



## Exchange Rate Pass-Through in ITF Adopting Countries: Indonesia, Thailand, Philippines Comparative Study

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### Abstract

This paper investigates how the adoption of inflation targeting influenced Exchange Rate Pass-Through (ERPT) in the three developing countries of Southeast Asia – Indonesia, Thailand, and the Philippines. Moreover, this paper aims to analyze the macroeconomic determinants of the degree of pass-through to a consumer price index. For this purpose, we employ an Error Correction Model (ECM) regression analysis. The results found evidence that adopting an inflation-targeting framework does not necessarily reduce the degree of ERPT. However, economic openness emerges as a key limiting factor as higher trade share and lower trade tariffs lessen the degree of ERPT in those countries. It implies that trade liberalization, economic diversification, and enhancing competitiveness to reduce reliance on imports can further mitigate ERPT's impact on inflation.

**Keywords:** Exchange Rate Pass-Through, Inflation Targeting Framework, Trade Openness, Error Correction Model (ECM)

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### INTRODUCTION

The Inflation Targeting Framework (ITF) employs various monetary policy tools to achieve monetary targets, primarily focusing on the inflation rate. By fine-tuning interest rates, the framework seeks to steer inflation toward its

target, thereby maintaining economic stability and preventing the adverse effects of significant inflationary fluctuations. The overall goal is to ensure that inflation remains within an acceptable range, supporting sustainable economic growth and financial stability

(Svensson, 2000; Agénor & Luiz A Pereira da Silva, 2019; Armand Fouejieu, 2017).

Even though Indonesia, Thailand, and the Philippines have implemented inflation-targeting frameworks as their primary monetary policy tools, inflation remained volatile over the years and frequently diverged from the target ranges set by their central banks. The challenges of achieving the inflation target stem from the risks associated with economic openness, one of which is exchange rate pass-through or the process in which the change in exchange rate is transmitted to prices through the distribution chain.

There are two channels through which exchange rate changes are transmitted to prices: direct and indirect. The direct pass-through occurs when exchange rate changes affect prices through the cost of imported goods. The indirect pass-through occurs when the exchange rate changes affect prices through the substitution effect mechanism. The demand for domestic goods increases as they become substitutes for imported goods (Hüfner & Schröder, 2002). Therefore, although the monetary authority does not directly control the exchange rate of the domestic currency, exchange rate movements still have profound implications for the monetary policy framework through inflation in small open economies, leading to a fear of floating conditions (Ball & Reyes, 2008).

It is essential to recognize the crucial role of the exchange rate in maintaining price stability. In this context, Taylor (2001) argued that exchange rate pass-through has a robust positive relationship with inflation, suggesting that a reduction in pass-through can help prevent producers from raising prices."

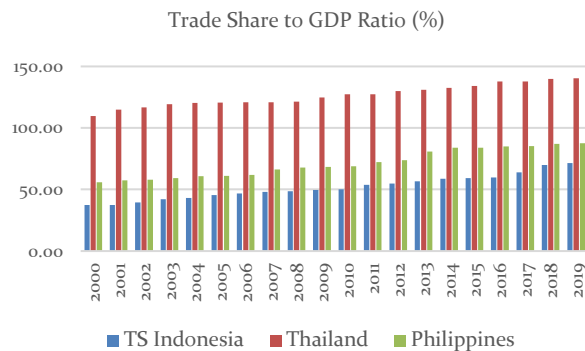
In principle, the ITF reduces the pass-through of the exchange rate against inflation, whereas if a country implements the ITF, markets

that import goods from abroad absorb most of the exchange rate shock through more minor variations in selling prices. Two views exist on the impact of exchange rate pass-through on inflation with the ITF. Coulibaly and Kempf (2010) find that the price response to exchange rate shocks in the target country has decreased since adopting the ITF, while in non-ITF countries, it has increased. However, empirical evidence shows that exchange rate pass-through continues to rise in ITF-implementing countries (Nasir & Vo, 2020).

Given the significant pass-through effect of the exchange rate, maintaining exchange rate stability is essential, even for countries implementing an inflation-targeting framework (ITF) within a floating exchange rate system, where the interaction between exchange rates and increasing the degree of trade openness can have pronounced effects on price stability. Figure 1 shows the trade share and tariff level in Indonesia, Thailand, and the Philippines from 2000 – 2019. Trade shares in Indonesia. Throughout the observed period, trade shares in Thailand and the Philippines exhibited a consistent upward trend, reflecting an overall increase in their engagement with international markets.

Notably, Indonesia maintained the highest trade share each year, underscoring its prominent role in regional trade. The Philippines and Thailand followed, with their trade shares also showing steady growth. Concurrently, tariff rates in Indonesia, Thailand, and the Philippines experienced fluctuations; however, these variations were relatively minor, indicating a general stability in tariff policies over time. Despite fluctuations, this stability in tariff rates suggests a sustained commitment to trade openness among these countries, which may have

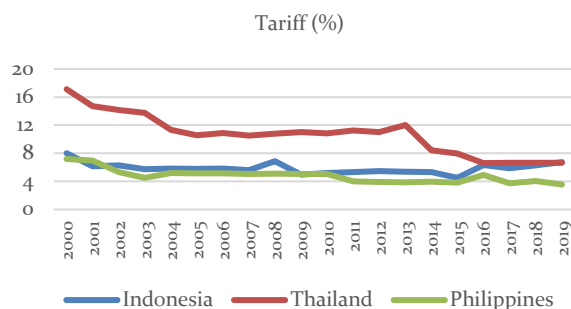
contributed to the observed increase in trade shares.



**Figure 1.** Trade Shares to GDP Ratio (TS)

Source: Data Procesed, 2023

As defined by Squalli and Wilson (2011), trade openness is also measured as total exports and imports in gross domestic product with a policy of trade barriers in the form of tariff barriers. Gust et al. (2010) argue that greater foreign competition implies lower exchange rate pass-through. According to him, market pricing decisions depend not only on its marginal cost but also on the prices set by its competitors.



**Figure 2.** Tariff Rate (TR)

Source: Data Procesed, 2023

Increased trade openness makes exporters more responsive to competitor prices. As a result, it leads to changes in pricing behavior that can

contribute to a decrease in price sensitivity to exchange rates, thereby reducing pass-through to prices.

Coulibaly and Kempf (2010) investigated exchange rate pass-through reactions to prices and found that adopting ITF reduces pass-through to the consumer, import, and producer prices. In addition, Coulibaly and Kempf find that the contribution of exchange rate shocks to price fluctuations in the target countries has decreased since adopting the ITF, while in non-ITF countries, it has increased.

However, Edwards (2006) shows that ITF causes higher exchange rate volatility because one of the costs of ITF adoption is increased exchange rate volatility. In addition, the latest empirical evidence, namely research conducted by Nasir and Vo (2020), shows that exchange rate pass-through has increased in ITF countries.

Although some evidence suggests that exchange rate volatility has declined in countries where the ITF was adopted, the debate over exchange rate pass-through continues. Goldfajn and Werlang (2005) find that exchange rate pass-through is positively correlated with inflation and negatively correlated with trade openness.

In addition, Gust et al. (2010) stated that greater competition implies lower exchange rate pass-through. Since market pricing decisions depend on competitors' prices, exporters' optimal situation is to vary their markups more and their prices less in response to shocks that change the exchange rate. This study also refers to the theory of "New Open Economy Macroeconomics" by Obstfeld and Rogoff (1997), where the price of goods will be rapidly adjusted due to the increasing number of trade shares in an open economy.

In addition, reduced transaction costs in international trade in goods and services will

limit the impact of shocks on real exchange rates and inflation, thereby reducing exchange rate pass-through (Forbes et al., 2018).

Referring to Coulibaly and Kempf (2010) and Pham et al., (2023), we hypothesize that the exchange rate pass-through positively affects the inflation rate, and the ITF instrument in the form of policy interest rates helps reduce the amount of exchange rate pass-through.

Then, referring to Goldfajn and Werlang (2005), Gust et al. (2010) and we postulate that trade openness can reduce the size of exchange rate pass-through.

Based on the explanation above, to reduce the negative impact of exchange rate pass-through, this study was conducted to analyze how the effect of trade openness through trade share and tariff rates on the degree of exchange rate pass-through under the inflation targeting framework (ITF) policy framework in Indonesia, Thailand, and the Philippines in 2000 to 2019. We limited our observations to 2019 due to a structural shock caused by the COVID-19 pandemic in 2020.

RESEARCH METHODS

This study employs a time series data structure encompassing three Southeast Asian developing countries—Indonesia, Thailand, and the Philippines—over the period from 2000 to 2019.

The data, meticulously gathered from reputable sources, including the International Financial Statistics (IMF), the Bank for International Settlements (BIS) Statistics, and the World Integrated Trade Solution (WITS), provides a robust

foundation for analyzing the economic trends and dynamics within these nations.

**Table 1.** Data and the Measures Definitions of the Variables

No	Variable	Measures	Source
1	Consumer Price Index (CPI)	Index	International Financial Statistics
2	Real Effective Exchange Rate (REER)	Currency Measures	International Financial Statistics
3	Exchange Rate Pass-Through	Coefficient Degree	Own Calculation
4	Interest Rate	Percentage	Bank of Indonesia (BI), Bank of Thailand (BOT), Bank of the Philippines (BSP)
5	Trade Share	Percentage of GDP	World Integrated Trade Solution (WITS)
6	Simple Mean Applied Tariff Rate	Percentage	World Integrated Trade Solution (WITS)

Source: Data Procesed, 2023

The initial step in the analysis involves determining the degree of exchange rate pass-through by applying Cholesky Decomposition to the Impulse Response Function (IRF) derived from a Vector Autoregressive (VAR) model. In line with the methodologies proposed by (Yilmazkuday, 2022) and (García-Cicco & García-Schmidt, 2020), this calculation is performed by dividing the Consumer Price Index (CPI) response to exchange rate shocks by the response of the exchange rate to its own shocks. This approach allows for a precise measurement of how changes in the exchange rate are transmitted to consumer prices within the analyzed economies.

$$\text{Degree of ERPT} = \frac{\sum_{i=1}^n \phi_{ER}^{cpi}}{\sum_{i=1}^n \phi_{ER}^{ER}}$$

Before generating the degree of ERPT obtained from the Cholesky decomposition of  $\mu$  in equation 1, it is crucial to ensure the validity of the VAR estimation. Several key issues must be addressed, including confirming that the data used for observation is stationary. Subsequently, it is imperative to determine the optimal lag length in the VAR model, as the choice of lag length significantly influences the robustness and reliability of the estimation results.

Table 2 presents the results of the stationarity tests, indicating that the data used for the VAR estimation are stationary at the first difference level. This transformation is necessary to ensure that the data meet the stationarity requirement for reliable VAR analysis. Additionally, Table 3 outlines the results of the lag selection criteria, identifying lag three as the optimal lag length for the model. The selection of this lag is based on minimizing information criteria such as AIC, SIC, and HQIC, which

suggest that a three-period lag structure best captures the dynamic interactions within the dataset, thereby providing a robust foundation for subsequent impulse response analysis.

**Table 2.** Optimum Lag Length Test

Lag	AIC		
	Indonesia	Thailand	Philippines
0	-5.041760	-5.041760	-3.449926
1	-9.122994	-9.122994	-8.530749
2	-8.935235	-8.935235	-9.009976
3	-9.216177*	-9.216177*	-9.389883*

Source: Data Prosesed, 2023

Afterward, the Error Correction Model (ECM) is used to investigate the effect of interest rate, trade openness, and tariff rate against ERPT. In addition, ECM is worthwhile for investigating the discrepancy between short-term and long-term equilibrium and examining whether or not an economic theory is consistent with empirical models (Gujarati & Porter, 2009). The long-term model specification is shown as follows:

$$ERPT_t = \alpha + \beta_1 IR_t + \beta_2 \ln TS_t + \beta_3 TR_t + e_t$$

where IR, TS, and TR are the Interest Rate, Trade Share, and Tariff Rate. Trade share is transformed into a logarithm. are coefficients to estimate where and are expected to be negative, while is expected to be positive. Based on equation (2), the ECM is specified as follows:

$$\Delta ERPT_t = \alpha + \beta_1 \Delta IR_t + \beta_2 \Delta \ln TS_t + \beta_3 \Delta TR_t + \beta_4 ECT_{t-1} + e_t$$

ECT is an Error Correction Term whose coefficient () is expected to be less than zero, indicating an adjustment of short-term disequilibrium into long-term equilibrium

through an error correction mechanism. ECT is defined as follows:

$$ECT_t = \widehat{ERPT}_t - \overline{ERPT}_t$$

$$ECT_t = \widehat{ERPT}_t - [\alpha + \beta_1 IR_t + \beta_2 \ln TS_t + \beta_3 TR_t + e_t]$$

## RESULTS AND DISCUSSION

Before proceeding with the estimation of Equation 3, which examines the relationship between ERPT and its explanatory variables within the ECM framework, it is essential to conduct a cointegration test. This test is crucial to determine whether there is evidence of a long-term equilibrium relationship among the variables under study. Identifying cointegration among the variables ensures that any short-term deviations observed in the data are temporary and that the variables will converge to a stable long-term relationship over time.

**Table 3.** Engle-Granger Cointegration Test

Countries	ADF t-Statistic	5% critical value	Prob
Indonesia	-3.117318	-3.029970	0.0423
Thailand	-5.350934	-3.029970	0.0005
Philippines	-4.796402	-3.029970	0.0015

Source: Data Procesed, 2023

Conducting the cointegration test not only validates the use of the ECM approach but also provides a deeper understanding of the underlying dynamics between the exchange rate pass-through and its determinants, thereby ensuring the robustness and accuracy of the final model estimation (Engle et al., 1987). The Engle-Granger cointegration test results presented in Table 4 indicate the presence of cointegration among the variables confirming the validity of

using the Error Correction Model (ECM) to estimate the relationship between exchange rate pass-through (ERPT) and its explanatory variables.

The ECM estimate is presented in Table 5. It can be seen that the interest rates in Indonesia and Thailand have a positive but not significant effect. Meanwhile, the interest rate in the Philippines has a significant positive impact at 1%. Thus, an increase in the policy interest rate will increase the degree of exchange rate pass-through. Nevertheless, trade shares in Indonesia, Thailand, and the Philippines have a negative and significant effect at 10%. Thus, an increase in trade shares will cause a decrease in the degree of exchange rate pass-through. Meanwhile, the tariff rates in Indonesia, Thailand, and the Philippines have a positive and significant effect at 10%. Thus, a decrease in the tariff rates will decrease the degree of exchange rate pass-through.

Furthermore, based on the short-term estimation results of ECM in table 6, it can be seen that interest rates in Indonesia and Thailand have a positive but not significant effect. Meanwhile, the interest rate in the Philippines has a significant positive impact at = 10%. Thus, an increase in the policy interest rate will increase the degree of exchange rate pass-through. Then, trade shares in Indonesia, Thailand, and the Philippines have a negative and significant effect at = 10%. Thus, an increase in trade share will cause a decrease in the degree of exchange rate pass-through. Therefore, the tariff rate in Indonesia, Thailand, and the Philippines has a positive and significant effect at a = 10%. Thus, a decrease in the tariff rate will decrease the degree of exchange rate pass-through.

The speed of adjustment value denoted by ECT (-1) is significant and has a negative sign for

Indonesia, Thailand, and the Philippines. This value explains that the applied ECM model specifications are valid. The coefficient value describes how quickly the residual in the previous period corrects the exchange rate pass-through towards equilibrium in the next period.

**Table 4.** ECM Estimation Results

<b>Indonesia</b>				
Variable	Coefficient	t-Statistic	Prob.	Description
Interest Rate	0.025156	0.486267	0.6343	Not Significant
Trade Share	-0.003440	-0.115199	0.0569	Significant
Tariff Rate	0.022381	0.180724	0.0537	Significant
ECT (-1)	-0.045515	-	0.0528	Significant
		0.199243		
<b>Thailand</b>				
Variable	Coefficient	t-Statistic	Prob.	Description
Interest Rate	0.010982	0.429702	0.6740	Not Significant
Trade Share	-0.002407	-	0.0942	Significant
		0.912644		
Tariff Rate	0.026672	1.569284	0.0695	Significant
ECT (-1)	-0.165731	-	0.0864	Significant
		0.975978		
<b>Philippines</b>				
Variable	Coefficient	t-Statistic	Prob.	Description
Interest Rate	0.049054	0.615845	0.0685	Significant
Trade Share	-0.034899	-	0.0317	Significant
		2.385998		
Tariff Rate	0.054263	0.586249	0.0709	Significant
ECT (-1)	0.044696	0.209320	0.0523	Significant

Source: Data Prosesed, 2023

Adjusting the price of goods will occur quickly due to the increase in trade share in the

open economy or the participation of foreign companies in the domestic market. Therefore, openness leads to higher international competition and “pricing to market” behavior, which reduces price power in the domestic market, thereby preventing domestic firms from passing exchange rate changes to prices (Obstfeld & Rogoff, 1997).

In addition, lower trading costs will increase the competitiveness of exporters in the domestic market, which causes firms to find it optimal to lower their prices in response to exchange rate movements, resulting in lower exchange rate pass-through.

The positive and significant influence of the policy interest rate on the degree of exchange rate pass-through in the Philippines means that the Bangko Sentral ng Philippines still avoids excess exchange rate volatility, even under the ITF regime. However, on the other hand, the ITF policy framework does not reduce the impact of shocks caused by the exchange rate (Meredith & Ma, 2002).

Meanwhile, in Indonesia and Thailand, the policy interest rate has a significant relationship with the degree of exchange rate pass-through, thus allowing inflation driven by exchange rate shocks to work from the supply side or cost-push inflation. A country's dependence on imported raw materials in terms of production structure causes the depreciation of exchange rates to increase production costs, which in turn causes an increase in inflation.

Therefore, to prevent cost-push inflation, supply-side policies are needed. In general, cost-push inflation occurs when aggregate demand is inelastic, where when producers raise prices, the market cannot easily adjust for price increases. Thus, the policy interest rate does not affect the exchange rate pass-through because the policy

interest rate is applied to prevent demand-pull inflation.

## CONCLUSION

This research contributes to the debate about the exchange rate pass-through in Southeast Asia's small open economies and whether the adoption of the ITF is followed by a decrease in the exchange rate pass-through to the consumer price index. This study also examines the dynamics of the exchange rate pass-through over time and identifies the macroeconomic determinants of changes in the degree of exchange rate pass-through. The results of this study prove several things; namely, the ITF comes with an increase in the exchange rate pass-through to inflation rather than a decrease.

Indonesia, Thailand, and the Philippines experienced increased trade openness, which led to greater competition from an increase in the trade share of foreign goods in the domestic market and ultimately reduced the degree of exchange rate pass-through. In addition, Indonesia, Thailand, and the Philippines have tariff rates that tend to decrease, which leads to lower trade costs, thereby increasing the relative competitiveness of foreign exporters in the domestic market and ultimately lowering the degree of exchange rate pass-through. Thus, policy implications emphasizing the importance of facilitating international trade and reducing various trade barriers can support macroeconomic stability, which will impact price stability.

This study has limitations; it does not discuss the types of trade barriers and how they affect exchange rate pass-throughs or consider exchange rate pass-throughs along the distribution chain. It leaves a future agenda to consider exchange rate movements along the

distribution chain, where exchange rate movements affect import prices in the first stage, producer prices in the second stage, and ultimately, consumer prices in the end. Our observation stopped only in 2019 due to the COVID-19 pandemic, which was considered a structural shock. It leaves future investigations that extend beyond shock episodes that might require distinctive methods.

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**Appendix 1.** Augmented Dickey-Fuller (ADF) Unit Root Test

<b>Indonesia</b>				
Variable	Probability (Level)	Description	Probability (1 <sup>st</sup> Difference)	Description
CPI	0.0199	Stationary	0.0176	Stationary
REER	0.1485	Not Stationary	0.0005	Stationary
ERPT	1.0000	Not Stationary	0.0013	Stationary
Interest Rate	0.2710	Not Stationary	0.0011	Stationary
Trade Share	0.8941	Not Stationary	0.0003	Stationary
Tariff Rate	0.0020	Stationary	0.0000	Stationary
<b>Thailand</b>				
Variable	Probability (Level)	Description	Probability (1 <sup>st</sup> Difference)	Decsription
CPI	0.3696	Not Stationary	0.0020	Stationary
REER	0.8347	Not Stationary	0.0034	Stationary
ERPT	0.0670	Not Stationary	0.0159	Stationary
Interest Rate	0.0935	Stationary	0.0230	Stationary
Trade Share	0.3870	Not Stationary	0.0031	Stationary
Tariff Rate	0.2794	Not Stationary	0.0019	Stationary
<b>Philippines</b>				
Variable	Probability (Level)	Description	Probability (1 <sup>st</sup> Difference)	Decsription
CPI	0.5467	Not Stationary	0.0031	Stationary
REER	0.6303	Not Stationary	0.0029	Stationary
ERPT	0.1688	Not Stationary	0.0000	Stationary
Interest Rate	0.6060	Not Stationary	0.0010	Stationary
Trade Share	0.6245	Not Stationary	0.0002	Stationary
Tariff Rate	0.0358	Stationary	0.0014	Stationary

Source: Data Procesed, 2023