and its effects under ERPT and the Prospect Theory. The average inflation for the group is 6.433 ± 3.98, as compared to the GDP growth rate of 4.144 ± 1.37. There is a short fall of 2.289 percent; this is a significant creeping inflation ($p = 0.047$). Among the ASEAN countries, only Philippines showed significant economic growth ($p = 0.043$). Inflation rates for the US and EU area are 8.6 percent and 8.98 percent. These major economies are expected to grow by 2.0 and 2.7 percent respectively. In contrast, the expected economic growth for ASEAN is 5.51 percent and the expected inflation is 10.41 percent. Inflation in the ASEAN exceeds economic growth by 4.10 percent. ASEAN's economic growth is threatened by inflation. Lacking unified policies, ASEAN countries are left to tackle these problems.

**Keywords**

ASEAN, ERPT, Exchange rate, Growth model, Inflation

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# เงินเฟ้อ: ความท้าทายและภัยคุกคามต่อการเติบโตทางเศรษฐกิจในอาเซียน

*อินทร์พงษ์ หลวงราช*
*วิทยาลัยนานาชาติ มหาวิทยาลัยกรุงเทพ*

**บทคัดย่อ**

บทความนี้มีวัตถุประสงค์เพื่อตรวจสอบภัยคุกคามและความท้าทายของอัตราเงินเฟ้อที่เศรษฐกิจอาเซียนเผชิญ ข้อมูลที่ใช้ในการศึกษานี้รวมถึงข้อมูลในอดีตของอัตราเงินเฟ้อ การเติบโตของ GDP และอัตราแลกเปลี่ยน ขนาดตัวอย่างมาจาก 550 สัปดาห์ของอัตราแลกเปลี่ยนรายสัปดาห์ บทความนี้ใช้แบบจำลอง autoregressive เพื่อให้ได้ฟังก์ชั่นการทำนายของอัตราเงินเฟ้อและผลกระทบภายใต้ ERPT และ Prospect Theory อัตราเงินเฟ้อเฉลี่ยของกลุ่มอยู่ที่ 6.433 ± 3.98 เมื่อเทียบกับอัตราการเติบโตของ GDP ที่ 4.144 ± 1.37 มีการลดลงเล็กน้อยที่ 2.289 เปอร์เซ็นต์; นี่คืออัตราเงินเฟ้อที่คืบคลานอย่างมีนัยสำคัญ (p = 0.047) ในกลุ่มประเทศอาเซียน มีเพียงฟิลิปปินส์เท่านั้นที่มีการเติบโตทางเศรษฐกิจอย่างมีนัยสำคัญ (p = 0.043) อัตราเงินเฟ้อสำหรับพื้นที่สหรัฐอเมริกาและสหภาพยุโรปอยู่ที่ 8.6 เปอร์เซ็นต์และ 8.98 เปอร์เซ็นต์ เศรษฐกิจหลักเหล่านี้คาดว่าจะเติบโตร้อยละ 2.0 และ 2.7 ตามลำดับ การเติบโตทางเศรษฐกิจที่คาดการณ์ไว้สำหรับอาเซียนอยู่ที่ร้อยละ 5.51 และอัตราเงินเฟ้อที่คาดการณ์ไว้ที่ร้อยละ 10.41 อัตราเงินเฟ้อในอาเซียนสูงกว่าการขยายตัวทางเศรษฐกิจร้อยละ 4.10 การเติบโตทางเศรษฐกิจของอาเซียนถูกคุกคามจากภาวะเงิน

เฟ้อ เพราะขาดนโยบายที่เป็นเอกภาพ ประเทศในอาเซียนจึงถูกทิ้งให้จัดการกับปัญหาเหล่านี้

**คำสำคัญ**

อาเซียน, ERPT, อัตราแลกเปลี่ยน, รูปแบบการเติบโต, อัตราเงินเฟ้อ

## 1. Introduction

The Association of Southeast Asian Nations (ASEAN) is a political and economic union of 10-member countries in Southeast Asia. These countries include: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam. The specific goals of ASEAN are to promote intergovernmental cooperation and to facilitate economic, political, security, military, educational, and socio-cultural integration amongst its members. Other goals are to promote peace and stability based on the rule of law and the principle of the United Nations Charter. The ASEAN way for member countries is compromise, consensus, and consultation in the informal decision-making process (Goh, 2003). Due to diverse political systems among member states, consensus for collective action is not easy (Leviter, 2010). In 2007 at the 13th ASEAN Summit in Singapore, the ASEAN agreed to form an Economic Community (AEC) (ASEAN Economic Community Blueprint, 2008). The goals of the AEC are free movement of skilled labor, goods, services and investment. ASEAN wants to become a one global market with the hope of increasing its competitiveness and opportunities for development (Rising as One, 2013). In 2022, two years after COVID-19 pandemic and facing the current global economic downturn in post-pandemic period, the economic growth in ASEAN is now facing threats from inflation. The expected growth for ASEAN is 5.51 percent and maximum expected inflation is 10.41 percent; there is an inflationary threat of 4.10 percent to detract ASEAN's real economic growth.

The purpose of this paper is to examine the effects and challenges of inflation on ASEAN economies. The ASEAN market has a combined GDP of 3.2 trillion dollars; it is the fifth largest economic group in the world. This paper is a study of ASEAN economies as a group and individual countries. The study will assess how each member country had been affected by inflation. By mid-2022, the global economy is faced with inflation and possible global recession. In June 2022, the World Bank warned of possible global recession by stating that there is "a protracted period of feeble growth and elevated inflation," as it cut global growth forecasts by 1.2 percentage points to 2.9 percent for 2022. It had predicted growth of 4.1 percent in January of 2022. The Bank explains that COVID-19 pandemic and the Russian invasion of Ukraine are main factors for the looming global recession. According to the World Bank stated that: “The war in Ukraine, lockdowns in China, supply-chain disruptions, and the risk of stagflation are hammering growth. For many countries, recession will be hard to avoid." (The World Bank Press Release, 2022). The Bank further estimated that growth in the U.S. would only be 2.5 percent this year, down from 5.7 percent last year. Europe would see the growth of 2.5 percent compared to 5.4 percent last year. China is expected to grow 4.3 percent this year, down from 8.1 percent last year (VOA, 2022).

The COVID-19 pandemic and the war between Ukraine and Russia are significant causes for the rise in price level. Governments’ measures against COVID-19, such as social distancing and restriction on travels, has led to the loss in economic activities. More recently in 2022, with the imposition of economic sanctions on Russian after the military conflict in Ukraine, fuel and food prices rose. The world today faces the threat of inflation. The ASEAN is presently dealing with the adverse effects of inflation. This paper examines the effects of inflation on economic growth in the ASEAN countries and explores monetary policy tools for stakeholders in the ASEAN to cope with inflation.

In the second quarter of 2022, the world faced inflation-led recession. The major economies, such as the US, EU area and Japan experienced the adverse effects of inflation. By June 2022, the US reported that it was facing 8.6 percent inflation. In less than 13 months, the fed raised interest rate 7 times. High inflation was also reported in the EU area where inflation is 8.98 percent. A third major economy is Japan. In June 2022, Japan reported its inflation to be at 2.50 percent; although this number is low, it doubles its previous level of 1.20 percent. These major economies are major markets for the ASEAN countries. Another major market for ASEAN countries is China. China's inflation rate is under control at 2.10 percent.

High inflation is often associated with lower growth and financial crises (Mishkin, 2008). Low inflation may be achieved, but this achievement is not permanent (Rogoff, 2003). There is always a need to fight and keep inflation at bay. Public and private debt must be under control. The labor market must produce job opportunities for people. The rise of commodity prices, such as prices food and fuel, may contribute to inflation. With the market integration at regional level and expansive trade ties between major economies and the ASEAN, for instance, inflation became a global phenomenon (Carney, 2015). This paper touches upon the issue of global inflation because the ASEAN's trading partners are major economies: US, EU area and Japan. Global inflation adversely affects economic growth in these major markets and, thus, directly affects economies in the ASEAN region.

Theories on economic growth—Solow (1956), Lucas (1988), Romer (1990), and Aghion and Howitt (1992)— suggest that there is a relationship between economic growth and inflation (Svensson, 2003; De Gregorio, 1993). Kormendi and McGuire (1985) studied a cross-section of 47 countries during the period 1950-1977 and found that there is a significant negative effect of inflation on growth. A study by Khan and Senhadji (2001) found that healthy inflation must be within certain thresholds; for industrialized countries, inflation should be about 1% and for developing economies, inflation should not exceed 11%. For industrialized countries, inflation below 1% would have a positive effect on the

economy. For developing economies, inflation below 11% has a positive effect on the economy. This finding was confirmed by Ghosh and Phillips (1998) who studied IMF member countries and found that inflation may threaten economic growth. High and fast growth may lead to inflation and in order to slow down inflation, interest rate becomes a tool to manipulate consumption and money supply in the economy. For example, the increase in money supply causes inflation and increasing interest rate helps to bring down that inflation. This relationship between inflation and economic growth may be found in the works of Sidrauski (1967), Brock (1974), or Lucas and Stokey (1987).

The research question presented in this paper is whether the ASEAN's economic growth is threatened by inflation. In answering this question, this paper tested the relationship between inflation, interest rate, and economic growth in the ASEAN region. The correlations between ASEAN's economic growth, exchange rates, and inflations rates were used to determine the effect of inflationary threats on ASEAN's economic growth. The exchange rate pass-through (ERPT) effect was also calculated to verify if domestic inflation among the ASEAN countries was caused by exchange rate fluctuation.

The intended contribution of this paper is to help policy makers and stakeholders to see that inflation threatens economic growth in the ASEAN. The relationship between inflation and economic growth could not be generalized for all countries. This paper shows that despite heavy reliance on export by ASEAN countries, exchange rate pass-through (ERPT) inflationary pressure has no significant risk for the group. However, other structural imbalance, such as trade deficits and domestic inflation, may bring more serious threats to economic growth among ASEAN countries.

## 2. Literature Review

The conceptual framework of this paper rests on the argument that inflation is caused by excessive money supply (Sims, 1980), exchange rate depreciation (Taylor, 2000), and balance of payment crisis. Inflation in the developed economies resulted from the growth of money supply (Sargent & Wallace, 1981). In developing economies, inflation may come from excessive money supply, exchange rate depreciation, and balance of payment crisis (Montiel, 1989). This paper is a study of the threat of inflation on ASEAN's economic growth. ASEAN countries are developing economies. This paper presents the literature review in two subsections. Section 2.1 explored the relationship between inflation and GDP. Nominal and real GDP differ in that real GDP is adjusted for inflation. In general, a nominal GDP growth rate must exceed inflation rate in order to make real gain in economic growth. Section 2.2 puts the ASEAN international trade into perspective through the concept of exchange rate pass-through (ERPT) inflation which exerts influence on the domestic price level, especially among those ASEAN countries with negative balance of trade.

### 2.1 Inflation and its effect of GDP growth

Inflation is the increase of price and the corresponding reduction of purchasing power (Walgenbach, Dittrich, and Hanson, 1973). It is measured as annual percentage change in price levels (Mankiw, 2002). Inflation may be caused by excessive money supply (Barro and Grilli, 1994). Since inflation has the effect of reducing purchasing power, it is public policy to keep inflation under control. The rate of growth for money supply must be matched by the growth rate of the economy to avoid inflation (Sidrauski, 1961). Economic growth may come from investment in market production, infrastructure, and education can all grow an economy (Henderson, 2003).

Inflation is one of many factors that correlate to economic growth (Barro, 1996). Some studies showed that there is no relationship between inflation and economic growth (Sidrauski, 1967); others showed a negative relationship (Fisher, 1993) or

positive relationship (Mallik and Chowdhury, 2001). It appears that the relationship is inconclusive; however, deeper analysis shows that the relationship depends on the level of inflation. Higher level of inflation may hinder the rate of return on investment Gultekin (1983). Lower rate of inflation may stimulate spending and economic growth. Ghosh and Phillips (1998), for instance, after studying 145 countries concluded that low inflation stimulates economic growth. Whether the relationship between inflation and economic growth is positive or negative depends on the level of inflation. Low inflation is good and high inflation is bad. High inflation reduces capital accumulation and total factor productivity (Cozier and Selody, 1992). Low inflation may stimulate growth (Mallik and Chowdhury, 2001).

The second issue of inflation and economic growth is the length of time that the economy sustained inflation (Umar and Zubariu, 2012) Datta and Mukhopadhyay (2011) showed that there is causality between inflation and economic growth in the short run. In the short run low inflation stimulates economic growth; in the long run, sustained economic growth causes higher level of inflation and higher level of inflation reverses the direction of the causality. Under these facts, one tool to reduce inflation may logically imply reduction of economic growth. For policy makers and stakeholders, controlling inflation means managing economic growth and managing inflation means controlling inflation.

From the above review, it is concluded that in general inflation has negative effects on economic growth (Orphanides and Solow, 1990; De Gregorio, 1993; and Roubini and Sala-i-Martín, 1995). Economic growth is measured by the growth of the GDP. GDP growth comes from the growth of capital investment. Inflation introduces uncertainties into decision on capital investment (Bruno & Easterly, 1998; Pindyck and Solimano, 1993). For example, inflation reduces capital accumulation and factor productivity (Fischer, 1991, 1993). In a study of the OECD countries, it was found that in the short-run inflation affects the level of productivity (Cozier and Selody, 1992). A study involving 120 countries found that higher level of inflation has a long-run negative effect on the economy (Barro, 1996). There is a consensus in the literature that inflation

negatively affects economic growth (De Gregorio, 1992a, 1992b; see also Motley, 1994).

One way to fight inflation is monetary discipline; monetary policy may be used to limits the money supply of an economy (Melitz, 1987; Neyapti and Ozgur, 2007; Dalmazzo, 2014). Policy aiming to fight inflation is to prevent a condition where "too much money chasing too few goods" (Barth and Bennet, 1975). Central banks may constrain money supply and effectively monitor the velocity of money in order to keep inflation under control. Inflation may be internally created within the economy or passing through exchange rate via international trade.

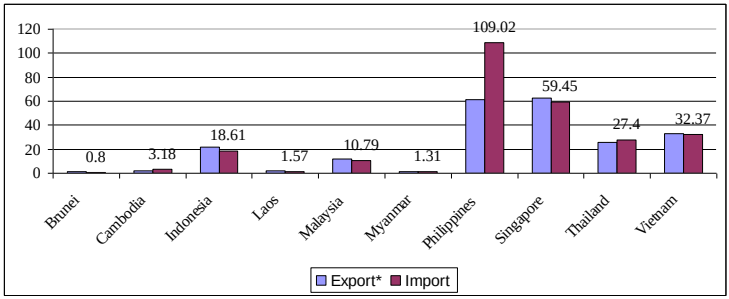
A second source of inflation may come through international trade. One tool to control inflation pass-through exchange rate effect is by pegging the local currency to a foreign currency (Fielding and Bleaney, 2000). Countries with lower inflation will tend to experience lower ERPT (Taylor, 2000). Low inflation expectations produce credible monetary policy, the latter can play a role in shaping the ERPT (Gagnon and Ihrig, 2004; McCarthy, 2007; Ozyurt, 2016). Low ERPT may contribute to effective monetary policy to stabilize inflation and output (Mishkin 2008). Exchange rate pass-through (ERPT) is the degree to which a country's import, producer or consumer prices change in response to a change in its exchange rate.

Changing price level is not possible to control, but at least policy makers can help ease the effect of rising price level. Thus, the best thing to hope for is a low and steady rate of inflation, i.e. a healthy rate of inflation (Hummel, 2007). Some argued that low inflation may lessen the effect of recession (Svenson, 2003); although true, but inflation often goes hand in hand with recession. Low inflation, by default generally promotes continuous economic growth because low inflation stimulates economic growth. However, it is high inflation that is prone to throw the economy into recession. The reason why economists like to see low and steady inflation is because such condition helps the economy to avoid recession.

### 2.2 Exchange rate pass-through effect inflation

One source of inflation that affects the ASEAN economy is Exchange-rate pass-through (ERPT). Ideally, countries would prefer to have low level of ERPT. Low inflation expectations produce credible monetary policy, the latter can play a role in shaping the ERPT (Gagnon and Ihrig, 2004; McCarthy, 2007; Ozyurt, 2016). Low ERPT may contribute to effective monetary policy to stabilize inflation and output (Mishkin 2008). Thus, monetary policy and ERPT are related to inflation. Some countries in the ASEAN (Cambodia, Laos, and Myanmar) traditionally are dependent on imports and often experienced trade deficits. McCarthy (2000) and Choudhri and Hakura (2006) found that countries with trade deficit generally are exposed to the risk of inflationary from ERPT. Fig. 1 illustrates trade volumes in the ASEAN countries; Philippines is a country with highest level of trade deficit.

**Figure 1 Trade balance of ASEAN countries (billion US dollars, 2021).**




Note. From IMF Global Economic Outlook, 2022

ERPT is the elasticity of local-currency import prices with respect to the local-currency price of foreign currency. It is often measured as the percentage change, in the local currency, of import prices resulting from a one percent change in the exchange rate between the exporting and importing countries (Goldberg and Knetter, 1997). When exchange-rate pass-through is greater, there is more transmission of inflation amongst countries (Campa and Goldberg, 2005). ERPT may differ from firm to firm in the same

country. Studies of firm-level differences explain why exchange-rate pass-through is not equal to one (Berman, Martin, and Mayer, 2012). Some studies suggest that increase globalization contributed to a decrease in exchange-rate pass-through (Cook, 2014). ERPT deals with imports. There is a connection between imports and domestic inflation. When the country's currency becomes weaker in relations to the currency of a country from which its imports, i.e. US dollar, domestic price level in the importing country will rise even though the price level in the exporting country does not change.

The use of local currency may also help reduce the effect of ERPT (Devereux and Engel, 2001; Bacchetta and Van Wincoop, 2003). However, many ASEAN countries have used US dollar instead of local currency to pay for imports. Among the ASEAN countries, such as Cambodia, Laos, Myanmar and Vietnam allow USD, EUR or RMB in addition to the local currency as a medium of exchange to pay for imports. By so doing, the implementation of monetary policy for purposes of reducing ERPT may be ineffective. Since the ERPT effect is exerted from outside of the country, it must be tackled with monetary policy tools at a macro-level (Gagnon and Ihrig, 2004). The issue of controlling ERPT in the ASEAN is further complicated by the fact that economic development in the ASEAN is unequal. The new members (Cambodia, Laos, Myanmar and Vietnam) are still marked by under-developed markets (Dornbusch & Reynoso, 1989) Under-developed market is characterized by imperfect competition. Imperfect competition may result from the inability of the seller to optimize its position (Besanko, 2012). The use of foreign currencies in the local economy also reflects this market imperfection among the new ASEAN countries.

The ASEAN economy is export driven; as such, the region's exposure to ERPT is unavoidable. As the result, domestic price of goods and services is strongly influence by changes in foreign exchange rate (Taylor, 2000). Thus, a fluctuation in the US dollar, for instance, directly influences the price of imports. For example, the increase of the interest rate by the US Federal Reserve results in stronger US dollar in the international market. Strong US dollar makes imports in the ASEAN more expensive since the local ASEAN

currencies become weaker against the US dollar. This ERPT inflation pressure is difficult to alleviate.

Among the ten ASEAN countries, Philippines has the largest trade deficit. The country runs a trade deficient of 47.73 billion US dollars in 2022. The seriousness of this deficit shows a significance level of p = 0.0022. This paper uses this information for estimating ERPT vulnerability by defining ERPT exposure as: $\delta = (1 - F(Z)_{def})ERPT$. The ERPT model is given by:

$$CPI_{adj.} = \frac{1}{n}\sum_{i=1}^{n} CPI(1-\delta) \qquad (1)$$

F(Z) is the cumulative density function (CDF) of a group of observations (X: $x_1, x_2, \ldots, x_n$). In this case, the observations are trade balance (export – import) for the ASEAN countries. A standard score (Z) is calculated from this series of observed trade balance: $Z = (x_i - S)/\sqrt{n}$). With known Z, the value of F(Z) or percentage probability of the event or F(Z) is obtained from the Z table. The pValue or the significance level is given by (1 – F(Z)). In equation (1) this significance level or pValue is used as an adjustment of the CPI to construct ERPT model. Equation (1) is the inflation caused by exchange rate pass-through (ERPT) effect.

**3. Data and methodology**

In order to determine ERPT effect, we must know the trade balance status of the country. Table 1 below presents the trade status of ASEAN economies ending the fiscal year 2021. In the ten countries, three countries (Cambodia, Myanmar, and Philippines) experienced trade deficit in 2021. Philippines incurred the most serious trade deficit among the group with significance level of 0.0327. Among the trade surplus countries, no single country had significant trade surplus. Overall ASEAN had the total exports of 1,356,889.4 million dollars and imported 1,234,341.0 million dollars worth of goods. The ASEAN economies experienced a trade deficit of -122,548.4 billion dollars. As a region, ASEAN may be classified as a region with potential ERPT effects due to its overall trade deficit.

**Table 1 ASEAN trade balance 2021**

| ASEAN Countries | Trade (million USD) | | Trade Balance (million USD) | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| | Export | Import | $x_i$ | $\bar{x}$ | $\pm s$ | Z | Prob. |
| Brunei | 6,607.7 | 5,343.2 | 1,264.5 | 12,254.8 | 23,061.4 | (0.48) | 0.3169 |
| Cambodia | 17,412.0 | 18,968.0 | (1,556.0) | 12,254.8 | 23,061.4 | (0.60) | 0.2747 |
| Indonesia | 163,191.8 | 141,568.8 | 21,623.0 | 12,254.8 | 23,061.4 | 0.41 | 0.3424 |
| Laos | 5,086.9 | 5,013.6 | 73.3 | 12,254.8 | 23,061.4 | (0.53) | 0.2987 |
| Malaysia | 233,931.2 | 189,730.6 | 44,200.6 | 12,254.8 | 23,061.4 | 1.39 | 0.0824 |
| Myanmar | 16,806.2 | 17,947.4 | (1,141.2) | 12,254.8 | 23,061.4 | (0.58) | 0.2807 |
| Philippines | 65,214.5 | 95,161.3 | (29,946.8) | 12,254.8 | 23,061.4 | (1.83) | 0.0327 |
| Singapore | 374,824.8 | 329,596.0 | 45,228.8 | 12,254.8 | 23,061.4 | 1.43 | 0.0757 |
| Thailand | 192,372.8 | 169,702.6 | 22,670.2 | 12,254.8 | 23,061.4 | 0.45 | 0.3258 |
| Vietnam | 281,441.5 | 261,309.5 | 20,132.0 | 12,254.8 | 23,061.4 | 0.34 | 0.3664 |
| Total | 1,356,889.4 | 1,234,341.0 | | | | | |
| Max | 374,824.8 | 329,596.0 | | | | | |
| Min | 5,086.9 | 5,013.6 | | | | | |
| Mean | 135,688.9 | 123,434.1 | | | | | |
| SD | 132,857.0 | 115,077.8 | | | | | |

Note. From ASEAN Statistical Yearbook 2021, p. 54. https://www.aseanstats.org/wp-content/uploads/2021/12/ASYB_2021_All_Final.pdf

### 3.1 Data on inflation, exchange rate and interest rate

The research question is whether inflation presents a threat to economic growth in the ASEAN. Economic growth is defined by GDP growth. If the GDP growth is smaller than inflation, it means that the economic did not experience real GDP growth or it means that the economy only grows nominally. In order to analyze GDP growth, it is necessary to examine domestic inflation. This paper used three sets of data for this paper. The first set of data consists of exchange rate over a period of 10 years. Weekly spot rate for 550 weeks was used to study the exchange rate pass through (ERPT) effect on domestic inflation and reflect on the type of challenges it presents to the ASEAN economies.

The second set of data consists of current and historical data of inflation rates for the ten countries in ASEAN. This paper examined inflation rates in a span of 30 years to understand the pattern of growth and retraction of the economies and to verify whether there is significant relationship between inflation and economic growth in ASEAN economies. Inflation rate was used because it has an effect on GDP growth. Real GDP growth is the GDP growth adjusted for inflation. If the GDP growth is less than domestic inflation, it means that the country does not experience real growth.

A third set of data consists of GDP growth rate over a period of 30 years for the ASEAN and proxy economies. Major economies included the US, EU area and Japan as a reference group was selected for study. China is also used as a proxy economy to contrast against Western major economies and may be used as a possible market for trade policy re-alignment.

Table 2 presents the inflation, interest, and GDP growth rates of ASEAN economies in a global context. These figures were compared to those of major economies: US, EU area, and Japan. In addition, China was used as a proxy economy for purpose of pointing out that China is a regional economic powerhouse and, as such, by realigning ASEAN's trade direction, the region could reduce its risk exposure so often brought about by western major markets. The experience of the Asian financial crisis of 1997 and series of financial crisis that followed showed that the ASEAN economies are not immune to western economic shock. Despite significant trade and investment activities between China and ASEAN countries, China on had never brought any shocks with negative effects upon the ASEAN. This study looked at the exchange rate movement of RMB overtime to verify the stability of China's currency as it was traded against the US dollar. The stability of China's currency offers a potential buffer to economic shock if ASEAN re-align its trade flows to China and decrease its dependence on western market, such as US and EU area.

**Table 2 ASEAN economic growth and inflation**

| Country & Region | Population (million) | Inflation*** 2021 | 2022 | Interest rate (percent) | GDP 2022* (percent) |
|---|---|---|---|---|---|
| ASEAN: | | | | | |
| Brunei | 0.463 | 2.500 | 3.20 | 5.50 | 3.70 |
| Cambodia | 15.993 | 2.475 | 7.20 | 1.02 | 4.50 |
| Indonesia | 274.859 | 1.551 | 3.55 | 3.50 | 5.01 |
| Laos | 7.481 | 4.900 | 12.80 | 3.10 | 3.80 |
| Malaysia | 33.782 | 2.500 | 2.80 | 2.00 | 5.00 |
| Myanmar | 53.886 | 4.128 | 13.82 | 7.00 | 2.00 |
| Philippines | 112.147 | 4.304 | 5.40 | 2.25 | 6.50 |
| Singapore | 5.743 | 1.560 | 5.60 | 0.64 | 3.70 |
| Thailand | 70.078 | 0.859 | 7.10 | 0.50 | 2.20 |
| Vietnam | 99.223 | 2.034 | 2.86 | 4.00 | 5.03 |
| MAJOR ECONOMIES** | | | | | |
| US | 329.500 | 8.30 | 8.60 | 1.75 | 2.0 |
| Euro area | 447,007 | 8.10 | 8.98 | 0.00 | 2.7 |
| Japan | 125.800 | 1.20 | 2.50 | -0.10 | 1.70 |
| China | 1,402 | 2.20 | 2.20 | 3.45 | 4.30 |

*https://www.imf.org/en/Publications/WEO/weo-database/2022/April/download-entire-database (Accessed: June 28, 2022).
**https://www.worldbank.org/en/news/press-release/2022/06/07/stagflation-risk-rises-amid-sharp-slowdown-in-growth-energy-markets (Accessed: June 28, 2022).
***Inflation figures are for 2021 and Q1/2022. https://tradingeconomics.com/japan/inflation-cpi (Accessed: June 28, 2022).

In June 2022, the inflation rate in the ASEAN countries ranges from the low of 2.80 percent (Malaysia) to the high of 13.80 percent (Myanmar). The average in the group is 6.433 ± 3.98. Meanwhile the percentage growth of the GDP forecasted for 2022 ranges from 2.00 percent (Myanmar) to the high of 6.50 percent (Philippines). The overall economic prospect for the ASEAN does not look promising. The average inflation for the group is 6.433 ± 3.98 compared to the GDP growth rate of 4.144 ± 1.37. There is a short fall of 2.289 percent. When the economic growth rate cannot keep up with inflation rate, the economy does not have real growth.

ASEAN is faced with the challenge of how to sustain economic growth at a rate higher than inflation. GDP is stated at current or nominal prices. GDP from two periods cannot be compared without adjustments for inflation. Inflation adjusted GDP is called real GDP. Therefore, GDP growth is looked at it in real term by adjusting the growth rate by inflation. GDP growth that is less than inflation rate tells us that there is no real growth. By taking inflation into account, the GDP growth in ASEAN is -2.289 percent because inflation is higher than GDP growth for the group by 2.289 points.

### 3.2 Methodology and hypothesis testing

Three types of testing were used. Firstly, the level of threats posed by inflation to economic growth in the ASEAN at country and regional levels was tested. Secondly, the impact of ERPT to the ASEAN economies was assessed. As a region depending on export and western market for growth, inflation pressure from weak exchange rate seems to be a potential cause for ERPT. Lastly, it is assumed that the ASEAN countries are exchange economies.

Granger-causality test was used to verify causal relationship between GDP, exchange rate, and inflation. Assume that there are three time series data: X (inflation), Y (GDP growth), and Z (exchange rate). Variable X is Granger-caused Y if it helps forecasting Y. Variable X is not granger-caused Y if it fails to help forecasting Y. In this study, exchange rate and inflation are used to predict the GDP.

A variable fails to Granger-cause another variable if its lags are not statistically significant in the equation for another variable, and past values are not significant in predicting the future values of another. The null hypothesis is $b_1 = b_2 = 0$; there is no Granger-cause between X and Y. The alternative hypothesis is $b_1 \neq b_2 \neq 0$. Using VAR (2), the general structure of the modeling is written as:

$$x_t = c_1 + \sum_{i=1}^{2} a_1 y_{t-1} + \sum_{i=1}^{2} \beta_1 y_{t-1} + \sum_{i=1}^{2} \gamma_1 y_{t-1} + \varepsilon_{x,t} \qquad (2)$$

$$y_t = c_2 + \sum_{i=1}^{2} a_2 y_{t-1} + \sum_{i=1}^{2} \beta_2 y_{t-1} + \sum_{i=1}^{2} \gamma_2 y_{t-1} + \varepsilon_{x,t} \quad (3)$$

$$z_t = c_3 + \sum_{i=1}^{2} a_3 y_{t-1} + \sum_{i=1}^{2} \beta_3 y_{t-1} + \sum_{i=1}^{2} \gamma_2 y_{t-1} + \varepsilon_{x,t} \quad (4)$$

This paper tested the effect of inflation on economic growth by looking at the loss of purchasing power due to inflation. At any given economic growth level, in order to be meaningful that growth must exceed inflation. In ASEAN, the regional expected growth rate is 4.14 percent ± 1.37 and the inflation rate is 6.43 ± 3.98. There is a shortfall of 2.98 percent. With a Z score of 1.67, the significance is p = 0.047. Inflation may be a significant threat to economic growth in the ASEAN. At this point, it is necessary to redefine the "significance" level for purposes of inflationary threat to economic growth.

In conventional significance test in social science, 95 percent confidence interval is used; however, in economic policy studies, this might not be the case. For instance, in exchange rate management, the band that monetary policy officials follow in the ASEAN is a 10 percent band under managed float exchange rate regime. This allowance of ten percent fluctuation of exchange rate implies that monetary authorities in ASEAN countries are using 90 percent confidence interval. For this reason, a test for significance in exchange rate may adjust the confidence interval to 90 percent in order to be consistent with the managed float band of 10 percent exchange rate fluctuation.

This paper proposed to follow the 10 percent band used in exchange rate management. We proposed the following steps: (i) find the difference (*d*) between growth rate and inflation for the ASEAN countries, (ii) use these differences as $d_i$ to calculate the percentage probability of short falls, and (iii) find the joint probability for the GDP growth and the difference between GDP growth and inflation (short fall) by using joint probability calculation: P(A|B) = P(A) + P(B) - P(A)*P(B). Under this structure, threats from inflation can be defined as (1 - P(A|B)) for the individual ASEAN country. The result

of P(A|B) is used to calculate inflationary threats to economic growth to individual country and the ASEAN region.

The effect of ERPT on GDP growth was tested. Conventionally, ERPT is treated as a component of domestic inflation rate by using aggregate price indices (Goldberg and Kettner, 1997). However, this paper proposes to look at exchange rate pass through as an external even that comes through the domestic market through import. The cause for the price rise is not domestically created but resulted from the devaluation of the local currency or appreciation of the US dollar. For instance, in the intra-trade among ASEAN countries, while the price level inside Thailand for certain goods exported to Laos remains unchanged; however, the price of that same item increases from $t_i$ to $t_{i+1}$ due to the depreciation of the Lao currency (LAK). The consumer price index, in this case, may be misleading because the rise in price level is transferred from exchange rate devaluation. One effect of exchange rate is the reduction of the purchasing power of the agent in the economy. Although the subject of this paper is to see how inflation affects GDP growth, inflationary pressure from ERPT at microeconomic level could be looked at by using the per capita GDP. The reduction of the purchasing power as the result of inflation is actually the decrease of individual consumer's purchasing power in the economy.

In Table 3, three sets of inflation rates were studied to find the coefficient of determination between ASEAN exchange rates and the corresponding US and global inflation rates. Each country in the ASEAN is designated as the output inflation (Y), the US and world inflation rates are designated as explanatory factors ($X_1$ and $X_2$). The percentage probability for each variable is used as a coefficient to obtain the adjusted value. The final value is defined as ERPT. Table 4 used the coefficient of determination ($R^2$) as an indicator of the level of correlation between ASEAN and the US and world inflation rates. The adjusted R-squares were highest among Brunei (0.6285) and Malaysia (0.5182) while the figures for Indonesia and Laos were less than 0.01.

**Table 3 ERPT indication for ASEAN**

| ASEAN countries | Intercept | | US Inflation (X1) | | World Inflation (X2) | | Adj. $R^2$ |
|---|---|---|---|---|---|---|---|
| | Value | Prob. | Value | Prob. | Value | Prob. | |
| Brunei | 1.8036 | 0.0001 | 0.3976 | 0.0015 | 0.3808 | 0.0007 | 0.6285 |
| Cambodia | -1.6842 | 0.2312 | 0.2774 | 0.3873 | 1.4190 | 0.3873 | 0.2523 |
| Indonesia | 5.6649 | 0.0244 | -0.4147 | 0.3243 | 0.8420 | 0.1168 | 0.0007 |
| Laos | 7.9878 | 0.2487 | 2.2463 | 0.3243 | 0.6466 | 0.3949 | 0.0000 |
| Malaysia | 0.3302 | 0.2250 | 0.2324 | 0.0528 | 0.3124 | 0.0031 | 0.5182 |
| Myanmar | 14.7708 | 0.0011 | -3.1855 | 0.0175 | 2.0430 | 0.0399 | 0.0670 |
| Philippines | 0.2878 | 0.4517 | 0.0971 | 0.4511 | 1.4312 | 0.0117 | 0.2636 |
| Singapore | -0.7568 | 0.0488 | 0.5069 | 0.0006 | 0.1908 | 0.0475 | 0.5903 |
| Thailand | -1.5536 | 0.0058 | 0.8904 | 0.0000 | 0.4038 | 0.0044 | 0.7476 |
| Vietnam | -1.1358 | 0.2984 | -0.7806 | 0.2006 | 2.4110 | 0.0002 | 0.4117 |

The argument based on results in Table 4 is that if there is no statistical significance or lack of coefficient of determination between domestic inflation and US and world inflations, ERPT effect is does not exists for ASEAN countries. The rationale for this argument is that domestic inflation consists of two components: internal and external price levels increase. If there is no significant correlation between domestic and international inflation rates, then domestic inflation is a result from economic or monetary policies within the country.

The general ERPT literature used the following as factors affecting ERPT: (i) log of import price index; (ii) log of consumer price index (excluding food and energy); (iii) log of commodity price index; (iv) log of domestic weighted average selling exchange rate against the US dollar; (vi) log of foreign prices; and (vii) output gap calculated by a filter on real GDP. Under this complex structure of multi-factors modeling, ERPT model may be represented as:

$$\Delta p_t^m = a_{0t}\Delta_{p_{t-1}}^m + a_{1t}(L)\Delta e_t + a_{2t}(L)\Delta p_t^* + a_{3t}(L)\Delta p_t^{com} + a_{4t}(L)\bar{y}_t + a_{5t} + \varepsilon_t \quad (5)$$

According to equation (5) import price index, commodity price index, and foreign prices constitute external prices; they are indexed in the inflation rate: US and world inflation rates. The model above would have been used if these two external inflation rates have not been available.

Instead of using the above ERPT algorithm in equation (5), this paper proposed to use domestic inflation against US and world inflation rates and use the coefficient of determination ($R^2$) as the adjusting factor. For example, if $R^2$ between domestic and external inflation is 0.75, the result of the equation $Y = a + b_1x_1 + b_2x_2$ is multiplied by 0.75 to obtain the expected ERPT effect. This $ERPT_y$ may be an external factor that caused domestic inflation. Under this proposed simplified ERPT calculation, the significance level may be tested by the following string of arguments; it is noted that R square in multiple regressions model is given by:

$$R^2 = \frac{\sum\left(\hat{Y}_t - \bar{Y}\right)^2 / T - 1}{\sum\left(Y_t - \bar{Y}\right)^2 / T - 1} \quad (6)$$

The significance test is verified by the F test given by:

$$F = \frac{R^2}{1 - R^2} \times \frac{df_2}{df_1} \quad (7)$$

From these simplified steps, it can be verified which country in the ASEAN group has significant ERPT in its inflation and which economy has inflation rate that was solely resulted from domestic economic policy.

## 4. Findings and Discussion

The findings are presented in two parts. Section 4.1 presented preliminary testing of relationships between GDP growth, inflation and interest rate. Section 4.2 presented the result of ERPT analysis under the modified version of regression domestic inflation against the US and world inflation rates. Since ASEAN's economic growth is heavily influenced by export-oriented policy, inflation rate relates more with exchange rate pass-through (ERPT) effect than by direct connection to the GDP growth.

### 4.1 Granger-Causality test for GDP, inflation, and interest rate

The null hypothesis of Granger test states that $b_1 = b_2 = 0$: there is no causality. Table 4 below lists the coefficient $b_1$ and $b_2$ for US and global inflation as potential negative effect GDP growth in ASEAN. This causality will show as $b_i \neq 0$.

**Table 4 Granger causality test**

| ASEAN countries | $b_1$ Domestic interest rate | $b_2$ Global inflation | $b_3$ Exchange rate | Null hypothesis $b_1 = b_2 = b_3 = 0$ |
|---|---|---|---|---|
| Brunei | 5.50 | 0.38 | 0.02 | Reject null |
| Cambodia | 1.02 | 1.42 | 0.02 | Reject null |
| Indonesia | 3.50 | 0.84 | 0.11 | Reject null |
| Laos | 3.10 | 0.65 | 0.11 | Reject null |
| Malaysia | 2.00 | 0.31 | 0.08 | Reject null |
| Myanmar | 7.00 | 2.04 | 0.08 | Reject null |
| Philippines | 2.25 | 1.43 | 0.06 | Reject null |
| Singapore | 0.64 | 0.19 | 0.02 | Reject null |
| Thailand | 0.50 | 0.40 | 0.01 | Reject null |
| Vietnam | 4.00 | 2.41 | 0.05 | Reject null |

*Granger-caused

By using the data from ten ASEAN countries, the relationship between GDP growth and inflation was tested. By running simple regression between GDP growth rate (X) and inflation (Y), it was found that there is a negative relationship between GDP growth and inflation: Y(inflation) = 13.44 - 1.69X(GDP) with the significance level of $p$ = 0.0392. Although this relationship is significant, the corresponding R square is 0.3372. This means that the growth in GDP contributed to the rise in inflation in the ASEAN by 33.72 percent and the remaining 66.28 is explained by other factors, i.e., investment, accumulation of capital, savings, etc. The result of this testing for the ASEAN countries is consistent with the literature that economic growth may contribute to the rise in inflation (McCallum, 1987). In this testing of ASEAN economies, the average

GDP growth was 4.144 percent and average inflation was 6.433 percent. The intercept of the regression in this case tells a story worthy of noting. Where $a$ = 13.44 with a statistical significance level of $p$ = 0.0031, it means that absent GDP growth the expected inflation in the ASEAN economies is 13.44 percent. ASEAN has a total population of about 673.655 million people who consume goods and services in 10 economies. If inflation is defined as price increase with corresponding willingness of buyers to buy, it is no surprising that a regional market of 673.655 million people has an expected inflation rate of 13.44 percent which is balanced by a negative effect from GDP growth by a factor of -1.69 points for every point gain in GDP growth. The adverse relationship between economic growth and inflation with a negative sign by a factor of -1.69 for the slope of the regression tell us that for every one percent change in GDP there is a reduction in the inflation by a factor of -1.69 points. This finding is consistent with the literature attesting a negative relationship between economic growth and inflation (Stockman, 1981; Kormendi and McGuire, 1985; Fischer, 1993).

A relationship between inflation and interest rate in ASEAN economies was examined. The purpose of this test is to see if we can infer by proxy that interest rate is used as a monetary policy tool in the ASEAN to control inflation. By regressing interest rate (X) against inflation (Y), it was found that the Y(inflation) = 4.9661 + 0.4971X(interest). There is a positive relationship between in interest rate and inflation. The general assertions that high interest rate causes contradictory money supply and reduced inflation seem not to be true in ASEAN. From our findings, the positive relationship between interest rate and inflation means that high inflation actually contributes to high inflation. With the intercept of 4.9661, it means that without interest rate as an explanatory factor, ASEAN economies have a base level of 4.9661 percent for inflation. With an increase one percent in interest, there is a corresponding factor of 0.49661 times plus 4.9661 in inflation. This finding contradicts the literature and intuition about the relationship between interest rate and inflation. Interest rate is a policy tool for controlling inflation (Berument et al., 1999). According to our finding, with the reading of $R$ square of

0.0707 or 7.07 percent, ASEAN policy makers may not depend on interest rate as a tool for controlling inflation.

There is a long line of literature on the relationship between inflation and interest rate. Darby (1975), Feldstein (1976), Mundel (1963), Tobin (1965), and Nelson & Schwert (1977) have verified positive relationship between inflation rate and interest rate. However, some researchers found that this relationship is not strong (Barsky (1987), Huizinga & Mishkin (1984), Mishkin (1992) and Ghazali, 2003). Our finding confirms the former assertion of the existence of the relationship and the latter's finding of weak relationship (significance level of the slope is 0.2289). Lardic and Mignon (2003) found that the relationship is long-run; our testing involves a point-wise testing of 10 economies in the ASEAN. This point-wise approach to the testing may explain our result. Most studies of the relationship between interest rate and inflation were long-run analysis (Brazozoza and Brzezina, 2001; and Fave and Auray, 2002).

Egilsson (2020) summarized the assumption of contemporary economic theory by stating that the increase in saving reduces the supply of money in circulation, curbs inflation, and increases the value of the currency. This explanation is known as the demand-pull effect. However, there are also publications which contend that the opposite may happen. An increase in interest rate may contribute to the rise in inflation; this is known as the cost-push effect (Shiller and Siegel, 1977; Friedman and Schwartz,1982).

Tillmann (2009a, 2009b) explained that the cost-push effect occurs when firms' working capital relied on borrowing. As demand for working capital rises, so does interest. This rise in the cost of capital is passed on to the market with a corresponding rise in price level. Another study explained that the cost-push effect is caused by monetary policy (Barth and Ramey, 2001). This monetary policy argument was confirmed by Ravenna and Walsh (2006) who showed that a cost-push effect may be generated endogenously when a cost-push channel for monetary policy is introduced into the new Keynesian model. New Keynesia economics argues that price and wages do not adjust instantaneously to changes in economic

conditions. This may help explain the positive relationship between inflation and interest rates in the ASEAN countries. Among the ten countries in ASEAN, economic development differs from country-to-country. Singapore, for instance is highly developed compared to the new members, such as Cambodia, Laos, Myanmar and Vietnam. Market imperfection may still exist in these less developed economies. Hence, the cost-push effect may explain the finding of positive relationship between interest rate and inflation in this study. This finding is not surprising. Prior studies by Chowdhury, Hoffmann, and Schabert (2006) also found cost-push effect in some G7 countries. In fact, cost-pust phenomenon is common in the eurozone (Adolfson, Laséen, Lindé, and Villani, 2005). Dedola and Lippi (2005) explained that cost-push effect may come from monetary policy of the state.

The collinearity between inflation and interest rate was tested using detection-tolerance and variance inflation factor (VIF). A tolerance of less than 0.20 or 0.10 or a VIF of 5 or 10 and above indicates a multicollinearity problem. The value for R square among the supposed relationship between inflation and interest rate is 0.07. The result of the detection-tolerance test shows 0.93. In a second test for collinearity, the result shows VIF is 1.07 compared to the standard of VIF > 5 for collinearity problem (O'Brien, 2007). Under both detection tolerance and VIF, there is no problem with collinearity between inflation and interest rate in the ASEAN.

A third test verified the relationship between GDP growth (Y), inflation (X1) and interest rate (X2). The results show that Y = 5.227 - 0.1928X1 - 0.0469X2. With these two independent variables, the expected GDP growth in the ASEAN is 5.277 with the significance level pf $p = 0.0002$. It was found that both inflation ($X_1$) and interest rate ($X_2$) have negative effect on GDP growth. Assume that inflation rate is allowed to approach zero, the effect of inflation on GDP growth is nil; however, if the inflation is raised, the higher the inflation rate the result shows that the GDP growth rate will be lowered. This effect is consistent with the argument that inflation has negative relationship with economic growth. For the second factor analysis, it was found that there is also negative effect of interest rate

on the GDP growth. Assume again that if interest rate is allowed to approach zero, the effect of interest rate on GDP grow will disappear. This is the case of Singapore; the only country in ASEAN maintaining zero near zero interest rate. In the obverse, if interest rate is slowed to increase, the result will be a reduction of the GDP by a factor of -0.0469. This is a small effect from interest rate; the significance level of interest rate effect on GDP growth in ASEAN is $p = 0.4125$. This means that the effect could account for only 0.5875 or 58.75 percent of the time. The overall adjusted R square reading for this model is 0.1541 or 15.41 percent. This low reading of the coefficient of determination (R square) means that interest rate is relevant to economic growth in the ASEAN economies only 15.41 percent.

### 4.2 Inflationary pressure under exchange rate pass-through (ERPT) effect

As a regional market, ASEAN's imports constitute 47 percent of total trade (export + import). The probability for trade deficit for the group is 0.33 with significance level of 0.5987 under the Laplace-DeMoivre Theorem. The probability that ASEAN economies will run trade deficit is 59.87 percent. Assume that export is a function of import in a case where imports are used as inputs to produce exports, this relationship is Y(ex) = 5.2862 + 0.639X(im) with *R* square of 0.8571; this relationship is significant at p = 0.0001. Under the Prospect Theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1986), ASEAN will most likely run trade deficit. Individual countries that has slim prospect for positive trade balance are Cambodia ($v$ = -0.14), Philippines ($v$ = -50.28) and Thailand ($v$ = -0.61). These two pieces of information were used to assess ERPT for the ASEAN region.

The relationship between inflation and balance of trade are studied. The regression equation shows that Y(inf) = 7.32 - 1.06X(bal) with significance level of $p = 0.1749$ and coefficient of determination (R square) of 0.1097 or trade balance explains 10.97 percent of inflation in ASEAN economy. It is noted that an expected inflation in the ASEAN is 7.32; with one unit of trade deficit, there is a contribution to increase inflation by a factor of -1.06 times. For

example, with -1 point of trade deficit will result in 8.38 points in inflation and vice versa if there is a +1 point in trade surplus, the expected inflation is 6.32. It is found that ERPT partially contributed to inflation in the ASEAN. ERPT may capture up to 10.79 percent of inflation rate.

Table 5 provides the overall ERPT reading for the ASEAN countries. Only one country shows statistical significance for ERPT effect: Thailand ($p$ = 0.0140). The new ASEAN members (Cambodia, Laos, Myanmar and Vietnam) showed the low significance level of ERPT effect. Laos' low ERPT effect may be due to its insular economy. The insignificant ERPT effect in Cambodia, Myanmar and Vietnam may be due to their better trade terms at balance or near balance. The RPT effect for the ASEAN as a group is about 0.71 ($p$ = 0.54) which means that ERPT effect on domestic inflation in the ASEAN economies is not significant.

**Table 5 Significance level of ERPT**

| Country | ERPT(obs) (1) | $R^2$(obs) (2) | ERPT(adj) (1x2) | Significance | |
|---|---|---|---|---|---|
| | | | | F | Prob. |
| Brunei | 1.8633 | 0.6285 | 1.17 | 1.69 | 0.1920 |
| Cambodia | (1.5653) | 0.2523 | (0.39) | 0.34 | 0.7422 |
| Indonesia | 5.6856 | 0.0007 | 0.00 | 0.00 | 0.8289 |
| Laos | 8.2243 | - | - | - | 0.8289 |
| Malaysia | 0.3711 | 0.5182 | 0.19 | 1.08 | 0.4130 |
| Myanmar | 14.6337 | 0.0670 | 0.98 | 0.07 | 0.8023 |
| Philippines | (0.1836) | 0.2636 | (0.05) | 0.36 | 0.7088 |
| Singapore | (0.7004) | 0.5903 | (0.41) | 1.44 | 0.2710 |
| Thailand | (1.4500) | 0.7476 | (1.08) | 2.96 | 0.0140 |
| Vietnam | (1.0414) | 0.4117 | (0.43) | 0.70 | 0.5987 |
| ASEAN Mean | 2.58 | 0.39 | (0.00) | 0.96 | 0.54 |
| ±SD | ± 5.35 | ± 0,26 | ± 0.71 | ± 0.96 | ±0.30 |

Table 6, summarizes inflationary threat for each country in the ASEAN. The results for some countries are worth noting. Myanmar faces 93 percent threat ($p$ = 0.0230). This level of threat is the highest in the group. Where the group average threat level is 0.33 ± 0.30 with mean probability $p$ = 0.54 ± 0.31 which is not statistically significant. The moderate level of threat is between significance level

of 0.10 and 0.20; two countries fall within this range: Laos ($p$ = 0.189) and Thailand ($p$ = 0.136). Three countries stood out as inflation resistant economies; these countries were Indonesia, Malaysia, and Vietnam where the significance level was 0.8289 for all three countries.

**Table 6 Determination of inflationary threats to economic growth**

| Country | P(A)* | P(B)** | P(A) + P(B) | P (A*B) | P(AB) | Threats | |
|---|---|---|---|---|---|---|---|
| | | | | | | Level | Prob. |
| Brunei | 0.3632 | 0.7160 | 1.08 | 0.26 | 0.82 | 0.18 | 0.7088 |
| Cambodia | 0.6030 | 0.4404 | 1.04 | 0.27 | 0.78 | 0.22 | 0.6736 |
| Indonesia | 0.7360 | 0.7760 | 1.51 | 0.57 | 0.94 | 0.06 | 0.8289 |
| Laos | 0.3632 | 0.0735 | 0.44 | 0.03 | 0.41 | 0.59 | 0.1890 |
| Malaysia | 0.7360 | 0.8210 | 1.56 | 0.60 | 0.95 | 0.05 | 0.8289 |
| Myanmar | 0.0495 | 0.0256 | 0.08 | 0.00 | 0.07 | 0.93 | 0.0230 |
| Philippines | 0.0430 | 0.7550 | 0.80 | 0.03 | 0.77 | 0.23 | 0.6368 |
| Singapore | 0.3632 | 0.5320 | 0.90 | 0.19 | 0.70 | 0.30 | 0.5596 |
| Thailand | 0.0735 | 0.2912 | 0.36 | 0.02 | 0.34 | 0.66 | 0.1360 |
| Vietnam | 0.7420 | 0.8190 | 1.56 | 0.61 | 0.95 | 0.05 | 0.8289 |

*P(A) = probability of growth; P(B) = probability of the difference between expected growth and inflation.

### 4.3 Limitation of the study

There are two limitations in this study. Firstly, this paper presents a case study of ASEAN countries on the relationship between inflation and economic growth with the argument that inflation threatens economic growth. Secondly, the data used in this study came from several sources. The GDP growth came from annual reports of the IMF. Other data, such as exchange rates and inflation came from other secondary sources.

Macroeconomic data may not be available at the same time. For example, GDP data is made available on annual basis and is made available in the following year. Inflation and interest rate may be available on a monthly or quarterly basis. The timing of the release of these economic data presents challenges and limitations for making the study reflective of the current situation in the economy. Nevertheless, this study made effective use of the available data to test whether inflation poses any threats to economic growth in the

ASEAN countries. During the study period, global inflation, effects of COVID-19 pandemic and the war in Ukraine, are still on-going; therefore, it is not possible to see a complete picture of how these events affect economic growth in the ASEAN countries. Despite these limitations, this paper charters a course for further research on how inflation effects economic growth among ASEAN countries.

## 5. Conclusion

This paper examined inflation and its potential threats and challenges on the ASEAN economy. As the region gains momentum after the COVID-19 pandemic, two new shocks were touching the region: global inflation and military conflict in Europe. The ASEAN economy still depends on trading with major economies: US, EU area and Japan; more recently, China also plays a significant role in regional trade with the ASEAN countries. The ASEAN economy, with ten currencies, may be exposed to ERPT inflationary effect as international trade is denominated in US dollar. Inflation in the global market may pass through the local economies; this ERPT is difficult for ASEAN to address since each country has its own currency and exchange rate. The lack of unified monetary policy in the ASEAN makes inflation risk exposure difficult to manage. The different effect of EPRT has policy implication for the ASEAN; lacking unified monetary policy, member countries are exposed to exchange rate pass-through inflationary effect as the result of local currencies become weaker against the US dollar. As long as the ASEAN countries still lack uniform monetary policies, each member state should be equipped with effective monetary policy and adequate reserves into order to carry out contractionary monetary policies in order to control inflation. This paper pointed out that inflation presents a real threat. GDP growth will be subtracted by inflation rate; inflation reduces real GDP growth rate. In order to see real growth, each country in the ASEAN must push itself to produce GDP growth rate higher than inflation.

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**Author**

Inpong Louangrath
International College, Bangkok University
E-mail: Inpong.L@bu.ac.th