Al-Khazali, Osamah

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Multinational finance journal

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Reference: Al-Khazali, Osamah (2019). Conditional beta : evidence from emerging stock markets. In: Multinational finance journal 24 (1/2), S. 93 - 117.
http://www.mfsociety.org/modules/modDashboard/uploadFiles/journals/MJ~0~p1eh1r2e1c17021tu5afe1sqenm44.pdf.

This Version is available at:
http://hdl.handle.net/11159/5530

Conditional Beta: Evidence from Emerging Stock Markets

Osamah M. Alkhazali*
American University of Sharjah, UAE

Using the Pettengill et al. (1995) asset pricing model, this paper examines the relationship between conditional beta and returns in 12 emerging stock markets over the period of 2005 to 2017. In applying weekly and monthly data, the evidence shows that there is a flat relationship between beta and returns using the unconditional CAPM. However, the opposite is true when applying the Pettengill et al. (1995) model. The findings indicate that the relationship between beta and returns is positive in a bullish market and negative in a bearish market. In addition, the results support the conditional CAPM for all months of the year. Finally, the results show that market excess returns are positive and the risk-return relationship is symmetrical in both bullish and bearish markets. We conclude that beta is still a valuable risk measure, which helps portfolio managers in emerging markets make optimal investment decisions. (JEL: G12, G15)

Keywords: CAPM; Beta; MENA stock markets; emerging markets

Article history: Received: 31 May 2019, Received in final revised form: 5 May 2020, Accepted: 30 July 2020, Available online: 31 August 2020

I. Introduction

Pettengill et al. (1995) observe the wide literature reporting a failure of the Capital Asset Pricing Model (CAPM) to describe expected stock returns, and propose a modified methodology that deals with the

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* Corresponding author. Finance Department, School of Business Administration, American University of Sharjah, Sharjah, UAE. E-mail: kazali@aus.edu.

(*Multinational Finance Journal*, 2020, vol. 24, no. 1/2, pp. 93–117)

problem of using realized returns to proxy for expected returns.[1] They develop a model that specifies a conditional relationship between returns and beta that depends on whether the excess returns on the market index is positive or negative. In periods where excess market returns are positive (up markets), there should be a positive relationship between beta and returns, and the opposite holds for down markets, where excess market returns are negative. This is because high beta stocks will be more sensitive to negative market excess returns and will have a lower return than low beta stocks in down markets. The evidence in Pettengill et al. (1995) shows that for the period 1936 to 1990, there was strong support for the significance of beta as an explanatory variable of US stock returns when the sample period was split into up market (bullish) and down market (bearish) months.

The Pettengill et al. (1995) model has captured the attention of many interested researchers in the field. A number of studies have shown the existence of a conditional relationship between beta and returns in both developed and developing markets (see, e.g., the US market, Xiao, 2016; the UK market, Fletcher, 1997; Fraser, et al., 2004; Hung, et al., 2004; Morelli, 2011; the Swiss market, Isakov, 1999; the German market, Elsas, et al., 2003; the Greek market, Theriou, et al., 2004, 2007; Theriou et al., 2010; and the Turkish market, Karacabey and Karatepe, 2004). Furthermore, studies have examined the conditional beta model in Asian equity markets (see, e.g., Australian market, Faff, 2001; Hong Kong, Lam, 2001; Tang and Shum, 2006; Singapore, Tang and Shum, 2004; Taiwan and Korea, Tang and Shum, 2007; and Durand et al., 2011). Sandoval and Saens (2004) examine the Pettengill et al. (1995) model in South American markets (e.g., Argentina, Brazil, Chile and Mexico). The findings of these previous studies support the conditional beta model of Pettengill et al. (1995).[2]

Our objective is to test Pettengill at al. (1995) model in the context

1. Fama and French (1992) and Jegadeesh (1992) report the absence of a systematic relationship between beta and security returns in the US. Furthermore, Lakonishok and Shapiro (1986) state that security returns are affected by various measures of unsystematic risk. Jointly, these studies conclude that beta lacks efficiency and completeness as a measure of risk and there is no risk-tradeoff, or, that beta does not measure risk.

2. Additional recent studies pertain to Tehran stock market (Sinaee, 2010; Rezagholizadeh, et al., 2013), Japanese and Sri Lanka markets (Nimal and Fernando, 2013), New Zealand (Choi and Fu, 2013) and the Karachi Stock Market (Khalid et al., 2013). In addition, Koch and Westheide (2013) examine the conditional approach of Pettengill, et al. (1995) and compare it to Fama-French three-factor model.

of the MENA region equity markets. Despite the extraordinary growth of emerging equity markets in the MENA region, no previous study has examined the conditional relationship between beta and returns for the MENA region with the exception of Al Refai (2009), who examined a limited sample firms traded on the Jordanian stock market. In addition, the opening of many MENA emerging markets to foreign investors in the 2000s has offered opportunities for investment, particularly to foreign investors seeking risk diversification. Researchers have noted that the risk-return relationship of stocks listed on MENA emerging markets is quite unique in that they exhibit low returns and low volatility compared to the high returns and high volatility generally observed in emerging markets in Asia, Latin America, and Eastern Europe.[3] Researchers point out that might not really be appropriate to continue testing a hypothesis using data from which the hypothesis was first generated, given that any such tests may lead to fragile econometric inferences.[4] Thus, another motivation for this study is to provide new out-of-U.S. sample evidence of the conditional pricing relationship. Therefor research on asset pricing features of the emerging stock markets in the MENA region will provide academics and practitioners a better understanding of the cross-sectional behavior of stock returns in this region.

Using monthly and weekly stock returns data for three different MENA region equity indices and three proxies for the market portfolio,[5] this paper extends the international asset pricing literature by applying the conditional CAPM to twelve MENA region stock markets over the January 2005 and December 2017 time period.[6] We find that the relationship between beta and returns based on the unconditional CAPM is non-existent (i.e., we document a statistically insignificant relationship between beta and stock returns). However, the opposite is true when applying the Pettengill et al. (1995) model. Our findings demonstrate that the relationship between risk and returns is positive in up (bullish) markets and negative in down (bearish) markets. The results

3. For more discussion, see Alkhazali (2011), Alkhazali et al. (2010), Alkhazali et al. (2007), and Zoubi and Alkhazali, (2004).

4. For more discussion see Leamer (1983) and Fan et al. (2015).

5. The three indices are presented in the data section of this paper.

6. Fletcher (2000) and Tang and Shum (2003a, b) use aggregate indices.

also support the conditional CAPM for all months of the year. Finally, we find that market excess returns are positive and the risk-return relationship is symmetrical in both up and down markets. We conclude that beta is still a valuable risk measure in the MENA region context, which helps portfolio managers in making optimal investment decisions.

This study has implications on different fronts: first, it provides insights to investors, analysts, and policy makers into the pricing of risky securities in the MENA region. Second, it suggests that a conditional asset pricing framework should be used by MENA region managers in their cost of capital calculations. Third, it enriches our understanding of the relationship between risk and equity returns in MENA countries. Finally, the results of this study are significant to both researchers and practitioners as the empirical findings confirm the significance of a number of factors in the determination of portfolio returns.

The remaining sections are as follow: Section II provides a literature review regarding the relationship between beta and returns, section III describes the data and methodologies used, section IV reports our empirical results, and section V concludes the paper.

II. Literature Review

The empirical evidence to date on the CAPM has been inconclusive in U.S. and non-US studies. However, Pettengill et al. (1995), as a result of the heavy criticism of the beta as a statistically meaningful measure of risk, extended the CAPM model by separating market returns into periods of positive and negative market excess returns and tested for a conditional relationship between risk and return for the U.S. stock market from 1936 to 1990. They find that in up markets, the relationship between beta and stock returns is significantly positive and significantly negative in down markets. Consequently, researchers have applied the Pettengill et al. (1995) model to investigate whether the conditional beta is applicable to equity markets outside the U.S.

For instance, Isakov (1999) follows Pettengill et al. (1995) and in the context of Swiss stock returns. He finds that the relationship between beta and return is statistically significant and depends on the state of the market. The findings show that beta is a good measure of risk. Fletcher (2000) investigates the unconditional and conditional CAPM in 18 international stock markets.[7] He reports that there is no relationship between risk and return when using the unconditional CAPM, but his findings support the conditional CAPM.[8] He concludes that there is a significant positive relationship between beta and return in up market months and a significant negative relationship between beta and stock returns in down market months. Similarly, Theriou et al. (2010) examine both models in Athens stock market and their find support for only the Pettengill et al. (1995) conditional model only. They report a significant positive relationship between risk measured by beta and return in up markets and a significant negative relationship in down markets. Recently, Morelli (2011) and Xiao (2016) apply ARCH/GARCH model to examine the conditional relationship between beta and equity returns in the UK and US markets, respectively. Their results show the importance of recognizing the sign of the excess market return when testing the beta-return relationship.

For the Asian emerging countries, evidence suggests that the conditional beta model is useful in explaining returns. Hedoshima et al. (2000) examine both models in the Japanese stock market. They report that the conditional CAPM is better in circumstances where the excess return is negative than when it is positive. Lam (2001) examines the risk-return relationship in the Hong Kong stock market using the Pettengill et al. (1995) conditional model and documents a strong conditional positive and negative risk-return relationship. The results show that the estimated risk premiums in both up and down markets are insignificantly different from the corresponding expected risk premiums. However, the estimated risk premiums of up versus down markets are asymmetric with respect to the magnitude of down market premiums being greater than that of up markets. Thus, based on the conditional CAPM, the estimated security market line (SML) in down markets is negatively steeper than is the positively sloped estimated SML in up markets. Faff (2001) applies a multivariate one-step testing procedure to investigate a dual-beta CAPM in the Australian stock market. His findings support the conditional CAPM in that when the excess market return is negative (positive), there is strong evidence of

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7. The 18 countries are Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Italy, Japan, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, UK and USA.

8. To test the conditional CAPM, he splits the sample into up market and down market months.

a negative (positive) relationship between risk and return. Tang and Shum (2003) study the conditional CAPM relationship in 13 international stock markets.[9] Their results confirm the conditional model of Pettengill et al. (1995); they report that there a significant positive relationship between risk and return in bullish market periods (under conditions of positive market excess returns) and the opposite holds. Furthermore, Tang and Shum (2004) extend Pettengill et al.'s (1995) model by including other statistical variables in the model for the Singaporean stock market from April 1986 to December 1998. They find other variables to have an explanatory power of the risk and stock returns relationship, such as unsystematic risk, total risk and kurtosis. However, their tests did not correct for heteroscedasticity and autocorrelation potentially impacted their results. Tang and Shum (2006) revised their prior tests using Newey and West's (1987) method, which controlled for the effects of heteroscedasticity and autocorrelation and monthly stock returns in Hong Kong from 1986 to 1998; they document and find a significant relationship between beta (as well as other variables such as unsystematic risk, total risk, skewness and kurtosis) and stock returns. Further, Tang and Shum (2007) examine the conditional relation between risk and returns in up and down market periods in the Korean and Taiwanese equity markets. They find that beta is positively (negatively) related to realized returns in up (down) markets and that the results are sensitive to portfolio aggregation methods.

Recently, studies have re-examined the beta conditional model in Asian stock markets. Durand et al. (2011) examine this model in 11 Pacific Basin emerging markets. They use four different models in calculating betas, namely local excess returns, world excess returns, local and world excess returns, and a model using both local and world excess returns where local returns are orthogonal to world returns. They find evidence supportive of the conditional beta model indicating that segmentation of the sample will lead to a positive estimated market risk premium in up markets and a negative estimated market risk premium in down markets. Nimal and Fernando (2013) find that the estimated market premiums are positively related to realize market premiums, suggesting that the beta-return relationship is conditional on the realized

9. The 13 countries are France, Germany, Netherlands, UK, Japan, Canada, and US (the G7), Belgium, Denmark, and Switzerland (three European countries), Hong Kong, Singapore and Taiwan (three Asian countries).

market premium in the Japanese and Sri Lankan equity markets. Choi and Fu (2013) examine the dual-beta model in New Zealand and report that the conditional constant beta model shows that there is a significantly positive (negative) relationship between realized stock returns and beta in up (down) markets. However, after they segment the data into up and down market sub-samples (using the dual-beta model), they find that there exists only a significantly negative relationship between realized return and beta in the down markets; the relationship in the up markets is flat. Khalid et al. (2013) study betas under bull and bear market conditions using daily prices for a sample of 15 stocks traded on the Karachi Stock Market (KSE). Their results show that beta is higher when the market is bearish than when market is bullish for nine stocks, while the reverse is true for other six stocks. In addition, Koch and Westheide (2013) apply the conditional beta model to the Fama-French three-factor model. Despite the inclusion of the size and book-to market factors, they find a systematic conditional relation between market beta and returns. Sinaee and Moradi (2010) and Rezagholizadeh et al. (2013) examine the Pettengill et al. (1995) conditional model in the Iranian stock market and find that market risk has a significant positive relationship with stock returns in up markets and a significant negative relationship in down markets.

For the MENA region, to the best of our knowledge, only one study in the current literature has examined the conditional beta model. Al Refai (2009) applies the Pettengill et al. (1995) model to the Jordanian stock market, and finds a positive relationship between beta and returns in up markets and a negative relationship in down markets. However, the positive relationship exists in all industries, while the negative relationship only exists in a few industries. We observe that no research conducted an investigation of the Pettengill et al. (1995) model in a cross-country MENA region framework. This research aims to fill this gap by investigating the conditional relation between beta and returns in 12 MENA stock markets.

III. Data and Methodology

For comparison purpose, we use data from two sources: the Arab Monetary Fund (AMF) and DataStream.[10] The data consists of weekly

10. Source: http://www.amf.org.ae/en/page/objectives-and-means.

and monthly index returns for 12 stock indices in the MENA region: Abu Dhabi, Amman, Bahrain, Beirut, Casablanca, Doha, Dubai, Egypt, Kuwait, Muscat, Saudi and Tunisia. Further, for robustness test, we use three different proxies for the market portfolio, namely, the Morgan Stanley Capital International (MSCI) world index (a value-weighted index), equally weighted index, and the Arab composite index constructed by the AMF. All returns are calculated in US dollars. Similar to previous studies, the monthly return on a 3-month US Treasury Bill (obtained from the Federal Reserve Bank of Chicago internet site) is used as the risk-free asset chosen due to data availability.[11] The sample period covers June 2005 to December 2017 for the MSCI and from January 2005 to December 2017 for the AMF, producing a total of 151 and 156 data points of monthly returns and 604 and 650 data points of weekly returns.

To examine the Pettengill et al. (1995) model in the MENA region, we follow the methodologies of Fletcher (2000) and Tang and Shum (2003), who test the conditional beta model in international stock markets. In these studies, country betas are estimated by regressing realized excess returns of a national index against the world market risk premium.

The purpose of this paper is three-fold. The first is to test for a positive linear relationship between risk and realized return. The second is to test for a systematic conditional relationship between betas and realized returns. The third is to test for a positive long-run trade-off between beta risk and return. We apply the three-step approach of Fama and MacBeth (1973) with a minor change: since country indices are well-diversified portfolios, the first-step of Fama and MacBeth (1973) approach can be skipped. The sample period is divided into two equal sub-periods, which are the country beta estimation period and a test period. In the country beta estimation period, betas are estimated by regressing country index excess returns against world market excess returns.

In the first step, we estimate β_i using the regression model in the form:

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11. Fama and French (2017) use return in US dollars and one month US Treasury Bill as the risk free rate in testing five-factor asset pricing model in 23 international markets. Fletcher (2000) use monthly return in US dollars and 3 month US Treasury Bill as the risk free asset in testing the conditional CAPM in 18 international markets including the US. Moreover, Harvey and Zhou (1993) use monthly return in US dollars and one month US Treasury Bill as the risk free asset in testing the CAPM in 16 international markets.

$$R_{it} = \beta_{iw} Rp_{wt} + \varepsilon_{it} \, , \tag{1}$$

Where R_{it} is the realized excess return ($R_i - R_f$) of a country index, i, in period t, β_{iw} the sensitivity of country index, i, RP_{wt} the world market risk premium equals realized world market return minus the risk-free rate ($R_w - R_f$). The country betas in 2012 are estimated from the period 2005-2011. Similarly, the country betas in 2013 are estimated from the period 2006-2012, and so on.

In the second step, we test for a positive risk–return trade-off utilizes the following equation:

$$R_{it} = \gamma_{0t} + \gamma_{1t}\beta_i + \varepsilon_{it} \tag{2}$$

where β_i is estimated from equation (1), ε_{it} is a random error in both equations (1) and (2). The average values of the coefficients (γ_0, γ_1) are calculated and the average value can be tested to see if it is significantly different from zero. The CAPM implies $\gamma_0 = R_f$ and $\gamma_1 = (R_w - R_f)$, and the validity of the unconditional CAPM is tested by the following hypothesis:

$$H_0\colon \gamma_1 = 0$$

$$H_1\colon \gamma_1 > 0$$

If the null hypothesis is rejected, this means two things: (a) there is statistically significant relationship between systematic risk and realized returns; and (b) the average market risk premium is positive. In another words, if the value of γ_1 is greater than zero with a significant t-statistic, a systematic unconditional relationship between beta and realized returns is supported.

For testing the systematic, conditional relationship between beta and realized returns, Pettengill et al. (1995) adjust the Fama and MacBeth (1973) approach to examine the conditional relationship between beta and returns.[12] Pettengill et al. (1995) specify the following conditional

12. Pettengill et al. (1995) report the following: i) studies which focused on the relationship between returns and beta should take account of the fact that ex post returns are used in the tests and not ex ante returns; and ii) a conditional relationship between beta and returns should exist when realized returns are used. This occurs since there must be some probability where investors expect that the realized returns on a low beta portfolio is greater than the returns on a high beta portfolio. This is because no investor would hold the low beta

relationship between beta and realized returns:

$$R_{it} = \gamma_{0t} + \gamma_{1t}\alpha\beta_i + \gamma_{2t}(1-\alpha)\beta_i + \varepsilon_{it} \tag{3}$$

where α is a dummy variable and equal to one if, $(R_w - R_f) > 0$ (i.e. when the world excess market returns is positive) and $\alpha = 0$, if $(R_w - R_f) < 0$ (i.e. when the world the excess market returns is negative), γ_{1t} is the monthly risk premium estimates in up market months (positive excess market returns) and γ_{2t} are the risk premium estimates in down market months (negative excess market returns). Equation (3) implies that either γ_{1t} or γ_{2t} will be estimated in a given month depending on the sign of the excess market returns. Since γ_1 is estimated in periods with positive market excess returns, the expected sign of this coefficient is positive. Hence, the following hypotheses are tested,

$$H_0: \gamma_1 = 0$$
$$H_1: \gamma_1 > 0$$

Since γ_2 is estimated in periods with negative market excess returns, the expected sign of this coefficient is negative. Hence, the following hypotheses are tested,

$$H_0: \gamma_2 = 0$$
$$H_1: \gamma_2 < 0$$

where γ_1 and γ_2 are the average values of the coefficients γ_{1t} and γ_{2t}. These can be tested with the standard Fama and MacBeth (1973) *t*-tests. If the null hypothesis is rejected in both situations, a systematic conditional relationship between beta and realized returns is supported. Furthermore, we test for seasonality in the risk-return relationship by segmenting country index returns by months and re-estimating equations (2) and (3).

Pettengill et al. (1995) state that if a systematic, conditional relationship between beta and returns exists, a positive reward for holding risk will occur if two conditions are met: i) market excess

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portfolio if this were not the case. In addition, they indicate that this occurs when the risk-free return is greater than market return, which they suggest is implied by the excess returns market model. They also state that the consequence of this is that there should be a positive relation between beta and returns when the risk premium is positive and a negative relationship when the risk premium is negative.

returns are, on average, positive; and ii) the risk–return relationship is symmetrical across periods of positive and negative market excess returns.

To test the first condition, we use the *t*-test to determine whether market excess returns are, on average, positive. Before we examine the second condition, we reserve the sign for γ_2 and re-estimate its mean value. After the adjustments, the following hypotheses are tested by using the Mann-Whitney *U*-test:

$$H_0: \gamma_1 - \gamma_2 = 0$$
$$H_1: \gamma_1 - \gamma_2 \neq 0$$

If we fail to reject the null hypothesis, this implicit would imply that there is no difference between the risk premiums during up versus down markets, and the risk–return relationship is symmetrical during periods of positive and negative market excess returns.

IV. Empirical Results

A. Beta vs. realized returns

Similar to previous studies, and following Fama and McBeth (1973), we examine whether there is a significant positive linear relationship between risk and realized returns for MENA region equity indices. To investigate this relationship, we estimate the slope coefficients for equation (2) by employing the above three indices (MSCI world, equally weighted and AMF). Table 1 presents the results for the unconditional relationship between beta and realized returns. For monthly returns and using the above three indices as market proxies (MSCI, EW and AMF), the mean values of γ_1 are (–0.212, –0.142, and –0.091, respectively), and we cannot reject the null hypothesis of no relationship between risk and returns at the 5% level. In addition, table 1 presents the same results using weekly returns, which are qualitatively similar to those found using monthly returns. For the three world market indices, the mean values of γ_1 are (–0.081, –0.021, and –0.04, respectively), and we cannot reject the null hypothesis of no relationship between risk and returns at the 5% level. These results are consistent with Fama and French (1992) and a number of other studies that document a flat (statistically insignificant) relationship between beta and stock returns in the US and

TABLE 1. Tests of unconditional beta and return relationship

Monthly data			
$R_{it} = \gamma_{0t} + \gamma_{1t}\,\beta_i + \varepsilon_{it}$			
Index	γ_1	T-statistic	P-value
MSCI	–0.212	–0.394	0.642
EW	–0.142	–0.321	0.723
AMF	–0.091	–0.201	0.462
Weekly data			
$R_{it} = \gamma_{0t} + \gamma_{1t}\,\beta_i + \varepsilon_{it}$			
Index	γ_1	T-statistic	P-value
MSCI	–0.081	–0.051	0.932
EW	–0.021	–0.121	0.821
AMF	–0.004	–0.043	0.883

Note: MSCI: Morgan Stanley Capital International, EW: Equally weighted, and AMF: Arab Monetary Fund.

in other countries. Ferson and Harvey (1993) also find a weak relationship between beta and international stock returns.

Pettengill et al. (1995) argue that the flat relationship between beta and returns can be explained by the failure of prior tests of the CAPM to take into account the fact that realized returns are used in the test rather than expected returns as well as the overall market over a period consisting of a combination of positive and negative market excess returns. They also indicate that the conditional CAPM implies that high beta countries will have higher returns, whereas low beta countries in bullish market months have poorer returns in bearish market months. Given the conditional relationship between risk (beta) and realized returns, we test the dual hypothesis of a positive relationship between beta and returns during periods of positive market excess returns and a negative relation during periods of negative market excess returns. This hypothesis is tested by examining the regression coefficients γ_1 and γ_2 of equation (3).

The estimated regression coefficients for monthly and weekly returns of the world market three indices are reported in table 2. The evidence is consistent with Pettengill et al. (1995) in that there is a significant positive relation between returns and beta in bullish markets and the opposite in bearish markets. For monthly returns, the mean values of γ_1 during up markets (positive market excess returns) are

TABLE 2. Tests of the conditional relationship between beta and return

Monthly data

$$R_{it} = \gamma_{0t} + \gamma_{1t} D\beta_i + \gamma_{2t} (1 - D) \beta_i + \varepsilon_{it}$$

A. Up markets				B. Down market			
Index	γ_1	T-statistics	P-value	Index	γ_2	T-statistic	P-value
MSCI	0.0454	13.21	0.0001	MSCI	–0.0434	–12.12	0.0001
EW	0.0343	8.12	0.0001	EW	–0.0312	–13.21	0.0001
AMF	0.0412	10.11	0.0001	AMF	–0.044	–9.12	0.0001

Weekly data

$$R_{it} = \gamma_{0t} + \gamma_{1t} D\beta_i + \gamma_{2t} (1 - D) \beta_i + \varepsilon_{it}$$

A. Up markets				B. Down markets			
Index	γ_1	T-statistics	P-value	Index	γ_2	T-statistic	P-value
MSCI	0.0393	12.12	0.0001	MSCI	–0.037	–13.21	0.0001
EW	0.0353	11.23	0.0001	EW	–0.041	–14.67	0.0001
AMF	0.0314	10.23	0.0001	AMF	–0.032	–11.45	0.0001

Note: MSCI: Morgan Stanley Capital International, EW: Equally weighted, and AMF: Arab Monetary Fund.

0.0454, 0.0343 and 0.0412 for the MSCI, EW and AMF, respectively. The mean values of γ_2 during down markets (negative market excess returns) are –0.0434, –0.0312 and –0.044 for the MSCI, EW and AMF, respectively. We find that both coefficients are significant at the 5% level.

Table 2 also presents the slope coefficients for up and down markets using weekly returns. For the MSCI index, the mean value of γ_1 during up markets is 0.0393, while that of γ_2 during down markets is –0.037, which are both significant at the 1% level. For the equally weighted index, the mean value of γ_1 during up markets is 0.0353 while that of γ_2 during down markets is –0.041, which are both significant at the 1% level. For the AMF index, the mean value of γ_1 during up markets is 0.0314 while that of γ_2 during down markets is –0.032, which are both significant at the 1% level. The results in table 2 are consistent with previous findings of a conditional relationship using US, European, and Asian stock market returns data. There is a significant positive (negative) relation between beta and returns during periods of positive (negative) risk premium. Our findings provide strong evidence that high-risk stock markets outperform low-risk stock markets when the

TABLE 3. Average monthly / weekly excess returns

	MSCI index		EW index		AMF index	
	Monthly	Weekly	Monthly	Weekly	Monthly	Weekly
Annualized mean excess returns	6.78%	6.84%	5.94%	5.73%	4.81%	4.63%
Mean excess return	0.71%	0.15%	0.61%	0.13%	0.55%	0.11%
Variance	0.0016	0.0005	0.0024	0.0005	0.0032	0.0004
T-stat.	4.41	4.51	3.54	4.26	3.67	4.23
P-value	0.0001	0.0001	0.0002	0.0001	0.0002	0.0001

Note: MSCI: Morgan Stanley Capital International, WE: Equally weighted, and AMF: Arab Monetary Fund. This table shows both the annualized and monthly mean excess returns of the equally weighted market proxy. The test result of whether the monthly mean excess return is significantly different from zero is also presented.

realized world market excess returns is positive and similarly, the high-risk stock markets incur higher losses when the realized world market excess returns is negative.

B. Risk vs. Return: A Test for a Positive Tradeoff

Pettengill et al. (1995) state that given the systematic relationship between beta and returns, a positive risk-return tradeoff requires that i) market excess returns, on average, be positive, and ii) the risk-return relation be consistent during up markets and down markets (i.e., periods of positive and negative market excess returns). To examine the first condition, when average market excess returns are positive, the mean excess returns is estimated. Table 3 presents the average monthly and weekly excess returns for the sample period 2005-2017. For monthly data, the average annualized MSCI world, EW and AMF monthly excess returns are 6.78%, 5.94% and 4.81%, respectively significant at the 1% level. Using weekly data, the table shows that the average annualized MSCI world, EW and AMF weekly excess returns are 6.84%, 5.73% and 4.63%, respectively, all of which are significantly at the 1% level. Hence, the first condition for a positive risk–return trade-off is met.

The second condition required for a positive trade-off is a consistent relation between risk and returns during up markets and down markets. For a symmetrical relationship during periods of positive and negative market excess returns, we test the following hypothesis:

$$H_0: \gamma_1 - \gamma_2 = 0$$

TABLE 4. Test for a symmetrical relation between risk and return during positive and negative periods

	MSCI index		EW index		AMF index	
	Monthly	Weekly	Monthly	Weekly	Monthly	Weekly
Z-stat.	0.342	0.256	0.456	0.387	0.164	0.121
P-value	0.654	0.786	0.432	0.492	0.632	0.623

Note: MSCI: Morgan Stanley Capital International, EW: Equally weighted, and AMF: Arab Monetary Fund.

If we fail to reject the null hypothesis, it would imply that there is no difference between the risk premiums during up and down markets. Hence, the risk–return relationship is symmetrical during periods of positive and negative market excess returns. The results in table 4 show that the null hypothesis of no difference between the risk premiums during up versus down markets cannot be rejected at the 5% level in the monthly returns of MSCI, EW and AMF indices. Thus, a symmetric risk–return relation across periods of positive and negative market excess returns is supported using monthly returns. For weekly returns, the null hypothesis of no difference between the risk premiums during up and down markets is not rejected at the 5% level in both cases. Thus, a symmetrical relationship of market excess returns in up and down markets exists in the weekly returns of the three indices. This result, in addition to the finding of a significant and positive average monthly market excess returns, strongly supports the expectation of a positive reward for holding risk.

C. Robustness Test

To test the robustness of the results, we follow the steps of Fletcher (2000) and Tang and Shum (2003) and examine whether the unconditional and conditional beta vary over the months of the year.

It is well known that there is a strong January seasonal component in US stock returns (Rozeff and Kinney, 1976) and international stock returns (Gultekin and Gultekin, 1983). De Santis and Gerard (1997) find strong support for a January seasonal component in the market price of risk in the conditional CAPM.[13] Heston et al. (1999) find a January

13. Fan et al. (2015) examine equity anomalies and idiosyncratic risk around the world. In addition, Rieger et al. (2013) examine the equity premium puzzle in international markets.

TABLE 5. Seasonal tests of the unconditional beta and return relationship from monthly data

$$R_{it} = \gamma_{0t} + \gamma_{1t}\beta_i + \varepsilon_{it}$$

Market Index	MSCI			EW			AMF		
Sample period	γ_1	T	P	γ_1	T	P	γ_1	T	P
All months	–0.212	–0.394	0.642	–0.142	–0.321	0.723	–0.091	–0.201	0.462
January	–0.812	–0.871	0.871	–0.712	–0.671	0.891	–0.412	–0.812	0.265
February	–0.231	–0.361	0.562	–0.331	–0.892	0.231	–0.231	–0.921	0.876
March	–0.056	–0.241	0.231	–0.053	–0.082	0.871	–0.053	–0.891	0.781
April	0.435	0.981	0.732	0.635	0.891	0.891	0.535	0.926	0.981
May	0.056	0.231	0.126	0.056	0.901	0.231	0.076	0.098	0.431
June	–0.452	–0.876	0.892	–0.252	–0.782	0.651	–0.232	–0.872	0.982
July	0.067	0.453	0.651	0.067	0.092	0.781	0.067	0.782	1.03
August	–0.981	–0.976	0.891	–0.911	–0.891	0.981	–0.811	–0.452	0.762
September	–0.021	–0.765	0.782	–0.041	–0.213	1.021	–0.031	–0.098	0.162
October	–0.451	–0.812	0.92	–0.551	–0.908	0.891	–0.451	–0.982	1.12
November	–0.551	–0.916	0.371	–0.155	–0.781	0.231	–0.152	–0.231	0.511
December	0.451	0.681	0.871	0.541	0.982	0.872	0.599	0.872	0.971

Note: MSCI: Morgan Stanley Capital International, EW: Equally weighted, and AMF: Arab Monetary Fund.

TABLE 6. Seasonal tests of the unconditional beta and return relationship from weekly data

$R_{it} = \gamma_{0t} + \gamma_{1t}\beta_i + \varepsilon_{it}$

Market Index	MSCI world index			EW			AMF		
Sample period	γ_1	T	P	γ_1	T	P	γ_1	T	P
All months	–0.081	–0.051	0.932	–0.021	–0.121	0.821	–0.004	–0.043	0.883
January	–0.112	–0.771	0.771	–0.712	–0.571	0.791	–0.422	–0.512	0.365
February	–0.231	–0.261	0.262	–0.331	–0.592	0.431	–0.234	–0.821	0.576
March	–0.156	–0.231	0.431	–0.053	–0.182	0.771	–0.053	–0.591	0.381
April	0.135	0.961	0.632	0.535	0.591	0.791	0.135	0.826	0.681
May	0.066	0.241	0.226	0.056	0.801	0.431	0.076	0.198	0.431
June	–0.252	–0.866	0.592	–0.052	–0.682	0.451	–0.232	–0.672	0.782
July	0.067	0.423	0.351	0.167	0.192	0.881	0.007	0.882	1.13
August	–0.181	–0.916	0.591	–0.211	–0.691	0.481	–0.001	–0.652	0.862
September	–0.121	–0.715	0.782	–0.141	–0.313	1.121	–0.031	–0.198	0.362
October	–0.141	–0.612	0.823	–0.251	–0.808	0.591	–0.051	–0.882	1.02
November	–0.101	–0.716	0.571	–0.155	–0.981	0.131	–0.052	–0.431	0.611
December	0.051	0.781	0.671	0.894	0.882	0.672	0.809	0.772	0.671

Note: MSCI: Morgan Stanley Capital International MSCI, EW: Equally weighted, and AMF: Arab Monetary Fund.

TABLE 7. Estimates of slope coefficients for up markets and down markets from monthly data

a. MSCI world index $R_{it} = \gamma_{0t} + \gamma_{1t} D\beta_i + \gamma_{2t} (1 - D) \beta_i + \varepsilon_{it}$

	A. Up markets			B. Down markets		
Sample period	γ_1	T	P	γ_2	T	P
All months	0.0454	13.21	0.0001	–0.0434	–12.12	0.0001
January	0.0713	15.23	0.0001	–0.0613	–14.67	0.0001
February	0.0316	10.56	0.0001	–0.0517	–15.67	0.0001
March	0.0417	11.78	0.0001	–0.0632	–16.14	0.0001
April	0.0398	10.67	0.0001	–0.0413	–14.76	0.0001
May	0.0432	13.67	0.0001	–0.0432	–13.34	0.0001
June	0.0464	15.78	0.0001	–0.0442	–15.17	0.0001
July	0.0423	16.34	0.0001	–0.0423	–16.67	0.0001
August	0.0354	10.34	0.0001	–0.0364	–10.10	0.0001
September	0.0476	14.87	0.0001	–0.0236	–6.17	0.0001
October	0.0558	18.56	0.0001	–0.0341	–9.19	0.0001
November	0.0424	14.23	0.0001	–0.0378	–10.21	0.0001
December	0.0476	13.24	0.0001	–0.0418	–14.67	0.0001

b. Equally weighted world index $R_{it} = \gamma_{0t} + \gamma_{1t} D\beta_i + \gamma_{2t} (1 - D) \beta_i + \varepsilon_{it}$

	A. Up markets			B. Down markets		
Sample period	γ_1	T	P	γ_2	T	P
All months	0.0343	8.12	0.0001	–0.0312	–13.21	0.0001
January	0.0413	12.34	0.0001	–0.0323	–12.18	0.0001
February	0.0326	9.12	0.0001	–0.0226	–6.21	0.0001
March	0.0317	10.23	0.0001	–0.0357	–8.19	0.0001
April	0.0328	11.23	0.0001	–0.0328	–13.82	0.0001
May	0.0332	9.19	0.0001	–0.0312	–12.78	0.0001
June	0.0364	14.12	0.0001	–0.0344	–13.78	0.0001
July	0.0323	8.23	0.0001	–0.0323	–12.17	0.0001
August	0.0334	11.16	0.0001	–0.0234	–6.18	0.0001
September	0.0376	10.17	0.0001	–0.0316	–14.17	0.0001
October	0.0358	9.18	0.0001	–0.0358	–12.78	0.0001
November	0.0324	11.67	0.0001	–0.0314	–11.78	0.0001
December	0.0326	9.16	0.0001	–0.0316	–14.90	0.0001

c. AMF index $R_{it} = \gamma_{0t} + \gamma_{1t} D\beta_i + \gamma_{2t} (1 - D) \beta_i + \varepsilon_{it}$

	A. Up markets			B. Down markets		
Sample period	γ_1	T	P	γ_2	T	P
All months	0.0412	10.11	0.0001	–0.044	–9.12	0.0001
January	0.0422	11.34	0.0001	–0.0412	–10.17	0.0001
February	0.0446	14.78	0.0001	–0.0326	–9.18	0.0001

(*Continued*)

TABLE 7. (Continued)

c. AMF index	$R_{it} = \gamma_{0t} + \gamma_{1t} D\beta_i + \gamma_{2t} (1 - D) \beta_i + \varepsilon_{it}$					
	A. Up markets			B. Down markets		
Sample period	γ_1	T	P	γ_2	T	P
March	0.0475	13.17	0.0001	–0.0457	–13.16	0.0001
April	0.0438	12.17	0.0001	–0.0528	–16.89	0.0001
May	0.0432	16.89	0.0001	–0.0412	–13.89	0.0001
June	0.0434	13.16	0.0001	–0.0444	–17.19	0.0001
July	0.0413	10.78	0.0001	–0.0523	–19.89	0.0001
August	0.0464	11.45	0.0001	–0.0434	–14.78	0.0001
September	0.0306	10.78	0.0001	–0.0406	–13.67	0.0001
October	0.0411	14.16	0.0001	–0.0458	–12.89	0.0001
November	0.0324	9.18	0.0001	–0.0414	–15.17	0.0001
December	0.0376	10.16	0.0001	–0.0476	–13.56	0.0001

Note: MSCI: Morgan Stanley Capital International, EW: Equally weighted, and AMF: Arab Monetary Fund.

seasonal effect in the beta risk premium in European stock returns. Therefore, using monthly and weekly data for three different market indices (MSCI world, EW and AMF), we test for seasonality in the risk-return relationship by segmenting country index returns by months and re-estimating equations (2) and (3). Table 5 presents the regression coefficients from equation (2) using MSCI world, EW and AMF monthly returns. Based on the results, we cannot reject the null hypothesis of no risk–return relationship for all months at the 5% level. The results are consistent across the three market indices in that none of the 12 months shows a significant linear relationship between risk and returns at the 5% level. Table 6 presents the regression coefficients from equation (2) using MSCI world, EW and AMF weekly returns. The results are consistent with those using monthly returns to examine the seasonality effect. It appears, therefore, that there is no difference in using monthly or weekly data to examine the seasonality effect. Our results uncover no January effect in the unconditional relationship between beta and returns, as opposed to Fletcher (2000), who found a significant positive risk–return relationship in January. The reason that the results differ may be due to the fact that different models are used (international CAPM instead of domestic CAPM is used in our study).

For comparative purpose, we test the seasonality in the conditional risk-return relation using monthly and weekly returns for the three world indices. Using MSCI, EW and AMF monthly returns, table 7 presents

TABLE 8. Estimates of slope coefficients for up markets and down markets from weekly data

a. MSCI world index $R_{it} = \gamma_{0t} + \gamma_{1t} D\beta_i + \gamma_{2t} (1 - D) \beta_i + \varepsilon_{it}$

	A. Up markets			B. Down markets		
Sample period	γ_1	T	P	γ_2	T	P
All months	0.0393	12.12	0.0001	–0.0337	–13.21	0.0001
January	0.0513	14.23	0.0001	–0.0403	–13.67	0.0001
February	0.0306	09.16	0.0001	–0.0327	–13.67	0.0001
March	0.0347	11.98	0.0001	–0.0344	–15.14	0.0001
April	0.0418	1.67	0.0001	–0.0332	–14.12	0.0001
May	0.0332	12.67	0.0001	–0.0335	–12.14	0.0001
June	0.0469	16.78	0.0001	–0.0306	–14.17	0.0001
July	0.0443	15.34	0.0001	–0.0354	–15.67	0.0001
August	0.0354	11.34	0.0001	–0.0324	–12.10	0.0001
September	0.0376	12.45	0.0001	–0.0326	–7.27	0.0001
October	0.0458	16.26	0.0001	–0.0341	–9.19	0.0001
November	0.0324	11.23	0.0001	–0.0338	–09.21	0.0001
December	0.0376	12.24	0.0001	–0.0318	–13.17	0.0001

b. Equally weighted world index $R_{it} = \gamma_{0t} + \gamma_{1t} D\beta_i + \gamma_{2t} (1 - D) \beta_i + \varepsilon_{it}$

	A. Up markets			B. Down markets		
Sample period	γ_1	T	P	γ_2	T	P
All months	0.0353	12.12	0.0001	–0.041	–14.67	0.0001
January	0.0416	11.34	0.0001	–0.0323	–13.18	0.0001
February	0.0346	8.32	0.0001	–0.0226	–7.21	0.0001
March	0.0317	11.23	0.0001	–0.0357	–9.19	0.0001
April	0.0319	10.21	0.0001	–0.0328	–12.82	0.0001
May	0.0322	8.19	0.0001	–0.0312	–11.18	0.0001
June	0.0374	13.12	0.0001	–0.0344	–12.18	0.0001
July	0.0349	7.23	0.0001	–0.0323	–11.17	0.0001
August	0.0364	10.12	0.0001	–0.0234	–7.18	0.0001
September	0.0356	9.27	0.0001	–0.0316	–13.17	0.0001
October	0.0368	8.28	0.0001	–0.0358	–11.78	0.0001
November	0.0324	10.27	0.0001	–0.0314	–10.28	0.0001
December	0.0379	8.26	0.0001	–0.0316	–12.19	0.0001

c. AMF index $R_{it} = \gamma_{0t} + \gamma_{1t} D\beta_i + \gamma_{2t} (1 - D) \beta_i + \varepsilon_{it}$

	A. Up markets			B. Down markets		
Sample period	γ_1	T	P	γ_2	T	P
All months	0.0314	10.23	0.0001	–0.032	–11.45	0.0001
January	0.0334	8.34	0.0001	–0.0312	–9.27	0.0001
February	0.0316	12.18	0.0001	–0.0316	–8.13	0.0001

(*Continued*)

TABLE 8. (Continued)

c. AMF index	$R_{it} = \gamma_{0t} + \gamma_{1t} D\beta_i + \gamma_{2t} (1 - D) \beta_i + \varepsilon_{it}$					
	A. Up markets			B. Down markets		
Sample period	γ_1	T	P	γ_2	T	P
March	0.0315	11.27	0.0001	–0.0307	–11.13	0.0001
April	0.0315	11.07	0.0001	–0.0328	–13.82	0.0001
May	0.0304	14.19	0.0001	–0.0312	–12.29	0.0001
June	0.0314	12.26	0.0001	–0.0324	–13.14	0.0001
July	0.0312	9.28	0.0001	–0.0323	–14.59	0.0001
August	0.0314	10.25	0.0001	–0.0334	–12.18	0.0001
September	0.0306	9.28	0.0001	–0.0306	–12.37	0.0001
October	0.0319	12.12	0.0001	–0.0328	–11.29	0.0001
November	0.0304	8.48	0.0001	–0.0314	–11.17	0.0001
December	0.0319	9.26	0.0001	–0.0376	–10.46	0.0001

Note: MSCI: Morgan Stanley Capital International, EW: Equally weighted, and AMF: Arab Monetary Fund.

the slope coefficients for up markets and down markets. In up-market months, the null hypothesis of no relationship between beta and returns is rejected at the 1% level for all months. In down-market months, the null hypothesis of no relationship between beta and returns is rejected at the 1% level for all months.

For weekly returns, table 8 presents the slope coefficients for up-market and down market months. The findings show that there is a significant positive relation between risk and returns in up-markets for all months and a significant negative relationship between risk and returns in down markets for all months at 1% level. The results are consistent regardless of which proxy for the world market is used. The results reported in tables 5, 6, 7, and 8 support our findings in tables 1 and 2. Thus, our results are robust and indicate that the relationship between risk and return depends on whether the excess market is positive or negative.

V. Summary and Conclusions

Using monthly and weekly returns from three MENA region indices and three proxies for the world market returns (the MSCI world index, an equally weighted world index and the AMF index), this paper examines both the unconditional and conditional relationship between beta (systematic risk) and returns in 12 MENA stock markets between January 2005 and December 2017. The results are robust to the index used. Further, our results are robust using both monthly and weekly returns.

The findings are consistent with results of previous studies that fail to document evidence of a positive, unconditional relationship between beta and returns. However, when the tests are estimated taking account the conditional relationship between beta and returns, we find support for Pettengill et al. (1995) model in the MENA region. The results indicate that the relationship between risk and returns in MENA stock markets is significant and positive in up (bullish) markets, significant and negative in down (bullish markets). In addition, the same relationship is found for all months in a year. Moreover, the results show that market excess returns for both weekly and monthly data are positive and that the risk-return relationship is symmetrical in both bullish and bearish markets.

Similar to the findings of Tang and Shum (2003), we also report that high-beta countries capture higher returns in up markets and poorer returns in down markets than low-beta countries. The findings of the study add to the international asset pricing literature. We conclude that beta is still a valuable risk measure, which assists portfolio managers in making optimal investment decisions in the MENA region.

Accepted by: *Prof. P. Theodossiou, PhD, Editor-in-Chief* , *July* 2020

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