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DETERMINANTS OF FINANCIAL CONDITION IN MALAYSIA

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Abstract

This research studies the determinants of financial condition in Malaysia. It employs the external financial variables from the United States (U.S.) and domestic financial variables from Malaysia. The research assesses the long-run association among the domestic and external indicators via the ARDL bounds test approach and monthly time series data starting from January 2008 to May 2018. This research also investigates the level of the effect caused by the U.S. financial variables on the financial condition in Malaysia. The empirical findings have proven the validity of the long-run association between the majority of domestic financial indicators with the asset side of the U.S. balance sheet (lnUSTA) and the Fed funds rate (USFUND). Particularly, lnUSTA has appeared as a key determinant to the financial condition in Malaysia, specifically the Kuala Lumpur Composite Index, Malaysian credit spread, Malaysian overnight policy rate, and Malaysian term spread which has the highest level of negative effect at 1.412%. In contrast, USFUND does not show significant long-run influence with the involved domestic financial indicators except with the Malaysian credit spread.

Keywords: Financial condition, federal funds rate, U.S. balance sheet.

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1. Introduction

Financial condition is being defined as "the current state of financial variables that influence economic behaviour and (thereby) the future state of the economy" (Hatzius et al., 2010, p. 1). It acts as an intermediate role in transmitting the alteration of monetary policy (MP) stance to influence the macroeconomic outcome (Arregui et al., 2018). In order to sway the macroeconomics outcomes, the MP has to first exert effects on the financial condition to stimulate economic behaviour (Hatzius et al., 2010). The interest in assessing the financial condition of a nation has grown over the decades, particularly when the issue of global financial market meltdown arose, owing to the Global Financial Crisis (GFC).

GFC was initiated by the outburst of the mortgage bubble in the United States (U.S.) during the late 2000s. Owing to the highly interrelated bilateral economic ties, Malaysia, as an emerging economy (EME) was not spared from the U.S.-originated spill-over effects amid the globalisation, although Malaysia was not the host country of the financial storm. As a result of GFC, the performance of Malaysian share price hugely deteriorated during the second half of 2008 followed by the first quarter in 2009 with the worsening financial and economic condition. Starting from the second quarter of 2008, Malaysia encountered a drastic drop in capital inflow like other Asian nations, as the U.S. and other western nations reduced cross-nation businesses (Tey et al., 2018). A full-scale economic downturn in Malaysia materialized in 2009 with the evident slowdown in export growth and national output, accompanied by rising unemployment (Tey et al., 2018).

During the fall of 2008, GFC paralysed the U.S. credit market, causing a huge economic contraction in the U.S. To revamp the economy, the Fed had repeatedly compressed the conventional MP tool, the Fed funds rate (USFUND) until it reached zero lower bound (ZLB) in December 2008 (Bauer & Neely, 2014). When the rate reached ZLB, the conventional MP tool turned ineffective. The scenario urged U.S. policymakers to adopt a new monetary measure, the unconventional monetary policy (UMP), i.e. the Quantitative Easing (QE), also being referred as Large-Scale-Asset-Purchase (LSAP) to alter long-term interest rate for the sake of economic stability (Neely & Bhattarai, 2016). Since then, a growing volume of academic discussions has directed their studies on the effects of the adoption of UMP in the U.S. (Neely & Bhattarai, 2016).

Malfunction in the financial markets which is led by the financial crisis can result in a severe economic downturn for both the advanced economies and the EMEs (Debuque-Gonzales & Gochoco-Bautista, 2017). Via the conduct of cross-country comparison on the effects of unconventional policy shocks among the major central banks in the U.S., Japan, Europe, and England, the U.S. monetary shocks portrayed the strongest international spill-overs effects (Rogers et al., 2014). Several studies have pointed out that the U.S. MP is an essential determinant in affecting the global financial cycle, at which the changes in monetary stance transmits its effect to the EMEs' financial condition via international capital flows (Rey, 2016, 2018). The domestic asset prices of the EMEs are likely to be affected by the U.S. UMP as the EMEs' financial condition worsens (Bowman et al., 2015). Several studies have consensus on the influence of the actual LSAP operation of shows higher significance than the LSAP announcement (Bowman et al., 2015; Fratzscher et al., 2012). As argued by Rey (2016), even equipped with the large financial market, the impact of the U.S. MP shocks via international transmission is still evident in the financial conditions of the inflation targeting economies.

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With the aforementioned shreds of evidence, the impact of the changes in U.S. monetary stance cannot be merely dismissed. Hence, it is necessary to analyse the effect of changes in MP stance towards the financial condition, as the transmission has to first convey through the vessel of financial condition before the impact ultimately influences the macroeconomic outcomes (Dudley, 2010). The role explains the rising prominence of the Financial Condition Index (FCI) among the academicians and policymakers since the onset of GFC (Debuque-Gonzales & Gochoco-Bautista, 2013). The limitation of using a single indicator, i.e. the alteration in central bank policy rate starts to materialize as it only represents one dimension of the overall evolution in the financial system to inform on the current monetary stance (Osorio et al., 2011). Financial Condition Index (FCI) aims to act as a summary indicator to distil the information about future economic condition contained by a wide array of current financial indicators (Angelopoulou et al., 2014; Debuque-Gonzales & Gochoco-Bautista, 2013, 2017; Hatzius et al., 2010). The increment in FCI depicts financial easing, while a drop in the FCI illustrates potential financial stresses (Badrudin & Abu Bakar, 2017).

Over the decades, major financial institutions have contributed in developing the FCIs for mostly the U.S. (Brave & Butters, 2011; Hatzius et al., 2010), the selected European economies (Angelopoulou et al., 2014), a few studies on the EMEs (Debuque-Gonzales & Gochoco-Bautista, 2013, 2017), while rarely set foot on a single emerging market. Several examples of well-established FCIs which were being constructed from decades ago are the Bloomberg FCI, and the Citi FCI (Hatzius et al., 2010). In 2017, Bank Negara Malaysia (BNM) has noticed FCI's prominence and proceeded with its own FCI construction. The constructed FCI includes 12 variables, representing the components of the banking system, foreign exchange market, bond market and equity market (Badrudin & Abu Bakar, 2017).

To assess the validity of the constructed FCI, studies often examine its predictive power on the real economy. In the predictability assessment, the FCIs often being made comparison with five useful financial indicators (Debuque-Gonzales & Gochoco-Bautista, 2013, 2017; Hatzius et al., 2010). The aforesaid five financial indicators are adjusted to fit in the Malaysian context to represent the Malaysian financial condition in this research. To investigate the spill-over effects from the U.S. MP decision, the Fed funds rate (USFUND) and the asset side of the balance sheet (USTA) are taken into the account as both of the external indicators represent different monetary policy regime adopted by the U.S. The research will assess the validity of long-run association among the domestic and external variables using the Autoregressive Distributed Lag (ARDL) bounds test approach of Pesaran et al. (2001). The research also investigates the level of the effect caused by the U.S. financial indicators on the Malaysian financial condition. The monthly time series data ranging from January 2008 to May 2018, a total of 125 observations will be utilized in the research.

This research is divided into several sections. Section 2 proceeds with the problem statement, it is then followed by Section 3 which will illustrate the research questions. The purpose of the study is being stated in Section 4, while section 5 shows the elaboration on the research findings. In section 6, the research will be concluded with final remarks.

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2. Problem Statement

Several prior studies infer that the conventional MP tool, the USFUND is a significant driver of capital flows to EMEs (Bruno & Shin, 2015). Tillmann (2016) suggests that identical to the conventional monetary measures, the unconventional measures too, have sizeable spill-over impacts on the EMEs. Chen et al. (2016) suggests the U.S. UMP measure, specifically the QE program, have even greater influences on EMEs than the U.S. economy itself. Anaya et al. (2017) propose that the response of the EMEs towards U.S. monetary shocks is to reduce their short rate during the conduct of expansionary monetary regime. The study suggests that the easing in U.S. UMP drives portfolio reallocation into the EMEs, exerting upsurge pressure in the EMEs' equity prices. The finding from Punzi and Chantapacdepong (2017) outlines the impacts of U.S. UMP on Asia and the Pacific region, particularly the drastic rush in capital flows, heavy liquidity and strong hike in asset prices. The literature has pointed out that when encountering the monetary shocks from developed economies, the region tends to respond with an accommodative monetary stance. According to Hofmann and Takats (2015), both of the short rates and long rates from the U.S. have substantial impacts on the matching rates of other nations' economic condition, particularly the spill-over effect is highly evident on the long-term bond return. Fratzscher et al. (2012) observed that in comparison with the impact of the Fed's UMP announcements, the higher significance of impacts on the asset prices and portfolio rebalancing is substantially shown in the U.S. UMP actual operation. A brief assessment is conducted to preliminarily examine the influence of U.S. MP stance on the Asian financial conditions, denoted by the author-computed FCIs (Debuque-Gonzales & Gochoco-Bautista, 2017). The finding depicts substantial influence from the alteration in U.S. MP rates is found in the illustrated financial conditions, where the relatively evident responses appear in the Philippines and Hong Kong among the selected Asian economies.

The complexity of the financial system in Malaysia has been evolving as the interdependence between nations develops over time. The literature that sheds light on how the U.S. MP stance directly influences the financial condition in Malaysia is noticeably scarce. In terms of evaluating the U.S. MP effects, it is important to lay focus on the effects generated by UMP actual operation, instead of concentrating only on the LSAP announcements. Several attempts intend to bridge the aforementioned gaps in this research. To portray the evaluation on the impact of the U.S. UMP actual operation, the research has employed USTA to represent the U.S. balance sheet size to study the way it affects Malaysian financial condition. The impact of a different monetary regime, the U.S. conventional MP on Malaysian financial condition is being examined by employing USFUND with the incorporation of the Wu and Xia (2016) shadow rate.

Instead of constructing a new FCI, this research focuses specifically on five financial variables that are often being made comparison with FCI, (i) a stock market index, (ii) an indicator of the short-term credit spread, (iii) a relevant variable reflecting policy conditions, (iv) the real money supply and (v) an indicator of the term spread. The common comparison with these financial indicators is often being mentioned in the forecasting literature, as they have been considered as useful indicators (Stock & Watson, 2003, 2006). The financial indicators are adjusted to fit in the Malaysian context as a representation of financial condition in Malaysia, (i) Kuala Lumpur Composite Index (KLCI), (ii) short-term credit spread (MCS), (iii) Overnight Policy Rate (MOPR), (iv) real M2 of Malaysia (MRM2), (v) term spread (MTS).

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The occurrence of GFC has led the U.S. suffering from the effect of the financial turbulence as the crises have driven a drastic drop in equity prices and severe volatility in stock markets of both the advanced economies and the EMEs (Gómez et al., 2011). Kurov and Gu (2016) confirm that amid financial turbulences, the easing in monetary stance can positively stimulate equity prices. The term spread is important in informing the financial health, its role is accentuated for such interest rate differential is considered useful even during the normal period (Chen et al., 2016). Credit spread informs on the risk premium of bearing default risk, while term spread reflects on the shortage of short-term liquidity (Debuque-Gonzales & Gochoco-Bautista, 2017). A positive term spread will signify a normal economic state, while an inverted term spread indicates a sign of a possible economic downturn. The inclusion of policy rate measures the price of financing for the household and firms (Gómez et al., 2011). The money supply reflects on the money market condition (Koong et al., 2017).

3. Research Questions

The research questions are being illustrated as below:

- Is the long-run association valid between the external financial indicators from the U.S. and the financial condition in Malaysia?
- To which extent the external financial variables from the U.S. affect the financial condition in Malaysia?

4. Purpose of the Study

This research aims to assess the validity of the long-run association among the external and domestic indicators using the ARDL bounds testing approach. This research also investigates the level of the effect caused by the external financial variables from the U.S. on the financial condition of Malaysia.

5. Research Methods

5.1. Empirical models

This research investigates the validity of long-run association between the domestic and external indicators, where the domestic indicators are Kuala Lumpur Composite Index (KLCI), credit spread (MCS), overnight policy rate (MOPR), real M2 (MRM2) and term spread (MTS), while two U.S. external indicators are the Fed fund rate (USFUND) and the total assets of all Fed Reserve banks (USTA). The linear equation model is:

$$Y_t = \beta_0 + \beta_1 DOM_t + \beta_2 DOM_t + \beta_3 DOM_t + \beta_4 DOM_t + \beta_5 FOR_t + \varepsilon_t \quad (1)$$

where Y_t denotes the dependent variable that is being composed of the studied domestic variable, DOM_t denotes the domestic variables, while FOR_t denotes the external variables, β_0 signifies the intercept coefficient of the tested equation, ε_t denotes the disturbance term while $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 represent the slope parameters respectively.

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Upon the completion of natural logarithm transformation made on KLCI, MRM2, and USTA, the study is able to construct such equations based on each of the models, denoted by models from model M1 to M10:

M1. $$lnKLCI_t = \beta_0 + \beta_1 MCS_t + \beta_2 MOPR_t + \beta_3 lnMRM2_t + \beta_4 MTS_t + \beta_5 USFUND_t + \varepsilon_t \quad (2)$$

M2. $$MCS_t = \beta_0 + \beta_1 lnKLCI_t + \beta_2 MOPR_t + \beta_3 lnMRM2_t + \beta_4 MTS_t + \beta_5 USFUND_t + \varepsilon_t \quad (3)$$

M3. $$MOPR_t = \beta_0 + \beta_1 lnKLCI_t + \beta_2 MCS_t + \beta_3 lnMRM2_t + \beta_4 MTS_t + \beta_5 USFUND_t + \varepsilon_t \quad (4)$$

M4. $$lnMRM2_t = \beta_0 + \beta_1 lnKLCI_t + \beta_2 MCS_t + \beta_3 MOPR_t + \beta_4 MTS_t + \beta_5 USFUND_t + \varepsilon_t \quad (5)$$

M5. $$MTS_t = \beta_0 + \beta_1 lnKLCI_t + \beta_2 MCS_t + \beta_3 MOPR_t + \beta_4 lnMRM2_t + \beta_5 USFUND_t + \varepsilon_t \quad (6)$$

M6. $$lnKLCI_t = \beta_0 + \beta_1 MCS_t + \beta_2 MOPR_t + \beta_3 lnMRM2_t + \beta_4 MTS_t + \beta_5 lnUSTA_t + \varepsilon_t \quad (7)$$

M7. $$MCS_t = \beta_0 + \beta_1 lnKLCI_t + \beta_2 MOPR_t + \beta_3 lnMRM2_t + \beta_4 MTS_t + \beta_5 lnUSTA_t + \varepsilon_t \quad (8)$$

M8. $$MOPR_t = \beta_0 + \beta_1 lnKLCI_t + \beta_2 MCS_t + \beta_3 lnMRM2_t + \beta_4 MTS_t + \beta_5 lnUSTA_t + \varepsilon_t \quad (9)$$

M9. $$lnMRM2_t = \beta_0 + \beta_1 lnKLCI_t + \beta_2 MCS_t + \beta_3 MOPR_t + \beta_4 MTS_t + \beta_5 lnUSTA_t + \varepsilon_t \quad (10)$$

M10. $$MTS_t = \beta_0 + \beta_1 lnKLCI_t + \beta_2 MCS_t + \beta_3 MOPR_t + \beta_4 lnMRM2_t + \beta_5 lnUSTA_t + \varepsilon_t \quad (11)$$

where lnKLCI denotes the natural log of Kuala Lumpur Composite Index, MCS represents Malaysia credit spread, MOPR signifies overnight policy rate of Malaysia, lnMRM2 indicates the natural log of real money supply M2 of Malaysia, MTS represents Malaysia term spread, USFUND implies the federal funds rate, and lnUSTA symbolizes the natural log of total asset side of the US balance sheet.

This research employs the ARDL bounds test approach to investigate the existence of the long-run association between the indicators. The following regressions have been constructed to prepare the models for bounds testing procedures to assess the validity of cointegration among the variables:

M1. $$\Delta lnKLCI_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta USFUND_{t-i} + \alpha_1 lnKLCI_{t-1} + \alpha_2 MCS_{t-1} + \alpha_3 MOPR_{t-1} + \alpha_4 lnMRM2_{t-1} + \alpha_5 MTS_{t-1} + \alpha_6 USFUND_{t-1} + \varepsilon_t \quad (12)$$

M2. $$\Delta MCS_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta USFUND_{t-i} + \alpha_1 lnKLCI_{t-1} + \alpha_2 MCS_{t-1} + \alpha_3 MOPR_{t-1} + \alpha_4 lnMRM2_{t-1} + \alpha_5 MTS_{t-1} + \alpha_6 USFUND_{t-1} + \varepsilon_t \quad (13)$$

M3. $$\Delta MOPR_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta USFUND_{t-i} + \alpha_1 lnKLCI_{t-1} + \alpha_2 MCS_{t-1} + \alpha_3 MOPR_{t-1} + \alpha_4 lnMRM2_{t-1} + \alpha_5 MTS_{t-1} + \alpha_6 USFUND_{t-1} + \varepsilon_t \quad (14)$$

M4. $$\Delta lnMRM2_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta USFUND_{t-i} + \alpha_1 lnKLCI_{t-1} + \alpha_2 MCS_{t-1} + \alpha_3 MOPR_{t-1} + \alpha_4 lnMRM2_{t-1} + \alpha_5 MTS_{t-1} + \alpha_6 USFUND_{t-1} + \varepsilon_t \quad (15)$$

M5. $$\Delta MTS_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta USFUND_{t-i} + \alpha_1 lnKLCI_{t-1} + \alpha_2 MCS_{t-1} + \alpha_3 MOPR_{t-1} + \alpha_4 lnMRM2_{t-1} + \alpha_5 MTS_{t-1} + \alpha_6 USFUND_{t-1} + \varepsilon_t \quad (16)$$

M6. $$\Delta lnKLCI_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta lnUSTA_{t-i} + \alpha_1 lnKLCI_{t-1} + \alpha_2 MCS_{t-1} + \alpha_3 MOPR_{t-1} + \alpha_4 lnMRM2_{t-1} + \alpha_5 MTS_{t-1} + \alpha_6 lnUSTA_{t-1} + \varepsilon_t \quad (17)$$

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M7. $\Delta MCS_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta lnUSTA_{t-i} + \alpha_1 lnKLCI_{t-1} + \alpha_2 MCS_{t-1} + \alpha_3 MOPR_{t-1} + \alpha_4 lnMRM2_{t-1} + \alpha_5 MTS_{t-1} + \alpha_6 lnUSTA_{t-1} + \varepsilon_t$ (18)

M8. $\Delta MOPR_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta lnUSTA_{t-i} + \alpha_1 lnKLCI_{t-1} + \alpha_2 MCS_{t-1} + \alpha_3 MOPR_{t-1} + \alpha_4 lnMRM2_{t-1} + \alpha_5 MTS_{t-1} + \alpha_6 lnUSTA_{t-1} + \varepsilon_t$ (19)

M9. $\Delta lnMRM2_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta lnUSTA_{t-i} + \alpha_1 lnKLCI_{t-1} + \alpha_2 MCS_{t-1} + \alpha_3 MOPR_{t-1} + \alpha_4 lnMRM2_{t-1} + \alpha_5 MTS_{t-1} + \alpha_6 lnUSTA_{t-1} + \varepsilon_t$ (20)

M10. $\Delta MTS_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta lnUSTA_{t-i} + \alpha_1 lnKLCI_{t-1} + \alpha_2 MCS_{t-1} + \alpha_3 MOPR_{t-1} + \alpha_4 lnMRM2_{t-1} + \alpha_5 MTS_{t-1} + \alpha_6 lnUSTA_{t-1} + \varepsilon_t$ (21)

The F-statistics extracted from the bounds test will be compared with the upper bound critical values. Once the F-statistics exceeded *I*(1), the presence of cointegration in the model is assured. Then, the equations will be further expanded under the error correction model (ECM):

M1. $\Delta lnKLCI_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta USFUND_{t-i} + \lambda EC_{t-1} + \varepsilon_t.$ (22)

M2. $\Delta MCS_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta USFUND_{t-i} + \lambda EC_{t-1} + \varepsilon_t$ (23)

M3. $\Delta MOPR_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta USFUND_{t-i} + \lambda EC_{t-1} + \varepsilon_t$ (24)

M4. $\Delta lnMRM2_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta USFUND_{t-i} + \lambda EC_{t-1} + \varepsilon_t$ (25)

M5. $\Delta MTS_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta USFUND_{t-i} + \lambda EC_{t-1} + \varepsilon_t$ (26)

M6. $\Delta lnKLCI_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta lnUSTA_{t-i} + \lambda EC_{t-1} + \varepsilon_t .$ (27)

M7. $\Delta MCS_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta lnUSTA_{t-i} + \lambda EC_{t-1} + \varepsilon_t$ (28)

M8. $\Delta MOPR_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta lnUSTA_{t-i} + \lambda EC_{t-1} + \varepsilon_t$ (29)

M9. $\Delta lnMRM2_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta lnUSTA_{t-i} + +\lambda EC_{t-1} + \varepsilon_t$ (30)

M10. $\Delta MTS_t = \beta_0 + \Sigma\beta_1 \Delta lnKLCI_{t-i} + \Sigma\beta_2 \Delta MCS_{t-i} + \Sigma\beta_3 \Delta MOPR_{t-i} + \Sigma\beta_4 \Delta lnMRM2_{t-i} + \Sigma\beta_5 \Delta MTS_{t-i} + \Sigma\beta_6 \Delta lnUSTA_{t-i} + +\lambda EC_{t-1} + \varepsilon_t$ (31)

where λ signifies the coefficient of the error correction term, EC_{t-1}. It measures the speed of long-run adjustment to correct disequilibrium within the model. The expansion of equation is shown in equation (22), (23), (24), (25), (26), (27), (28), (29), (30), and (31).

5.2. Data

Seven variables are being employed in this research to study the determinants of financial condition in Malaysia. The domestic variables are comprised of Kuala Lumpur Composite Index (KLCI) which

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exhibits the share price performance of 100 components stocks on the Kuala Lumpur Stock Exchange's Main Board, Malaysian credit spread (MCS) which portrays the interest differential of the 3-months Kuala Lumpur Interbank Offered Rate (KLIBOR3M) and 3-months Malaysian Treasury Bill (MTB3M), overnight policy rate (MOPR) which serves as the indicator of monetary policy stance for Malaysia, real money supply, M2 (MRM2) which reflects the money market condition, lastly the Malaysian term spread (MTS) which outlines the interest differential of the 10-years Malaysian Government Securities (MGS10Y) and 3-months Malaysian Treasury Bill (MTB3M). The external variables are the Fed funds rate (USFUND) which refers to the U.S. central bank policy rate and the total assets of all Federal Reserve Banks (USTA) reflect the U.S. balance sheet size. All of the studied indicators are in the form of monthly frequency, as the samples period ranges from January 2008 till May 2018, accumulating a total of 125 observations. The data sources are the monthly statistical bulletin of Bank Negara Malaysia, FRED Economic Data and International Financial Statistics (IFS).

To transform the money supply, M2 into the real term, the Consumer Price Index (CPI) which the base year is 2010 has acted as the deflator, then the unit of the series is converted into millions of U.S.D using the Malaysia/U.S. foreign exchange rate. For the USFUND, the Wu and Xia (2016) shadow rates ranging from January 2009 to November 2015 is incorporated in the series.

5.3. Estimation procedure

This research began with the unit root tests to identify the existence of data stationarity. The ADF and PP tests (Phillips & Perron, 1988) are used in this research. When the data series indicates stationarity at the different order of integration. The estimation will proceed to the ARDL approach to identify the long-run properties among the indicators.

6. Findings

6.1. Lag order selection

Table 01 illustrates the selection of lag length under the Akaike Information Criterion (AIC) for models M1, M2, M3, M4, and M5 is 2, given the lag number has indicated the lowest value at $\beta = -14.0142$ among the tested number of lags. For model M6, M7, M8, M9 and M10, the optimal lag selection according to the AIC is 5, given the lag number illustrated the lowest value at $\beta = -17.3367$ among the tested number of lags. The 4th column of Table 01 shows the specification of estimated ARDL for each model based on the respective lag order.

Table 01. Specification of estimated ARDL for each model

Model	Equation	Selected Lag Length	Selected Model
M1	F(lnKLCI | MCS, MOPR, lnMRM2, MTS, USFUND)	2	ARDL(2, 0, 2, 1, 1, 1)
M2	F(MCS | lnKLCI, MOPR, lnMRM2, MTS, USFUND)	2	ARDL(1, 2, 0, 1, 2, 2)
M3	F(MOPR | lnKLCI, MCS, lnMRM2, MTS, USFUND)	2	ARDL(1, 1, 1, 0, 1, 1)
M4	F(lnMRM2 | lnKLCI, MCS, MOPR, MTS, USFUND)	2	ARDL(1, 2, 2, 2, 1, 1)
M5	F(MTS | lnKLCI, MCS, MOPR, lnMRM2, USFUND)	2	ARDL(2, 2, 1, 2, 1, 0)
M6	F(lnKLCI | MCS, MOPR, lnMRM2, MTS, LNUSTA)	5	ARDL(3, 2, 2, 1, 0, 4)
M7	F(MCS | lnKLCI, MOPR, lnMRM2, MTS, LNUSTA)	5	ARDL(4, 0, 0, 1, 2, 4)

M8	F(MOPR | lnKLCI, MCS, lnMRM2, MTS, LNUSTA)	5	ARDL(2, 5, 5, 0, 1, 5)
M9	F(lnMRM2 | lnKLCI, MCS, MOPR, MTS, LNUSTA)	5	ARDL(4, 3, 2, 2, 1, 2)
M10	F(MTS | lnKLCI, MCS, MOPR, lnMRM2, LNUSTA)	5	ARDL(1, 2, 1, 5, 2, 5)

6.2. Unit root tests

Table 02 has shown that while MTS, USFUND, and lnUSTA are significant at level, the rest of the variables are significant at the first difference. Looking at these results, it is apparent that all the indicators are stationary at *I*(0) and *I*(1), indicating that the models are suitable for ARDL estimation.

Table 02. ADF and PP test results

Variable	Augmented Dickey-Fuller (ADF) Test		Phillips-Perron (PP) Test	
	Level			
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
lnKLCI	-0.923 (0)	-1.728 (0)	-1.283 (6)	-2.284 (6)
MCS	-2.573 (0)	-3.129 (0)	-2.520 (1)	-3.096 (2)
MOPR	-2.143 (1)	-2.769 (1)	-2.211 (6)	-2.674 (5)
lnMRM2	-1.508 (0)	-1.190 (0)	-1.565 (3)	-1.319 (3)
MTS	-2.652 (0)*	-2.783 (0)	-2.840 (1)*	-3.067 (2)
USFUND	-1.257 (5)	-1.586 (1)	-3.225 (6)**	-3.478 (1)*
lnUSTA	-4.955 (7)***	0.153 (10)	-3.564 (8)***	-2.559 (8)
Variable	**First Difference**			
lnKLCI	-4.716 (12)***	-5.896(12)***	-9.317 (5)***	-9.274 (5)***
MCS	-12.106 (0)***	-12.055(0)***	-12.207 (5)***	-12.15 (5)***
MOPR	-5.491 (1)***	-5.545(1)***	-8.385 (4)***	-8.428 (4)***
lnMRM2	-9.916 (0)***	-9.928(0)***	-9.914 (1)***	-9.926 (1)***
MTS	-9.418 (0)***	-9.400(0)***	-9.302 (6)***	-9.280 (6)***
USFUND	-3.820 (4)***	-6.725(2)***	-8.562 (3)***	-9.193 (9)***
lnUSTA	-4.591 (9)***	-5.126(9)***	-6.710 (15)***	-6.717 (23)***

Notes: The table depicts the t-statistic of the unit root test, where *** (**)* represents significance at 1%, 5%, and 10% level correspondingly. The figures in parentheses represent the lag length for the ADF test and the Newey-West bandwidth using the Bartlett kernel for the PP test.

6.3. Autocorrelation test

Table 03 demonstrates the results of the autocorrelation test. Referring to Table 03, the Prob. Chi-Square coefficients from the tested models have exceeded 5%, indicating that the models are all free from autocorrelation.

Table 03. Autocorrelation test results

Model	Equation	F-statistic	Prob. Chi-Square	Result
M1	F(lnKLCI | MCS, MOPR, lnMRM2, MTS, USFUND)	0.654	0.479	H_0 is not rejected.
M2	F(MCS | lnKLCI, MOPR, lnMRM2, MTS, USFUND)	0.853	0.381	H_0 is not rejected.

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M3	F(MOPR | lnKLCI, MCS, lnMRM2, MTS, USFUND)	1.199	0.270	H_0 is not rejected.
M4	F(lnMRM2 | lnKLCI, MCS, MOPR, MTS, USFUND)	0.408	0.625	H_0 is not rejected.
M5	F(MTS | lnKLCI, MCS, MOPR, lnMRM2, USFUND)	0.197	0.798	H_0 is not rejected.
M6	F(lnKLCI | MCS, MOPR, lnMRM2, MTS, LNUSTA)	0.573	0.633	H_0 is not rejected.
M7	F(MCS | lnKLCI, MOPR, lnMRM2, MTS, LNUSTA)	0.776	0.471	H_0 is not rejected.
M8	F(MOPR | lnKLCI, MCS, lnMRM2, MTS, LNUSTA)	0.419	0.746	H_0 is not rejected.
M9	F(lnMRM2 | lnKLCI, MCS, MOPR, MTS, LNUSTA)	0.758	0.467	H_0 is not rejected.
M10	F(MTS | lnKLCI, MCS, MOPR, lnMRM2, LNUSTA)	1.649	0.082	H_0 is not rejected.

6.4. Bounds test

Table 04 reports the bounds test result. The F-statistics of all models have exceeded the upper critical value, *I*(1), except models M4 and M9. Therefore, given that the null hypothesis of no cointegration is being overruled, it is evident that the long-run associations are present among the studied indicators.

Table 04. Bounds test approach results

Model	**Equation**	**F-Statistic**	
M1	F(lnKLCI | MCS, MOPR, lnMRM2, MTS, USFUND)	5.576****	
M2	F(MCS | lnKLCI, MOPR, lnMRM2, MTS, USFUND)	7.101****	
M3	F(MOPR | lnKLCI, MCS, lnMRM2, MTS, USFUND)	8.346****	
M4	F(lnMRM2 | lnKLCI, MCS, MOPR, MTS, USFUND)	1.611	
M5	F(MTS | lnKLCI, MCS, MOPR, lnMRM2, USFUND)	3.408*	
M6	F(lnKLCI | MCS, MOPR, lnMRM2, MTS, LNUSTA)	7.086****	
M7	F(MCS | lnKLCI, MOPR, lnMRM2, MTS, LNUSTA)	7.406****	
M8	F(MOPR | lnKLCI, MCS, lnMRM2, MTS, LNUSTA)	5.637****	
M9	F(lnMRM2 | lnKLCI, MCS, MOPR, MTS, LNUSTA)	1.403	
M10	F(MTS | lnKLCI, MCS, MOPR, lnMRM2, LNUSTA)	10.958****	
Bounds test critical values (Case III. Unrestricted intercept and no trend)			
Significant Level		***I*(0)**	***I*(1)**
10%		2.26	3.35
5%		2.62	3.79
2.5%		2.96	4.18
1%		3.41	4.68

Note: **** (***) ** (*) represents significance at 1%, 2.5%, 5% and 10% level correspondingly.

6.5. Error Correction Model (ECM)

Table 05 depicts the error-correction coefficients of all cointegration equation. The coefficients are all negative and they have achieved statistical significance at 1% level. These results indicate that all variables are able to move towards long-run equilibrium. The speed of adjustment towards long-run equilibrium is 3.00% in model M1, which is the lowest among the illustrated models, while variables in

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model M10 will adjust towards long-run stability by 42.4%. As a result, the long-run equilibrium relationship is confirmed in all models.

Table 05. Error correction model results

Model	Equation	CointEq(-1) Coefficient	Probability
M1	F(lnKLCI | MCS, MOPR, lnMRM2, MTS, USFUND)	-0.030***	0.000
M2	F(MCS | lnKLCI, MOPR, lnMRM2, MTS, USFUND)	-0.221***	0.000
M3	F(MOPR | lnKLCI, MCS, lnMRM2, MTS, USFUND)	-0.047***	0.000
M5	F(MTS | lnKLCI, MCS, MOPR, lnMRM2, USFUND)	-0.256***	0.000
M6	F(lnKLCI | MCS, MOPR, lnMRM2, MTS, LNUSTA)	-0.194***	0.000
M7	F(MCS | lnKLCI, MOPR, lnMRM2, MTS, LNUSTA)	-0.398***	0.000
M8	F(MOPR | lnKLCI, MCS, lnMRM2, MTS, LNUSTA)	-0.197***	0.000
M10	F(MTS | lnKLCI, MCS, MOPR, lnMRM2, LNUSTA)	-0.424***	0.000

Notes: *** represents significance at 1% level.

6.6. Long-run coefficients

According to Table 06, with the inclusion of USFUND in the models, model M2 is the only model where the USFUND depicts significant influence over the dependent variable, MCS. M1 and M3 have none of the variables showing a significant relationship with their respective dependent variables. In contrast, there are three out of five variables show significant relationships with the dependent variable in the model M2, where MOPR and MTS have a positive and highly significant relationship with MCS at a 1% level, while USFUND negatively influences MCS at 5% significant level. A 1% increment in the central bank policy rate or term spread of Malaysia will lead to an increment of 1.017% or 0.604% in Malaysian credit spread correspondingly. For a 1% decrease in the US Fed funds rate, it will lead to an increase of 0.149% in the Malaysian credit spread. For model M5, two out of five variables show a significant relationship with the dependent variable, MTS, where MCS positively influence MTS at 5% significant level, while MOPR negatively influences MTS at 1% significant level. A 1% increment in Malaysian credit spread will increase the term spread by 0.546%, while a 1% increase in the central bank policy rate will lead to the downward pressure of 1.048% on term spread.

Referring to Table 07, with the inclusion of lnUSTA, the total assets of US Fed Reserve banks in the models, the majority of the variables show a significant relationship with their respective dependent variables. lnUSTA exhibits a positive and highly significant relationship at 1% level with the dependent variables, lnKLCI (model M6) and MCS (model M7) respectively. When there is a 1% decrease in the total asset of US Fed Reserve banks, there will be a 0.281% decline in the Malaysian stock price index or a 0.689% reduction in the Malaysian credit spread respectively. On the contrary, lnUSTA has a negative and highly significant relationship with the dependent variables, MOPR (model M8) and MTS (model M10) at a 1% significant level. The result indicates that a 1% shrinkage in the total asset of US Fed Reserve banks will drive a 0.675% rise in the Malaysian overnight policy rate or a 1.412% increase in Malaysian term spread. Looking at the domestic indicators, lnKLCI has the highest level of effect on MTS (model M10), as it portrays a positive and highly significant relationship with the dependent variable. A 1% upsurge in the stock market index will lead to a 4.111% increment in the term spread.

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In summary, with the inclusion of USFUND, only in model M2, USFUND exhibits a significant relationship with MCS. As for the illustrated models with the inclusion of lnUSTA, lnUSTA exhibits a highly significant relationship with the respective dependent variable in model M6, M7, M8, and M10. The highest level of effect from external determinant, specifically lnUSTA to domestic financial condition is at 1.4122 where the dependent variable is Malaysian term spread (model M10). As for the domestic determinants, the highest level of effect is illustrated by lnKLCI at 4.1111 where the dependent variable is Malaysian term spread (model M10). The results prove the role of USTA, acting as a key determinant to be taken into account as an external influence on domestic financial conditions in Malaysia.

Table 06. Results of estimated long-run coefficients for models with the inclusion of USFUND

Model	Dependent Variable	Independent Variables						
		lnKLCI	MCS	MOPR	lnMRM2	MTS	USFUND	C
M1	lnKLCI	-	0.731	-1.993	1.897	-0.562	0.020	-1.852
M2	MCS	0.832	-	1.017***	-1.542	0.604***	-0.149**	3.097
M3	MOPR	5.129	-1.294	-	3.361	1.391	0.338	-62.895
M5	MTS	0.711	0.546**	-1.048***	-1.369	-	0.077	9.929*

Note: *** (**)* represents significance at 1%, 5% and 10% level correspondingly.

Table 07. Results of estimated long-run coefficients for models with the inclusion of lnUSTA

Model	Dependent Variable	Independent Variables						
		lnKLCI	MCS	MOPR	lnMRM2	MTS	lnUSTA	C
M6	lnKLCI	-	-0.186***	0.096	0.434***	0.058	0.281***	-0.626
M7	MCS	-1.335***	-	0.896***	0.446	0.532***	0.689***	-6.977***
M8	MOPR	2.6053***	0.212	-	-0.485	-0.148	-0.675***	-1.962
M10	MTS	4.111***	1.133***	-1.306***	-2.495***	-	-1.412***	15.746***

Note: *** (**)* represents significance at 1%, 5% and 10% level correspondingly.

7. Conclusion

The research has proven the validity of the long-run association between the majority of domestic financial indicators and the external financial indicators, lnUSTA, and USFUND. Particularly, lnUSTA is a key determinant of the domestic financial condition. In contrast, USFUND does not portray a significant long-run impact on the involved domestic financial indicators, except the Malaysian credit spread which is negatively influenced by USFUND at 5% significant level. This indication implies that the drop in USFUND will widen the credit spread in Malaysia. The widening of credit spread suggests that the risk premium of bearing credit risks increases in Malaysia, as it signifies times of economic uncertainty, i.e. when the Fed decreases USFUND to boost growth in the economy. The findings in this research suggest several courses of action for policymakers. Looking at the external drivers of Malaysia's financial condition, the asset side of the U.S balance sheet acts as significant indicators towards the majority domestic variables in the long-run, namely Kuala Lumpur Composite Index, Malaysian credit spread, Malaysian overnight policy rate and Malaysian term spread that represent Malaysian financial condition. Hence, it is

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essential to pay concern on the alteration of lnUSTA as it shows a highly significant impact on the aforementioned domestic indicators.

The findings also indicate the reduction in the U.S. balance sheet will shrink the Malaysian stock market index and Malaysian credit spread while driving up the Malaysian overnight policy rate and Malaysian term spread. The normalization in the U.S. MP measures, i.e. deduction in securities purchase to reduce the balance sheet size, will shadow the equity market performance in Malaysia, and it will reduce the risk premium of bearing default risk in Malaysia. On a contrary, such a monetary action from the U.S. will drive up the central bank policy rate where Malaysia tends to respond with accommodative MP, and lastly, the strongest impact on the widening of the term spread, where larger and positive spread signifies normal and desirable economic state. The finding is not surprising as Chen et al. (2016) consider the interest rate differential as a handy indicator to reflect the wellbeing of the financial sector. The study of Hofmann & Takats (2015) shares an identical tone in the significance of U.S. spill-over impacts on the short and long rates.

The international spill-over effects are evident to drive instability in both the macroeconomic and financial outcomes. The level of impacts stemming from the spill-over of U.S. UMP measures partially relies on the response of each economy towards such shocks (Chen et al., 2016). To buffer such impact, resilience in the economic fundamentals in Malaysia has to be strengthened in order to sustain growth and stability within the economy. Kiendrebeogo (2016) proposes that more strength in macroeconomic position is preferable for countries to mitigate from the international monetary spill-over effects from the U.S. Structural reforms are vital such as raising the economic productivity with human capital development, promoting better competencies by better access to higher education, and promoting better investments. Secondly, the improvement in the domestic financial market is strongly encouraged for the policymakers. Georgiadis (2016) proposes that such effort will be able to reduce the economic fragility to the impacts of U.S. MP shocks.

The discussion of this research solely focuses on the context of Malaysia, providing an only single-sided view on the matter. The future recommendations are: (1) altering the incorporation of Wu & Xia (2016) shadow rate to the version of shadow rate estimated by Krippner (2013) in order to investigate the potential difference of impact brought by different versions of estimation; (2) exploring further with the inclusion of regional economies i.e. ASEAN-5 economies. According to the finding of this research, U.S. Total Assets is relatively significant to be taken into account when researching the financial condition in Malaysia as an external factor.

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