CHAPTER KP

IPO Valuation

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Abstract: Most initial public offerings (IPOs) are young and thus it is difficult to forecast their future cash flow. Moreover, most IPOs do not have any historical data and their value rely on their future growth. Consequently, valuing IPOs is difficult compared to valuing brick and mortar firms. Valuing IPOs is widely implemented by the use of financial information through regression analysis and through comparable firm multiples. Regression analysis incorporates firm and market information. The regression model can be used to predict value of IPOs. Comparable firm multiples rely on finding comparable firms that match IPOs. The most widely used multiples include market-to-book, price-to-sales, enterprise value-to-sales, and enterprise value to-operating cash flow ratios, where enterprise value is defined as the market value of equity plus the book value of debt, minus cash. The use of forecasted financial information and growth of cash flow can improve the accuracy of IPO valuation.

Keywords: initial public offering (IPO), valuation, comparable firm method, regression, underwriters, underpricing, winner's curse theory, signaling theory, prospect theory

Valuing an early-stage company or *initial public offering (IPO)* is difficult because much of the company's current value depends on expected future revenues from products not yet marketed. Valuing an IPO in a nascent industry is even more difficult since there is no historical information for comparison. When the first companies in a new industry go public, *underwriters* have little guidance beyond traditional *valuation* methods employed in other industries, though they may have a vague sense of uneasiness about unfamiliar territory. Market participants are not limited to the information used by the underwriters. Moreover, incentives may induce underwriters to set offer prices below their best estimates of the value. For either reason or both, IPOs generally experience sizeable first-day returns. This chapter reviews the methodology underwriters used to properly value IPOs.

LITERATURE REVIEW ON IPO VALUATION

Typically, IPO prices are determined in stages along the IPO process. The filing price range is determined first by the investment bankers and is contained in the prospectus, which consists of the financing information of the issuing company. During the period from the filing of the prospectus to the final offer date, called "the waiting period," the managers of the issuing companies, analysts, and investment bankers are on the road show to meet with investors and to get an assessment of the demand to be able to set the offer price. If the demand is higher than expected, the final offer price is set higher; if the demand is lower than expected, the final offer price is adjusted downward.

Since issuing shares are allocated mainly to the most influential or institutional investors, the offer price reflects the information possessed by the most informed investors. However, the closing price on the IPO day reflects private information from small or retail investors, who rarely receive an allocation of issuing shares. The IPO process involves three players: firms, investment bankers, and investors, all of which have very different goals. There are several reasons for the short-run first-day return of IPOs, and their relative importance differs across countries and mechanisms.

In the finance literature, IPOs have been found on average to have large first-day returns (the percentage difference between the first-day closing price and the offer price) of between 10% and 15%. This phenomenon is referred to as IPO *underpricing.* Evidence of large first-day returns can be found in Logue (1973); Ibbotson (1975); and Ibbotson, Sindelar, and Ritter (1994). Ibbotson and Ritter (1995) also provided an intensive survey and review of IPO literatures. Overall, the first-day return phenomenon is explained by asymmetric information and adverse selection that forces the issuer to set the price below the fundamental value. To induce the uninformed investor to participate in an IPO, the issuer has to set the offer price below the intrinsic value. In contrast, to induce institutional investors, the issuer has to set a high offer price. Nevertheless, after issuing, the price will move back to the intrinsic value, leading to the underpricing or overpricing of the offer price. If the market is efficient, the first-day closing price will reflect the IPO's intrinsic value.

Several researchers used this idea to explain the first-day return phenomenon. Rock (1986) and Beatty and Ritter (1986) developed the *winner's curse theory* and explain that IPO first-day return occurs from the information asymmetry between investors. Baron and Holmstrom (1980) and Baron (1982) explained that the IPO first-day return can occur from the information asymmetry between issuers and investment bankers. If investment bankers take advantage of their superior knowledge of market conditions to underprice offerings, which permits them to expend less marketing effort and to ingratiate themselves with buy-side clients, IPOs will be underpriced. Another explanation by Benveniste and Spindt (1989) is that information asymmetry between investment bankers and investors leads to IPO first-day return. Investment bankers, who use bookbuilding, may underprice IPOs to induce regular investors to reveal information during the pre-selling period, which then can be used to assist in pricing the issue. Moreover, Allen and Faulhaber (1989), Grinblatt and Hwang (1988), and Welch (1989) developed the *signaling theory* to explain this phenomenon. This theory hypothesizes that underpriced IPOs leave investors with a good taste, allowing the firms and insiders to sell future offerings at a higher price than would otherwise be the case. Chemmanur (1993) showed that publicity is generated by a high first-day return. This publicity could generate additional investor interest and brand awareness. Tinic (1988) and Hughes and Thakor (1992) explained that the frequency and severity of future class action lawsuits can be reduced by first-day return because only investors who lose money are entitled to damages. Welch (1992) illustrated that it can be explained when potential investors pay attention not only to their own information about a new issue but also to (1) whether other investors are purchasing, (2) bandwagon effects, and (3) informational cascades that may develop. Booth and Chua (1996) explained this phenomenon by ownership dispersion. Mauer and Senbet (1992) explained that this phenomenon is from the incompleteness of market.

Another theory of underwriter price support, proffered by Rudd (1993), is based on the distribution of first-day return. He finds that there is an unobserved left tail or left-skewed distribution of first-day return distribution and attributes this to the support of underwriters. Along other lines, Aggarwal and Rivoli (1990) and Shiller (1990) argued that this phenomenon can be explained by fad or investor's optimism. Similarly, Teoh, Welch, and Wong (1998) supported this argument by showing that investor over-optimism is based on accounting manipulation by the issuers. In contrast, Rajan and Servaes (1997) evaluated analyst earnings forecasts of IPO firms and find that investors are really overly optimistic about the long-term growth prospects of IPOs, inducing an upward bias in analyst earning forecasts. Overall, there are two anomalies that support this theory, namely, hot issue markets and long-run underperformance of IPO issuers. Hot issue markets are the periods during which both IPO volumes and first-day returns are abnormally high. The long-run underperformance of an IPO is supported mostly by the findings of Ritter (1991), which suggests that IPO-issuing companies underperformed by 5.6% per year compared to nonissuing firms.

Due to the Internet bubble of 1999 and early 2000, the most puzzling aspect of the first-day return phenomenon is that, in some circumstances, issuers do not object to a severe first-day return. Loughran and Ritter (2002) explained this phenomenon by using *prospect theory* developed by Kahneman and Tversky (1979): investors focus on changes in their wealth rather than on the level of their wealth. Loughran and Ritter note that most of the money left on the table is by a minority of firms for which the offer price was revised upwards during the book-building process. For these issuing firms, the executives see their personal wealth increase relative to the mid filing price, even as they agree to leave money on the table. Loughran and Ritter argued that the issuing firm's managers bargain less hard for a higher offer price in this circumstance than they otherwise would do, thus offer prices do not adjust fully to market movements during the book-building period. Furthermore, they illustrate why underwriters prefer to underprice IPOs rather than to charge higher gross spreads. This happens because issuers pay less attention to the opportunity costs of first-day returns than to the direct costs of gross spreads.

In contrast to previous findings about first-day returns, Purnanandam and Swaminathan (2004) using comparable firm multiples found that IPOs from 1980 to 1997 were overvalued and not undervalued by about 50% from their fair value. They rationalized this argument using behavioral theories based on investor overconfidence. According to Daniel, Hirshleifer, and Subrahmanyam (1998) and to DeLong, Shleifer, Summers, and Waldmann (1990),

stock prices initially reflect an overreaction to new information. Daniel, Hirshleifer, and Subrahmanyam explained that this is due to positive feedback trading, while DeLong, Shleifer, Summers, and Waldmann suggested that this is due to investor overconfidence. This overconfidence about the future success of IPOs leads underwriters and issuers to overprice initial offerings.

To summarize, underpricing with respect to observed market demand is different from undervaluation with respect to fundamental value. Empirical evidence provided later in this chapter examines whether IPOs are undervalued or overvalued (i.e., misvalued with respect to fundamental value using regression method and comparable multiples).

ESTIMATION OF INTRINSIC IPO VALUE

The overwhelming extant evidence on short-run underpricing and long-term underperformance suggests that the observed IPO offer value is a biased estimate of intrinsic IPO value; the offer value equals IPO offer price multiplied by the shares outstanding at the close on the offer date, as reported by the Center for Research in Security Prices (CRSP). Institutional investors, market makers, and other large traders are posited to form unbiased estimates based on superior information and/or superior valuation capabilities of intrinsic value. Valuation discrepancies between observed offer value and estimated intrinsic value are then likely to trigger flipping activity. (Flipping has often been characterized as a proxy for institutional informed trading.) In general, underwriters apply two methods to estimate intrinsic IPO value (Kim and Ritter, 1999; Pukthuanthong-Le and Varaiya, 2007). First is the comparable firm approach that is frequently used by investment bankers to price IPOs (Varaiya, Bergmark, and Taylor, 1997; Kim and Ritter, 1999) and in academic studies (Carter and Van Auken, 1990; Alford, 1992). The *comparable firm method* uses information about firms comparable to the IPO firm as a benchmark for setting the IPO offering price and offering value. Kim and Ritter (1999) used the comparable firm method, together with accounting information to value IPOs. They reported that valuation accuracy can be improved by using forecasted data and data from comparable companies identified in their study by a research boutique specializing in IPO pricing. In a recent paper, Purnanandam and Swaminathan (2004) used comparable firm multiples and report that from 1980 to 1997, IPOs are not undervalued, but are significantly overvalued by about 50 percent compared to their industry peers.

The second valuation method we employ, which is more common in academic studies, could be called the *regression* method. It is based on Beatty, Riffe, and Thompson (2000) who examined whether firm-specific accounting information can explain variations in IPO offering values for a sample of IPOs from 1993 to 1998. They find that historical accounting information primarily determines where the IPO price is established. Bartov, Mohanram, and Seethamraju (2002) and Johnston and Madura (2002) applied a similar method to explain the variation in IPO offering values and initial returns of Internet and non-Internet firm IPOs from January 1996 to June 1999, confirming the results of Beatty, Riffe, and Thomson.

COMPARABLE FIRM METHOD TO ESTIMATING INTRINSIC VALUE

Choosing Matching Firms

For each IPO firm in the sample, a matching firm should be selected from among the currently listed firms, and the matching firm has been public for during the same time as the IPO. It should have the same characteristics as the IPO. For example, Pukthuanthong-Le and Varaiya (2007) chose matching firms by selecting a matching firm that is in the same industry as the IPO firm with the closest sales, and sales divided by gross costs in the most recent fiscal year. Since most IPO firms are young and have negative earning, to include observations with negative EBITDA (earnings before interest expense, tax, depreciation, and amortization), matching the comparables based on sales divided by gross costs, defined as sales minus EBITDA is appropriate. Firms in the same industry are more likely to have similar operating risks, profitability, and growth opportunities. Sales is a proxy for size, and matching on sales divided by gross costs can control for differences in profitability across firms. Since sales divided by gross costs measures operating profitability, it is a more stable measure of profitability than sales divided by net costs, which equals sales minus earnings and thus affected by interest expense. Matching firms based on past sales growth is not widely implemented because most IPOs do not have sales data available for two prior fiscal years. Each IPO should get a unique matching firm in a given cohort year; nevertheless, sometimes the matching firms are repeated in subsequent years.

Pukthuanthong-Le and Varaiya's matching method is similar to that of Kim and Ritter (1999), who argued for controlling the differences in both growth and profitability. Their method is a balance between matching only on industry and sales, and trying to match on too many financial variables. To choose matching firms based on industry, sales, and profitability, an investor should first consider all firms in Compustat that are active for the fiscal year before the IPO year. From these firms, an investor should delete firms that went public during the past three years, real estate investment trusts (REITs), closed-end funds, American Depositary Receipts (ADRs), financial firms, and firms with share prices less than $5. This is a standard screening criteria in IPO literatures.

To obtain a matching firm, an investor should first classify all remaining firms into industries based on their Standard Industrial Classification (SIC) codes obtained from SDC at the time the company went public. These firms should be grouped into 48 industries using the updated industry specifications from Kenneth French's web site, which are groupings of various 4-digit SIC codes and then the IPO firm is assigned into its industry group. Potential matching firms in the same industry group as the IPO are expunged unless their revenue is between 70% and 130%

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of the IPO's revenue. From this final set, an investor can select the match as the one whose sales divided by gross cost is closest to that of the IPO firm.

Calculating Comparable Firm Multiples

For each sample IPO, the offer price can be computed from the following ratio:

$$P_{IPO} = \left(\frac{P}{S}\right)_{match} \times S_{IPO} \quad \text{(KP.1)}$$

where S can be any key value driver that we select to derive intrinsic value. It can be either sales or earnings and has to be measured in prior fiscal year. For internet firms, S can be number of page views or number of hits. For biotech firms, S can be number of patents, number of employees who have PhD, or R&D expense. Kim and Ritter (1999) demonstrated that using forecasted numbers reduces valuation errors; as such, S can be forecasted current earnings, or forecasted next year's earnings. P denotes the market price multiplying by CRSP shares outstanding value for the matching firm. This market price is for the trading day before the IPO date. The comparable firm approach assumes that $\left(\frac{P}{S}\right)_{match}$ is an estimate of the IPO firm's (unobserved) intrinsic value multiples. P_{IPO} is offer price ($Offer\ \mathrm{Pr}ice_{IPO}$) multiplying by CRSP shares outstanding at the end of the offering date including the new primary shares. Thus, to get the offer price of the IPO, $Offer\ \mathrm{Pr}ice_{IPO}$, we have to divide P_{IPO} by CRSP shares outstanding.

In addition to ratios of these sales, forecasted current earnings, or forecasted next year's earnings, an investor can also compute ratios of two additional multiples: (i) P divided by the ratio of sales to net costs; net costs equals (sales-earnings); and (ii) P divided by the ratio of sales to gross costs; gross costs equals (sales-EBITDA). Both (i) and (ii) are computed for the IPO firm and its match as in equation (KP.1). These two multiples allow an investor to also utilize IPOs with either negative earnings or negative EBITDA. A price-to-sales (P/S) multiple is widely implemented because sales are commonly available. Price-to-forecasted current earnings and price-to-forecasted next year earnings multiples capture the impact of growth. However, analyst earnings forecasts to compute earnings multiples is not available for every firm. Price to book value multiples is not widely used because book values tend to be low for IPO firms before going public. Moreover Liu, Nissim, and Thomas (1999) found that book value multiples tend to do poorly in terms of valuation accuracy, while earnings and cash flow multiples give the best accuracy.

The offering value multiples for the IPO firms are computed as follows:

$$P_{IPO} = \left(\frac{P}{Sales}\right)_{match} \times Sales_{prior} \quad \text{(KP.2)}$$

$$P_{IPO} = \left(\frac{P}{sales/net\ \cos t}\right)_{match} \times sales/net\ \cos t_{prior} \quad \text{(KP.3)}$$

$$P_{IPO} = \left(\frac{P}{sales/gross\ \cos ts}\right)_{match} \times (sales/gross\ \cos ts)_{prior} \quad \text{(KP.4)}$$

$$P_{IPO} = \left(\frac{P}{Current\ Year\ Earnings_{forecasted}}\right)_{match} \times Current\ Year\ Earnings_{forecasted} \quad \text{(KP.5)}$$

$$P_{IPO} = \left(\frac{P}{Next\ Year\ Earnings_{forecasted}}\right)_{match} \times Next\ Year\ Earnings_{forecasted} \quad \text{(KP.6)}$$

where P_{IPO} denotes the offer value, which is $Offer\ \mathrm{Pr}ice_{IPO}$, offering price multiplying by the shares outstanding at the close on the offer date, as reported by CRSP. $Sales_{prior}$ is annual sales before the IPO, net costs are sales minus earnings, and gross costs are sales minus EBITDA. All prior accounting data are fiscal year data before the issue and forecasted data are obtained from the I/B/E/S database.

For the matching firm, P_{match} is market price of a matching firm multiplying by CRSP shares outstanding. This market price is its stock price from CRSP on the day prior to the offering date of IPO firm and all accounting data are for the fiscal year prior to the offering date.

Empirical Evidence

Purnanandam and Swaminathan (2004) and Pukthuanthong-Le and Varaiya (2007) showed the offer price of IPO based on sales, sales/net costs, and sales/gross costs, current year forecasted earnings, and next year forecasted earnings comparable methods are overvalued. Kim and Ritter used several valuation metrics and conclude that using forecasted earnings is the best comparable method. Thus, an investor should calculate IPO offer value using next year's earnings forecast in order to take growth into account. This may be impossible due to the limited availability of earnings forecast data. Purnanandum and Swaminathan (2004) noted that analyst earnings forecasts are available only several months after the IPO date and are therefore affected by information that is not available to investors at the time of IPO.

Note that this problem is more severe due to the fact that analysts have incentives to issue excessively optimistic recommendations for IPOs (Michaely and Womack, 1999). Rajan and Servaes (1997) show that IPOs with high analyst growth expectations underperform IPOs with low analyst growth expectations in the long run. This suggests that IPOs with high analyst growth forecasts tend to be overvalued; thus, matching on growth may bias the results toward overvaluation and reduce power of the test.

Given the concerns with using forecast earnings data, an investor should calculate IPO offer value by sales divided by gross costs, where sales and gross costs are from the fiscal year prior to IPO. We should use prior fiscal year data since investors—institutions and other block traders—use information obtained from the pre-IPO phase. Pukthuanthong-Le and Varaiya (2007) computed

the ratio of IPO offer value with the offer value of comparable firms based on sales divided by gross costs and the value is 1.36, suggesting significant overvaluation.

Zheng (2007) offered some reasons Purnanandam and Swaminathan (2004) and Pukthuanthong-Le and Varaiya (2007) found that IPOs are overpriced. First, most IPO firms raise a lot of capital and increase sales, EBITDA, and earnings substantially after going public. These two studies used accounting number before the IPO to compute comparable ratios. On the other hand, the matching firms do not raise capital and have the same increase in future financial performance as the IPO. As a consequence, the price of an IPO firms is much higher than the price of its matching firm because the IPO is expected to grow at a much higher rate than its matching firm. To solve this problem, Zheng (2007) suggested rescaling prices of IPO firms and matching firms. Purnanandam and Swaminathan (2004) and Pukthuanthong-Le and Varaiya (2007) found the IPO prices are overstated because they do not adjust cash holdings and leverage. Zheng (2007) suggested an investor exclude the new primary shares because these new equity raised in the IPO will bring higher sales and the total value of the IPO firm reflecting the expected increase in cash flows. The matching firm will not have the same increase in cash flows because it has not raised any new capital. As a result, both studies found the overvaluation of IPO firm compared to its matching firm. In addition, Zheng adjusted for cash holding and leverage when an investor computes comparable firm method. Furthermore, he suggested matching firms have the same growth as IPOs because the value of these IPO firms depends on their future growth. The reason Purnanandam and Swaminathan (2004) and Pukthuanthong-Le and Varaiya (2007) found IPOs are overvalued because their matching firms do not have the same growth as their IPOs. To summarize, Zheng (2007) argued that overvaluation of IPO from Purnanandam and Swaminathan (2004) and Pukthuanthong-Le and Varaiya (2007) is caused by biases from new primary shares, cash holdings, and capital structure. He, therefore, suggested adapting equations (KP.2) to (KP.6) to the following:

$$P_{IPO} - cash_{IPO} + Total\ Debt_{IPO} = \left(\frac{P - cash + Total\ Debt}{Sales}\right)_{match} \times Sales_{prior} \quad \text{(KP.7)}$$

$$P_{IPO} - cash_{IPO} + Total\ Debt_{IPO} = \left(\frac{P - cash + Total\ Debt}{sales/net\ \cos t}\right)_{match} \times sales/net\ \cos t_{prior} \quad \text{(KP.8)}$$

$$P_{IPO} - cash_{IPO} + Total\ Debt_{IPO} = \left(\frac{P - cash + Total\ Debt}{sales/gross\ \cos ts}\right)_{match} \times (sales/gross\ \cos ts)_{prior} \quad \text{(KP.9)}$$

$$P_{IPO} - cash_{IPO} + Total\ Debt_{IPO} = \left(\frac{P - cash + Total\ \ Debt}{Current\ Year\ Earnings_{forecasted}}\right)_{match} Current\ Year\ Earnings_{forecasted} \quad \text{(KP.10)}$$

$$P_{IPO} - cash_{IPO} + TotalDebt_{IPO} = \left(\frac{P - cash + Total\ Debt}{Next\ Year\ Earnings_{forecasted}}\right)_{match} \times Next\ Year\ Earnings_{forecasted} \quad \text{(KP.11)}$$

where P_{IPO} is offer price ($Offer\ Price_{IPO}$) multiplying by CRSP shares outstanding at the end of the offering date excluding the new primary shares. To get the offer price of the IPO, $Offer\ Price_{IPO}$, an investor has to divide P_{IPO} by CRSP shares outstanding excluded the new primary shares. In addition, he selected matching firms based on industry, sales, and *ex post* consensus analyst growth forecasts to capture the effect of expected growth on valuation. Analyst growth forecast of earnings per share are collect from the IBES analyst forecast database and the average of growth forecasts in year after the IPO is used as the ex post consensus analyst growth forecast. The drawback of this methodology is the analyst forecast data is not available for every firm.

REGRESSION METHOD TO ESTIMATING INTRINSIC VALUE

Another methodology that we can use to compute IPO offer value is by estimating a regression. We can estimate a regression model using the data of IPO firms that went public and apply this model to forecast the offer price of future IPO (Pukthuanthong-Le and Varaiya, 2007; Beatty, Riffe and Thompson, 2000; Kim and Ritter, 1999).

Independent Variables

The intrinsic IPO offer value at the offering date can be estimated from the following regression equation:

$$\begin{aligned}\text{Total Offer Value/Total Assets}_n = {} & a + b_1\,\text{Revenue/Total Assets}_n + b_2\,\text{Positive Earnings/Total Assets}_n + b_3\,\text{Negative Earnings/Total Assets}_n + b_4\,\text{Positive Book Value/Total Assets}_n + b_5\,\text{Negative Book Value/Total Assets}_n + b_6\,\text{Positive Operating Cash Flow/Total Assets}_n + b_7\,\text{Negative Operating Cash Flow/Total Assets}_n + b_8\,\text{Growth of Profit Margin}_n + b_9\,\text{Growth of Sales}_n + b_{10}\,\text{Percentage of Shares Offered}_n + b_{11}\,\text{Market Rate of Return}_n + b_{12}\,\text{Age Less than Five}_n + b_{13}\,\text{Percentage of Filing Price Range}_n + \varepsilon_n\end{aligned}$$

where n denotes the IPO firms. The Percentage of Shares Offered is defined as number of shares offered in the IPO divided by number of shares outstanding at the close on the offer date; Percentage of Filing Price Range equals (High Filing Price—Low Filing Price)/Low Filing Price, in percent; An investor should use the original file price range rather than the final file price range. Using final price range, in the definition of the "filing price range" variable, results in an endogeneity problem in the Table 3 regression. Specifically, because almost all of the file price ranges are $2 (both original and final), this variable is essentially a constant divided by the low file price range.

So for deals that are revised up, the denominator will be larger and the ratio will be lower. At the same time, on deals that are revised up, the dependent variable will have a higher value. So upward revisions will cause the coefficient to be biased downwards. Age Less than Five is a dummy variable for age, and it is one if the issuing firm's age is less than five and zero otherwise; Market Rate of Return is defined as the value-weighted-market rate of return two weeks before the IPO, calculated as the average of NYSE/AMEX/NASDAQ index two weeks before the offer. The dependent variable, and all the accounting-based independent variables are normalized by dividing by total assets, and all accounting data are fiscal year data before the IPO issue.

Empirical Evidence

The offering price is set in light of both available financial information and what the underwriter learns about investor demand during the marketing phase (road show). The dependent variable equals total offer value/total assets. The information about the financial health of the firm is reflected in the pre-IPO accounting variables used in the regression equation.

According to the signaling literature, the percentage of outstanding shares offered in the IPO (the number of shares offered divided by total number of shares outstanding at the close on the offer date) should send a signal about company value. Leland and Pyle (1977) suggested that greater percentage ownership by insiders is a positive signal about the company, since insiders are assumed to have superior information about expected future cash flows. Klein (1996) also supported the importance of share retention as a positive signal of company future. Hence, IPO offer value should be negatively related to percentage of shares offered to the extent that an increase in shares offered in the IPO reduces percentage ownership of insiders (while increasing percentage ownership of noninsiders). The cumulative market rate of return before the IPO should be added as one of the control variables. Based on Loughran and Ritter (2004), changes in the overall market should cause revisions in the offering prices of IPOs. An investor can calculate the market rate of return as the value-weighted NYSE/AMEX/NASDAQ index rate of return for 15 days before the IPO.

Age Less than Five is a dummy variable which is equal to one if the firm's age at time of IPO is less than five years, and zero otherwise. According to existing studies, this variable is expected to be negatively related to offering value since younger firms at the time of IPO are more risky (and/or more difficult to value). The filing price range is the original filing range before the IPO and reflects the valuation uncertainty for IPO shares estimated by the investment banker(s). The regression results in Table 3 of Pukthuanthong-Le and Varaiya (2007) indicate that IPOs with strong financial health i.e., high sales, high positive earnings, high positive book value, high positive cash flow, high growth in profit margin, and high growth in sales exhibit high offer values. The other significant variables are the market rate of return and percentage filing price range whose positive coefficients indicate that overall market changes and the uncertainty of IPO price measured by filing price range are positively associated with offering values. IPOs with low percentage of shares offered have high offer values.

Using the estimated regression equation to obtain the estimate of IPO intrinsic value, ETOP, an investor can compute an IPO offer price by dividing ETOP by number of shares outstanding at the end of the offering date. Pukthuanthong-Le and Varaiya (2007) found that the median value of TOP/ETOP where TOP is total offer value divided by total assets is 1.31 and the first and third quartile values are, respectively, 0.49 and 2.77 for the IPO sample; and these values are respectively comparable to the median, first quartile, and third quartile P/V multiples (sales to gross costs). Therefore, as in the comparable firm approach, the existing IPO valuation studies conclude that the median offer values are significantly greater than estimated intrinsic values.

SUMMARY

This chapter reviewed the methodologies that can be used to determine the intrinsic value of an initial public offering. Since initial public offering does not have as long history as brick and mortar firms, their valuation is more complex. Most of their value depends on the future growth; as such, their valuation method needs to incorporate growth. We described the procedures for implementing comparable firm method and regression analysis and provided suggestions for improving valuation accuracy.

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