The Impact of Stock Exchange on Economic Growth: The Case of Mauritius Using VECM Approach.

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Abstract: *This paper examines the impact of stock exchange on economic growth of Mauritius using time series secondary data covering the period of 1993 - 2015. Co integration and vector error correction mechanism (VECM) was used to estimate the short as well as the long run parameters after ascertainment of co-integration test. The results show that there is no long run causality running from market capitalization ratio, turnover ratio and value traded ratio to economic growth. However, there is a short - run causality running from turnover ratio to economic growth and the rest variables such as market capitalization ratio and value traded ratio have no short - run causality running to economic growth. These results will help the policy makers, local and foreign investors in Mauritius stock market exchange for the decision making.*
Keywords: *Economic growth, Market capitalization ratio, Turnover ratio, Value traded, Stock market, Mauritius.*

I. Introduction

The stock market is playing significant role in the capital mobilization and offers to the investors and financial intermediaries through exchange the securities. It also regarded as a liquid when large entries are transacted with minor effect on prices of securities. Alile (1994) defined stock market as financial intermediary ability to associate shortage to the surplus sectors of economy and utilization and provision of investment between competitive uses which are critical to the development and effectiveness of the economy. Donwa and Odia (2010) argued that the well-built stock market can be considered as one significant organization to promote local and foreign investment. Wachtel (2002) argued that the evaluation of the firm's assets through the investment exchange provides the standards that may be valuable for the management and shareholders resulting in expanding the power and capability of companies' resources. The stock exchange of Mauritius Ltd (SEM) was established on March 30, 1989 under the Stock Exchange Act 1988, as a private limited company to promote efficient and regulate securities market in Mauritius. SEM started its operation with five listed companies with market capitalization estimated about 92 million dollars. Currently there are 51 companies listed on Official Market representing a market capitalization of nearly USD 9.1 billion as at October 31, 2016. During October 06, 2008 SEM became a public company. The SEM operates in two markets today: The Official Market and the development and Enterprise Market (DEM). The size of market has grown from market capitalization to GDP ratio of less than 4% in 1989 to more than 75% at current market cap/GDP in economy. Currently, the growth rate is 5% average during the last 25 years. The DEM has been launched on August 4, 2006 and there are 43 companies listed on this market with market capitalization of nearly USD 1.3 billion as October 31, 2016. Local investors account isabout 60% of the daily trading activities and foreign investors account are approximately 40%. Moreover, 75% of local volume is generated by institutions as mutual funds, pension funds and insurance companies. Also, SEM has a room for remote membership with the view to promote membership from foreign brokers and foreign counterparts to the market. Foreign investors have been appeared as key players on the SEM accounting to 40% of the daily trading volumes of the exchange. SEM has structured itself into a multi-asset class international securities exchange and poise to hold the future with renews optimism. In 2001, SEM become the first exchange market in Africa to move to a fully automated and electronic stock market infrastructure which operate on one of the best technology currently available in the exchange space worldwide. This indicates the adoption of technological platform employed by SEM in the stock market at the international level. Today, SEM has managed to connect live to a top bracket of global brokers and dealers in the worldwide(www.stockexchangeofmauritius.com).The aim of this paper is to examine the impact of stock exchange on economic growth of Mauritius. Following the introduction, the objectives of study, the rationale behind of the study in section I. Literature of review occupies the section II. Materials and Methods in section III, Results and Discussion occupy section IV and section V presents the conclusions and recommendations.

1.1 Objective of the study

The objective of the study is to investigate the impact of the stock exchange on economic growth in Mauritius. In addition to that, we want to check whether there is an existence of positive and significant relationship between stock exchange and economic growth; as well as long run and short run causality.

1.2 Rationale of the study

The rationale behind of this study is to assess the contribution of stock exchange toward economic growth by bearing in mind that few studies have been done on stock market in Mauritius.

II. Review of Literature

Shreya et al. (2016) examined the empirical analysis of the top 20 companies of listed on Bombay stock exchange for the period 2001-2012 employed GARCH models. Their result showed that the returns from the portfolio of 20 companies reveal high volatility for the period 2007-2009. They also found that the Indian economy has felt due to the global financial crisis. Dakhlaoui and Aloui (2011) determined the interactive relationship between the U S economic policy uncertainty and B RIC stock markets covering period from July 4, 1997 to July 27, 2011 employed five models such as GARCH, EGARCH, TS-GARCH, P-GARCH and T-GARCH. Their results portrayed that the mean return spillover between the BRIC stock indices and US uncertainty was negative as well as volatility spillover indicated to oscillate between positive to negative values. They also argued that it was very risk to investors to invest in this market. Abdullah et al. (2012) examined the causality between stock and foreign exchange markets in Bangladesh from January 1993 to August 2010 using Granger causality test found that there was no causality running from foreign exchange market to stock market. They advocated that policy makers should stop to interfere foreign exchange market so as to curb excessive volatility in the stock market of Bangladesh in the short – run. They also argue that policy makers should use both fiscal policy and monetary policy tools to steady both market. Pan and Mishra (2016) investigated on the relationship between Stock Market Development and Economic Growth for the period from January 1991 to November 2015 for Shanghai and Shenzhen stock exchange employed ARDL model. Their results showed that Global Financial Crises had a significant impact on both China's real sector and financial sector. Moreover, they argued that Shanghai a share market has a long run negative relationship with the real sector of the economy. Prats and Sandoval (2016) examined on impact of Stock Market and Economic Growth covering the period of 1995 to 2012 using Vector Autoregressive Model (VAR). Their results indicated that there was positive relationship between the stock market growth variables such as market capitalization ratio, stock total traded value and turnover ratio to the economic growth. In particular, the relationship caused between the financial variables and the economic variables was higher in Bulgaria, Hungary and Romania. Lin Lu et al (2016) examined the Study on the interactive mechanism of economic growth, inflation and capital markets using dynamic Bayesian factor graph for the period of on quarter - on - quarter data from January 1991 to December 2014. Found that the transition period of industrialization to economic financialisation there was association ship between capital market and economic activity become closer and closer. They also argued that policy makers should concentrate more on the stability development of the financial market and transmission impact of capital market. Moreover, they also advocated optimizing the structure of traditional economy and capital market in order to maintain balance development. Bilal et al (2016) investigated the Impact of Stock Market Development on Economic Growth: Evidence from Lower Middle Income Countries for the period from 1990 to 2012 using Hausman test for analysis found that there was a positive and significant relationship between stock market development and economic growth. Moreover, the findings showed that there was positive relationship between stock market development and economic growth. They concluded that financial market can lead to make operational policies for valuable channelization of economic growth. Belkaoui (2016) aimed to test Earning capacity, Stock market wealth effect and economic growth for the period from 1998 to 2001 using multiple linear regression approach. Their results portrayed that stock market wealth effect was negative exaggerated with earning tediousness and earning opacity was positive association ship with economic growth as well. Moreover, the impact of earning opacity on economic growth is expected negative but insignificant. Finally, he argued that countries with better accounting quality create a better condition for market performance which enhances stepping up economic growth in the long run. Masoud and Hardaker (2012) determined the impact of financial development on economic growth: Empirical evidence of emerging market countries for the period from 1995 to 2006, using endogenous growth model. Their result indicated that stock market development has a tremendous outcome on economic growth, and this effect remains tough even after the control of banking sectors and other control variables. Moreover, the study observed that there was stable long run equilibrium association ship between the development of the stock market and the evolution of the economy. Ultimately they argued that policy makers should keep in to account the determinants of banks and stock markets development in order to facilitate economic growth in all countries and identifying key conditions as good quality institutions. Aregbeshola (2012) investigated on the role of local financial market growth: Empirical evidence from three African economic groping for the period from 1980 to 2012 using descriptive

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statistics, unit root tests, dynamic panel estimations and Granger causality test. The results indicated that domestic financial markets play important roles in economic development of each of these groupings, although in varying magnitude. Moreover, he observed that domestic financial market plays minute role on the whole economic development of the three groupings whilst interacted. Masoud and Hardaker (2012) observed the impact of financial development on economic growth: empirical evidence from India for the period from 1995 to 2006 using the Phillips–Perron (PP) test and Augmented Dickey-Fuller t-statistics (ADF). Their results showed that stock market development result on economic growth and stock market development has a significant role on economic growth and steady long-term equilibrium association between the progress of the stock market and development of the economy. Hence they argued that government should concentrate to support the development of banking sectors and stock market and identifying key factors for good quality institutions. Kyereboah-Coleman (2008) highlighted the impact of macroeconomic indicators on stock market performance: Empirical evidence from Ghana stock exchange for the period from 1991 to 2005 employed Co-integration and correction model techniques. The results indicated that the lending rates from deposit money banks have an unfavorable effect on stock market performance and mainly provide major obstacle to business growth. He also found that inflation rate was found to have a negative effect on stock market performance. Finally, he advised to the policy makers that capital market and stock market to take advantage of the different opportunities to cope with challenges and interest rates, inflation must be reduced. Pal and Mitta (2011) investigated on impact of macroeconomic indicators on Indian capital markets: Evidence from India covering the period of January 1995 to December 2008 using unit root test, the co-integration test and error correction mechanism (ECM) test. Their results indicated that there was co-integration between macroeconomic variables and Indian stock indices which confirmed long-run association ship. They advocated that India's should give attention to promote equity shares as leading financial instruments. Abdul-Khaliq (2013) aimed to test the impact of stock market liquidity on economic growth: Evidence from Jordan for the period from 1991 to 2011 employed simple linear regression model. The results indicated that market capitalization to GDP doesn't exert significant effect upon the economic growth; however, turnover ratio has significant effect upon the economic growth. Finally,he suggested that government should promote stock market liquidity by propagating education to the public regarding benefits by investing in stock markets and higher liquidity on stock markets and hence will lead to bust up economic growth. Ayopo et al. (2016) based on stock market response to economic growth and interest rate volatility: Evidence from Nigeria for the period from January 1985 to December 2013 using exponential general autoregressive heteroskedasticity estimation techniques. Their results showed that stock prices act in response significantly to innovations in the interest rate and the real gross domestic product (RGDP). Finally, they advocated that policy makers should consider volatility in both the interest rate and the RGDP to the enhancement stock market development. Naik (2012) Examined the impact of stock market development on economic growth: Evidence from emerging market economies for the period from 1995 to 2012 using dynamic panel 'system GMM' estimators and unit root test. The results showed that stock market development contribute significantly to economic growth. He also found a unidirectional causation running from stock market development to economic growth as well. Ultimately the researcher argued to the policy makers that there must be good planned financial policy of stock markets traded domestically and internationally in order to bust up economic growth. Maria Francesca D. Tomaliwan (2013) focused on stock market respond to domestic economic fundamentals and regional equities markets: evidence from Philippine for the period from January 2006 to December 2013 using Autoregressive distributed lag (ARDL) method and vector error correction model (VECM). The results showed that there was co-integration between Philippine stock market and abovementioned factors which meant a long-run equilibrium relationship ship existed. Moreover, the study showed that in the Singapore stock market affects the Philippine stock price in the long-run and short-run as well. The researcher suggested that the policy makers should have and strong clear monetary policy in order to control the Philippine stock market price in the long-run and short-run as well. Ekong and Ebong (2014) explored on the crude oil price, stock market development and economic growth: Evidence from Nigeria for the period from January 1995 to November 2014 employed Vector Autoregressive (VAR) model and co-integration analysis. Their results highlighted that there was long-term sustainable equilibrium relationship between stock market movement and economic growth and both affected by distortion of the price of the crude oil. Ebele (2010) investigated on appraisal of the effect of saving on stock market development: Evidence from Nigeria for the period from 2001 and 2010 using multiple linear regression approach. The results indicated that savings has important and positive consequence on stock development in Nigeria. He argued that policy makers in oil dependent economies should be keen on the effect of the changes of oil prices on their economy and stock markets and play vital role to influence exchange rate and volumes of market capitalization through the use of oil prices.

III. Materials and Methods

In this paper, we used time series secondary data covering the period of 1993 to 2015 related to Mauritius. The variables used in this paper are: growth domestic product (GDP), market capitalization ratio (MCR), turnover ratio and value traded ratio (VTR). The data were collected from different sources by World Bank through the publication of World Development Indicators. GDP was collected from World Bank national account data and OECD National Accounts data files and the rest variables were collected from World Federation of Exchange database. In this paper, following procedures was adopted firstly, we test our variables for unit root test using both Augmented Dickey-Fuller (ADF) test and Phillips–Perron (PP) test. Secondly we determined optimum lag selection criterion by using the unrestricted VAR model to select for optimum number of lags. Thirdly, after determination of optimum lags we run Johansen's co-integration test to assess whether the variables are co-integrated or not. Fourthly we run restricted VAR model to estimate long - run and short - run causality among variables. Finally, we check for diagnostics test and stability of the model to check the strength of the model and verify the results. All the above procedures in details are explained in next part of the paper below.

Empirical Model

The empirical model can be specified as follows;

$$GDP_t = f(\text{MCR}_t, \text{TR}_t, \text{VTR}_t)\varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where the empirical model will be employed as follows

$$GDP_t = \alpha_0 + \alpha_1 MCR_t + \alpha_2 TR_t + \alpha_2 VTR_t + \varepsilon_t \dots\dots\dots\dots (2)$$

Where;

GDP$_t$ = Economic Growth is measured by GDP annual growth rate at time t.

MCR$_t$ = Market Capitalization Ratio is measured by ratio of value of listed domestic shares on domestic exchanges as percentage of GDP at time t.

TR$_t$ = Turnover Ratio is measured by the value of trades of domestic shares on domestic exchanges to the value of listed domestic shares at time t.

VTR$_t$ = Value Traded Ratio measured by value of the trades of domestic shares on domestic exchanges as the percentage of GDP at time t.

t = Represents the time from 1993 to 2015

α$_0$ = Intercept term

ε = Error term

Market Capitalization Ratio is measured by ratio of value of listed domestic shares on domestic exchanges as percentage of GDP. We expect Market capitalization ratio to have positive relationship to the economic growth. Turnover Ratio is measured by the value of trades of domestic shares on domestic exchanges to the value of listed domestic shares. We expect turnover ratio to have positive relationship with economic growth. Value Traded Ratio measured by value of the trades of domestic shares on domestic exchanges as the percentage of GDP. We expect value traded ratio to have positive relationship to the economic growth.

IV. Result and Discussion

The table 1 shows the distractive statistics the dependent and independent variables of the model. The mean of growth in gross domestic product (GDP) was approximately 424% while the standard deviation was about 167%.The GDP growth range from 124% as a minimum and 902% as a maximum.

Table 1: Descriptive statistics

Variables	Mean	SD	Min	Max
GDP	4.249724	1.671982	1.241388	9.026614
MCR	49.26969	22.46820	21.46221	101.6302
TR	5.636279	1.614625	3.163652	10.77077
VTR	2.650754	1.128011	1.149734	5.284615

Source: author's computation using Eviews 8.

The nasty in Market Capitalization Ratio: The mean of growth in market capitalization ratio (MCR) was around 4927% while the standard deviation was approximately 2247%. The MCR growth range varies from 2146% as minimum and 10163% as a maximum respectively. The gross in Turnover Ratio: The mean of growth in turnover ratio (TR) was about 564% while the standard deviation was approximately 161%. The TR growth range from 316% as a minimum and 1077% as a maximum as well.The gross in Value Traded Ratio: The mean of growth in value traded ratio (VTR) was approximately 265% while standard deviation was about 113%. The VTR growth range varies from 115% as a minimum and 528% as a maximum.

Table 2: ADF Unit Root Test

	AT LEVEL			FIRST DIFFERENCE		
Variable	Lag [Order]	t-stat	Prob*	Lag[order]	t-stat	Prob*
GDP	(0) [0]	-5.378224	0.0003	(0) [1]	-6.134670	0.0001
MCR	(0) [0]	-2.082774	0.2527	(0) [1]	-5.147246	0.0006
TR	(0)[0]	-5.025725	0.0006	(0) [1]	-5.964637	0.0001
VTR	(0)[0]	-2.512351	0.1262	(0) [1]	-7.009909	0.0000

Source: author's computation using Eviews 8.

Table 2 shows the results of Unit Root using Augmented Dickey-Fuller test, variables of growth domestic product (GDP) and turnover ratio (TR) both show that they are stationeries at level and at first difference as well while variables of market capitalization ratio (MCR) and value traded ratio (VTR) are not stationeries at level and became stationeries after first different. This will pave a way for running the Lag Selection Criterion.

Table 3: Philips - Perron Unit Root Test

	AT LEVEL			FIRST DIFFERENCE		
Variable	Lag [Order]	t-stat	Prob*	Lag[order]	t-stat	Prob*
GDP	(0) [0]	-5.421214	0.0002	(0) [1]	-17.22300	0.0000
MCR	(0) [0]	-2.075774	0.2553	(0) [1]	-10.87453	0.0000
TR	(0)[0]	-5.195324	0.0004	(0) [1]	-13.97072	0.0000
VTR	(0)[0]	-2.428442	0.1459	(0) [1]	-9.492313	0.0000

Source: author's computation using Eviews 8.

Table 3 indicates the results of Unit Root using Philips-Perron test. Both GDP and TR show that they are stationeries at level and at first difference as well while MCR and VTR indicates that they are not stationeries at level and become stationeries after converting them in the first difference. This will overlay for running lag section criterion.

Table 4: Lag selection criterion

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-178.8766	NA	430.7804	17.41682	17.61578*	17.46000
1	-155.4804	35.65130*	221.0044*	16.71242*	17.70720	16.92831*
2	-141.8986	15.52203	339.6146	16.94273	18.73334	17.33134

Source: author's computation using Eviews 8.

Besides this study uses a small sample of annual data, selecting more lags would reduce the degree of lack of restrictions. Johansen and Juselius (1990) theory advocates that for small samples the optimum lags should be limited to 1 or 2 for the well-organized results. The optimum lags selected in this model is 1. This optimum lag will be using in the Johansen Co-integration test and Vector Error Correction Model (VECM) test as well.

Table 5: Johansen Trace Test for Co-integration

HypothesizedNo. of CE(s)	Eigenvalue	TraceStatistic	5% Critical Value	Max-EigenStatistic	5% Critical Value
None *	0.912609	66.10506	47.85613	48.74718	27.58434
At most 1	0.394303	17.35788	29.79707	10.02750	21.13162
At most 2	0.303776	7.330374	15.49471	7.241662	14.26460
At most 3	0.004426	0.088711	3.841466	0.088711	3.841466

Trace test indicates no cointegration) at the 0.05 level and * denotes rejection of the hypothesis at the 0.05 level.
Source: Prepared by the authors, based on Eview 8

The results for both the Trace statistic and the Maximum Eigen statistic observed in the table 5 indicated a maximum rank of one for the scenario selected at the 5% significance level; the Johansen co-integration test has acknowledged one co-integrating vectors or rank, hence one rank is applied to establish the VECM. Therefore, we conclude that the variables in this model have one long run co-integrating associationship.

Table 6: VECM Long run causality

	Coefficient	Std. Error	t-Statistic	Prob
CE(1)	0.303112	0.191098	1.586165	0.1438

Source: author's computation using Eviews 8.

According to the results in the table 6 of which the optimum lags selection is 2, and the Johansen's co-integrating test shows 1 co-integrating vector indicated that there is no long run causality running from MCR, TR and VTR toward GDP because probability value is 14.38% which is insignificantand the coefficient is approximately 30.32% which is positive, thus Co-integrating equation one CE (1) is not significant.

Table 7: VECM Short run causality using Wald Test

Variables	Test Statistic	Value	df	Probability
MCR	Chi-square	2.338471	2	0.3106
TR	Chi-square	7.298388	2	0.0260
VTR	Chi-square	4.182777	2	0.1235

Source: author's computation using Eviews 8.

The table 7shows that short run causality using Wald Test observed that only TR with probability value of 2.60% shows that there is short run causality running from TR to GDP while the rest variables such as MCR and VTR with probabilities of 30.06% and 12.35% respectively concluded that there is no short run causality running from MCR and VTR to GDP.

Table 8: Diagnostic test

	Obs*R-squared	Prob.
Serial correlation: Breusch-Godfrey Serial Correlation LM Test	2.272965	0.3209
Heteroskedasticity Test: Breusch-Pagan-Godfrey	7.432723	0.8277

Source: author's computation using Eviews 8.

The researcher also checked diagnostic test of the residuals of serial correlation using Breusch-Godfrey Serial Correlation LM and Heteroskedasticity Test using Breusch-Pagan-Godfrey in the table 8. The result show that the probability value of 32.09% indicated that residuals are not serially correlated and probability value of 82.77% concluded that the residuals are homoscedasticity as well.

Figure 1: Test of normality
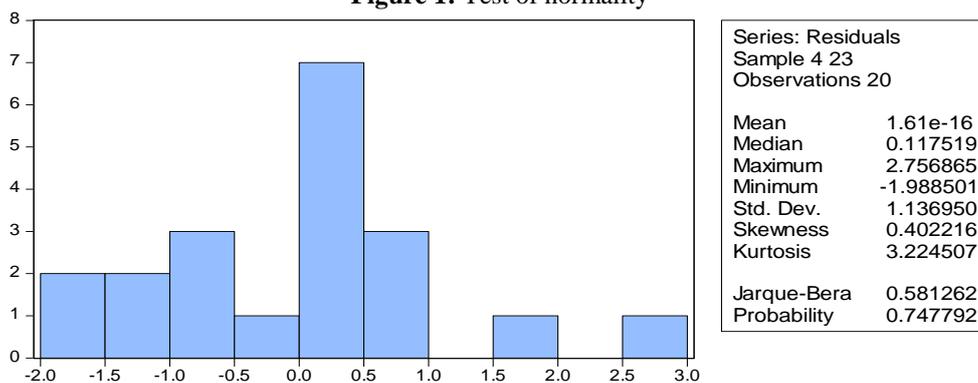
The figure 1 shows the test of normality of the residuals using Jarque-Bera. Since the probability value is approximately 74.78% which is greater than 5% implies that the residuals are normally distributed from this model
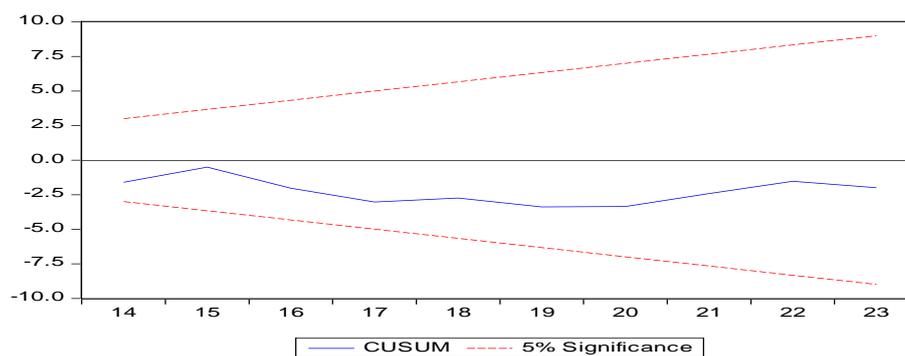
Figure2: Stabilitytest

The figure 2 shows the stability of the model using CUSUM test at 5% significance level .From this figure shows that the model of the data are stable because blue line is within the red lines which implies that the model is good.

V. Conclusion and recommendations

The purpose of this study was empirically investigating the impact of stock on economic growth in Mauritius by taking MCR, TR and VTR as dependent variables. The impact of these variables was empirically tested on economic growth which is GDP as dependent variable for the period of 1993 to 2015-time series data using unit root testing, lag section criterion, Johansen co-integration test and vector error correction model (VECM).Under long run, we find that there is no long run causality running from MCR, TR and VTR to economic growth. However, under shot run only TR has short run causality running to GDP, the rest variables such as MCR and VTR have no short run causality running to economic growth. The results obtained in this study are similar to Noman (2012) for Bangladesh and Murinde (1997) for India and Pakistan. These results would help the policy makers, domestic and foreign investors in Mauritius stock market exchange in their decision making. The government of Mauritius should promote stock market exchange by for instance propagating knowledge to the public relating benefit obtained by investing in stock markets and ensure higher liquidity on stock markets. Stock market regulators should address issues that are capable of boosting the investors' confidence through improving policy formulation and creating awareness. When confidence is restored the total value traded will increase significantly thus raising stock market capitalization. These incentives would be promoted both domestic and foreign as well in order to boost up economic growth. Also, the policy makers would avoid interrupting foreign exchange market in order to control excessive volatility in the stock market of Mauritius in the short run.

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