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## Relationship between Macroeconomic Variables and Malaysia Available Shariah Indices

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### ABSTRACT

This paper aims to study on the association between selected macroeconomic variables and Malaysia Shariah Indices. In our study, we used the Vector Error Correction framework by looking at the long run and short run relationship between macroeconomic variables and (i) Kuala Lumpur Shariah Index (1990-2006), and (ii) FTSE Bursa Malaysia EMAS Shariah Index (2007-2011). Monthly data during the twenty one-year period between 1990 and 2011 are collected and tested. In the long run, the impacts of all selected variables on Kuala Lumpur Shariah index for the period of 1990 to 2006 are positive. However, the effect of increases in consumer price index, exchange rate, Treasury Bill and US Federal Fund Rate on Malaysian Shariah index after the period till 2011 are negative. Besides, this study found positive relationship only in industrial production and money supply for the period of 2007 to 2011. In the short run, mix results were found during 1990 to 2011. The result also shows in overall the variables have unidirectional short run causal effect during the study period. This study then conclude that the standardized set of macroeconomic variables that specified by previous researchers still can be relied but in careful strategy formulation.

**Keywords:** *Granger Causality, KLSI, FTSE EMAS Shariah Index, Macroeconomic Variable*

## I. INTRODUCTION

The claim that macroeconomic variables have an effect on stock market behavior is a well-established theory in the financial economics literature and there are growing efforts made by many researchers to empirically calibrate these macroeconomic affects. As results, we can see that the growing linkages between macroeconomic variables and the movement of stock prices for the developed countries have well been documented in the past literature (see Fama, 1981; Mukherjee and Naka, 1995; Mookerjee and Yu, 1997; Naseh and Strauss 2000; Maysami and Koh, 2000; Sadorsky, 2001; Kandir, 2008; Al Jafari, Salameh and Habbash 2011). For studies in the developing countries, a few studies have highlighted the linkages between macroeconomic variable and stock movement such as Kwon, Shin and Bacon (1997), Ibrahim (2011), and Seyed Mehdi, Zamri and Yew Wah (2011). However, in the Malaysian context, Ibrahim (1999, 2000, 2002), Ibrahim (2001), Ibrahim and Aziz (2003) and Rasiah (2010) investigated the dynamic interactions between stock market and

economic activities by conjecturing that the stock market leads the movement of macroeconomic variables.

Al Jafari et. al. (2011), Seyed Mehdi et. al (2011), Rasiah (2010), Ibrahim and Aziz (2003), Wongbangpo and Sharma (2002), Maysami and Koh (2000), Ibrahim (1999) and Mukherjee and Naka (1995) reveal that the rate of inflation, money growth, interest rates, industrial production, reserves, and exchange rates are the most popular significant factors in explaining the stock market movement. Since Malaysia is one of the countries that introduced Shariah index, and only few studies were found to relate the macroeconomic variable and the Shariah index, added that their findings were given mixed result, therefore this study try to fill the gap. This is because, while the association between market and economic activities is quite obvious regardless of its causality direction, a standardized set of macroeconomic variables is not found since macroeconomic variables selected to examine the determinants of stock market tend to differ slightly across studies. (See Naka, Mukherjee and Tufte, 1998; Abdul Rahman, Mohd Sidek and Tafri, 2009; Tsai and Chen, 2010; Abd. Kadir, Selamat, Masuga, and Taudi, 2011; Safdari, Mehrizi, and Elahi, 2011). Hence, this study attempt to identify whether the standardized set of macroeconomic variables that specified by previous researcher can be relied or not.

## **II. REVIEW OF THE RELATED LITERATURE**

Many studies on the existing literature reveal that, there is significant relationship between macroeconomic variables and country's equity market. However, results from these studies shown different variation of cointegration between macroeconomic variables and equity index. (see ; Mukherjee and Naka 1995; Naka et. al., 1998; Wongbangpo and Sharma 2002; Al Sharkas, 2004 ;Atmadja, 2005; Humpe & Macmillan, 2007; Abdul Rahman, et. al 2009; Ozbay, 2009; Tsai and Chen, 2010; Abd Kadir, Selamat, Masuga, and Taudi, 2011; Safdari, Mehrizi, and Elahi, 2011). Since local and international investor demand for more cointegration evidence and available studies show a variation of results, the latest standardized set of macroeconomic variables that can be relied by such investors are perceived needed. Rad (2011), in his research for the period of 2001 to 2007, investigates the relationship between the stock market in Iran and consumer price index, liquidity, and free market exchange. He hypothesized that monetary policy can influence the stock price index. However, the result gave that there are weak relationship between the selected macroeconomic variables with the Tehran Stock Exchange. He concluded that, in Iran, macroeconomic variables did not play an important role in influencing the movement in stock exchange. The study on the relationship between the ASEAN countries' stock market and macroeconomic variables which are GDP, inflation rate, interest rate and exchange rate also gave the same result. Atmadja, (2005), by using VAR method and Granger test study the relationship between the ASEAN countries' stock market and macroeconomic variables which are GDP, inflation rate, interest rate and exchange rate. He found that there are weak Granger caused relationship between market price index and macroeconomic variables. The weak relationship had shown that the capitals market in ASEAN country

unable to efficiently affect by the information of the movement in the macroeconomic variables.

There are many other previous studies publicized that there are weak relationship between macroeconomic variables and countries' equity market (Wan Mahmood and Mohd Dinniah 2009; Asaolu and Ogunmuyiwa, 2010; Hsing 2011a; Hsing 2011b). The relationship also was found differ based on the economic condition of a particular country. Wong, Khan and Du (2005), in their study found relationship between money, interest rate, and the selected sample stock price before the financial crisis on 1997. However, their result showed no relationship after the crisis. Thas Thaker, Rohilina, Hassama and Amin, (2009) only found a positive relationship in Malaysia Stock Index before the economic crisis. Even though many previous researches found not supporting the relationship between the stock index and the macroeconomic variables, yet there are several studies that hold up the theory of existence relationship between macroeconomic variables and the equity market. A study conducted by Al Jafari, Salameh and Habbash (2011), examined the links between macroeconomic variables (real economic activity, inflation, interest rate, money supply and exchange rate) for the period of 2002 to 2008. The study investigates the relationship by using 25 stock markets from developed countries and 23 emerging countries including Malaysia. This study show there is causal relationship between macroeconomic variables with the interest rate and money supply, and stock prices for developed and emerging market. In addition, this study also highlighted that there is positive long run relationship between real economic activity level and stock price for developed market. They also noted that the relationship between macro-economic variables and stock return in emerging countries is significantly more established than in develop countries. Additionally, Hsing (2011a), by using the exponential GARCH model, found a positive relationship between GDP, interest rate, and exchange rate and the stock markets. Though, in his another research (Hsing, 2011b) found a mix result with a positive relationship of real GDP, ratio of the government debt to GDP and the market, and a negative relationship between real interest rate, expected inflation and the equity market. The same positive result also found by Ali (2011). He examined the relationship between macroeconomic variables (inflation, industrial production index, foreign remittance, market P/E, monthly average growth in market capitalization) and the Dhaka Stock Exchange (DSE). His study found that there was an influenced of equity market by industrial production index, market P/E and monthly average growth in market capitalization. This also supported by Kwon, Shin and Bacon (1997) in which they documented a strong evidence using cointegration and causality to prove macroeconomic variable activities in Korea are significant. However, they claimed that as a small open country, the global macroeconomic impact provides Korean Stock Exchange more sensitive than domestic.

Numerous research have been conducted to examine the relationship between money supply, exchange rate, inflation, interest rate and the Malaysian conventional price index, namely Kuala Lumpur Composite Index (KLCI).(See Ibrahim, 2000;Ibrahim and Wan Yusof, 2001; Ibrahim 2002; Ibrahim and Aziz, 2003; Abd Majid and Yusof, 2009; Rasiah

2010). Previous researchers claimed that, generally, the Malaysian stock prices seem to be driven more by changes in domestic factors, particularly money supply in the short run. Meanwhile, Wongbangpo and Sharma (2002) investigated a short run and long run effect of macroeconomic variable in five ASEAN countries (Indonesia, Malaysia, Singapore, Thailand and Indonesia) to stock prices. Through Granger causality test they found that the economic variables (i.e. money supply and exchange rate) able to predict future changes in stock price. The causal effect was due to the fact of the relationship characteristic between equity prices and forex market since Malaysia has an economic dependence on foreign portfolio inflows and the economy openness.

Based on the study on the dynamic interaction between Malaysian Shariah equity prices and economic activity, Wahid, Bakar, and Shahriza (2009) reveals that the Kuala Lumpur Shariah Index (KLSI) is highly depends on domestic and international macroeconomic variables. They revealed that Shariah common share return has significant relationship with inflation, monetary instrument, economic growth and currency exchange rate. They also found that KLSI has significant influence on the Malaysian conventional index namely Kuala Lumpur Composite Index (KLCI) as Shariah compliance equity are part of KLCI's component, hence, any changes in KLCI may influence the performance on KLSI. Abd Majid and Yusof (2009), in their study, revealed that both changes in the Malaysian monetary policy and in the US monetary policy as measured by the changes in the FFR have a significant direct impact on the Islamic stock market behavior in Malaysia. It is interesting to highlight that they used Treasury Bill Rate in exploring the relationship between macroeconomic variables and Kuala Lumpur Shariah Index, contradicting to several other researchers that refuse to include interest rate in their explanatory variables. They claimed that rates of return for Shariah compliant products are benchmarked against the conventional interest rate. Since there is still insufficient study that reveals on Malaysian Islamic market, hence, this further supports our desire to enhance the literature. However, in our study, we focus only the money market namely real effective exchange rate (EX), money supply (M3), consumer price index (CPI), and industrial production index (IPI), Treasury bill rate (TBR) and US Federal Fund Rate (USFR) which represent domestic and international activities relation to stock price. Our motivation is to provide useful information to market participants in terms of investment benchmark, policy creation, or financial product development.

### **III. RESEARCH METHODOLOGY**

In this study, examination of the relationship involved the co integration analysis technique (Engle and Granger 1987) using Johansen (1990) procedure. The establishment of cointegration analysis has offered an empirical approach in doing time-series analysis (for e.g. analyzing the relationship between macroeconomic variables and the stock market). For instance, Granger (1988) has verified a long-term equilibrium existed between stock prices and macroeconomic variables via the co-integration approach. This study is done by looking at the long run and short run relationship between Malaysian Shariah Index and

the macroeconomic variables. Based on Roca et al. (1998), if cointegration is found during cointegration test, Vector Error-Correction Model (VECM) of Granger causality will be used. On the other hand, if no cointegration is found, the analyses will then be based on the regression of the first difference (1) of the variables using a standard VAR model.

Based on intuitive financial theory (Chen et al. 1986; Fama 1981) coupled with the results of previous studies, assumptions on the relationship with Shariah index are express in Table 1. This means that any movement in macroeconomics variables will influence the performance of Shariah Indices in short-term and long –term.

**Table 1** Justification of Assumption

<b>Variables</b>	<b>Assumption on the relationship with Shariah Index</b>	<b>Justifications</b>
Inflation (CPI)	Negative Significant Relationship	Increase in inflation rate will decrease the stock price, hence discourage investment activities
Exchange Rate (EX)	Positive Significant Relationship	Currency depreciation will have positive impact on domestic stock market
Interest Rate (TBR)	No Significant Relationship	Islamic investment is not interest rate driven. Muslim only decide to invest their money only in interest free securities
Industrial Production (IPI)	Negative Significant Relationship	Signal for the economic growth. An increase in output may increase expected future cash corporate profitability
Money Supply (M3)	Positive Significant Relationship	Increase in money supply leads to in the expected dividends (investor asset portfolio) and in turn increase the stock price
US Federal Fund Rate (USFR)	No Significant Relationship	No influence as the Islamic investment in Malaysia is not driven by US policies

## **A. DATA**

The monthly data for macroeconomic variables and indices were obtained from the DataStream. For the Malaysia macroeconomic variables, the data used are Consumer Price Index (CPI), Real Effective Exchange Rate (EX), Treasury bill rate (TBR), Industrial Production Index (IPI), and Money Supply (M3). This study used United States Federal Fund Rate (USFR) to see whether Malaysia is driven by international policy or not. While for the Islamic equity market indices, our study used the KLSE Shariah Index (KLSI) (period of 1990 to 2006), and FTSE Bursa Malaysia EMAS Shariah Index (period of 2007 to 2011). The data in different period were used as the latter become the new benchmark for Malaysian Shariah compliant investments. The indices are transformed into their natural logarithms prior to the analysis to ensure the data is normally distributed.

In exploring the relationship between the Malaysian Islamic equity market and macroeconomic variables, we take into consideration the following model:

$$\ln \text{MSI}_t = a + b \ln \text{CPI}_t + c \ln \text{EX}_t + d \ln \text{TRE}_t + e \ln \text{IPI}_t + f \ln \text{M3}_t + g \ln \text{USFR}_t + \varepsilon_t \quad (1)$$

## B. ECONOMETRIC MODELS

Suitable econometric models are required in order to examine the hypotheses, hence our study proceed with the appropriate multivariate time-series models. We begin our study by examining stationarity in financial time series as most of studies had shown that most of economic variables follow a random walk. This is based on the assumption that the economic variables of some systems are in equilibrium in the long run. A series is said to be stationary if the mean and autocovariances of the series do not depend on time. To test the financial series are stationary, this study employed the Augmented Dickey Fuller (ADF) (1988) and Phillips-Perron (PP) (1988) test. The ADF test that is an extension of Dickey-Fuller regression allows for more dynamics in the DF regression and consequently is over parametrized in the first order case but correctly specified in the higher order cases (Johansen & Juselius 1990). The Phillips-Perron (PP) test regression makes a correction to the t-statistic of the  $\gamma$  coefficient. It uses nonparametric statistical methods in considering the serial correlation in the error terms with no lagged difference terms added. Moreover, the PP lag length follows the default available in the quantitative software. The unit root test using both ADF and PP tests, are run at the level and first difference of the series in order to determine the number of unit roots in the series. In addition, the null hypotheses for both tests are that  $\delta=0$ ; that is, the the unit root is present in which means that the time series is nonstationary. The null hypothesis is rejected if the calculated value obtained is large and negative as compared to the critical values set. The alternative hypothesis is that the time series is stationary. Johansen test (1988) is employed once the study had determined the order of integration of each series. Null hypothesis of no cointegration is tested and compare with the critical value. Based on the Johansen (1988) concept of cointegration, if the cointegration is found in these tests, the study will proceed to use the Granger causality test based on the Vector Error Correction (VECM) model.

## C. GRANGER CAUSALITY TEST

The Granger causality is employed to test the null hypothesis that independent variable does not Granger-cause dependent variable, or vice-versa. We hypothesizes that there is a Granger-causality among the macroeconomic variables (i.e. There is a Granger-causality between inflation rate and the exchange rate). In our case, this study uses two-way causation;  $X$  Granger-cause  $Y$  (e.g. MSI Granger-cause CPI) and  $Y$  Granger-cause  $X$ .

## IV. RESULTS AND DISCUSSIONS

### A. Unit Root Test Results

This study employed Augmented Dickey-Fuller test (ADF test) and Phillip-Perron Test in order to test the present of unit root. If the series contains a unit root, this means that the series is non-stationary. Otherwise, the series will be categorized as stationary.

**Table 2:** The Unit Root Test Results

Variables	ADF Test		PP Test	
	At Level	First Different	At Level	First Different
KLSI	Accept $H_0$	Reject $H_0$	Accept $H_0$	Reject $H_0$
FTSEBMEMS	Accept $H_0$	Reject $H_0$	Accept $H_0$	Reject $H_0$
CPI	Accept $H_0$	Reject $H_0$	Accept $H_0$	Reject $H_0$
EX	Accept $H_0$	Reject $H_0$	Accept $H_0$	Reject $H_0$
IPI	Accept $H_0$	Reject $H_0$	Accept $H_0$	Reject $H_0$
TBR	Accept $H_0$	Reject $H_0$	Accept $H_0$	Reject $H_0$
M3	Accept $H_0$	Fail to Reject $H_0$	Accept $H_0$	Reject $H_0$
USFR	Accept $H_0$	Reject $H_0$	Accept $H_0$	Reject $H_0$

Table 2 reports the conclusion of ADF test and Phillip-Perron test results for all series (with 95% confidence interval). The table shows that there are all acceptance of  $H_0$  in the series at levels, in both ADF test and PP test. Hence, the majority of the series can be concluded as non-stationary, since their ADF test results fail to reject the null hypothesis. Therefore, it is essential to continue ADF test for all series in first difference. The results of this second test are that all series are now stationary except that the rejection of  $H_0$  for M3 only occurs in PP test. As the results tend to propose non-stationarity in levels of the variables but stationarity in their first differences, this study is proceed by coping that the variables belong to the I(1) process.

### B. Estimation Results

#### 1) Cointegration Analysis

This study assume an existence of possibility that the selected variables share a long-run relationship, since the six variables are noted to be I(1). Hence, to test the possibility, this study applies Johansen cointegration procedure. This study, hence, report the trace statistics and maximal eigenvalue statistics which denotes rejection of the null hypothesis at the 0.05 level that imply the presence of cointegration among the variables. The number of lags is chosen using the Akaike Information Criterion (AIC) criteria. Based on the analysis, this study found that at least two cointegrating vectors during 1990-2006 (KLSI) and at least four cointegrating vectors after the periods (FTBMEMS). Hence, the results enlighten that there are long term relationship between Malaysian Shariah Indices and the selected macroeconomic variables which correspond closely to those stated by economic theory. The test results represent long-term elasticity measures, due to logarithmic



transformation of KLSI (normalized), CPI, EX, IPI, M3, TBR, and USFR. Thus, the cointegration relationship can be re-expressed as:

$$LKLSIt = 248.03LCPIt + 219.56LEXt + 3.79LIPIt + 15.58LM3t + 2.54LTBRt + 1.49LUSFRt \quad (2)$$

$$LFTBMEMSt = -15.81LCPIt - 6.68LEXt + 0.87LIPIt + 5.67LM3t - 1.18LTBRt - 0.02LUSFRt \quad (3)$$

Based on the cointegration results in the equation (2), the long-term impacts of all selected variables on Kuala Lumpur Shariah index for the period of 1990 to 2006 are positive. However, equation (3) demonstrate different results as compared to equation (2) seeing that the effect of increases in consumer price index, exchange rate, Treasury Bill and US Federal Fund Rate on Malaysian Shariah index after the year of 2006 to 2011 are negative. Only industrial production and money supply continue to have a positive relationship. The positive relationship in industrial production and money supply (M3) on Malaysian Shariah index are consistent with Abd Majid and Mohd Yusof (2009). In the case of interest rate, this study shows inconsistent with the findings Mukherjee and Naka (1995) as they found a positive relationship between share prices and short-term interest rates.

## 2) Vector Error Correction Model Results

Since the cointegration is found in the Johansen Integration tests, this study proceeds to use the Vector Error Correction Model (VECM) to test the dynamic relationship between selected variables. The null hypothesis which indicates the non-existence of the short-run relationship is tested against the existence of short-run relationship. Results from VECM tests are reported in Table 3. This study did not impose restrictions; hence, default normalization that identifies all cointegrating relations was used.

**Table 3:** Vector Error Correction Model Test Results

Dependent Variable	Independent Variable					
	$\Delta CPI_{t-1}$	$\Delta EX_{t-1}$	$\Delta IPI_{t-1}$	$\Delta M3_{t-1}$	$\Delta TBR_{t-1}$	$\Delta USFR_{t-1}$
KLSI (1990-2006)	-0.044 [-0.0393]	-0.011 [5.9350]*	0.114 [-5.1830]	-0.01 [2.4830] (0.00)*	-0.067 [3.8573]	0.085 [-0.3282]
FTBMEM S (2007-2011)	0.008 [10.533] (0.00)*	-0.230 [7.1492] (0.01)*	0.036 [9.3342] (0.01)*	-0.070 [-2.9701] (0.00)*	0.273 [6.6683] (0.00)*	0.008 [0.5467]

Note: a) Asterisk \* denote significant at the 5% value  
 b) The numbers inside the bracket indicates the t-statistic  
 c) The numbers inside the parenthesis show the p-values for F-statistics.

In the short run, impact of inflation on the KLSI is negative and insignificant. However the impact is positive and significant after the period of 2006. While, in short run also, the

increases in money supply has a negative but significant impact on the Malaysian Shariah indices. Based on these findings, money supply and CPI appear to have explanatory power over Malaysia Shariah Equity market returns. However, the effect of exchange rate is negative and significance for the whole period (1990 to 2011). On the other hand, the effect of industrial production is positive but only significant after the period of 2006. This finding is consistent with Wahid et. al. (2009), and Abd Majid and Mohd Yusof (2009). The increase in interest rate moreover has a negative significant impact during 1990 to 2006 while after the period is positive and significant. In the short run, furthermore, the test result shows positive but insignificant impact of US monetary policy changes on Malaysian Shariah indices for the whole period of study.

### 3) Granger Causality Test Results

**Table 4:** Granger Causality Test Result

Period	Unidirectional		Bidirectional
(1990-2006)	CPI → KLSI M3 → KLSI M3 → IPI CPI → EX	CPI → IPI IPI → TBR TBR → EX	
(2007-2011)	FTBMEMS → CPI FTBMEMS → IPI CPI → TBR	EX → IPI USFR → IPI USFR → M3 USFR → TBR	IPI → TBR TBR ← IPI

Note: Contents portray Y Granger Cause X, and vice versa.

Based on Table 3, the results indicate that there are unidirectional short-run causal effects running from inflation and money supply to index from the period of 1990 to 2006. Hence, this study infers that during this period monetary expansion does lead to increase investments in Shariah equities and inflation may cause investment in Shariah equities to be harmful. In addition to this, inflation also is seen to Granger cause industrial production in the whole period of study. Inflation only Granger caused TBR after the period of 2006 to 2011. In the period of 2006 to 2011, this study found that US monetary policy which proxy by its Federal Fund Rate to be statistically significant to Granger cause production, money and Malaysian interest rate over this period. This clearly supports the evidence of Abd Majid and Mohd Yusof (2009). Their study disclosed that both changes in the Malaysian monetary policy and in the US monetary policy as measured by the changes in the FFR have a significant direct impact on the Islamic stock market behavior in Malaysia. This is due to the fact that Malaysia has significant relationship with United States. (See also Royfaizal, Lee, and Azali, 2009).

## V. CONCLUSIONS

The results depict that in both long and short run, there is a relationship between the six selected macroeconomics variables and Malaysian Shariah indices. In the long run, the impacts of all selected variables on Kuala Lumpur Shariah index for the period of 1990 to

2006 are positive. However, the effect of increases in consumer price index, exchange rate, Treasury Bill and US Federal Fund Rate on Malaysian Shariah index after the period till 2011 are negative. The negative result on the relationship between interest rate and Shariah index provide signal to investors to shift their investment decision from Shariah compliance stock to non-Shariah, or vice versa (Abd Majid and Yusof, 2009). Besides, our study found positive effect of increases only in industrial production and money supply on FTSE Bursa Malaysia EMAS Shariah Index. In the short run, mix results were found during 1990 to 2011. With regard to this result, the inflation on the KLSI (before the period of 2007) is negative and insignificant however the impact is positive and significant on FTSE Bursa Malaysia Emas Shariah Index (after the period of 2006). The effect of exchange rate is negative and significance for the whole period (1990 to 2011). On the other hand, the effect of industrial production is positive but only significant after the period of 2006. For the increases in money supply, however, a negative but significant impact has on the selected Malaysia Shariah indices. The increase in interest rate moreover has a negative significant impact during 1990 to 2006 while after the period of 2006 is positive and significant. Furthermore, in the short run, the result shows positive but insignificant impact of US monetary policy changes on Malaysia Shariah indices for the whole study period.

As our study is to examine the association of macroeconomic variables and the Shariah equity market, we believed that our finding can lead local and foreign investors for a better short and long-term investment decision-making. The evidence of cointegration between the Malaysia Shariah indices and the macroeconomic variables in our sample suggests that the existence of long run relationship provide a useful benchmark to investors who seek to invest in Malaysia Shariah equity markets. In addition, this paper also examines the Granger causal relationship among few chosen macroeconomic variables and the selected Malaysia Shariah indices. The result of this paper shows that in overall, the variables have unidirectional short run causal effect during the study period. Findings of this paper also demonstrate some variables having similar result to other researchers and some not having based on the study period, hence, the standardized set of macroeconomic variables that specified by previous researchers still can be relied but in careful formulation of strategy and policy. In future research, it is recommended to study on how the economy reacts over time through the use of other method for a better overview of Malaysia's macroeconomic system in Islamic setting.

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