Factors Behind Exchange-Traded Derivatives Products Success

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Abstract

This paper empirically analyzes factors behind successful derivatives products in the emerging markets of the Asian region. Successful derivatives products are defined as contracts with high trade volume. The influencing factors are the size of the underlying spot market, the spot market volatility, the spot market liquidity, whether the derivatives product was the first contract introduced in the derivatives exchange, and whether the product was options or futures. We find that the size of the underlying spot market, the spot market volatility and the spot market liquidity have statistically significantly positive effect on the trading volume of the derivatives products. Moreover, if the derivatives product was the first derivatives product introduced in the exchange, it is more likely to be successful. Option contracts are relatively more successful than their respective futures contracts in terms of trading volume, which could be due to the costs associated with margin requirements.

Keywords: Derivatives Products, Spot Market Size, Spot Market Volatility, Spot Market Liquidity

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I. Introduction

According to CNNMoney,[1] while in terms of volume and size, derivatives markets are much smaller than equity markets, the same cannot be said about profitability. The world's largest futures and derivatives exchange, CME Group operates at a profit margin of around 71 percent in comparison to 43 percent of the NYSE Euronext, the largest and most well-known stock exchange. In fact, exchange-traded derivatives business accounts for only around one-tenth of the trillions that are traded every year. The rest of over-the-counter derivatives products are handled by major investment banks.

Exchange-traded derivatives products are highly profitable and have an ample room to grow. As a result, derivatives exchanges are coming up with new products to be listed, however, some products become successful after introduction while others never record any significant trading. Both qualitative and quantitative literature has attempted to explain success of contracts which in turn determines success of derivatives products. Most studies use volume and/or open interest as the measure of success. Sandor (1973) used cut-off point of 1,000 contracts traded annually to distinguish successful from unsuccessful contracts. In Silber's (1981) study of financial innovation by US futures exchanges between 1960 and 1980, contract success is defined by; (i) the number of years a contract has been trading, and (ii) annual volume exceeding 10,000 contracts. Carlton (1984) analyses longevity and competition for US futures between 1921 and 1983, and relies on average lifetime and survival rates. Black (1986) uses Wall Street Journal's criterion for listing contracts in its financial pages: i.e.

[1] Sweet, Ken(2011), 'NYSE's grab a $3.7 quadrillion market, 'CNNMoney, February 14, 2011.

a contract is considered successful if its daily open interest exceeds 5,000 contracts and/or its daily average trading volume exceeds 1,000 contracts. She imposes a longevity criterion on the Wall Street Journal criteria and further states that contracts should record at least 1,000 daily average volumes for the first three years[2] before being termed as successful[3].

This paper seeks to establish the factors influencing contracts' success and is presented as follows; first brief literature review is given in the next section, the methodology adopted and data composition are discussed in the following section. In section IV empirical results are discussed and the conclusion is given in the last section.

II. Literature Review

The success of derivatives products and contracts has been discussed in both qualitative as well as quantitative terms. First, contracts are likely to succeed when the underlying *market is large* and characterized by *volatile prices*. All empirical investigations find a strong correlation between trading volume and price volatility. Corkish et al. (1997) found that changes in the market size (measured by the spot market capitalization) do have a positive impact on the growth in

[2] Carlton (1984) found that most contracts die within the first two years of their introduction. Since contracts may delay for a while before listing, three years were found to be an optimal period for a contract to distinguish itself as successful or not on the basis of trading volume. Furthermore, Silber (1981) examined volume during the third year of trading on the grounds that contracts that are deemed successful at that time "frequently grow considerably during subsequent periods".

[3] This is the criteria which most literature has used to distinguish successful and unsuccessful contracts.

futures volume. They concluded that successful contracts benefit from a large spot market. However, their findings weakly supported that a volatile spot market is a necessary condition of contract's success. Similarly, Black (1986) found that contracts where the cash market is large and cash prices volatile are more likely to succeed. Cornell (1981) established that "new contracts should be written on commodities with "sufficient" price variability. Tashjian and Weissman (1995) concluded that "good" contracts have payoffs that are highly correlated with payoffs on a large cash market with highly variable cash prices. Empirical evidence supported these predictions.

Tashjian (1995) further analyzed the role of *competition* in contract's success. A contract is likely to be affected by the existence of competing contracts. She stated that if two contracts are sufficiently similar, typically only one will attract significant trading volume. Black (1986) investigated the issue empirically and found that new contracts with actively traded close substitutes are less likely to succeed than new futures contracts without close substitutes. Corkish et. al. (1997) tested the first mover advantage, i.e. whether contracts introduced when there are no competing contracts are more likely to succeed than those with already trading contracts. The results confirmed the first-mover advantage. Cuny (1993) shows that a first-mover advantage exists since traders are attracted to liquidity offered by established market. However, there are some cases that contradict the first mover advantage where the volume of a contract migrates from existing successful foreign market to own market. Some newly established contracts (in own market) may trade more successfully even though a similar contract was already successful in a different market (foreign market). For example, Nikkei 225 index futures contracts, an index future based on Japanese Nikkei 225 index on Tokyo Stock Exchange

was first listed in Singapore Stock Exchange (SGX) in 1986 and became very successful. Later in 1988, Osaka Securities Exchange (OSE) listed the Nikkei 225 futures and the volume shifted to OSE. Similarly, Bund, a 10-year futures contract based on a German Government Bond was first listed in Liffe in late 1988 and became very successful. However, when Eurex listed Bund futures later, the Bund volume migrated from Liffe to Eurex.

Most literature[4] identified hedging use referred to as hedging effectiveness (HE)[5] of a contract as important prerequisite to its success. A derivative product and contract must address the hedging demand of the traders. Tashjian (1995) states that a market should first look for a group of investors with significant risk exposure and high costs to bearing price risks; e.g. the banks. Then identify the risk that cannot be diversified and finally design an instrument that is highly correlated with the underlying asset. HE of a contract in relation to its underlying asset is thus a key to success. Lack or low HE leads to low trading volume and hence unsuccessful contracts. For example, a big drop in HE is attributed to the fall of GNMA CDR[6] contract which enjoyed considerable success, with volume climbing steadily from its introduction in 1975 to 1980 when it leveled off at 2 million contracts per year before it dropped precipitously to below 10,000

[4] Black (1986), Corkish et. al. (1997), Cuny (1993), Silber (1981), Tashjian and Weissman (1995), Tashjian (1995).

[5] Measured as the reduction in price variation that results when the asset to be hedged is combined with a futures contract in such a way as to minimize the variance of the two-asset portfolio. It is defined by the coefficient of determination (R2) of the regression: $RSt = \alpha + \beta RFt + et$, where RSt (spot return) and RFt (futures return) are defined as logarithmic price changes.

[6] GNMA (Government National Mortgage Association) CDR (Collateralized Depository Receipt) is an interest rate futures contract introduced by the Chicago Board of Trade in 1975, aimed at mortgage bankers to hedge current coupon (newly produced) mortgage securities.

contracts by 1987. Johnston and McConnell (1989) shows that GNMA CDR hedging effectiveness dropped dramatically in parallel with a decline in volume. For a contract to be successful therefore, it is important that it addresses the hedging demand of the traders.

Additionally, hedgers and speculators are also concerned about liquidity of the contract. Lack of sufficient liquidity in most newly initiated markets results to relatively high cost of hedging, thereby inhibiting contract growth. Tesler (1981) argues that liquidity is the key difference between futures and forwards markets. Ceteris paribus, traders will prefer a liquid market[7] even at the expense of low HE, because trading costs (the bid-ask spread) and the execution risk (the risk that adverse price movement occur before trade execution) will be lower. Black (1986) uses the cross market liquidity cost to assess liquidity of own market. Among the numerous measures of liquidity[8], Black uses breadth as the measure for liquidity, which is proxied by the average contract volume as the proxy for liquidity. If the cross market provides a more liquid market, investors might prefer to use it even though it may have lower HE to an own market with higher HE but lower liquidity. This is possible because of two reasons; (a) Large volume is highly correlated with market breadth (Garbade and Silber (1983), Tesler (1981)), and (b) Volume of trading is also a major determinant of the bid-ask spread. Corkish et. al. (1997) examines market liquidity with the bid–ask spread as proposed by Roll (1984)

[7] Addressing how to increase liquidity in a market, Cuny (1993) argues that the optimal contracts attract a sufficiently large set of non-hedgers as liquidity providers by setting appropriate entry fees.

[8] Since liquid market exhibit different characteristics (i.e.) tightness, immediacy, depth, breadth, and resiliency. Sarr and Lybek (2002) classified liquidity measures into four categories: (i) transaction costs measures; (ii) volume − based measures (breadth and depth); (iii) equilibrium price-based measures (resiliency); and (iv) market − impact measures (resiliency and speed of price discovery).

using tick by tick data. They also used the ratio of volume to open interest as a measure of liquidity. A high ratio indicates that trading is high compared to the number of outstanding contracts and hence a more liquid market. They however found futures market liquidity to be a consequence rather than a cause of success. Chordia, Roll, and Subrahmanyam (2000) found that increasing liquidity attracts more investors resulting to more trading activity.

Most derivatives markets, developed or emerging, look into the indicators of derivatives products success before developing and listing a new product or contract. For example, the CME Group, which is the world's largest futures exchange and enjoys a long history of successful new product innovation and development, carefully lists products which have achieved "benchmark" status and hence, with higher success probability. To determine if the product has achieved benchmark status, they reference relevant characteristics of potential new products. They identify five "core" requisites that reference the characteristics of the underlying market. These requisites include: price transparency and volatility - volatility produces speculative opportunity and the necessity to hedge market risks while protection is the key to protecting traders against possibility of manipulation; large, competitive cash or underlying markets; lack of suitable cross hedges; free of government interference or excessive regulation; homeogenous product with established grades and standards for quality and quantity; competitive or strategic considerations; and product support. Ultimately, they attempt subjectively to rate and weigh each product by reference to the above criteria in order to guide their prioritization and choice of the product to be listed. Given this example from the leading futures exchange, emerging markets can follow suit and critically analyze their products against the discussed requisites of product success before listing.

Based on the existing literature, the level of trading volume has been used as the measure of contracts success and the two terms are used as synonymous. Some of the measures of success as discussed among others include: size of the underlying spot market measured by market capitalization, price variability of the underlying product, hedging effectiveness, liquidity as well as the presence or absence of competing contracts either in the same exchange or different exchanges.

Black (1986) pioneered an empirical model that can be used to determine the success or failure of contracts. Analyzing various futures contracts listed on US exchanges, she used a cross-market approach to determine how successful a market was. This means, if a similar market with more liquidity or higher hedging effectiveness exists, then the likelihood of the market being successful are minimal and vice versa. She developed a model to predict the success of contracts using a sample of 19 interest rates futures contracts from different US derivatives exchanges. Following the Wall Street Journal listing criteria, she distinguished successful and failed contracts. The paper emphasized on the "efficient[9] cross hedge" determined by relative residual risk[10] measure of own hedging versus cross hedging. The trading volume was used as the dependent factor. The independent variables include; (i) relative residual risk of cross hedge versus own hedge for commodity i, RR_i; (ii) market liquidity of cross market for commodity

[9] Efficient as used to refers to low liquidity cost and low residual risk.

[10] Residual risk refers to the risk remaining in a hedged position compared with a theoretically perfect hedge in which all risk is eliminated. It is calculated by (1-R2) where R2 refers to the coefficient of determination between the cash and futures price changes. The relative residual risk variable is the ratio of the residual risk for the cross hedge (R*c) to residual risk for the own hedge (R*o) as shown:

$$\text{Residual risk}_{\text{cross}} = \text{Var}\,(R^*c)$$
$$\text{Residual risk}_{\text{own}} = \text{Var}\,(R^*o)$$

i, CLQ_i (measured by the average daily trading volume); (iii) cash market volatility for commodity i, $PVAR_i$ (measured by the standard deviation of daily price changes in a contract equivalent dollar amount of the cash commodity); and, (iv) the size of the cash market for commodity i, $SIZE_i$ (measured by the market capitalization of the cash instruments). The model is as shown.

$$lnVOLUME_i = ln\beta_0 + \beta_1 lnRR_i + \beta_2 lnCLQ_i + \beta_3 lnPVAR_i + \beta_4 lnSIZE_i + u_i$$

Where $VOLUME_i$ = average daily volume of trading in the innovated (own) futures market.

RR_i = relative residual risks.

CLQ_i = liquidity of the cross market.

$PVAR_i$ = price variability of the cash market commodity.

$SIZE_i$ = size of the cash market.

Using annual and average data with volume and open interest as dependent variables[11], she obtained various equations to determine contracts success. To establish the prediction capability of the models, two other contracts[12] not included in the initial sample were used. The models correctly predicted one as a success and the other as unsuccessful. Finally she tested the forecasting capability of a contract that was awaiting listing. The contract[13] was predicted to be successful

[11] She used a sample of 19 contracts established between 1975 and 1983 in various US futures exchanges (CBT, CME, NYFE, ACE, COMEX). However, four contracts were traded in more than one exchange. She run regressions with and without duplicate contracts to check for robustness. Models from both cases performed the similarly and the variables displayed the expected signs although there were differences in the relative importance of the variables.

[12] One successful and one already delisted from CBOT.

[13] Municipal Bond Futures contract based on an index of municipal bond prices. It was

and when it was listed later, it was a success.

Though a useful model, it suffers from the fact that it only considered the first three years to determine the success of a contract. However, as Corkish et. al. (1997) pointed out, some contracts may record more than 1,000 daily average contracts in the first three years but fail in subsequent years.

Corkish et. al. (1997) adapted to a great extent Black's work in their model on determining product success. However, they analyzed the hedging effectiveness and the liquidity variables separately. They used the bid-ask spread as well as the execution risks as measures of liquidity. Their results rejected the hypothesis that high volume contracts have lower bid-asks spreads. Also, their intra-day analysis indicated that market liquidity in terms of both execution risks and transaction costs is fairly constant across active Liffe contracts. Consequently, liquidity seemed to be a consequence rather than a cause of contract success (or lack of liquidity a cause of failure). They estimated hedging effectiveness by the coefficient of determination of the regression: $RS_t = \alpha + \beta\ RF_t + e_t$ (Where RS_t (RF_t) represent spot (futures) return). They found that more successful contracts clearly serve their purpose by providing effective risk reduction. At the same time, proper contract design does not guarantee success.

In addition to liquidity and hedging effectiveness, they carried out a success regression model. They used quarterly volume data as the dependent variable. The explanatory variables as shown in the model below are: (i) spot market volatility, VOLAT (measured by the quarterly average of daily closing price changes); (ii) size, DSVOL (of the underlying market measured by market capitalization); and (iii)

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listed on CBT in 1985 and became a success.

dummies.

$$DFVOL_{it} = \alpha + \beta_1 DSVOL_{it} + \beta_2 VOLAT_{it} + \beta_3 D_{it} + w_{it},$$

Where: $DFVOL_{it}$ is the change in quarterly futures volume;
$DSVOL_{it}$ is the change in quarterly spot market capitalization;
$VOLAT_{it}$ is the change in spot market volatility.

The following Dummies were used in the regression: D_0=1 if the contract has option; D_1=1 if the contract was a first-mover contract; D_2=1 if a cross-listed contract exists with non-overlapping trading hours; D_3=1 if a cross-listed contract exists with overlapping trading hours;

The empirical result showed the significant coefficients for the size (DSVOL) leading to a conclusion that successful contracts benefit from a large spot market. However, the volatility coefficients were small and mostly negative. The data weakly supported that a volatile spot market is a necessary condition for futures contract's success. First- mover advantage was also confirmed. Competition from contracts with the same trading hours had a positive, but insignificant effect on volume while options had a negative, but insignificant effect on futures volume. This suggests that exchange-listed options are not instrumental in creating additional trading opportunities in the markets.

These success models attempted to explain determinants of contracts success in quantifiable way. They used trading volume as the dependant variable but they vary the independent variables and their definitions. In conclusion, their models shed light on key factors that influence contracts success and how they can be measured.

III. Methodology and Data

This paper slightly borrows from Black's work in developing a success[14] model to a sample of emerging market contracts to determine the likelihood of a new contract succeeding. Trading volume[15] is used as the proxy for success and is thus the dependent variable while the spot market size, the cash market variability and market liquidity are used as explanatory variables together with various dummy variables. From each of the derivative markets, equity index contracts data are collected from the first year the contract was listed (t_0) to t_{10} depending on data availability and the duration the contract has been traded. When an emerging market introduces a derivatives exchange, equity index futures are usually the first contract listed. Our final data is presented as long format panel data. However, since derivatives markets vary in the number of equity index contracts traded and the years each contract has been trading, our panel is unbalanced. The model is estimated as panel with common intercepts and coefficients utilizing the fixed effect.

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[14] Our model largely differs from the Black's model as explained: (a): Data: (i) While Black used only the first three years data, we use a 11-years period data or when a contract ceased trading (whichever is shorter); (ii) Black uses three years average data for the variables while we use annual data (to capture the time patterns); (b) Variables: (iii) We introduce the cash market liquidity instead of the futures markets liquidity; (iv) Unlike Black's model, we use dummy variables to capture the qualitative factors that determines contract's success; (c) Approach: (v) Black uses the cross-market approach (using cross market to determine own market success) while we focus on own market success; (vi) Black's paper analyzed contracts in developed market (US exchanges) while we focus on emerging markets in Asia; (vii) Black focuses principally on interest rates futures contracts while we use equity futures and options contracts.

[15] The trading volume refers to the numbers of contracts traded. Though this approach suffers from the drawback in that contracts vary in size and hence when comparing across contracts we will not be comparing like with like, the alternative of using the trading value may require converting the value to single currency. However, it would be impossible to distinguish between "real" growth and "exchange rate related" growth. Hence, volume was preferred as an absolute measure of activity.

1. Data and Sample Composition

Asia is classified as one of the fastest growing region[16] in derivatives trading in the world. The Asia-pacific region in 2010 has 11 countries with financial derivatives markets namely; Australia, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Singapore, Taiwan, and Thailand. However, since we want to focus on emerging markets, our study sample markets are reduced to India, Indonesia, Korea, Malaysia, Taiwan, and Thailand.

We use these emerging markets' derivatives exchanges to establish the indicators of derivatives products success. The derivatives markets are[17]: Bursa Malaysia, Malaysia (1995); Indonesia Stock Exchange (IDX), Indonesia (2001); Korea Exchange (KRX), Korea (1996); National Stock Exchange (NSE), India (2000); Taiwan Futures Exchange (TAIFEX), Taiwan (1998); and Thailand Futures Exchange (TFEX), Thailand (2006). The most traded products as shown in Table 2 are equity index products, followed by interest rate products and currency products.

[16] In 2008, Asia-Pacific region was second after the North America region and accounted for 28% of futures traded volume on exchanges in the world. Korea Exchange has recorded the largest trading volume in index options for several years while the National Stock Exchange of India (NSE) continues to move up the top exchange list in total volume and has the fastest growing stock options.

[17] Numbers in parenthesis refers to the year the derivatives market was established.

Table 1 Financial Products Traded in the Derivatives Markets.

Market	Year Est.	Product	Year Est.
Bursa Malaysia	1995	Index Futures	1996
		Interest rates Futures	1997
		Index Options	2001
		Single Stock Futures	2006
Indonesia Stock Exchange (IDX)	2005	Index Futures	2001
		Single Stock Options	2004
Korea Exchange (KRX)	1996	Index Futures	1996
		Index Options	1997
		Interest Rates Futures	1999
		Currency Options	1999
		Currency Futures	1999
		Single Stock Options	2002
		Options on Interest Rates Futures	2002
National Stock Exchange of India (NSE)	2001	Index Futures	2000
		Index Options	2001
		Single Stock Futures	2001
		Single Stock Options	2001
		Interest Rates Futures	2003
Taiwan Futures Exchange (TAIFEX)	1998	Index Futures	1998
		Index Options	2001
		Single Stock Futures	2003
		Single Stock Options	2003
		Interest Rates Futures	2004
Thailand Futures Exchange (TFEX)	2006	Index Futures	2006
		Index Options	2007

Sources: Bursa Malaysia, IDX, KRX, NSE, TAIFEX, TFEX.

The table shows the derivatives markets in Asia-pacific region emerging markets, the year they were established, the different products traded in each market and the year the product was introduced. It is important to note that most of these products have diverse contracts listed under them.

From the respective derivatives exchanges data bases as well as from the Futures Industry Association (FIA) and World Federation of Exchanges (WFE), data is collected for 27 equity index futures and options[18] contracts. For each contract, data is obtained for the year's t_0 to t_{10} depending on data availability and duration the contract has been trading. The year refers to calendar year and t0 is the first year a contract was traded[19]. Total number of contracts and observations from each market are shown in Table 3.

Table 2: Distribution of Contracts and Observations

Market	Contracts			Observations		
	Futures	Options	**Total**	Futures	Options	**Total**
India	5	1	**6**	23	8	**31**
Indonesia	3	-	**3**	17	-	**17**
Korea	2	1	**3**	15	11	**26**
Malaysia	1	1	**2**	11	9	**20**
Taiwan	8	3	**11**	52	16	**68**
Thailand	1	1	**2**	3	2	**5**
Total	**20**	**7**	**27**	**121**	**46**	**167**

Source: Bursa Malaysia, IDX, KRX, NSE, TAIFEX, TFEX, WFE, FIA
The table shows the number of equity index contracts and number of observations from each derivative market. The selection depended largely on the number of equity index contracts traded and availability of data. Generally, equity index futures are the most frequently traded than options contracts which explains the high number of futures than options. Taiwan (Taifex) leads with the total number of index futures and options followed by India (NSE).

[18] Equity based products (especially index products) are the most popular derivatives contracts in exchanges and are first introduced in emerging markets followed by interest rates based products and then currency products (Tsetsekos and Vangaris, 1997). Some of the reasons for equity products development more than other products include; more developed equity market (Kim, 1998, Donmez 1997), larger market size (Kim, 1998), less regulation (Kim 1998, Pardy 1998) compared to the bond or forex markets. If the first products (equity products) are successful, the market is deemed to be successful and other products introduced later may become substantial success.

[19] For almost all the contracts, t0 is less than one calendar year since there are seldom any contracts listed on January 1st.

2. Variables

To determine the relative importance of the various factors that influence trading volume which in turn determines the products success, a panel data is considered. The variables are selected based on prior findings of the factors influencing contracts success as well as by intuitive a priori reasoning. The first step is to determine the dependent variable that best captures success of a contract. Logically, successful contracts are those with (high trading volume) while unsuccessful contracts have less number of contracts traded (low trading volume). Hence, trading volume is selected as the proxy for success and we use trading volume (VOL) as the dependent variable. Various explanatory variables for contracts' success are as discussed.

Size

The size of the underlying spot market (SIZE) is measured by annual market capitalization of the underlying products. Black (1986) estimated that contracts where the cash market is large are more likely to succeed. Corkish et. al (1997) hypothesized that changes in market size have positive impact on the growth of futures volume. Similarly, Tashjian and Weissman (1995) found that "good" contracts are highly correlated with payoffs of a large cash market. Consistence to other literature hypotheses, we expect a large underlying spot market to yield high trading volume and a positive sign on this variable is hence expected. The hypothesis tested is:

H1: The size of the underlying cash market is positively related to trading volume.

Volatility

The cash market price variability (CMVOL) is measured by annualized standard deviation of daily price changes[20] of the cash instrument. Most empirical investigations have found a strong, positive correlation between trading volume and price volatility. Rutledge (1979) examined the causality between the trading volume and price variability and found "strong support for the hypothesis that movements in trading volume represent a response to, rather than a cause of, movements in price variability. While Corkish et. al. (1997) weakly supported that volatile spot market as a necessary condition of contract's success, Cornell (1981) established that "new contracts should be written on commodities with sufficient price variability. Black (1986) hypothesized those contracts written on volatile cash markets are more likely to succeed. Our analysis and previous studies hypotheses lead us to expect that higher cash price volatility will result in larger trading volume, and we thus expect a positive coefficient for this variable. The hypothesis tested is:

H2: Price variability of the cash market is positively related to trading volume.

Liquidity

We include spot market liquidity (MLIQ) to assess how it affects trading volume. The rationale is based on the notion that if the underlying market is liquid, we expect more traders be attracted to the market who in turn use the derivatives market to hedge, speculate or

[20] Following Bacha and Villa (1993), the logarithmic return of daily closing prices is defined as; In (Ct / C t - 1). Where Ct is the closing price on day t.

arbitrage. We measure market liquidity by the turnover velocity which is the ratio between the turnover of domestic shares and their market capitalization. Both theoretical and empirical studies suggest that liquidity is an important measure of success. Chordia et. al. (2000) found that increasing liquidity attracts more investors resulting to more trading activity. Based on our analysis, we thus expect a positive sign. We test the following hypothesis:

H3: Liquidity of the underlying cash market is positively related to trading volume.

Dummies

In addition to the above quantitative variables, dummy variables are introduced to capture how qualitative factors might affect contract's success;

DFIRST: It takes a value of 1 if the contract is the first one to be introduced in a new exchange, otherwise 0. Out of our total number of observations, 54 are first contracts. As previously stated, if the first contract listed in a newly established derivatives market is successful, then, the exchange will thus be successful and vice versa. The staff will put a lot of effort to make sure the product is successful and we therefore expect a positive coefficient on this variable. The hypothesis tested is:

H4: The first contract in a new exchange is positively related to trading volume.

DFUT: It takes a value of 1 if it is a futures contract and 0 if it's an option contract. It determines whether futures or options contracts have higher trading volume compared to option contracts or vice versa.

From our sample, 121 observations are futures contracts[21]. Futures contracts normally requires a large initial margin whereas for an option contract, an investor normally pays a small premium and only puts a premium margin in case they are selling. Therefore, futures contracts have higher financial burden than option contracts. In addition, since trading an option contract is similar to several thousand underlying shares, option contracts normally attracts more traders. We therefore expect option contracts to have higher trading volume than futures contracts. The hypothesis tested here is:

H5: Futures contracts are negatively related to trading volume.

Additionally, given that contracts are introduced in different time periods and years, which might affect the trading volume, a period dummy (non-crisis and crisis periods) is introduced. Non-crisis[22] years take the value of 1 while crisis years take 0. Period dummy (DNON-CRISIS) thus captures the differences in trading volume as a result of varying financial periods. Generally, during financial crisis periods, we expect less trading volume[23] compared to non-crisis periods.

H6: Non-crisis period are positively related to trading volume.

Furthermore, since the contracts are from different markets with diverse economic development, political as well as legal and regulatory situations that may affect success of a contract, market development dummies are also introduced. However, to avoid loss in the degree of freedoms, the six markets are classified into two main categories –

[21] Most emerging markets introduce more futures contracts than options, hence the high number of futures than options contracts.

[22] Non- crisis years include 1996, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007 while crisis years are 1997, 1998, 1999, 2008.

[23] Investors' purchasing power is reduced and foreign investors have fled the market.

high/middle income markets (HIE) and lower income markets (LIE) – as classified by the World Bank[24].

H7: DHIE markets are positively related to trading volume.

IV. Determining Success Model

1. Model Estimation

Having described dependent and explanatory variables for contract i at time t, we estimate our model as follows;

$$VOL_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 CMVOL_{it} + \beta_3 MLQ_{it} + \beta_4 DFIRST_{it} + \beta_5 DFUT_{it} + \beta_6 DNON\text{-}CRISIS_{it} + \beta_7 DHIE_{it} + e_{it}$$

(Equation 4.1)

Where: VOL_{it} = Log of annual trading volume
$SIZE_{it}$ = Log of the size of the cash market
$CMVOL_{it}$ = Cash market price variability
MLQ_{it} = Cash market liquidity
$DFIRST_{it}$: = 1 If first contract, otherwise 0.
$DFUT_{it}$: : = 1 If future contract, 0 if option contract.
$DNON\text{-}CRISIS_{it}$ = 1 for non-crisis period, 0 if crisis period.
$DHIE_{it}$ = 1 if high/upper middle income economy, 0 otherwise.

From the estimated model, we expect the following; $\beta 1>0$, $\beta 2>0$, β

[24] Markets are classified following the World Bank's classification of various economies. High/middle income countries include Korea, Malaysia and Taiwan while lower income countries include India, Indonesia and Thailand. Economies in same categories have almost similar backgrounds in terms of economic development, political stability among others.

$\beta_3>0$, $\beta_4>0$, $\beta_5<0$, $\beta_6>0$, and $\beta_7>0$.

The data is presented in unbalanced long panel format. To capture time effect (period dummies) and group effect (market dummies), the data is regressed as a two-way fixed effect regression model. Robust standard errors are used and t-statistics are adjusted for heteroscedasticity (White 1980).

2. Summary Statistics

First, we present the empirical data used in the model to give a general sense of the data in Table 4.

Table 3: Empirical Data

(A) Exchange	(B) Contract	(C) Obs period	(D) Obs	(E) VOL (No. of contracts)	(F) SIZE (USD M)	(G) CMVOL (%)	(H) MLIQ (%)	(I) CSIZE (USD)	(J) GDPPC (USD)	(K) GDPGR (%)	(L) INF (%)	(M) FMVOL (%)
Bursa Malaysia	KLCI Futures	1996~2006	11	609,978	158,957	29	38	565,767	4,446	5	3	10
	OKLI Options	2000~2008	9	102	180,900	18	36	2,464,948	5,262	5	2	NA
IDX	LQ-45Futures	2001~2008	8	39,090	88,968	26	49	13,602	1,388	5	9	27
	JP Futures	2004~2008	5	547	1,922,143	17	126	15,290	1,660	6	9	17
	Mini-LQ Futures	2005~2008	4	0	132,692	27	58	3,955	1,778	6	10	29
KRX	Kospi 200 Futures	1996~2006	11	31,042,752	309,164	31	205	46,900	12,949	5	4	35
	Kospi 200 Options	1997~2007	11	1,457,860,875	398,572	33	214	10,991	13,756	4	3	NA
	KOSTAR	2005~2008	4	54,757	786,455	29	198	12,808	19,606	4	3	26
NSE	S&P CNX Nifty	2000~2008	9	55,019,842	511,605	26	95	11,781,378	651	7	5	26
	S&P CNX Nifty	2001~2008	8	29,631,524	548,686	25	87	12,577,342	677	7	5	NA
	CNXIT Futures	2003~2008	6	104,380	694,439	58	84	32,018,092	753	8	5	59
	Bank Nifty F.	2005~2008	4	949,906	887,617	38	72	96,457,603	850	9	6	38
	Junior Nifty F.	2007~2008	2	118,340	1,130,189	38	72	41,059,801	978	8	8	39
	CNX 100 Futures	2007~2008	2	10,171	1,130,189	34	72	21,109,583	978	8	8	35
TAIFEX	TX (F)	1998~2008	11	6,673,401	395,490	26	203	7,663,896	14,579	4	1	27
	TF (F)	1999~2008	10	822,537	408,989	30	191	5,154,051	14,777	4	1	31
	TE (F)	1999~2008	10	957,614	408,989	28	191	6,774,252	14,777	4	1	30
	MTX (F)	2001~2008	8	2,450,346	433,223	24	171	467,336	14,977	3	1	24
	TXO (O)	2001~2008	8	53,685,689	433,223	21	171	467,336	14,977	3	1	NA
	T5F (F)	2003~2008	6	3,525	485,267	19	157	1,493,436	15,594	4	2	21
	TFO (O)	2005~2008	4	956,147	522,776	24	143	66,706	16,365	4	2	NA
	TEO (O)	2005~2008	4	897,069	522,776	23	143	21,976	16,365	4	2	NA
	MSF (F)	2006~2008	3	3,630	538,362	21	147	6,705	16,605	4	2	23
	XIF (F)	2007~2008	2	112,338	510,213	33	149	2,437,659	16,900	3	3	33
	GTF (F)	2007~2008	2	48,215	510,213	-	149	2,703,937	16,900	3	3	40
TFEX	Set 50 Futures	2006~2008	3	1,175,358	146,806	27	71	1,855,040	3,676	4	4	34
	Set 50 Options	2007~2008	2	27,165	150,129	32	70	2,782,559	3,929	4	4	NA

Source: Bursa Malaysia, IDX, IMF, KRX, NSE, TAIFEX, TFEX, WFE, World Bank, FIA, IMF
NA- Not Applicable
The table gives the average empirical data used in the model. Column A shows the six exchanges data is derived from while column B shows the contracts in each derivative market. Column C gives the time period for each contract whereas column D gives the total number of observations from each contract. Column E (VOL) gives the average number of contracts traded over the period of observations. The main explanatory variables used in estimation model include the SIZE, CMVOL and MLIQ. Column F (SIZE) gives the size of the underlying market (average data in millions of USD), measured by market capitalization. Column G (CMVOL) gives the average cash market price variability which is measured by the annualized standard deviation of daily price changes (Bacha and Villa, 1993). Column H is the average cash market liquidity and is measured by the turnover velocity (shares traded/shares outstanding). The other independent variables (CSIZE, GDPPC, GDPGR, INF, and FMVOL) are used for robustness check. The CSIZE shown in column I is the average contract size in USD. (CSIZE = closing price x multiplier). Column J contains the average gross domestic price per capita (GDPPC) in USD for each of the country. The average GDP growth rate is recorded in column K while the average inflation rate is given in column L. These three variables are economic and political indicators and their data is obtained from World Bank and IMF database. Finally, in Column F, we have the average futures market price variability (FMVOL) which is measured by the annualized standard deviation of daily price changes. In this column, since only the futures contracts are used, the options contract cells appear as NA, not applicable.

A summary statistics for the trading volume (VOL), and the explanatory variables; size of the underlying market (SIZE), cash market volatility (CMVOL), and market liquidity (MLIQ) are presented in Table 5.

Table 4: Summary Statistics

Variable	Obs	Mean	Std. Dev
VOL	167	105,830,792	469,421,233
SIZE	167	463,142	417,881
CMVOL	165	28%	21%
MLIQ	167	133%	71%

The table shows the summary statistics including the number of observations (Obs), the mean, as well as the standard deviation. VOL refers to annual trading volume of contracts, SIZE refers to the size of the underlying market measured by market capitalization while MLIQ refers to the market liquidity of the cash market and is measured by the turnover velocity. From the table, we note that CMVOL has less number of observations (165) compared to other variables due to some missing values.

To check how the dependent variable (VOL) is correlated with explanatory variables (SIZE, CMVOL, MLIQ, DFIRST and DFUT) as well as multicollinearity amongst the independent variables, a correlation was run and presented in correlation matrix as shown in Table 6.

Most of the variables are significant at 5% significant levels. Similar to our expectations, the trading volume (proxy for success) is positively correlated with the size of the underlying market (SIZE), the cash market price volatility (CMVOL) as well as the market liquidity (MLIQ). In addition, VOL is also positively correlated to the dummy variable (DFIRST) in case it is the first contract to be introduced but negatively correlated to the dummy variable (DFUT) if it is a futures contract as opposed to options contracts.

Table 5: Pearson Correlation between Variables

	SIZE	CMVOL	MLIQ	DFIRST	DFUT
VOL	0.1169*	0.0854	0.4010**	0.2256**	-0.1130*
SIZE		-0.1568**	0.2029**	-0.3938**	0.0537
CMVOL			0.0778	-0.0000	0.0870
MLIQ				-0.1279**	0.0217
DFIRST					0.4204**

The table shows the correlation between the dependent variable (VOL) with the independent variables as well as among the independent variables. The trading volume (VOL) is positively correlated to the SIZE, CMVOL, MLIQ and DFIRST but negatively correlated with DFUT. VOL refers to the annual trading volume of contracts, SIZE refers to the size of the underlying market measured by market capitalization while MLIQ refers to liquidity of the cash market and measured by the turnover velocity. DFIRST is a dummy variable taking the value of 1 if the contract was the first one to be introduced in the exchange, otherwise a 0. DFUT is also a dummy variable taking value of 1 if it is a futures contract and 0 if it is an option. DNON-CRISIS is a period dummy taking the value of 1 for non-crisis years and 0 for crisis years. DHIE is a market dummy taking the value of 1 for high/upper income economies, otherwise 0.The period dummy (DNON-CRISIS) and the market dummies (DHIE) are not reported. * = correlations significant at 10% level, and ** = correlations significant at 5% level.

As indicated in the correlation matrix, market liquidity has the strongest correlation with volume followed by the size and cash market volatility. Amongst the explanatory variables, there is no case of multicollinearity and hence we can rely on the variables to empirically estimate success model.

3. Empirical Results

This section reports two-way fixed effect regression results of trading volume and explanatory variables of contracts' success. Regression coefficients are reported in Table 7.

As expected and similar with previous empirical studies, the cash market price volatility has a positive effect on the success of a

contract. The higher the price variability, the higher the chances of contract success. Our findings are similar to Black (1986), Cornell (1981), Fratscher (2006) and Tashjian and Weissman (1995), who found trading volume to be highly sensitive to cash market price volatility. This is however contrary to Corkish et. al. (1997) findings that the cash market volatility weakly supports success. The findings confirm our hypothesis that cash market price variability is positively related with the trading volume and contract's success. Hence, contracts should be written on products with "high" price volatility.

Similarly, the size of the underlying market has a positive effect on the success of a contract. The larger the underlying market, the higher the chances of the contracts succeeding. Similar to the empirical results of Corkish, et. al. (1997), Black (1986), and Tashjian and Weissman (1995), spot market capitalization has a positive and significant effect on trading volume. Our results thus strongly support the hypothesis that the size of the underlying market is positively related to the trading volume. Our findings also show that successful contracts benefit from a large cash market.

The liquidity of the cash market also has a positive effect on trading volume and hence on a contract's success. Both theoretical and empirical studies suggest that liquidity is an important requisite of success and are positively related. Carlton (1984) found liquidity as positively correlated to trading volume. Cuny (1993) shows that the optimal futures contract attracts a sufficiently large set of non-hedgers when the market is liquid. Chordia et. al. (2000) similarly finds that market liquidity increases trading activity and thus volume. Our findings thus support the hypothesis that market liquidity positively affects trading volume and that contracts established on liquid cash markets have higher chances of being successful.

Table 6: Empirical Results

VOL	Coeff	t-stat
SIZE	1.7677	3.87***
	(.457)	
CMVOL	1.8359	2.00**
	(.917)	
MLIQ	1.2657	4.66***
	(.271)	
DFIRST	2.6681	8.34***
	(.320)	
DFUT	-1.8953	-5.32***
	(.356)	
DNON-CRISIS	0.4790	1.29
	(0.370)	
DHIE	0.1533	0.42
	(0.368)	
Constant	-6.5143	-2.55**
	(2.554)	
R Squared	0.3852	
Obs.	165	
F -test	14.05	

Note: The table reports the results for the regression:

$$VOLit = \beta 0 + \beta 1SIZEit + \beta 2CMVOLit + \beta 3MLQit + \beta 4DFIRSTit + \beta 5DFUTit + \beta 6Period\ Dummiesit + \beta 7Market\ Dummiesit + eit$$

The dependent variable VOL (used as the proxy for success) is the annual trading volume for each contract i at time t. The main explanatory variables include: SIZE which is the size of the underlying market measured by market capitalization. CMVOL is the cash market price volatility and is obtained by the annualized standard deviation of logarithmic return of daily closing prices; ln(ct/ct-1) where Ct is the closing price on day t (Bacha and Villa, 1993). MLIQ refers to liquidity of the cash market and is measured by turnover velocity. The following dummy variables are introduced in the model. DFIRST is a dummy variable taking the value of 1 if the contract was the first one to be introduced in the exchange, otherwise a 0. DFUT is also a dummy variable taking the value of 1 of it is a futures contract and 0 if it is an option. DNON-CRISIS is a period dummy taking the value of 1 for non-crisis years and 0 for crisis years. DHIE is a market dummy taking the value of 1 for high/upper income economies, otherwise 0. The model was estimated by a two-way fixed effect model incorporating both the time effect (year dummies) and group effect (market dummies). Robust t-statistics shows standard errors (presented in parenthesis) and are adjusted for heteroscedasticity (White 1980). Values significantly different from zero at 10%, 5% and 1% significant levels presented by *, ** and *** respectively.

As for dummy variables, the results partially confirm our hypothesis. DFIRST which took a value of 1 if it's the first contract and 0 otherwise, has a positive coefficient. This shows that the first contract introduced in a new exchange has higher likelihood of being successful compared to contracts introduced subsequently. DFUT has a negative coefficient similar to our expectations. This therefore means that futures contracts has less chances of being successful compared to option contracts. The period dummy, DNON-CRISIS which took a value of 1 for non- crisis years and 0 for crisis period, has a positive coefficient as expected but it is statistically insignificant. Similarly, the market dummy also has a positive coefficient as hypothesized but is also statistically insignificant.

In conclusion therefore, our model works well in explaining contracts success using trading volume as the success proxy. Empirical results support hypothesis that the size of the underlying cash market (SIZE), the cash market price volatility (CMVOL), and market liquidity (MLIQ) are all positively related with the trading volume. Also, the dummy variables DFIRST and DNON-CRISIS are positively related with the trading volume. Our main explanatory variables can thus be relied on as some of the factors influencing trading volume and hence determinants of contracts success.

V. Conclusion

This paper looks into the indicators or determinants of derivatives products success which were analyzed through the development of a contract's success determining model. An empirical analysis was carried out and variables that influence contracts trading volume which in turn

determine contracts' success were identified. From our findings, the explanatory variables, the size of the underlying market, the cash market variability as well as the market liquidity can be relied on to determine the likelihood of a contract being successful once introduced. In conclusion therefore, we have shown there is a strong quantitative way of determining the likelihood of a contract's success which in turn enhances derivatives products and by extension, derivatives exchange success.

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