# Trade openness and the Phillips curve

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# The Phillips curve

- The Phillips curve has been regarded as an essential tool for formulating monetary policy (Akerlof, 2002).

- This curve, which traces a trade-off relationship between inflation and unemployment rate, is a foundation for central banks' monetary policy. If unemployment is too low, inflation would rise. By contrast, if unemployment is too high, inflation would fall (The Economist, October 12, 2019,p.4).

# Flattening of the Phillips curve

- However, in recent decades there has occurred a flattening of the Phillips curve or decrease in its slope coefficient (Doyle and Beaudry, 2000; Roberts, 2006).

- This fact was discovered in the United States where the curve's slope decreased from 0.130 between 1961–1979 to 0.092 between 1984–2002 (Roberts, 2006).

- Similarly, in Canada, the Phillips slope curve had flattened from 0.4 between 1977–1991 to 0.1 between 1985–1999 (Doyle and Beaudry, 2000).

# The impact of the flattening Phillips curve

- The basic economic model predicts that *less* economic slack would lead to *more* inflation (The Economist, October 12, 2019, p.7).

- The main implication of the flattening Phillips curve is a reduced impact of an economic slack on the inflation dynamics.

# The impact is negligible in recent decades

- More recently, an economic slack in Japan caused only a negligible impact on the inflation rate. A high negative output gap (i.e., the gap between actual and potential GDP) during the 1998–2002 period did not lead to a severe deflation (De Veirman, 2007).

- To compare, during the Great Depression in the USA in the 1930s, there was a severe deflation with annual price reduction of 10 percent.

- However, during the Great Recession in the USA in the 2000s the prolonged economic slack was not accompanied by a severe deflation (Coibion and Gorodnichenko, 2015).

# Main reasons for the flattening Phillips curve

- A pertinent question is: what are the causes of the flattening Phillips curve?

- No consensus exists regarding the answer (Kuttner and Robinson, 2010).

- The main hypotheses are:

    (1) the anchored expectations hypothesis (Roberts, 2006; Williams, 2006) and

    (2) the open economy hypothesis (Loungani et al., 2001; Borio and Filardo, 2007; Razin and Binyamini, 2007).

# The Anchored Expectations hypothesis

- It proposes that public confidence in the competence and trustworthiness of central bankers could ensure that there is neither inflation nor deflation during the expansion and contraction phases of a business cycle.

- In other words, a high credibility of central bankers could stabilize inflation by reducing the impact of the actual inflation rate on a target inflation rate (Bernanke, 2010).

- This is an interesting perspective. However, it would be challenging to conceptualize and operationalize the "trustworthiness" of central bankers.

# The Open Economy hypothesis

- It proposes that trade openness might reduce the effects of an economic slack on the inflation dynamics.

- A theoretical perspective on the linkage between openness and inflation was proposed by Romer (1993). He stated that the effects of an unexpected monetary expansion would be smaller in more open economies. As a result, such economies would experience lower inflation rates.

# Trade openness and the Phillips curve

- Loungani *et al.* (2001) proposed that the degree of openness could have an impact on the slope of the Phillips curve in two ways:

(1) Due to a greater flow of goods and services there would be a weaker correlational relationship between consumption and economic slack in more open economies

(2) An increase in international borrowings would boost consumer consumption in more open economies during the contraction phase of a business cycle.

- Furuoka and Ho' study (2009) provided empirical evidence that the Phillips curve does tend to be flatter in more open Asian economies.

# The openness-Phillips curve (OPC) hypothesis

- We put forward a testable Openness–Philipps Curve (OPC) hypothesis:

*The Phillips curve slope would be flatter in more open economies than in less open economies.*

# The static approach to hypothesis testing

- To test the hypothesis, we examined the relationship between trade openness and the Phillips curve in ten ASEAN countries.

- Two approaches— a static approach and a dynamic approach—were employed.

- In the static approach, the analysis focused on the relationship between trade openness and the slope coefficient.  In line with the OPC hypothesis, the slope coefficient in an open economy was expected to be lower than in  a closed economy.
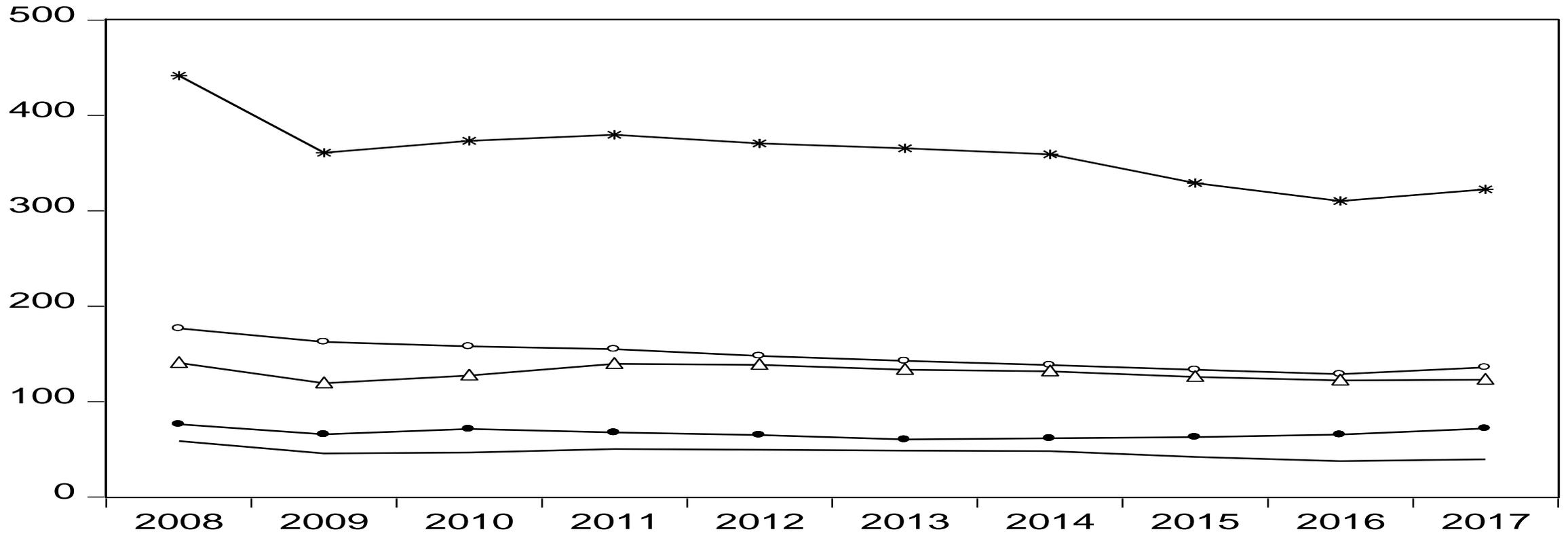
# The dynamic approach

- The dynamic or time-varying approach examined the relationship between changes in the trade openness and changes in the slope coefficient of the Phillips curve.

- In line with the OPC hypothesis, ASEAN countries with an increasing degree of trade openness were expected to have a decreasing slope coefficients of the Phillips curve.

- And *vice versa*, countries with a decreasing trade openness would have an increasing slope coefficient.

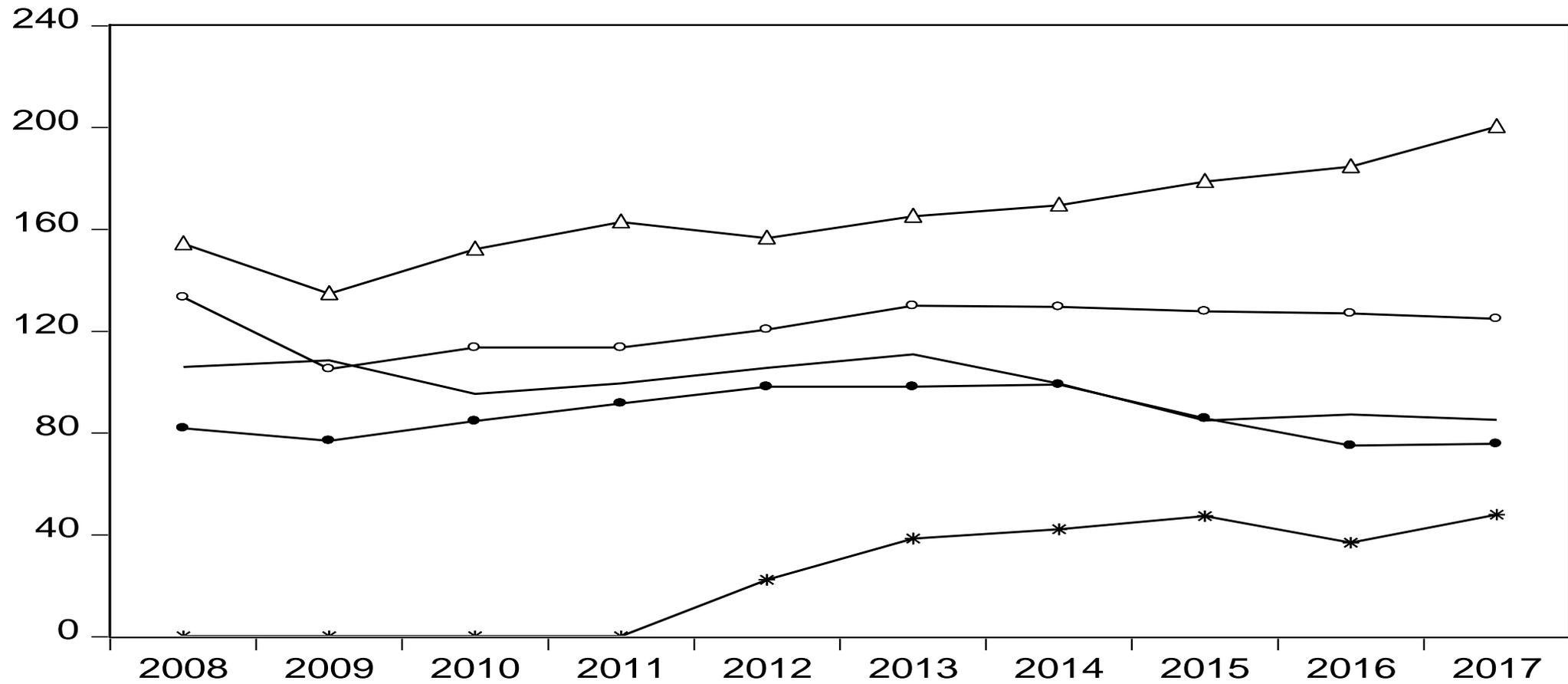## Table 1: Trade openness and GDP in ASEAN

| Country | Trade openness in 2017 (Trade as a percentage of GDP) | Gross Domestic Product in 2017 (US$ billion) |
|---|---|---|
| Brunei | 85 | 13 |
| Indonesia | 39 | 1,090 |
| Cambodia | 124 | 18 |
| Laos | 75 | 11 |
| Malaysia | 135 | 364 |
| Myanmar | 47 | 79 |
| Philippines | 71 | 303 |
| Singapore | 322 | 309 |
| Thailand | 122 | 422 |
| Vietnam | 200 | 175 |

*Source*: World Bank (2019)

Trade openness in ASEAN

# Unemployment rates in ASEAN



Legend: Indonesia, Malaysia, Philippines, Singapore, Thailand

| | | | |
|---|---|---|---|
| ──── Brunei | ──○── Cambodia | ──●── Lao | |
| ──*── Myanmar | ──+── Vietnam | | |
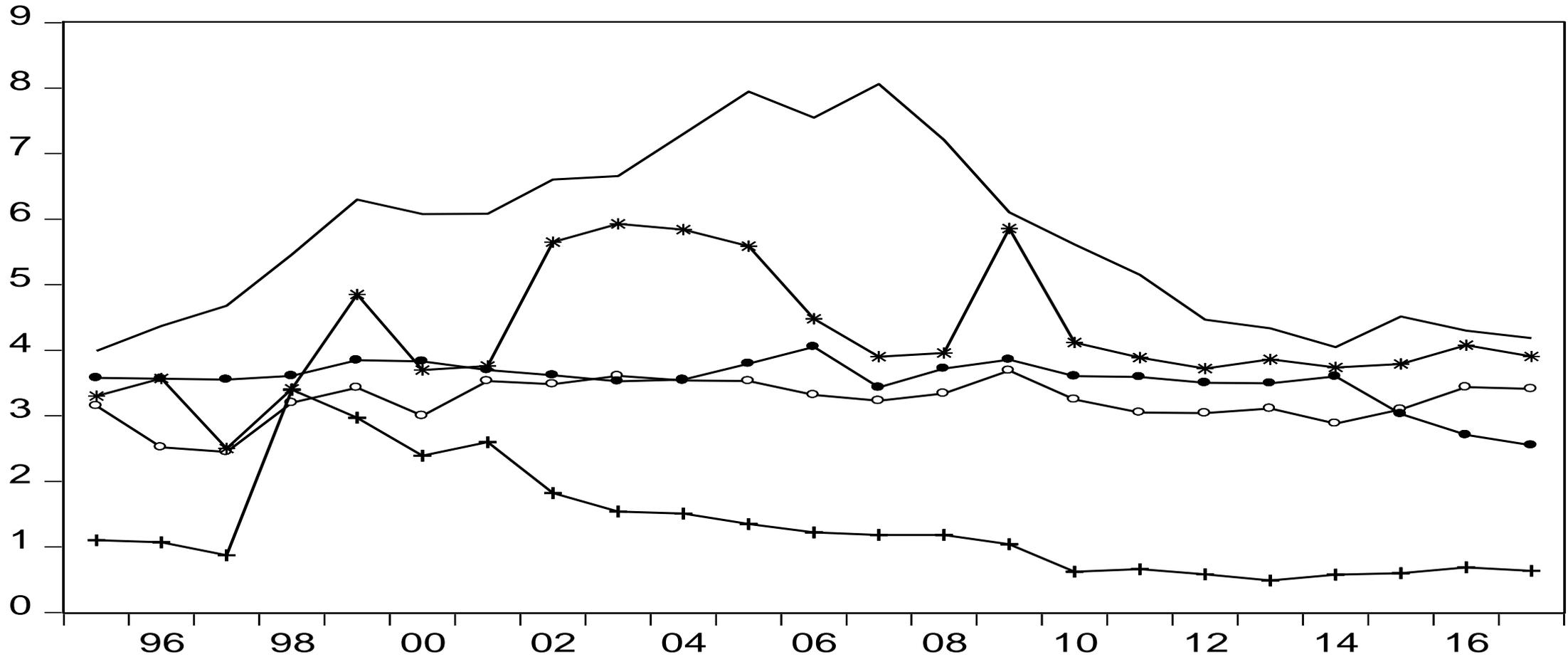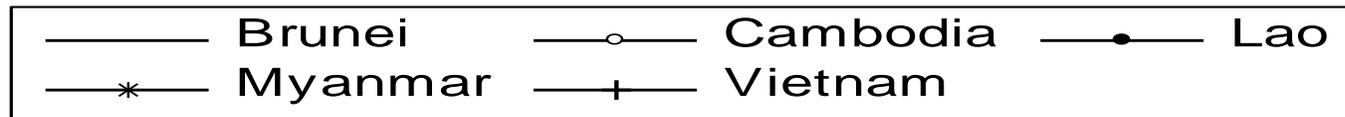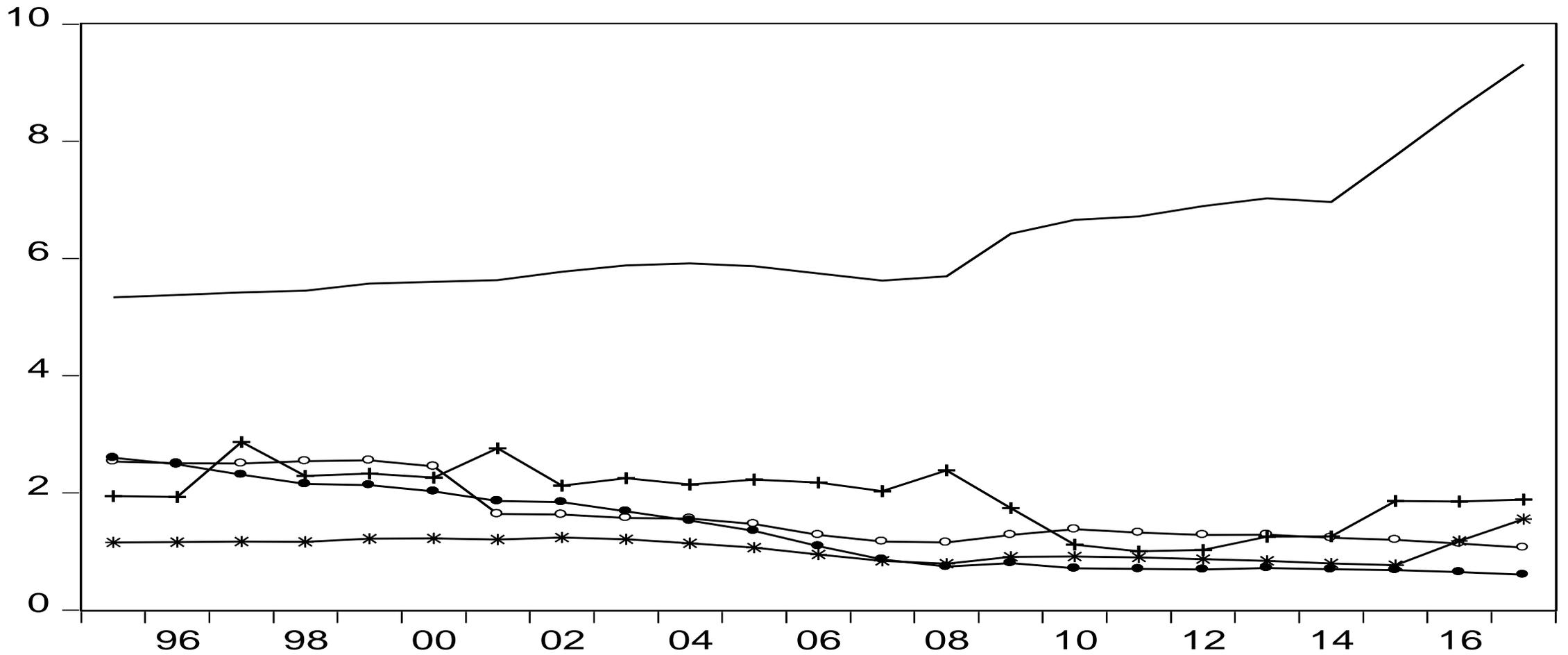
# Inflation rates in ASEAN

25

20

15

10

5

0

-5

96　98　00　02　04　06　08　10　12　14　16

——— Brunei　——o—— Cambodia　——•—— Lao
——*—— Myanmar　——+—— Vietnam
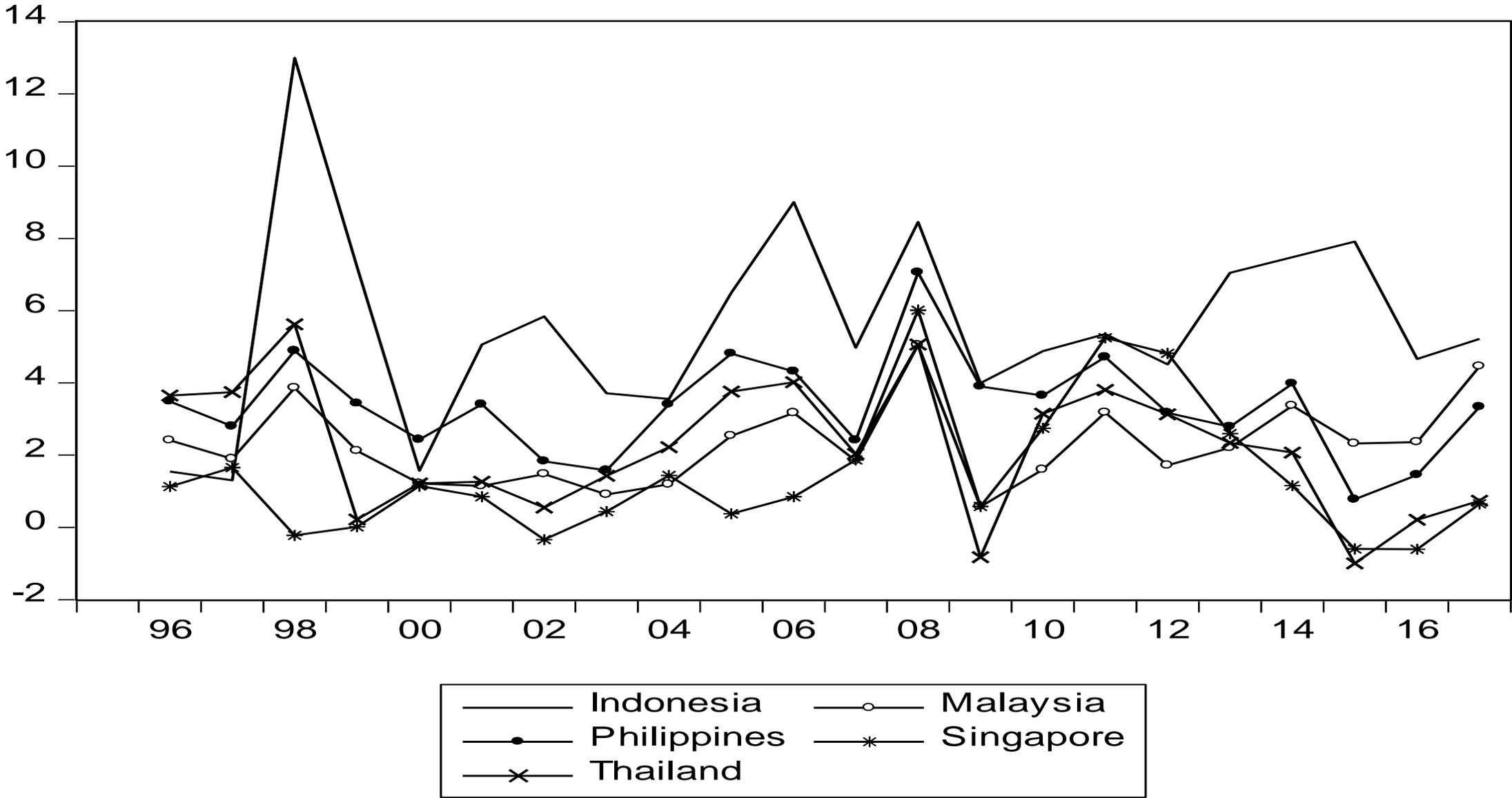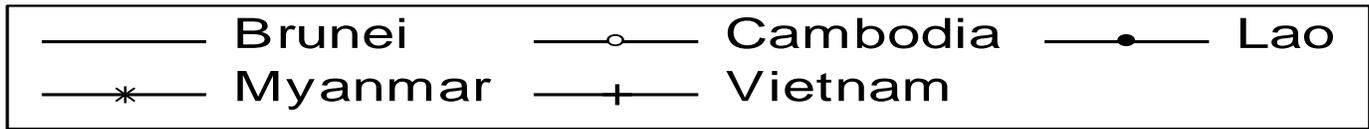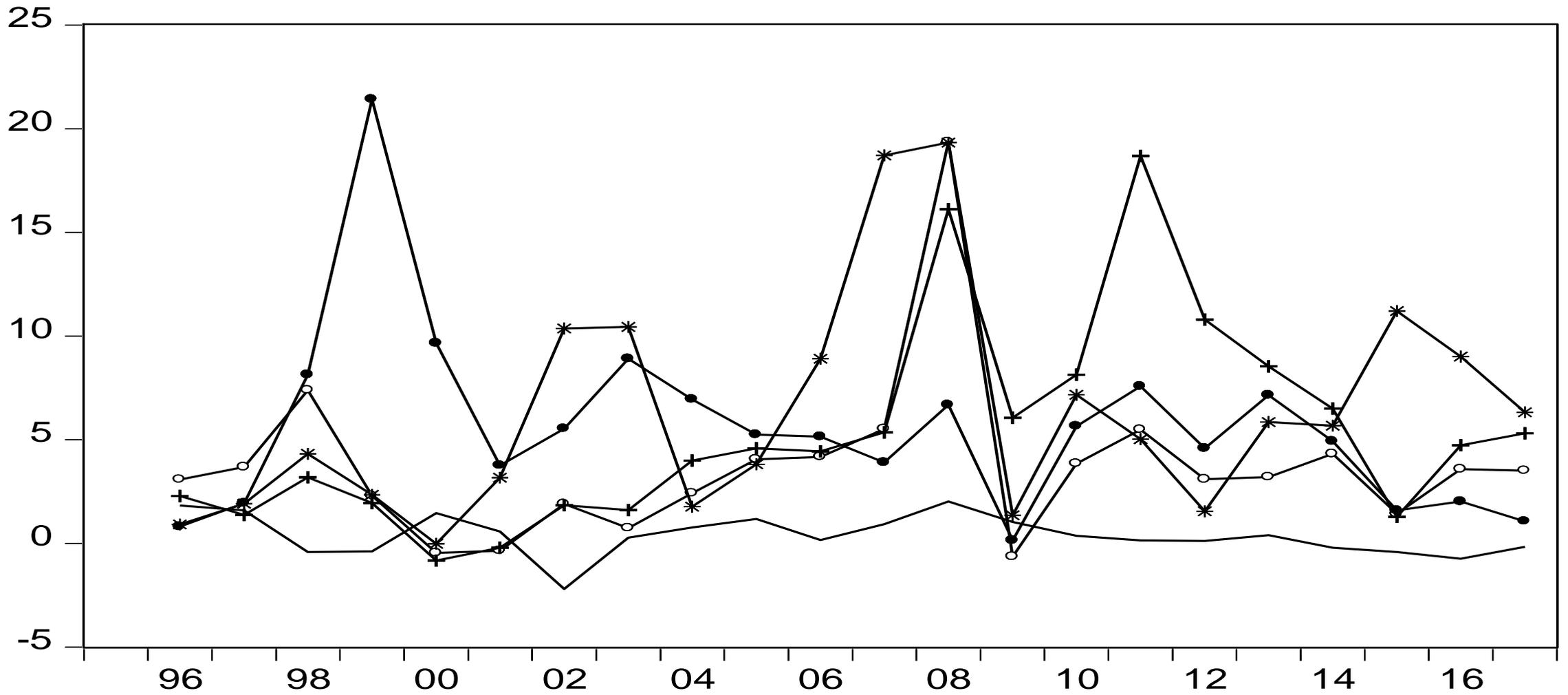
# The New Keynesian Phillips curve

The New Keynesian Phillips curve (NKPC) could be expressed as (Staiger *et al.*, 1997; Gali and Gertler, 1999):

$$\pi_t = \lambda c u_t + \beta E_t(\pi_{t+1})$$

where $\lambda = \{(1-\theta)(1-\beta\theta)\}/\theta$, $E_t(\pi_{t+1})$ is the expected future inflation rate, $\theta$ is the price stickiness parameter and $\beta$ is the discount parameter. In the GG method, the generalised method of moments (GMM) estimated the static Phillips curve. The orthogonality condition for the NKPC could be expressed as (Gali and Gertler, 1999):

$$E_t\{(\pi_t - (1-\theta)(1-\beta\theta)\theta^{-1}cu_t - \beta\pi_{t+1})z_t\} = 0$$

where $E$ is the expected value operator and $z_t$ is the instrumental variable. In the empirical analysis, the country-specific inflation expectations are not available. Under the rational expectations hypothesis, the expected future inflation rate is considered as equal to the future inflation rate or $\pi_{t+1}$ (Levy, 2019).

# The Hybrid New Keynesian Phillips curve

The hybrid NKPC is a crossbreed Phillip curve can be expressed as (Staiger *et al.*, 1997; Gali and Gertler, 1999):

$$\pi_t = \lambda cu_t + \gamma_f E_t(\pi_{t+1}) + \gamma_b E_{t-1}(\pi_t)$$

where $\lambda \equiv \{(1-\omega)(1-\theta)(1-\beta\theta)\}/\varphi, \quad \gamma_f \equiv \beta\theta\varphi^{-1}, \quad \gamma_b \equiv \omega\varphi^{-1}, \quad \varphi = \theta + \omega\{1 - \theta(1-\beta)\}$, which is the backwardness-adjusted price stickiness parameter, and $\omega$ is the backwardness price setting parameter. In the GG method, the orthogonality condition for the hybrid NKPC could be expressed as (Gali and Gertler, 1999):

$$E_t\{(\pi_t - (1-\omega)(1-\theta)(1-\beta\theta)\varphi^{-1}cu_t - \theta\beta\varphi^{-1}\pi_{t+1})z_t\} = 0$$

Under the adoptive expectations hypothesis, the expected current inflation rate is considered to be equal to the lagged inflation rate or $\pi_{t-1}$. Therefore, the past inflation rate ($\pi_{t-1}$) often serves as a proxy for the expected current inflation rate (Levy, 2019).

## Table 2: Average rate, natural rate and cyclical unemployment in ASEAN

| Countries | Average unemployment rate (2008–2015) | Natural rate of unemployment ($u^*$) | Average cyclical unemployment rate (2008–2015) |
|---|---|---|---|
| Brunei | 6.3 | 8.8 | -2.5 |
| Indonesia | 5.6 | 7.3 | -1.7 |
| Cambodia | 1.6 | 1.5 | 0.1 |
| Laos | 1.3 | 1.2 | 0.1 |
| Malaysia | 3.2 | 3.4 | -0.2 |
| Myanmar | 1.0 | 1.1 | -0.1 |
| Philippines | 3.3 | 3.5 | -0.2 |
| Singapore | 4.2 | 4.2 | 0 |
| Thailand | 1.3 | 0.6 | 0.7 |
| Vietnam | 1.9 | 1.7 | 0.2 |

# The Empirical Findings

**Table 3: New Keynesian Phillips curve (NKPC) in ASEAN countries**

| Countries | $\lambda$ | $\theta$ | $\beta$ |
|---|---|---|---|
| Brunei | -0.058 | -891.760 | -0.001 |
| Indonesia | -0.001 | 0.490 | 1.018** |
| Cambodia | 2.255* | 0.242** | 1.148** |
| Laos | -0.002 | 0.954 | 1.106** |
| Malaysia | -0.002 | 1.504 | 0.911** |
| Myanmar | -3.895 | -1.054 | 0.948** |
| Philippines | 0.722 | 0.436 | 1.010** |
| Singapore | 0.001 | 1.003 | 1.016* |
| Thailand | 0.262** | 0.649* | 0.956** |
| Vietnam | -3.987 | -1.002 | 0.991** |

*Notes*: * indicates significance at the 5 percent; ** indicates significance at the 1 percent level

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## Table 4: Hybrid New Keynesian Phillips curve in ASEAN countries

| Countries | $\lambda$ | $\theta$ | $\beta$ | $\varphi$ | $\omega$ |
|---|---|---|---|---|---|
| Brunei | 0.050 | 0.943* | 0.564* | 0.718* | -0.382 |
| Indonesia | -0.020 | 1.024** | 0.310 | 0.869 | -0.545 |
| Cambodia | 3.569* | -0.001 | -992.621 | 0.615 | 0.124 |
| Laos | -0.128 | 1.357 | 0.528 | 1.180 | -0.493 |
| Malaysia | -9.494 | -0.001 | 505.632 | -0.157 | -0.246 |
| Myanmar | 0.539 | 2.363 | 0.633* | 2.256 | -0.793 |
| Philippines | 0.540 | 4695.574 | -0.023 | -106.476 | 0.949 |
| Singapore | -0.150 | 1.400 | 0.492 | 1.251 | -0.516 |
| Thailand | 0.004 | 0.995* | 0.432 | 0.821** | -0.399 |
| Vietnam | 0.090 | 2.127 | 0.508 | 2.182 | -1.127 |

*Notes*: * indicates significance at the 5 percent level; ** indicates significance at the 1 percent level
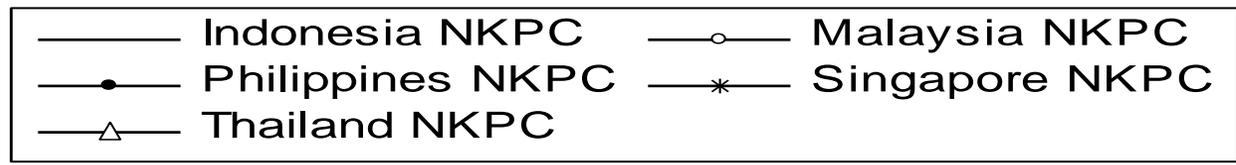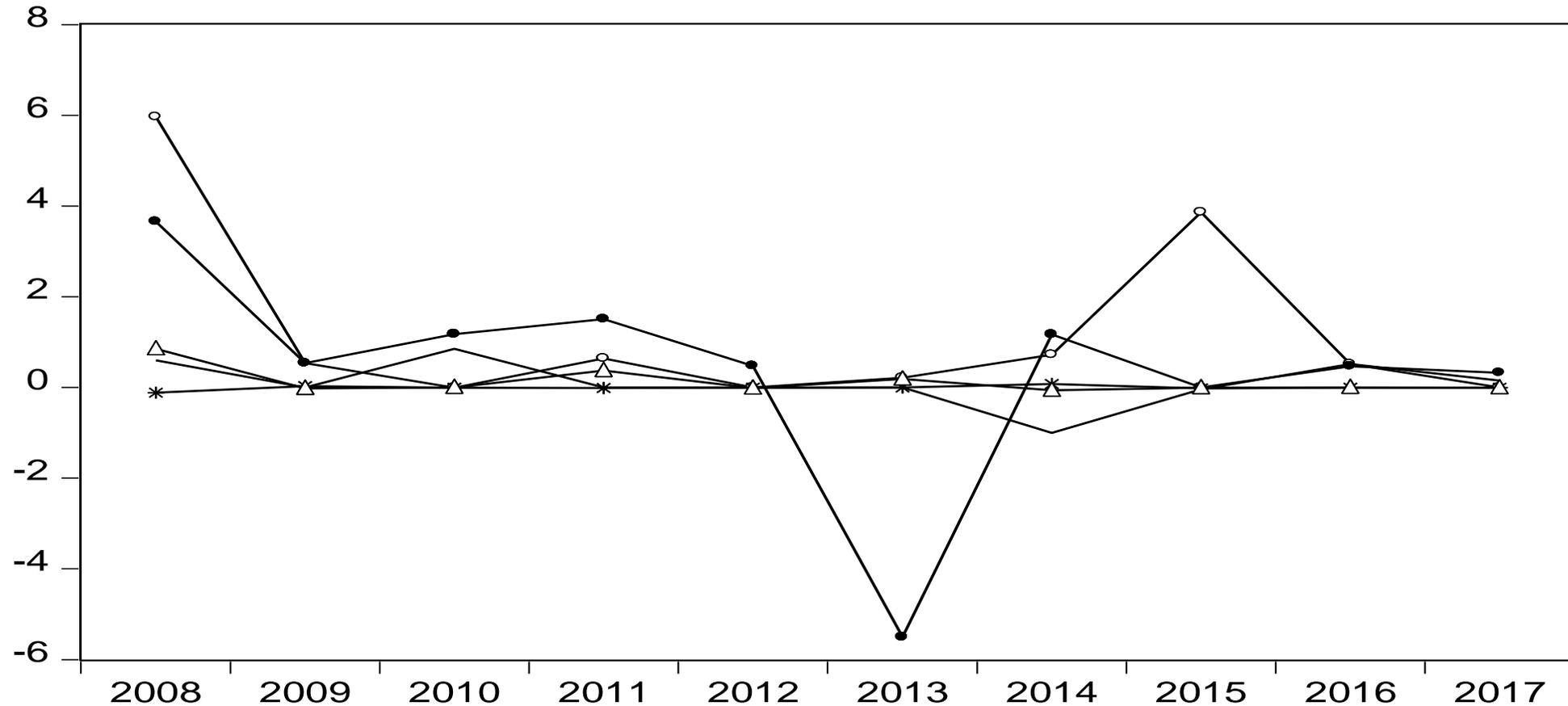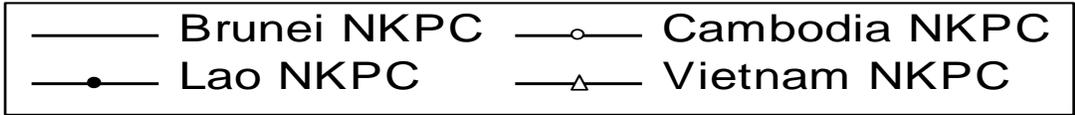
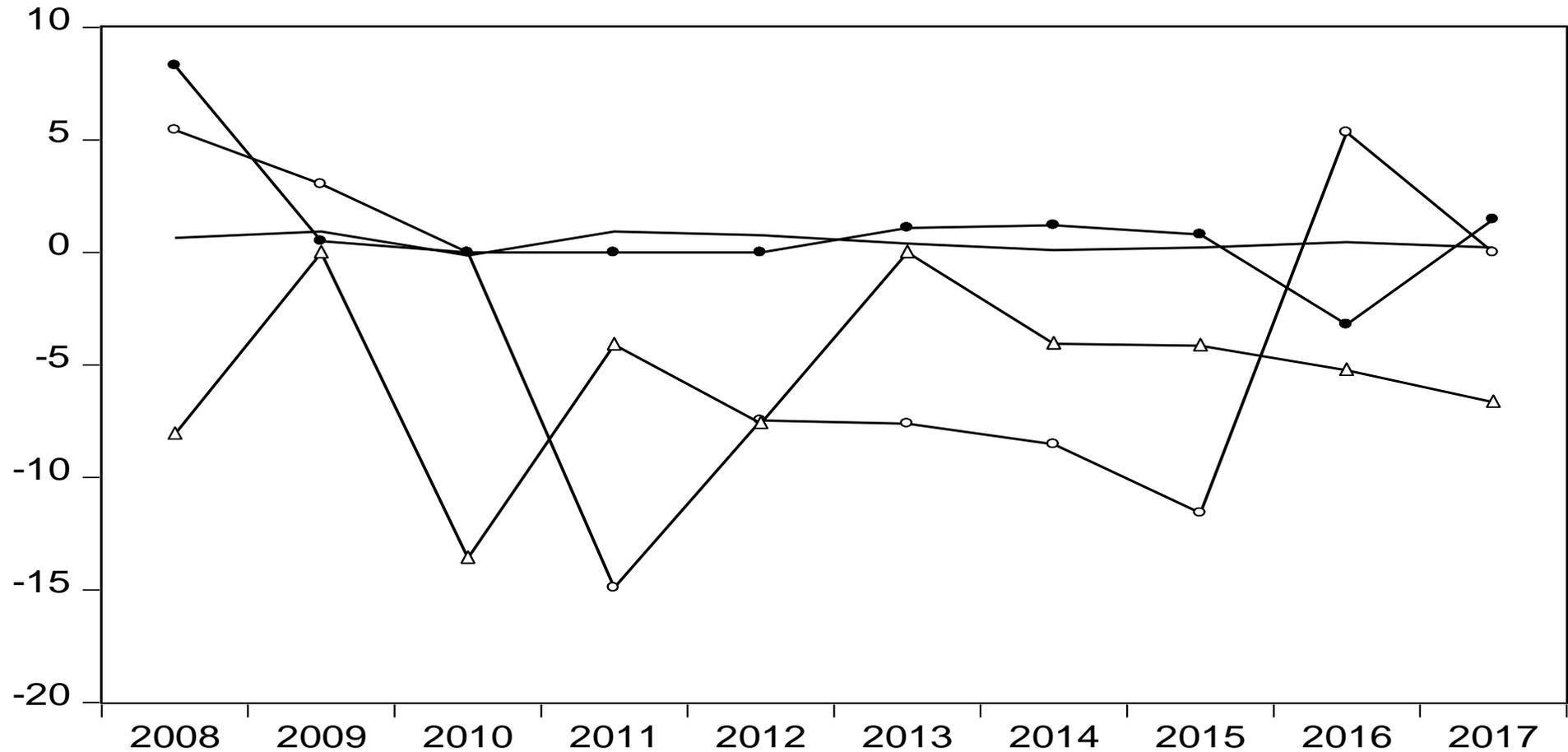# Trade openness and the NKPC
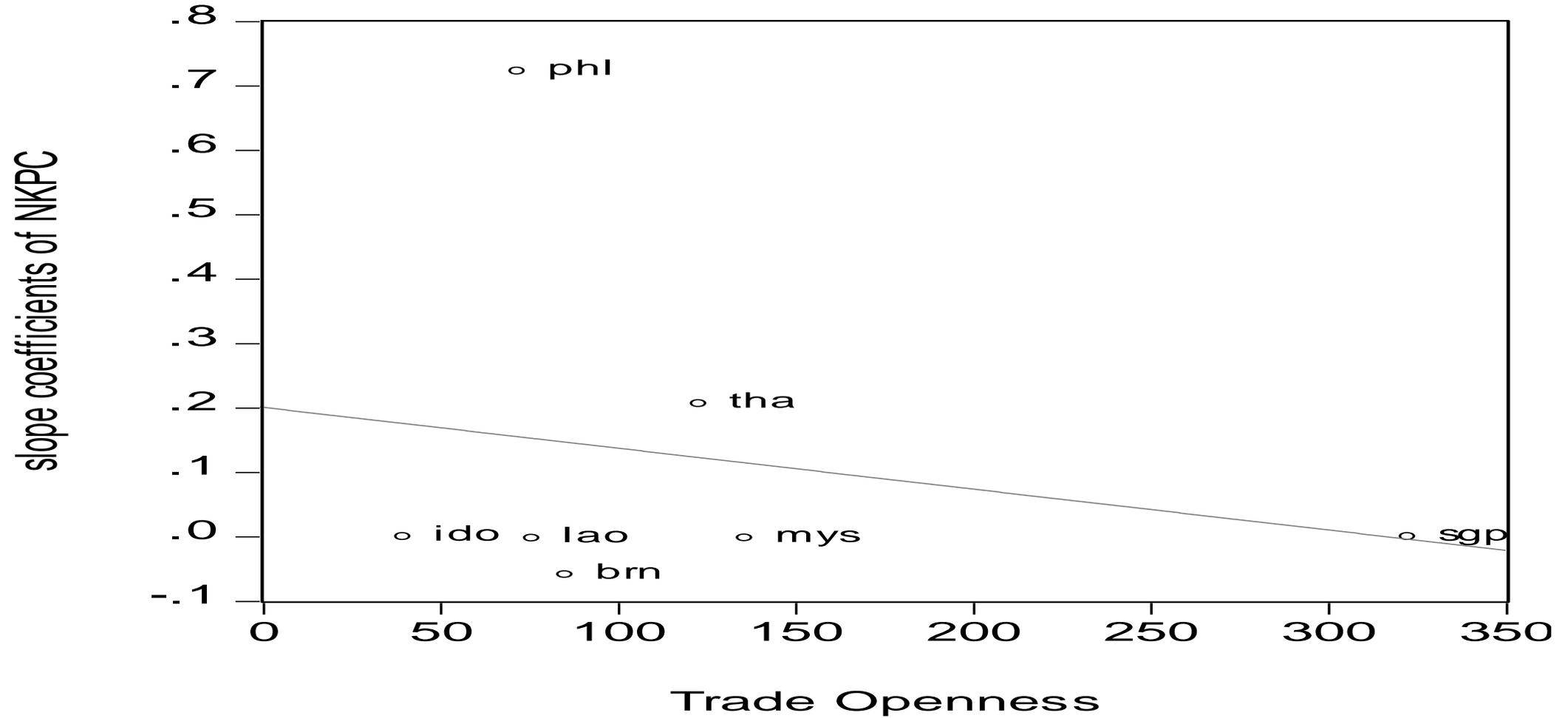
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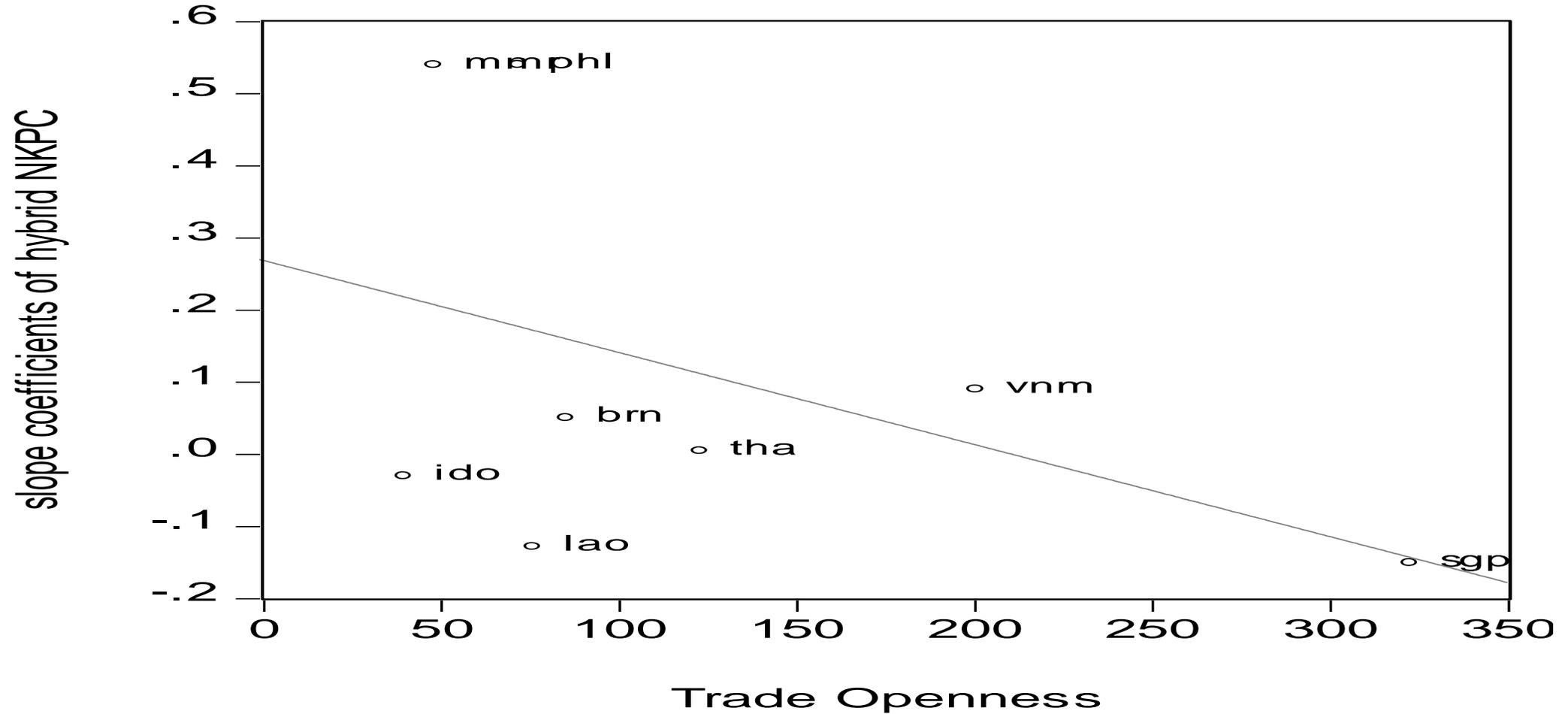
# The dynamic Phillips Curve

# Conclusions

- The empirical findings have provided some interesting insights.

- Among the ten ASEAN nations, two countries—Brunei and Indonesia—faced the problem of high unemployment. Four countries, namely, Indonesia, Laos, Myanmar and Vietnam, experienced a high inflation.

- The estimation of the natural rate of unemployment revealed that in five countries—Brunei, Indonesia, Myanmar, Malaysia and the Philippines—the cyclical unemployment was negative. In other words, there was an excessive labour demand in these countries.

# Conclusions

- The time-varying NKPC and hybrid NKPC analyses indicated that Brunei was the only ASEAN country where the slope coefficient of the Phillips curve was consistently decreasing.

- However, the general findings from the time-varying analysis were ambiguous: in other ASEAN nations the slope coefficient was neither flattening nor was it getting steeper.

# Conclusions

- Secondly, the findings from the static NKPC and hybrid NKPC detected the existence of a negative relationship between trade openness and the Phillips curve slope coefficient.

- This suggests that more open ASEAN economies tended to have a flatter slope of the Phillips curve, which supports the openness–Phillips curve (OPC) hypothesis.

- The findings of this study based on the Gali–Gertler (GG) method agree with the results of a study based on a regression analysis of the Phillips curve–openness in Asian countries (Furuoka and Ho, 2009).

# Main conclusion

- The findings offer some support to the hypothesis that in more open economies the Phillips curve would tend to be flatter.

- This means that trade openness does have an impact on the slope coefficient of the Phillips curve. In contrast, a decrease in the trade openness might result in a steeper Phillips curve.

- The main significance of the current study is that it offers empirical evidence that the trade openness could be a determining factor of the flattening of the Phillips curve.

# Thank you.