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CAN FIRM-SPECIFIC VARIABLES PREDICT UNIQUE RISK IN THE IPO MARKET?

Key Words

Initial public offering (IPO); stock return volatility; unique risk; firm-specific variables; GARCH (1, 1) Model; Egypt

Abstract

This paper examines the relationship between pre-IPO firm variables and after-market residual risk of the market-model in Egyptian IPOs issued over the 1994-2009 period. It emphasizes the use of conditional (GARCH (1,1)) variance as the suitable measure of unique risk over one, three, and five years after listing. The paper finds that firm size, institutional ownership, insider ownership, and assets growth rate variables are the main determinants of IPO shares' unique risk.

Introduction

Initial public offerings (IPOs) are one of the most significant events in a firm's history. If managers fail to adapt their firms to the new environment, a firm's survival will be doubtful (Jain and Kini, 2000). The initial and long-run returns of IPOs are studied well by many authors. Jenkinson and Ljungqvist (2001) provide a detailed review of IPO studies regarding both short- and long-run returns. However, the studies related to the risks of IPOs are less abundant.

Although some studies are conducted on Egyptian IPOs, most of them examine the returns of IPOs and ignore IPO risks. Many studies (e.g., Moustafa, 2014; Al-Shiab, 2013; Cressy and Farag, 2011; Omran, 2005; Hegazy, 2001) are interested in measuring and explaining the initial and/or the long-run returns of Egyptian IPOs. Others (e.g., Kamel and Elbanna, 2012) study earnings management in the Egyptian IPO market. Some of the previously mentioned studies (e.g., Moustafa, 2014; Omran, 2005; Hega-

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zy, 2001) consider IPO risks indirectly by adjusting performance by risk.

The risk of IPO shares could directly be studied in terms of either delisting risk from a stock exchange or return volatility (Peristiani, 2003). Several studies focus on the determinants of delisting risk (e.g., Lamberto and Rath, 2010; Goot *et al.*, 2009; Jain and Kini, 2008; Peristiani, 2003; Jain and Kini, 2000, 1999). Algebaly (2011) examines the determinants of delisting risk in the Egyptian IPO equity market. Therefore, the present paper focuses on the IPO risk of stock return volatility. Total volatility or total risk is segmented into market risk and unique risk (Sharpe, 1963).

The capital asset pricing model (CAPM) developed by Sharpe (1964), Lintner (1965), and Black (1972) claims that market risk, measured by beta coefficient, is the only determinant of expected stock returns, and unique risk should be neglected because it could be eliminated by diversification. On the other hand, Levy (1978) and Merton (1987) argue that unique risk, as well as market risk, should be priced in the expected stock returns when investors fail to hold a well-diversified portfolio. They also expect a positive relationship between unique risk and expected stock returns.

Since most investors do not hold a well-diversified portfolio due to wealth constraints or transaction costs, it is important to treat unique risk as a potential predictor of expected stock returns (Liow and Addae-Dapaah, 2010; Bali *et al.*, 2008). The positive relationship between unique risk and expected stock returns is confirmed empirically by many studies such as Jiang and Lee (2006), Boehme *et al.* (2009), Fu (2009), and Liow and Addae-Dapaah (2010).

Several authors (e.g., Liow and Addae-Dapaah, 2010; Beneda and Zhang, 2009; Johnson and Marietta-Westberg, 2004; Campbell *et al.*, 2001) report high percentage of unique risk to total risk, especially in newly listed firms. That is, stock prices incorporate more unique risk information. Since unique risk results from factors that are unique to the firm, it is hypothesized that unique risk could be predicted by firm-specific variables. However, there is rarity in the studies that relate firm-specific variables to unique risk, particularly in the IPO market. Therefore, this study aims to explore the determinants of unique risk in the Egyptian IPO equity market. The most suitable measure of unique risk is used as discussed subsequently.

The findings of this study show that firm size, institutional ownership,

insider ownership, and assets growth rate variables are the main determinants of unique risk. This study contributes to the extant literature on the determinants of IPO shares' unique risk. To the best of my knowledge, this is the first study that examines the relationship between firm-specific variables and unique risk in IPO shares. Several potential determinants of unique risk are examined such as financial leverage, assets growth rate, and cash coverage ratio which are theoretically well hypothesized in the relationship with unique risk.

The following sections include hypotheses development, data and variable description, model specification, empirical results, and a conclusion.

Hypotheses Development

Firm's age, firm size, institutional ownership, and insider ownership variables are the firm characteristics variables used as explanatory variables of IPO shares' unique risk in this study. Young firms are associated with greater risk because they often belong to high growth industries and their stocks are more speculative than old ones (Xu and Malkiel, 2003). The empirical studies of Gaspar and Massa (2006) support the negative relationship between firm age and unique risk. Peristiani (2003) also supports the negative relationship between firm age and relative stock return volatility in the US IPO market. Therefore, it is hypothesized as follows:

Hypothesis 1: There is a significant negative relationship between firm age and unique risk.

Examining the relationship between firm size and unique risk is important for the prospective IPO share investors; this relationship will help them in making the suitable investment decisions. Large firms are more diversified in terms of individual assets and operations compared with small firms (Abdelghany, 2005). Thus, the IPO shares of large firms are expected to have lower unique risk than those of small ones. Kaur (2004) attributes the higher volatility of small capitalized stocks to their infrequent trading. He also argues that these small firms are more exposed to merger or acquisition, which is usually preceded by a very high volatility in stock returns. Support for the negative relationship between firm size and unique risk is introduced by Pastor and Veronesi (2003), Xu and Malkiel (2003), and Chang and Dong (2006), among others. Therefore, the second hypothesis is developed as follows:

Hypothesis 2: There is a significant negative relationship between firm size and unique risk.

Firms with high institutional ownership may have higher stock return

volatility because institutional investors in these firms are expected to form a relatively homogeneous group that reacts similarly to the same events. In addition, Sias (1996), Xu and Malkiel (2003), Chang and Dong (2006), and Gaspar and Massa (2006) report a significant positive association between the percentage of institutional ownership and unique risk. Therefore, a positive relationship is expected between the proportion of institutional ownership and IPO shares' unique risk. Therefore, the third hypothesis is developed as follows:

Hypothesis 3: There is a significant positive relationship between the proportion of institutional ownership and unique risk.

Insider owners are generally better informed than outsider ones. Consequently, they are expected to build their trading decisions in their firms based on information and ignore noise trading. Thus, firms with high insider ownership retention after going public may have less unique risk. However, the information available to insiders in these firms may trigger them to react similarly to firm's events, which may increase unique risk. In other words, the relationship between insider ownership retention and unique risk is ambiguous. Therefore, the fourth hypothesis is developed as follows:

Hypothesis 4: There is either a positive or negative relationship between insider ownership retention and unique risk.

Five firm performance variables are next examined in this study, namely financial leverage, liquidity, assets growth rate, coverage ratio, and profitability. The increase in debts results in high default risk and high sensitivity to market fluctuations (Beaver *et al.*, 1970). That is, high volatility in stock returns is expected to associate positively with financial leverage. Black (1976) and Christie (1982), among others, support the positive association between total risk and financial leverage empirically. In addition, the empirical evidence of Beaver *et al.* (1970), and Hong and Sarkar (2007), among others, confirm the positive relationship between financial leverage and market risk. Therefore, the fifth hypothesis is developed as follows:

Hypothesis 5: There is a significant positive relationship between financial leverage and unique risk.

Beaver *et al.* (1970) and Abdelghany (2005) argue that liquid assets have less volatile returns than non-liquid ones. This is because liquid firms have safer assets and thus less asset variability, which produces less risk. Castagna and Matolcsy (1978), among others, confirm the negative

relationship between liquidity, measured by current ratio, and market risk. Therefore, the sixth hypothesis is developed as follows:

Hypothesis 6: There is a significant negative relationship between IPO firm's liquidity and unique risk of IPO shares.

Xu and Malkiel (2003), and Chok and Sun (2007) claim that growth prospects are positively related to unique risk. In addition, Beaver *et al.* (1970), and Abdelghany (2005) argue that firms with lower payout ratios are expected to have higher growth rates. These firms are also associated with higher risk because they are not certain about their future. Thus, the next hypothesis is developed as follows:

Hypothesis 7: There is a significant positive relationship between assets growth rate and unique risk.

Coverage ratios are measures of financial risk. These ratios measure the ability of a firm's earnings or cash flows to cover its fixed obligations (Reilly and Brown, 2006). Consequently, the coverage ratios are expected to be inversely related to stock return volatility. Castagna and Matolcsy (1978) find that market risk decreases significantly with the increase in interest coverage ratio. Cash coverage ratio is the measure of coverage used in this study. Therefore, the eighth hypothesis is developed as follows:

Hypothesis 8: There is a significant negative relationship between cash coverage ratio and unique risk.

The relationship between unique risk and profitability is expected to be positive due to the trade-off association between risk and return in a firm's operation. This relationship is supported empirically by Chang and Dong (2006) in the Japanese context. Thus, the ninth hypothesis is developed as follows:

Hypothesis 9: There is a significant positive relationship between profitability and unique risk.

Data Description and Variable Measurement

Egyptian market and data description

This study examines the determinants of unique risk related to the Egyptian IPOs issued over the period of 1994-2009. The Egyptian IPO market is expected to show a high percentage of unique risk to total risk. In addition, there are no studies on Egypt, as far as I know, on this topic. Moreover, the Egyptian stock market is an attractive market to study because it is one of the most open and advanced financial markets in the

Middle East and North Africa (MENA) region, with the features of no taxes imposed on dividends or capital gains, no restrictions on foreign investments, no restrictions on the repatriation of capital gains and dividends, active foreign involvement, significant retail and institutional participation, low listing and trading fees, high dividend yield and P/E ratio, local presence of international investment banks, and well-diversified sectors and firms. Consequently, Egypt is included in many international market indices such as International Finance Corporation (IFC) and Morgan Stanley Indices (Algebaly, 2011; Azab, 2002).

Unique risk is calculated in this study for one, three and five years from the listing date as commonly used in the long-run IPO literature. Therefore, these three sample periods are used in this study to examine unique risk determinants. The year of 1994 as a starting year is chosen because data related to the Egyptian Public Index is only available from that year. Meanwhile, data related to IPO share prices and the Egyptian Public Index are available to the author till the end of year 2010. Thus, the analysis only includes IPOs issued till the end of the previous year (i.e., year 2009) to calculate unique risk for at least one observation year.

IPO prospectuses are the main source of firm characteristic and performance data used in this study. They are obtained from the Capital Market Authority (CMA), and Egyptian

Table 1

Distribution of IPOs Related to One-Year Analysis by Industry

This table shows the distribution of IPOs by industry based on 104 Egyptian IPOs issued from 1994 to 2009. The "others" group includes the following industries: travel & leisure, technology, oil & gas, basic resources, retail, utilities, media, and telecommunications.

	Industry Type	Number of IPO Firms
1	Construction & Materials	21
2	Chemicals	7
3	Personal & Household Products	8
4	Industrial Goods, Services & Automobiles	8
5	Real Estate	12
6	Food & Beverages	24
8	Healthcare & Pharmaceuticals	8
9	Others	16
Sum		**104**

newspapers. Stock prices and the Egyptian Public Index are basically obtained from DataStream. Sample sizes used in the one-, three- and five-year analyses are 104, 100 and 90 IPO firms, respectively, after excluding IPOs of financial institutions. Thus, our sample includes all non-financial IPO firms sufficiently covered by DataStream, given the availability of their IPO prospectuses. The distribution of 104 IPO firms by industry in the first sample is shown in Table 1.

The largest sector of IPO firms in this study is the food & beverages industry as shown in Table 1 (24 firms). The "others" group includes 16 IPO firms; these firms are categorized by industry type as follows: Travel & leisure (3 firms), basic resources (3 firms), retail (3 firms), telecommunications (2 firms), utilities (2 firms), technology (1 firm), oil & gas (1 firm), and media (1 firm).

Sias (1996), among others, use weekly returns to compute volatility. He claims that using weekly returns has the advantage of increasing return observations and decreasing volatility bias at the same time. Therefore, weekly data are used in this study to calculate unique risk.

Measurement of variables

Unique risk is calculated in this study by two methods. The first one is the unconditional variance of residuals from the market model estimated through OLS regression. The second method calculates unique risk measured as the average of conditional variance estimated by the GARCH (1, 1) model. However, the determinants of unique risk are identified based only on GARCH (1, 1) model because it is a suitable method to calculate unique risk in the Egyptian IPO market as discussed later.

Many researchers (e.g., Chang and Dong, 2006; Xu and Malkiel, 2003; Sias, 1996) measure unique risk by the natural log of the unconditional variance of the residuals ($\varepsilon_{i,t}$) estimated by the market model as shown in equation (1). However, this method of measuring unique risk assumes that volatility is constant over time. So, it is recommended only if volatility is constant over time.

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \qquad (1)$$

where $R_{i,t}$ is the return of stock i during week t, $R_{m,t}$ is the market return during week t measured by the return of the Egyptian Public Index, β_i is beta coefficient of stock i which equals the slope of the linear relationship between $R_{i,t}$ and $R_{m,t}$, α_i is the intercept and ε_i is the error term in the equation.

Stock and market returns are calculated as follows:

$$R_i, t = (P_{i,t} - P_{i,t-1})/P_{i,t-1} \quad (2)$$

where $R_{i,t}$ is the return of stock i during week t, $P_{i,t}$ is the total return index of stock i at the end of week t, and $P_{i,t-1}$ is the total return index of stock i at the end of week t-1.

$$R_{m,t} = (I_t - I_{t-1})/I_{t-1} \qquad (3)$$

where $R_{m,t}$ is the return on the Egyptian Public Index during week t, I_t is the value of the index at the end of week t, and I_{t-1} is the value of the index at the end of week t-1.

Autoregressive conditional heteroskedasticity models, known as ARCH, suggest that the conditional variance of the error term is not constant over time. Nevertheless, there are some limitations in using ARCH models that are cured by generalized ARCH model known as GARCH. To illustrate, GARCH (1, 1) model is equivalent to an infinite order ARCH model. It is also the most frequently used model for depicting the change in volatility, and higher order GARCH models are rarely used in the field of finance (Brooks, 2008; Asteriou and Hall, 2007; Chok and Sun, 2007). GARCH (1, 1) model is used by Turtle *et al.* (1994), among others, in the field of finance.

$$h_{it} = \gamma_{o,i} + \gamma_{1,i}\varepsilon^2_{i,t-1} + \delta_{1,i}h_{i,t-1} \quad (4)$$

where h_{it} is the conditional variance of firm i at time t, $\varepsilon^2_{i,t-1}$ *is the lagged squared residuals of firm* i by one period, $h_{i,t-1}$ is the lagged conditional variance of firm i for one period, $\gamma_{o,i}$ is the constant of volatility model of firm i, and $\gamma_{l,i}$, i and $\delta_{l,i}$ are the parameters of the lagged squared residuals and the lagged conditional variance of firm i, respectively.

Although ARCH and GARCH models are mainly used to deal with time series data, they can also be used in cross-sectional studies. Chok and Sun (2007) employ GARCH (1, 1) model to measure unique risk in order to identify its managerial determinants for Biotech IPO firms. They use the average of the conditional variance resulting from running GARCH (1, 1) model at time t for each firm to measure unique risk. This measure is employed in this study but in the natural logarithmic form; as shown in equation 5. Taking the natural log reduces the influence of heteroskedasticity in the results (Chang and Dong, 2006). In addition, several authors use it in measuring unique risk (e.g., Chang and Dong, 2006; Xu and Malkiel, 2003; Sias, 1996).

$$\textit{Unique risk} = Ln(\textit{Conditional variance average})_i$$
$$= Ln(\textstyle\sum h_{it}/n) \qquad (5)$$

where n is the number of observations of firm i, and h_{it} is as defined in equation 4.

Table 2 shows the measurement of independent variables used in this

Table 2

Summary of measurement of variables used and their expected relationship with unique risk

Variable	Measurement	Expected relationship
A. Firm Characteristics Variables		
Firm's age *(FIRMAGE)*	Number of months from incorporation to the offering date	Negative
Firm size *(FIRMSZ)*	Ln (Real market capitalization) = Ln (Market capitalization /consumer price index (CPI)) where market capitalization = Number of shares listed x closing price on the first trading day	Negative
Institutional owner ship *(INSTITUTE)*	Post-IPO percentage of shares held by institutions to the total number of common shares outstanding	Positive or Negative
Insider ownership *(ALPHA)*	Alpha = Post-IPO percentage of shares retained by managers and original entrepreneurs to the total number of shares outstanding after offering	Positive or Negative
B. Firm Performance Variables		
Financial leverage *(LEVERAGE)*	Total debts ratio = (total liabilities / total assets) (The median over three-year period before going public)	Positive
Liquidity *(CURRENT)*	Current ratio = (current assets / current liabilities) (The median over three-year period before going public)	Negative
Asset growth rate *(GROWTH)*	The arithmetic annual growth of firm's assets (The average over three-year period before going public)	Positive
Cash coverage *(COVERAGE)*	Cash coverage ratio = (EBIT + depreciation) / interest payments (The median over three-year period before going public)	Negative
Profitability *(ROE)*	Return on equity (ROE) = Net income to shareholders' equity (The median over three-year period before going public)	Positive
Industry Type (D_i)	Seven dummy variables with a value of "1" if the firm belongs to the industry and "0" otherwise.	Positive or Negative

study. The first group of variables focuses on four firm characteristics, including firm age, firm size, institutional ownership, and insider ownership. Many studies (e.g., Yang and Sheu, 2006; Peristiani, 2003) define firm age as the period from incorporation to the IPO date. Thus, this measure is adopted in this study.

Nominal market capitalization, defined as the number of shares outstanding multiplied by closing price on the first trading day, is used as a

proxy for firm size (Gaspar and Massa, 2006; Kaur, 2004; Xu and Malkiel, 2003; Aggarwal and Rao, 1990). Kaur (2004) argues that market capitalization is preferred to other measures of firm size such as total sales and total assets because it values all firms, whether old or new, using current market prices. This provides a uniform basis to compare firms. Ahmad-Zaluki *et al.* (2007), among others, use real market capitalization at the time of listing, defined as the nominal market capitalization adjusted for inflation risk using the Consumer Price Index (CPI). However, it is common to use firm size variable in the natural logarithmic form (Yung *et al.*, 2008; Goot *et al.*, 2009). Therefore, the natural log of the real market capitalization is employed in this study to measure the firm size variable.

Institutional ownership concentration is measured by many authors (e.g., Gaspar and Massa, 2006; Xu and Malkiel, 2003; Sias, 1996) as the number of shares owned by institutional owners divided by the number of shares outstanding. Therefore, this measure is employed in this study. In addition, the percentage of ownership in post-IPO firm retained by original entrepreneurs and managers is known as Alpha. Alpha is the measure of insider ownership used in the present study. It is used as a measure of insider ownership by several researchers (e.g., Goot *et al.*, 2009; Jain and Kini, 2008, 2000, 1999).

The second group of independent variables includes five firm performance variables: financial leverage, liquidity, assets growth rate, coverage ratio, and profitability. According to Article 5 of the Egyptian Capital Market Law No 95/1992, all IPO firms are mandated to disclose their financial statements in the prospectus for the last three years, or from the date of firm's incorporation, whichever is less. Therefore, the median of each individual variable in the firm performance group is calculated over three-year time period before the offering date or over the period from firm's incorporation to the offering date, whichever is less.

For example, the value of financial leverage is calculated for each firm in each year of the three years before going public. If the firm's incorporation is less than three years (two years for instance), the financial leverage values are calculated for each firm in each year over the period from firm's incorporation to the offering date (two years in this example). Afterwards, one value for each firm is used to calculate financial leverage; it is the median of the calculated financial leverage values before going public. Median is preferred to mean because it is not affected by outliers.

Several Authors (e.g., Yung *et al.*, 2008; Bushee and Noe, 2000) use total debts to total assets to measure financial leverage. Therefore, the same total debt ratio is employed in this study to measure financial leverage. In addition, currents ratio is used by many authors (e.g., Abdullah *et al.*, 2008; Abdelghany, 2005; Farrelly *et al.*, 1985; Beaver *et al.*, 1970) to measure liquidity. Thus, liquidity is measured by current ratio in the present study. In order to capture the effect of changing operating leverage, assets growth rate is used (Chen, 1982). It is measured in this study by the arithmetic average (the mean) of the assets growth rate for three years before the offering date (Cooper *et al.*, 2008). Based on the data of the three years before the offering date, we have two growth periods; the first is from the 3rd year before going two the 2nd year, and the second is from the 2nd year to the 1st year before the offering date. Therefore, the values of the median and the mean (i.e., the arithmetic average) are the same in this case.

Interest coverage ratio indicates the extent to which interests are covered by earnings. It equals earnings before interest and taxes (EBIT) divided by interest payments. Nevertheless, it is not preferred to treat depreciation as a cash expense because it is not necessarily a cash expense in the year it is recorded in. Since cash flow from operations excludes depreciation from expenses, it is preferred to use it instead of earnings (Reilly and Brown, 2006; Brealey *et al.*, 2001). Therefore, cash coverage ratio is the measure of coverage employed in the present study. It equals EBIT plus depreciation divided by interest payments.

Return on equity (ROE) is a comprehensive measure of the profitability of both investment and finance decisions (Quiry *et al.*, 2005). Therefore, ROE is preferred to ROA, which only measures the profitability of the investment decision. It is also used to measure profitability in several other related studies (e.g., Pastor and Veronesi, 2003; Bushee and Noe, 2000). Therefore, it is chosen to measure profitability in this study.

Finally, industry type is employed in this study as a control variable; this variable has eight categories, namely construction & materials, chemicals, personal & household products, industrial goods, services & automobiles, real estate, food & beverages, healthcare & pharmaceuticals, and the "others" category, as illustrated in Table 1. Therefore, industry type variable is measured by seven dummy variables with a value of "1" if the firm belongs to the industry and "0" otherwise. This method of measuring industry type is used by several authors

in the IPO field such as Yang and Sheu (2006), and Ritter (1991). Construction & materials industry is used as the base or reference category.

Model specification

The multiple linear regression model employed in this study to identify the determinants of unique risk is illustrated in the following equation:

$$\begin{aligned} UNIQRISK_i &= b_0 + b_1 FIRMAGE_i \\ &+ b_2 FIRMSZ_i + b_3 INSTITUT_i \\ &+ b_4 ALPHA_i + b_5 LEVERAGE_i \\ &+ b_6 CURRENT_i + b_7 GROWTH_i \\ &+ b_8 COVERAGE_i + b_9 ROE_i \\ &+ b_{10} D_i + \varepsilon_i \end{aligned} \quad (6)$$

where;

$UNIQRISK_i$ = unique risk of firm i measured in the natural logarithmic form for one, three and five years after the listing date;

$FIRMAGE_i$ = the age of firm "i" at the offering date in months, measured as the difference between the IPO date and the founding date;

$FIRMSZ_i$ = size of firm "i" measured by the natural log of market capitalization divided by the monthly CPI at the time of listing;

$INSTITUT_i$ = the post-IPO percentage of institutional ownership of firm "i";

$ALPHA_i$ = the post-IPO percentage of insider ownership of firm "i";

$LEVERAGE_i$ = financial leverage of firm "i" measured by total debts ratio before the offering date;

$CURRENT_i$ = current ratio of firm "i" before the offering date measured as current assets to current liabilities;

$GROWTH_i$ = growth rate of total assets of firm "i" before the offering date;

$COVERAGE_i$ = cash coverage ratio of firm "i" before the offering date defined as the sum of EBIT and depreciation divided by interest expense ;

ROE_i = return on equity of firm "i" before the offering date measured as net income divided by shareholders' equity;

D_i = Dummy variable of industry "i" with a value of "1" of the firm belongs to the industry, and "0" otherwise.

ε_i = error term of firm "i".

After measuring variables, multiple linear regression analysis is used to identify the determinants of unique risk.

Empirical Results

Descriptive Statistics

Tables 3 and 4 present descriptive statistics and Pearson correlation ma-

trix, respectively, related to Sample 1; which includes 104 IPO firms and relies on one-year after listing to calculate unique risk. The statistics and correlation matrices related to Samples 2 and 3 used in the three- and five-year analyses are very similar to that based on Sample 1. Thus, they are not presented for the sake of brevity. Table 3 shows the mean, median, standard deviation, minimum, maximum and skewness of variables used in this study.

Several notes are extracted from Table 3. First, there is a big difference between the mean and median values in each variable of *total risk, unique risk,* and *firm size* (measured by the real market capitalization). The skewness values are also high in these variables. This confirms the importance of taking the log of these variables to reduce their skewness; as proposed earlier. Second, the percentage of unique risk's average to total risk's average is quite high; which

Table 3

Descriptive Statistics Related to One-Year Analysis

This table presents descriptive statistics related to variables used in this study based on 104 Egyptian IPOs issued from 1994 to 2009. Total risk is measured by the variance of stock returns. Unique risk is measured by both the average of the unconditional variance resulting from estimating market equation by OLS, and the average of the conditional variance obtained from GARCH (1, 1) Model. The remaining variables are measured as illustrated in Table 1.

Variable (N = 104 IPO firms)	Mean	Median	Std. Dev.	Min.	Max.	Skewness
Total risk	285	47	1407	3	11173	6.900
Unique risk (based on OLS method)	256	42	1247	3	8938	6.683
Unique risk (based on GARCH (1, 1) Model)	213	38	1588	5	1208	6.680
Firm's age (in months)	357	358	280	3	1193	1.017
Real market capitalization (in million Egyptian pounds)	22.165	3.872	5.711	0.068	450.397	5.271
Institutional ownership (in %)	62	67	23	0	97	-1.035
Alpha (in %)	60	68	25	5	97	-0.592
Total debts ratio (in %)	65	68	20	8	97	-0.743
Current ratio (times)	1.39	1.17	1.09	0.34	9.00	4.796
Assets growth rate (in %)	18	8	33	-38	190	2.736
Cash coverage ratio (times)	126	21	552	0.2	4357	6.701
ROE (in %)	29	26	19	-4	122	1.436

means that stock prices incorporate more unique risk information. It approximately equals 90% based on OLS method, and 75% based on GARCH (1,1) Model.

It is evident from Table 4 that the highest correlation coefficient is between *current ratio* and *cash coverage ratio* variables (0.757). Due to the high correlation between these two variables, it is preferred to model them separately. In other words, three samples are analyzed in this study; each sample has two models. Therefore, there are six regression models used in this study as illustrated in Table 5.

The Breusch-Pagan ARCH test is used to test for the presence of ARCH effects of the weekly returns of the Egyptian Public Index from 10/1/1994 to 28/12/2009. After regressing the weekly returns of the Egyptian Public Index on their lagged values for one week, the test statistic of the Breusch-Pagan ARCH test equals 136.1071 with 0.000 probability limit. Thus, there is evidence for the presence of ARCH effects in the weekly returns series of the Egyptian Public Index. Therefore, the volatility of returns of the Egyptian Public Index, which reflects return volatility of all IPO firms in the market, is not constant over time. So, it is preferred to use the conditional variance that varies over time to measure unique risk in Egyptian firms. This conditional variance can be obtained from GARCH (1, 1) Model (Brooks, 2008; Asteriou and Hall, 2007).

Table 4
Pearson Correlation Matrix based on One-Year Analysis

This table presents Pearson correlation matrix using a sample of 104 IPO firms. The variables of *FIRMAGE, FIRMSZ, INSTITUT, ALPHA, LEVERAGE, CURRENT, GROWTH, COVERAGE,* and *ROE* are as defined in Table 1.

	Firmage	Firmsz	Institut	Alpha	Leverage	Current	Grpwtj	Coverage	ROE
Firmage	1.0000								
Firmsz	-0.1383	1.0000							
Institut	0.0084	0.2142	1.0000						
Alpha	-0.1776	0.1694	0.0303	1.0000					
Leverage	0.2015	-0.2403	-0.3126	-0.1029	1.0000				
Current	-0.1249	0.1856	0.2019	0.0688	-0.5463	1.0000			
Growth	-0.2022	0.0991	-0.1188	0.0956	-0.0720	0.0176	1.0000		
Coverage	-0.0720	0.1822	0.0901	0.0323	-0.3821	**0.7571**	0.0492	1.0000	
ROE	0.3514	-0.0124	-0.1302	0.0425	0.3003	-0.1708	-0.1753	0.0166	1.0000

Results Related to Multiple Linear Regression Models

The dependent variable used in the multiple regression analysis is the unique risk calculated for one, three, and five years after listing. It is measured by the natural log of the average conditional variance of GARCH (1, 1) Model resulting from running the market model by the maximum likelihood estimation (MLE) method. Table 5 shows the results of the three analyses based on the period used to measure unique risk, namely one-, three-, and five-years. The sampling period ends on December 2009, December 2007, and December 2005 in the one-, three-, and five-year analyses, respectively. Each analysis includes two models. While the first model includes current ratio variable and excludes cash coverage ratio variable, the second model contains the cash coverage ratio and excludes current ratio variable due to the high correlation coefficient between these two variables (0.757). This leads to the six models illustrated in Table 5.

Table 5 also shows that all models employed are significant at the 1% significance level based on the results of F test. Breusch-Pagan test is used to check the presence of Heteroskedasticity; this test has the null hypothesis that heteroskedasticity is not present.

The Breusch-Pagan test statistics in all models shown in Table 5 are significant at the 1% significance level. It means that the null hypothesis of no heteroskedasticity is rejected, and heteroskedasticity is present in all models. Therefore, White's robust standard errors method is used in all models of this study.

The variables of firm size, institutional ownership, insider ownership, and assets growth rate are significant in at least one of the three analyses used in this study. That is, most firm characteristics variables, and assets growth rate variable (as a firm performance variable) employed in this study are significant determinants of unique risk. In addition, unique risk differs significantly across industries.

Firm size (*FIRMSZ*) variable has a significant negative association with unique risk based on the results of the three- and five-year analyses; as shown in Models 3, 4, 5, and 6. Therefore, the second hypothesis (i.e., *Hypotheses (2)*) is accepted. Additionally, both ownership structure variables used in this study, namely institutional ownership and insider ownership, associate significantly with unique risk. Thus, *Hypotheses (3)* and *(4)* are accepted.

More specifically, unique risk increases significantly in firms with a high percentage of institutional ownership (*INSTITUT*) based on the results of all

Table 5
Multiple Linear Regression Results Estimates based on One-, Three-, and Five-Year Analyses by Modelling Liquidity and Coverage Variables Separately

This table shows the results of unique risk determinants based on six multiple linear regression models. *UNIQRISK* is the unique risk calculated for one, three, and five years after listing, and measured by the natural log of the average conditional variance of GARCH (1, 1) Model resulting from running the market model by the maximum likelihood estimation method. Models 1 and 2 show the results of the one-year analysis, Models 3 and 4 present the results of the three-year analysis, and Models 5 and 6 show the results of the five-year. *FIRMAGE, FIRMSZ, INSTITUT*, *ALPHA, LEVERAGE, CURRENT, GROWTH, COVERAGE*, *ROE,* and D_i are as defined in Table 2. All analyses are based on White's robust standard errors method.

Variable	Model 1 Coefficient (P-value)	Model 2 Coefficient (P-value)	Model 3 Coefficient (P-value)	Model 4 Coefficient (P-value)	Model 5 Coefficient (P-value)	Model 6 Coefficient (P-value)
Constant	3.979 (0.036)**	3.913 (0.027)**	6.098 (0.002)***	6.515 (0.001)***	5.859 (0.001)***	6.359 (0.000)***
Firmage	0.000 (0.727)	0.000 (0.708)	0.000 (0.327)	0.000 (0.326)	-0.001 (0.193)	-0.001 (0.181)
Firmsz	-0.126 (0.127)	-0.128 (0.127)	**-0.272 (0.002)*****	**-0.274 (0.002)*****	**-0.169 (0.060)***	**-0.181 (0.044)****
Institut	**0.011 (0.070)***	**0.011 (0.067)***	**0.014 (0.003)*****	**0.014 (0.002)*****	**0.011(0.042)****	**0.012 (0.029)****
Alpha	**0.011 (0.019)****	**0.011 (0.019)****	0.001 (0.830)	0.001 (0.800)	**-0.007 (0.066)***	**-0.007 (0.084)***
Leverage	-0.002 (0.806)	-0.001 (0.873)	0.006 (0.499)	0.004 (0.651)	0.007 (0.380)	0.004 (0.549)
Current			0.237 (0.132)		0.155 (0.284)	
Growth	**0.006 (0.090)***	**0.006 (0.090)***	**0.009 (0.003)*****	0.009 (0.003)***	0.005 (0.150)	0.005 (0.162)
Coverage		0.000 (0.546)		0.000 (0.101)		0.000 (0.391)
ROE	0.011 (0.178)	0.011 (0.208)	0.008 (0.191)	0.006 (0.323)	0.009 (0.295)	0.008 (0.363)
Industry Type:						
Chemicals (D_1)	0.436 (0.429)	0.467 (0.392)	-0.211 (0.651)	-0.122 (0.796)	-0.527 (0.260)	-0.506 (0.283)

Cont. Table 5

Variable	Model 1 Coefficient (P-value)	Model 2 Coefficient (P-value)	Model 3 Coefficient (P-value)	Model 4 Coefficient (P-value)	Model 5 Coefficient (P-value)	Model 6 Coefficient (P-value)
Personal Products *(D2)*	**0.714 (0.019)****	**0.748 (0.015)****	0.281 (0.497)	0.347 (0.409)	-0.430 (0.253)	-0.406 (0.290)
Industrial Goods *(D3)*	0.760 (0.275)	0.797 (0.255)	**1.247 (0.065)***	**1.327 (0.056)***	**0.824 (0.097)***	**0.914 (0.092)***
Real Estate *(D4)*	0.391 (0.255)	0.409 (0.228)	0.204 (0.613)	0.329 (0.402)	-0.031 (0.949)	0.029 (0.954)
Food & Beverages *(D5)*	0.336 (0.418)	0.373 (0.358)	0.102 (0.783)	0.126 (0.732)	-0.414 (0.337)	-0.410 (0.343)
Healthcare *(D6)*	**-0.749 (0.033)****	**-0.712 (0.046)****	**-0.708 (0.098)***	-0.615 (0.159)	-0.620 (0.258)	-0.599 (0.284)
Others *(D7)*	0.227 (0.447)	0.267 (0.367)	**0.763 (0.100)***	0.822 (0.084)	0.277 (0.546)	0.298 (0.536)
Sample size	104	104	100	100	90	90
Maximum VIF value	1.968	1.880	1.953	1.890	2.304	1.922
R-Square	0.228	0.230	0.343	0.345	0.252	0.244
F statistic (P-value)	2.659 (0.002)***	2.667 (0.002)***	4.087 (0.000)***	3.766 (0.000)***	2.535 (0.004)***	2.408 (0.007)***
Breusch-Pagan test statistic (P-value)	54.800 (0.000)***	56.992 (0.000)***	34.505 (0.003)***	38. 778 (0.001)***	32.765 (0.005)***	31.290 (0.008)***

***, **, * indicate significant relationship at the 0.01, 0.05, and 0.10 level, respectively.

Table 6

Multiple Linear Regression Results Estimates based on One-, Three-, and Five-Year Analyses by Modelling Liquidity and Coverage Variables in the Same Models

This table shows the results of unique risk determinants based on three multiple linear regression models. *UNIQRISK* is the unique risk calculated for one, three, and five years after listing, and measured by the natural log of the average conditional variance of GARCH (1, 1) Model resulting from running the market model by the maximum likelihood estimation method. Models 1, 2 and 3 show the results of the one-, three- and five-year analyses, respectively, based on White's robust standard errors method.. *FIRMAGE, FIRMSZ, INSTITUT*, *ALPHA, LEVERAGE, CURRENT, GROWTH, COVERAGE*, *ROE,* and D_i are as defined in Table 2.

Variable	Model 1 Coefficient (P-value)	Model 2 Coefficient (P-value)	Model 3 Coefficient (P-value)
Constant	2.132 (0.036)**	3.172 (0.002)***	3.552 (0.000)***
Firamage	0.364 (0.717)	-0.962 (0.339)	-1.299 (0.198)
Firmsz	-1.545 (0.126)	**-3.212 (0.002)*****	**-1.917 (0.059)***
Institut	**1.853 (0.067)***	**3.147 (0.002)*****	**2.085 (0.041)****
Alpha	**2.387 (0.019)****	0.242 (0.810)	**-1.841 (0.070)***
Leverage	-0.242 (0.810)	0.673 (0.503)	0.870 (0.387)
Current	-0.286 (0.776)	0.835 (0.406)	0.849 (0.399)
Growth	**1.695 (0.094)***	**3.084 (0.003)****	1.419 (0.160)
Coverage	0.559 (0.577)	1.014 (0.314)	0.351 (0.727)
ROE	1.279 (0.204)	1.101 (0.274)	0.975 (0.333)
Industry Type:			
Chemicals (D_1)	0.870 (0.387)	-0.294 (0.770)	-1.057 (0.294)
Personal Products (D_2)	**2.493 (0.015)****	0.814 (0.418)	-1.056 (0.295)

Cont. Table 6

Variable	Model 1 Coefficient (P-value)	Model 2 Coefficient (P-value)	Model 3 Coefficient (P-value)
Industrial Goods *(D_3)*	1.143 (0.256)	**1.930 (0.057)***	**1.678 (0.098)***
Real Estate *(D_4)*	1.232 (0.221)	0.686 (0.495)	-0.024 (0.981)
Food & Beverages *(D_5)*	0.886 (0.378)	0.399 (0.691)	0.904 (0.369)
Healthcare *(D_6)*	**-2.003 (0.048)****	-1.452 (0.150)	-1.063 (0.291)
Others *(D_7)*	0.879 (0.382)	**1.763 (0.082)***	0.621 (0.536)
Sample size	104	100	90
Maximum VIF value	3.176	3.203	3.502
R-Square	0.23	0.35	0.25
F statistic (P-value)	2.572 (0.003)***	3.843 (0.000)***	2.384 (0.006)***
Breusch-Pagan test statistic (P-value)	58.13 (0.000)***	74.36 (0.002)***	33.81 (0.006)***

***, **, * indicate significant relationship at the 0.01, 0.05, and 0.10 level, respectively.

models, except Model 2. Furthermore, the one-year analysis shows a significant positive relationship between *ALPHA* variable and unique risk at the 5% level (Alpha coefficient is 0.011 in Models 1 and 2). However, the three-year analysis indicates that unique risk decreases significantly in Models 5 and 6 with the increase in *ALPHA* at the 10% level (p-value = 0.066 in Model 5, and 0.084 in Model 6, and Alpha coefficient equals -0.007 in each one of these two models). It means that insider investors react similarly to firm's events during the first year after listing. However, their reaction becomes less homogeneous with the passage of time.

Assets growth rate (*GROWTH*) is the only significant variable in the group of firm performance variables used in this study. This variable has a positive sign; which supports *Hypothesis (7)*. The remaining variables, namely firm age, leverage, liquidity, cash coverage ratio, and profitability associate insignificantly with unique risk. Therefore, their related hypotheses are not accepted based on the results of this study.

The results of industry type variable confirm the findings of several authors in the IPO field (e.g., Yang and Sheu, 2004; Hensler et al., 1997; Ritter, 1991) that performance differs significantly across industries. More specifically, the industries of personal & household products (in Models 1 and 2), industrial goods, services & automobiles (in the last four models), and "others" (in Model 3) have significantly higher unique risk than the construction & materials industry (the reference category). In addition, healthcare & pharmaceutical industry has significantly lower unique risk than the construction & materials industry.

Table 5 shows that all values of variance inflation factor (VIF) are less than 10. Thus, there is no evidence of multicollinearity in the models used in this study (Gujarati, 2003, p. 362). Therefore, the data of the three samples have been reanalyzed by modelling liquidity and coverage variables (i.e., the two variables with high coefficient of correlation "0.757") in the same models. The results of these analyses are illustrated in Table 6. By comparing the results obtained from tables 5 and 6, the same significant variables with the same signs are obtained. These results confirm the absence of multicollinearity problem in all models employed in this study.

Conclusion

Although CAPM developers argue that market risk is the only determinant of stock return, several authors find that unique risk associates positively with stock return when

investors fail to hold a well-diversified portfolio. Thus, studying unique risk and its determinants is as important as examining market and total risks. Since unique risk is attributed to factors specific to firm, this paper examines the effect of firm-specific factors on unique risk in the Egyptian IPOs issued from 1994 to 2009. Unique risk is measured by the natural log of the conditional variance obtained from GARCH (1, 1) Model based on the MLE method. This measure is more appropriate than the measure based on the OLS method because return volatility of the Egyptian Public Index, which includes all Egyptian publicly traded firms, is not constant over time.

The results of this paper show that firm size, institutional ownership, insider ownership, and assets growth rate variables are significant determinants of unique risk in the Egyptian IPO market. Although the institutional ownership variable is significant based on the three analyses employed, the results of the other variables differ according to the period used in measuring unique risk. More specifically, the firm size variable is only significant based on the three- and five-year analyses. In addition, the insider ownership variable is only significant in the one- and five-year analyses. Moreover, the assets growth rate is only significant in the one- and three-year analyses.

The phenomenon of getting different results for different time periods is also reported in both the IPO literature (e.g., Omran, 2005; Kooli and Suret, 2004; Bhabra and Pettway, 2003) and the unique risk literature (e.g., Xu and Malkiel, 2003; Sias, 1996). It sheds the light on the importance of period examined when identifying the determinants of unique risk. It also has some implications for the prospective investors in the Egyptian IPO market. Those investors should build their decisions based on their attitudes towards risk preference, and the expected period of holding the stock. For example, if an investor is a risk seeking and plans to hold the stock for one year after listing, he is advised to invest in firms with high percentages of institutional and insider ownership, and in firms with high rate of asset growth. This procedure will increase unique risk and the expected stock return accordingly. On the other hand, if an investor is a risk averse and also plans to hold the stock for one year, he is advised to invest in firms with low percentages of institutional and insider ownership, and in those with low asset growth rate to decrease unique risk.

This paper highlights the vital role played by firm-specific variables in

predicting unique risk in the Egyptian IPO equity market. The main contribution of this paper is represented by filling the gap related to examining the relationship between firm-specific variables and unique risk in the IPO market. This paper also contributes to practice by guiding prospective investors to the main determinants of unique risk, which may affect expected returns of their investments. Further research on unique risk determinants is suggested in the IPO market after employing other new firm-specific variables (such as foreign ownership and venture-capital (VC) backing), and offering variables (such as offering size, initial return and IPO activity). In addition, this research could be replicated on non-IPO firms to conduct a comparison with the results of the existing one.

There are possible biases in estimation caused by "sample selection" and "endogeneity problem" between the dependent variable and some independent variables. In other words, there is some possibility that hidden variable(s) determine(s) both riskiness of firm stock and firm variables considered in this paper. In addition, riskiness of firm's stock could also affect some independent variables in the model such as leverage or ROE. Therefore, another study is needed to deal with the possible endogeneity problem.

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