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Has the Yield Curve Accurately Predicted the Malaysian Economy in the Previous Two Decades?

Maya Puspa Rahman

Abstract

Previous researchers have argued that yield curve contains information for future growth, and to a certain extent, was accurate in predicting recessions through the signal of yield curve inversion. This paper provides new evidence on the long- and short-run relationship between economic growth and yield spread in Malaysia, based on a 20-year span of data ranging from January 1996 to December 2016. By using the autoregressive distributed lag (ARDL) framework, the sample data are divided into three samples after taking into consideration the two major crises occurred in Malaysia over the last two decades. We find strong evidence of cointegration between the yield spread and growth, concurring on the long-run and short-run dynamics between them. Though significant, the instability of the yield spread to affect the movement of growth does not support the priori expectation on the predictive ability of the yield curve in Malaysia.

Keywords: yield curve, predictive power, ARDL, Malaysia

1. Introduction

Predictive power of the yield curve is certainly not a new topic in finance. It has been empirically shown that a positive slope of the yield curve is linked with a future increase in real economic activity in the United States of America (US) in the early works by Estrella and Hardouvelis [1] while Estrella and Mishkin [2, 3] showed that yield curve provides a relatively strong signal in predicting US recession, particularly the one that had occurred during 1990–1991. In addition to that, Karunaratne [4] also finds that yield curve is a better and near perfect tool for forecasting economic activities compared to other macroeconomic indicators in Australia, whereas Hamilton and Kim [5] reexamined the predictability of the yield curve with updated data and confirmed the usefulness of the yield curve in predicting gross domestic product (GDP) growth. Apart from the above, there are voluminous studies that have been covering on the predictive ability of the yield curve. A much recent study by Boukhatem and Sekouhi [6], for example, also highlights that the yield curve can be considered as an advanced indicator for growth or recession for the Tunisian economy. As such, the slope of the yield curve,

which typically referred to the yield spread or term spread, is deemed to act as a valuable forecasting tool¹.

Even though the use of the yield curve in predicting the economy has been empirically proven, recent research came up with new evidence questioning whether it is still as powerful. Chinn and Kucko [7], for example, show the predictive power of the yield curve in the United States of America (US) and Japan to be declining over time. In addition to that, they also show that for all of the seven countries examined, yield spread is indeed important and has significant predictive power when forecasting industrial production growth over a 1-year horizon, but the result deteriorates when forecasting growth 2 years ahead.

In Malaysia, the Treasury bill spread have been empirically shown to be a significant predictor of future growth of annual output, see Ghazali and Low [8], while Elshareif and Tan [9] find a long-run cointegrated relationship between the short- and long-term rates, confirming the existence of pure expectation theory in the Malaysian bond market. The recent work of Zulkhibri and Abdul Rani [10] is one of the first to examine the role of yield spread² in inflation and growth in Malaysia. Based on the data span of 1992–2009, they used simple regression to establish the relationship between yield spread, output and inflation, and then used the probit model for forecasting. It was shown that the yield spread contains little information about future output and inflation at short horizons. They also argued that the use of yield spread in monetary analysis beyond conventional indicators is rather limited.

This study aims to discover the ability of the yield spread to predict economic growth over a longer time horizon. In consideration that the Malaysian economy as well as the sovereign bond market has grown rapidly over the past 20 years, it would be interesting to see whether there exists a long-run relationship between the yield spread and growth.

In addition to that, this study also aims to use the autoregressive distributed lag (ARDL) approach to cointegration and error correction models (ECMs) to determine whether there is evidence of relationship between yield spread and growth, in long run and short run within the span of the 20 years. In consideration of the prerequisites possessed by the conventional Granger [11] and Engle and Granger [12] to have all the underlying variables to be in the same order of integration, ARDL stands out to be the most appropriate technique in order to test for cointegration among the variables.

This paper makes two contributions to the existing literature. First, it examines the relationship between slope of the yield curve (in other words, yield spread) and growth based on updated data and over a 20-year time period. Second, it is the first to employ the ARDL method in consideration of the mixture of order of integration among the variables tested. The empirical result shows the existence of a long-run relationship between the yield spread and growth in Malaysia. Though significant, the instability of the yield spread to affect the movement of growth does not support the priori expectation on the predictive power of the yield curve, making it less reliable to be used as forecasting tool on the general economic condition.

The remainder of this paper is organized as follows. Section 2 highlights the theoretical framework and related literature on the predictive power of the yield

¹ Normally calculated as the difference between the yields of the 10-year government securities against 3-month Treasury bill. See among others, Estrella and Hardouvelis [1], Estrella and Mishkin [2], Karunaratne [4], Hamilton and Kim [5].

² Zulkhibri and Abdul Rani [10] used ‘term spread’ in their study instead of yield spread, but the calculation is similar as highlighted earlier.

curve. Section 3 discusses the major crises faced by the Malaysian economy, within our data span while Section 4 describes the estimation model, data and method employed. The empirical results are presented in Section 5 while the concluding remarks and recommendation for future research are presented in Section 6.

2. Theoretical framework of yield curve analysis

According to the economic research department of the Federal Reserve Bank of New York, the analysis on the behavior of interest rates of different maturities over the business cycle goes back to the early work of Mitchell [13]. Many years later, Butler [14] made a connection between the yield curve as a predictor of short-term interest rates and the implications of declining short-term rates for contemporaneous economic activity, of which he correctly predicted that there would be no recession in 1979³. Subsequently, numerous studies have been conducted on the predictability of the yield curve in charting the future state of the economy.

Fundamentally, yield curve analysis is developed based on the term structure of interest rates, strongly associated with pure expectation theory. This theory essentially equalizes the long-term interest rates with short-term interest rates and market expectation of future interest rates plus a risk premium, which refers to the opportunity cost and compensation for holding long-term bonds as investors generally prefer short-term rather than long-term bonds. The linkage between the long-term and short-term rate together with the risk (or liquidity) premium is as presented in the equation⁴ below;

$$i_{nt} = \frac{i_t + ie_{t+1} + ie_{t+2} + \dots + ie_{t+(n-1)}}{n} + l_{nt} \tag{1}$$

where i_{nt} is the long-term rate, it is the current short-term rate; $ie_{t+(n-1)}$ is the future short-term rate; and l_{nt} is the risk (liquidity) premium, which posits that the yield on a long-term bond is the average of the one period interest rates expected over the lifetime of the long bond. Hence, this theory puts forward that the expectations of market participants are to be formed rationally, based on the anticipated economic situation, leading to the expected level of future short rates that would in turn influence the yields on long-term bonds.

Therefore, the link between the yield curve and growth of the economy is rationalized through the monetary policy actions undertaken by the government. For example, suppose the government undertakes a contractionary monetary policy. During this time, financial market participants would expect the short-term interest rates to be temporarily raised. If the current short-term interest rate is higher than the expected future short-term rate, the long-term rate should rise less than the short-term rate according to the expectations theory. Thus, the yield spread will be flattened, or, in extreme cases, be negative. This will also reflect situations where the yield curve will be inverted as the short-term rate is higher than the long-term rate. Inverted (or negatively sloped) yield curves have been excellent predictors of recessions for many years, whereby every recession after the mid-1960s was predicted by a negative slope—an inverted yield curve—within six quarters of the impending recession. During those times, the monetary contraction would eventually reduce spending in interest-sensitive sectors of the economy,

³ Federal Reserve Bank of New York.

⁴ Incorporating the modification into the expectation theory, with the risk/liquidity premium, widely known as liquidity premium theory, see Mishkin and Eakins [11].

causing economic growth to slow. Alternatively speaking, it just makes no sense when short-term interest rates pay investors more than the long-term bonds, and so when it does, something unusual (usually economic downturn or recession) is expected to occur. On the other hand, expansionary monetary policy would result in a high yield spread, signaling for a possibility of a higher future real economic growth, see Hamilton, and Kim [5].

Putting it in a more comprehensible perspective, in general, the higher the yield on 10-year government securities relative to the yield on 3-month Treasury securities—that is, the more steeply sloped the yield curve—the higher the rate of future economic growth. Similarly, the less steeply sloped the yield curve, the lower the subsequent rate of growth. Hence, by looking in terms of the correlation between the two variables, it has been emphasized that the pattern of positive correlation between the current GDP growth and lagged yield spread and negative correlation between current GDP growth and future yield spread is consistent, see Wheelock and Wohar [15].

It is important to highlight that early studies on the predictability of recessions by the slope of the yield curve were primarily focused on the US economy (see Harvey [16], Stock and Watson [17], Chen [18], Estrella and Hardouvelis [1], while subsequent research tended to focus on whether the relationship between the yield spread and future economic growth still hold for other countries, apart from the US, see Harvey [19], Davis and Henry [20], Plosser and Rouwenhorst [21], Bonser-Neal and Morley [22], Kozicki [23], Estrella and Mishkin [3], Estrella et al. [24]). Some other studies have also empirically proven that the spread contains useful information about the future path of inflation (Jorion and Mishkin [25], Gerlach [26]).

With regard of the different views on the predictive power of the yield curve over time, particularly in Malaysia, the present study develops a model to examine the ability of the yield spread to predict economic growth over a longer time horizon, within two decades. An overview on the Malaysian economy and major crises over the last 20 years is also presented in the next section.

3. Malaysian economy, bond market development and major crises since 1996

With the celebration of her 60 years of independence, Malaysia has been globally recognized not only for the recent and dedicated effort in the Islamic banking and finance development, but is also known for the multicultural and diverse ethnics, apart from being among the top ranks in terms of GDP growth within the South-East Asian countries. With a population reaching up to 30 million people, Malaysia has recorded a stable economic growth over the last 20 years, with the highest recorded at 10% in 1996. GDP per capita has also increased by 98% from USD4797 to USD9502 in 1996 and 2016, respectively⁵.

It is important to highlight that healthy growth of the local bond market is essential in order to support the mobility of funds in the financial system. During the past 20 years since 1996, the bond market⁶ in Malaysia has grown remarkably, with bond outstanding value recorded at RM1.17 trillion in 2016. The sovereign bond has also increased many-fold over the last two decades, from RM75 billion in 1998 to RM628 billion last year. This rapid growth of the bond market is one of the

⁵ FRED Economic Data, Federal Reserve Bank of St. Louis.

⁶ Comprises of sovereign and private debt securities, including sukuk (Islamic bonds), sourced from Securities Commission Malaysia (www.sc.com.my).

motivating factors to undertake the research apart from the interest to establish the long-run relation of the spread with the growth.

Nonetheless, with an open economy structure, Malaysia is not exempted from economic crisis, with two of the major crises occurred within the past 20 years. One of the most significant ones was the 1997 Asian financial crisis triggered by the Thai Baht speculative trading leading to the domino effect on all Asian countries, causing the Malaysian Ringgit to be heavily sold and depreciated by almost 50% in value by January 1998, see Athukorala [27]. Coupled with the internally induced banking crisis, massive short-term and un-hedged capital inflows and sudden reversal of capital outflows have exacerbated the situation leading the massive downturn of the economy. GDP growth was recorded at negative 7.4% in 1998 from a positive growth of 7.3% recorded just a year earlier. Given the negative growth, Malaysian economy was officially down with recession, with the number of retrenchments increasing from 19,000 in 1997 to over 83,000 in 1998, while inflation rate peaked at 6.2% in 1998 surpassing the previous peak of 5.3% in 1991, see Athukorala [27].

Another notable crisis is the global financial crisis that was initiated from the credit subprime mortgage market in the US in 2007, being one of the horrendous events that has ever occurred in the world's history. The innovation acts of financial engineering to securitize and increase the liquidity of the US subprime residential mortgage-backed securities⁷ and packaged them into collateralized debt obligations (CDOs), had turned out to be an unimaginable crisis affecting not only the US economy but the rest of the world. The downturn impact arising from this crisis for Malaysia was evident when the growth was reduced from 6.5% in 2007 to 4.7% in 2008 with subsequent negative growth of 1.7% in 2009.

Mapping the movements of the yield spread over the past two decades, it is visible that the spread turned negative prior to the two recessions in Malaysia, as shown in **Figure 1** below. Whether the inversion of the yield curve could really signal for future declining of economic output should be proven through the

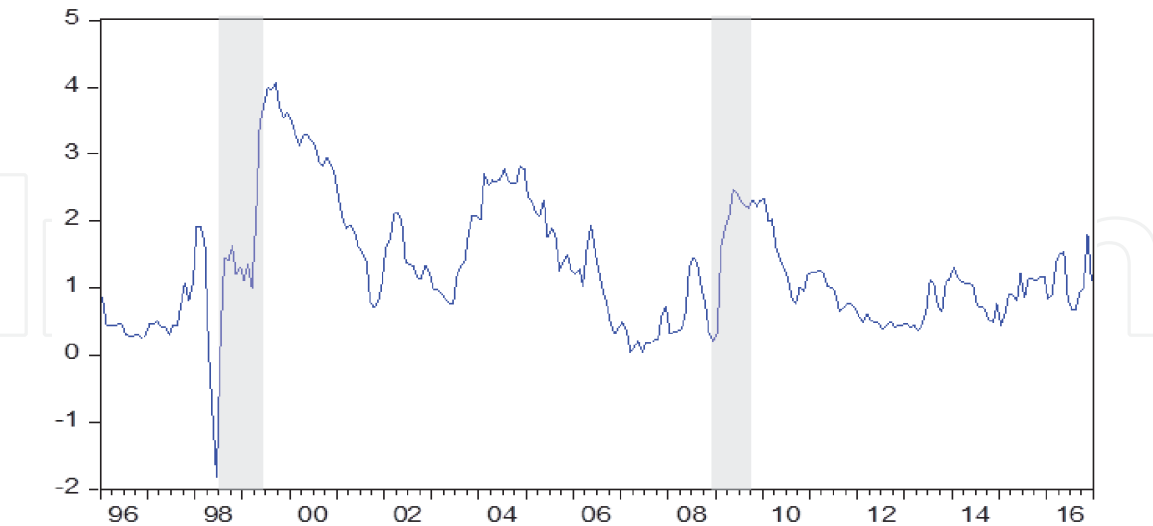


Figure 1. Malaysian yield spread and major recessions over 20 years. Note: The yield spread is calculated as the difference between the yields on 10-year and 3-month Malaysian Treasury securities. The shaded areas denote major recessions.

⁷ Subprime mortgages refer to mortgages made to borrowers who are less creditworthy than prime borrowers, see Dwyer and Tkac []. This study also presents an interesting series of events occurred during the crisis and how the tiny market of CDOs became the triggering factor.

empirical analysis undertaken to test the predictive ability of the yield curve in Malaysia, by establishing the long-run cointegration with economic growth. The following section will then discuss how the model is developed and how tests will be done on the collected data.

4. Data and methodology

All series examined in this study—industrial production index, yields of 10-year government bond and 3-month Treasury bill, FTSE-Kuala Lumpur Composite Index, broad money (M2) and exports—are collected from Thomson-Reuters Datastream. The data are monthly data and span the time period from January 1996 to December 2016. The industrial production index is used to signal economic growth, while the yield spread is calculated as the difference between the yields of 10-year government bond and 3-month Treasury bill.

In order to control for other leading variables that could be influencing economic growth, a single factor is constructed to extract the common signals from all the leading indicators. In this study, the leading indicators considered are FTSE-Kuala Lumpur Composite Index, broad money (M2), and exports value. It is also important to point out that the inclusion of all these leading indicators into the regression model could lead to multicollinearity issue, it is best to express them as a single controlled factor. Besides, the main objective of this study is to examine the cointegration of the yield spread and growth, without putting much emphasis on other leading economic variables. Hence, the principal component analysis technique is used to extract the single factor from the movements of these indicators.

In terms of methodology, the relationship between the yield spread and economic growth is established using the autoregressive distributed lag (ARDL) framework by Pesaran and Shin [28], Pesaran et al. [29], and Pesaran [30]. Given the characteristics of the cyclical components of the data, applying the conventional Granger [11] and, Engle and Granger [12] cointegration technique is not applicable in cases of variables that are integrated of different orders. This is because, a prerequisite for applying the abovementioned cointegration analysis is that all time-series are nonstationary and must be of the same order. The ARDL method stands out among other regression methods as it does not involve pre-testing variables, which means that testing on the existence relationship between variables that are integrated of different order of purely $I(0)$, purely $I(1)$, or mixture of both (Duasa [31], Nkoro and Uko [32]). Another superior feature of the ARDL method is that it avoids the larger number of specifications to be made into the regressions, particularly with regard to the decisions on the number of endogenous and exogenous variables (if any) to be included, as well as the optimal number of lags to be specified. With ARDL, it is possible that different variables have different optimal lags, which is impossible on the application of the standard cointegration test. Most importantly, the model could be used with limited sample data (30–80 observations) since in our analysis, even though the total observations for the whole sample is 249, the sub-sample of the data will be much smaller in quantity. On top of that, the ARDL method will automatically run models with different lags to choose the best estimation model based on the specified selection criteria, in our case, using Akaike info criterion (AIC).

In order to establish the relationship between the yield spread and growth, a linear regression relating the future growth to the current values of the yield spread is considered. The model below is developed based on the model used by Stock and Watson [17] and Zulkhibri and Abdul Rani [10], which has been extended to

incorporate the leading macroeconomics indicators and expressed based on the ARDL framework:

$$\Delta \ln Y_t = \alpha_0 + \sum_{i=0}^p \varphi_t \Delta \ln Y_{t-i} + \sum_{i=0}^p \theta_t \Delta \text{Spread}_{t-i} + \sum_{i=0}^p \beta_t \Delta \text{Leading}_{t-i} + \delta_1 \ln Y_{t-1} + \delta_2 \text{Spread}_{t-1} + \delta_3 \text{Leading}_{t-1} + v_t \quad (2)$$

where $\ln Y_t$ is the economic growth indicated by industrial production index and expressed in natural logarithm, Spread_t is the yield spread between 10-year government bond and 3-month Treasury bill and Leading_t are the controlled variables for other macroeconomics leading indicators, Δ is first-difference operator, and p is the optimal lag length whereby the optimal lag length which represents the previous values, are being automatically selected based on Akaike info criterion (AIC). In consideration that the growth could be serially correlated, since previous growth might influence future growth, its past values are useful predictors themselves. This could also be the case for other independent variables, namely spread and leading.

The estimation model above will be applied onto three different samples, first on the whole sample (sample A) for the period of January 1996 to December 2016, while the second and third samples are based on the periods within the occurrences of the major crisis, from January 1996 to December 2000 (sample B) and from January 2007 to December 2009 (sample C), respectively. Our aim is to examine whether the long-run relationship among the variables, particularly the significance of the yield spread in explaining growth, still persists over different time periods.

The ARDL long-run form and bounds test is then undertaken for testing the existence of the long-run relationship, which is detected through the F-statistics (Wald test), and is said to be established if the F-statistics exceeds the critical value band, see Nkoro and Uko [32]. Specifically, the null hypothesis for no cointegration among variables in Eq. (2) is defined as $H_0: \delta_1 = \delta_2 = \delta_3 = 0$ (where long-run relationship does not exist) against the alternative hypothesis of $H_1: \delta_1 \neq \delta_2 \neq \delta_3 \neq 0$ (long-run relationship does exist). Upon running the ARDL long-run form and bound test in Eviews 9.5, two sets of critical values are generated of which one set refers to $I(0)$ and the other one refers to $I(1)$. Critical values for the $I(1)$ series are referred to as upper bound critical values, while the critical values for $I(0)$ series are referred to lower bound critical values (Duasa, [31]). This is the bound testing procedure generated through the ARDL model and widely used in the estimation of long-run relationships when the properties of the time-series data are a mixture of $I(0)$ and $I(1)$.

If there is evidence of long-run relationship (cointegration), the following model is estimated:

$$\ln Y_t = \alpha_1 + \sum_{i=0}^p \varphi_t \ln Y_{t-i} + \sum_{i=0}^p \theta_t \text{Spread}_{t-i} + \sum_{i=0}^p \beta_t \text{Leading}_{t-i} + \mu_t \quad (3)$$

Subsequently, the ARDL specification of the short-run dynamics is derived by constructing the error correction model (ECM) of the following form:

$$\Delta \ln Y_t = \alpha_2 + \sum_{i=0}^p \varphi_t \Delta \ln Y_{t-i} + \sum_{i=0}^p \theta_t \Delta \text{Spread}_{t-i} + \sum_{i=0}^p \beta_t \Delta \text{Leading}_{t-i} + \psi \text{ecm}_t + \varepsilon_t \quad (4)$$

where the ecm_t is the error correction term and is defined as.

$$ecm_t = \ln Y_t - \alpha_1 + \sum_{i=0}^p \varphi_t \ln Y_{t-i} + \sum_{i=0}^p \theta_t \text{Spread}_{t-i} + \sum_{i=0}^p \beta_t \text{Leading}_{t-i} \tag{5}$$

with all coefficients of the above short-run equation are equations relating to the short run dynamics of the model’s convergence to equilibrium with ψ represents the speed of adjustments. The ecm_t shows how much of the disequilibrium is being corrected, that is the extent to which any disequilibrium in the previous period is being adjusted in Y_t .

5. Estimation results and discussions

5.1 Unit root tests

Although ARDL cointegration technique does not require pre-testing for unit roots, this test is still carried out in order to avoid the ARDL model crash in the presence of integrated stochastic trend of I(2) (Nkoro and Uko [32]). In testing the nonstationarity of the series based on unit root test, there are two widely used tests by the econometricians, namely, the Augmented Dickey-Fuller (ADF) unit root test and Phillips-Perron (P-P) unit root test. Some important note on the presence or absence of unit roots, it helps to identify some features of the underlying data-generating process of a series. If a series has no unit roots, it is characterized as stationary, exhibiting mean reversion in that it fluctuates around a constant long-run mean. Alternatively, if the series feature a unit root, they are better characterized as nonstationary processes, which have no tendency to return to a long-run deterministic path, see Libanio [33].

The ADF test accounts for temporarily dependent and heterogeneously distributed errors by including lagged first differences of the dependent variable in the fitted regression. In contrast, the P-P test uses a nonparametric correction to take account for possible autocorrelation. The formula for the ADF test and the P-P test are not presented here, in consideration that it is a standard procedure in data inspection for stationarity. Nonetheless, a good explanation on the unit root stochastic process is covered by Nkoro and Uko [32]. In this study, the unit root test is testing based on ADF test. **Table 1** below presents the results from ADF indicating that there is a mixture of I(0) and I(1) with the absence of I(2) of the regressors, validating the use of ARDL in this analysis.

5.2 Estimation results

Subsequently, Eq. (2) is estimated on three samples of data, namely, sample A (January 1996 to December 2015), sample B (January 1996 to December 2000), and sample C (January 2007 to December 2009). This different estimation of the data

Variable	ADF test statistics		Order of integration
	Level	First difference	
Growth ($\ln Y$)	-2.3388	-4.9688*	I(1)
Spread	-3.6630*	-3.3490*	I(0)
Leading	-4.7416*	-6.0707*	I(0)

*Significant at 1% level.

Table 1.
Unit root test.

period allows the testing on not only the significance of the yield spread on the growth, but on whether it is consistent throughout the periods, especially those during major crises. The optimal lag length is automatically selected by the ARDL method, based on the selection criteria of AIC as explained earlier. The calculated F-statistics for the cointegration test is displayed in **Table 2**. For sample A and B, the calculated F-statistics are above both the lower and upper bound critical values, leading to the rejection of the null hypothesis and to concur that there exists long-run relationship between the variables in the model. As for sample C, the calculated F-statistics is below the lower and upper bounds, which indicates that there is no cointegration, raising questions on the consistency of the relationship among the variables when the time period is altered.

The empirical results of the long-run relationship for sample A and B are presented in **Table 3**. It is interesting to note that during the longer time span of 20 years, the yield spread is not significant, as compared to a much shorter time span of 4 years and during the period of Asian financial crisis.

Next, the error correction model indicating the short-run dynamics is presented in **Table 4**, estimated for all of the samples A, B, and C. The lagged term of the yield spread appeared to be only significant during the crisis samples (B and C) but not for the whole 20-year period. A number of diagnostic tests for the error correction model are also applied where there is no evidence of serial correlation, heteroskedasticity, and ARCH (Autoregressive Conditional Heteroskedasticity) effect in the disturbances. All samples except for sample A passed the Jarque-Bera normality test, suggesting that the errors are normally distributed. Most importantly, the

Sample	Data span	Number of observations	F-statistics value	Lag (k)	Significance level	Lower bound critical values I(0)	Upper bound critical values I(1)
A	January 1996 to December 2015	236	4.4619	2	10% 5% 1%	2.63 3.10 4.13	3.35 3.87 5.00
B	January 1996 to December 2000	57	5.2644	2			
C	January 2007 to December 2009	36	0.8542	2			

Table 2.
F-statistics of cointegration relationship.

Sample	Dependent variable	Independent Variables	
		Spread	Leading
A	$\ln Y_t$	0.2179 (0.3282)	1.0540 (0.9671)
B		0.09514* (0.0207)	-0.0893* (0.0349)

*Significant at 1% level.

Table 3.
Long-run model.

Coefficients for the independent variables	Dependent variable $\Delta \ln Y_t$		
	A	B	C
$\Delta \ln Y_{t-1}$	-0.7082* (-12.2363)	-0.5669 (-5.4635)	-0.3976* (-2.8088)
$\Delta \ln Y_{t-2}$	-0.3328* (-5.72900)	-0.2772* (-2.4433)	
$\Delta Spread$	0.0187* (2.3919)	0.0504* (4.3587)	-0.0247 (-1.1328)
$\Delta Spread_{t-1}$	-0.0127 (-1.5925)	-0.0438* (-4.0941)	0.0474* (2.2004)
$\Delta Spread_{t-2}$			
$\Delta Leading$	0.0001 (0.0619)	-0.0123* (-3.849)	
$\Delta Leading_{t-1}$	-0.0128* (-4.3831)		
$\Delta Leading_{t-2}$	-0.0091* (-4.4656)		
ecm_t	-0.0128* (-4.2378)	-0.2326* (-4.7301)	-0.1365* (-1.9418)
Diagnostic tests:			
<i>Far</i>	1.2449	0.4888	0.4381
<i>Farch</i>	2.0439	0.4346	1.6578
<i>JBnormal</i>	17.8131	0.0663	3.6493
R-square	0.4238	0.5678	0.3701
1. t-statistic in parentheses; 2. <i>Far</i> is the F-statistic of Breusch-Godfrey serial correlation LM test. <i>Farch</i> is the F-statistic of ARCH Test. <i>JBnormal</i> is the Jarque-Bera Statistic of Normality Test. *Significant at 1% level. **Significant at 5% level. ***Significant at 10% level.			

Table 4.
Error correction model for all samples.

significant of the error correction term (ecm_t) for all samples also provide evidence of causality in at least one direction, with the negative coefficient indicating high rate of convergence to equilibrium. Nonetheless, the mixed signs of the yield spread do not match with the theory previously discussed, rendering difficulty in making general inferences with regard to the relationship of the yield spread to growth.

Though significant, the instability of the yield spread to affect the movement of growth in this analysis does not support the priori expectation on the predictive power of the yield curve, in Malaysia. This is consistent with the finding of Zulkhibri and Abdul Rani [10] that yield spread contains little information on the direction of the overall economy. As such, despite the fact that the bond market (both conventional and Islamic) has grown rapidly over the past two decades, the market still needs to deepen more in terms of issuance and trading, so as to facilitate the efficiency of yield curve movement, which could possibly be tagged along with the growth in the future.

6. Conclusion

This study aims to discover the ability of the yield spread to predict economic growth over the last two decades, up until 2016. Based on the priori expectation on the predictive ability possessed by the yield spread on growth, this study uses ARDL approach to cointegration and error correction models to determine whether there is evidence of relationship between yield spread and growth, in long run and short run. This paper makes two contributions to the existing literature. First, it examines

the relationship between slope of the yield curve (yield spread) and growth based on updated data and over a 20-year time period. Second, it is the first to employ the ARDL method on yield spread analysis, in consideration of the different order of integration among the variables tested.

The empirical result proves the existence of a long-run relationship between the yield spread and growth in Malaysia. Though significant, the instability of the yield spread to affect the movement of growth in this analysis does not support the priori expectation on the predictive power of the yield curve, making it less reliable to be used as forecasting tool in the general economic condition. Further expansion of the local bond market in terms of issuance and trading may be the one of the keys to establish a much stronger relationship and predictive power of the yield curve in assessing the direction of the Malaysian economy.

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