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Pricing High Growth Firms: Arbitrage Opportunities in the Inc. 100

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The ability of the market to price high growth stocks is examined by analyzing the returns to simple investment portfolio strategies based on public information. The portfolios consist of shares in the firms listed in the Inc.100 Ranking of the fastest growing public companies in America. The results indicate that significant abnormal returns are generated by these strategies, even after adjusting for risk. Although the tests could potentially be affected by a form of survivorship bias, supplementary analyses indicate that this is unlikely to be the case here. These results support the assumption that markets have difficulties pricing high-growth entities, leaving significant arbitrage opportunities in these stocks and validating the use of various market timing practices.

I. INTRODUCTION

Were capital markets efficient, no advantages could be gained by issuers attempting to time their stock offerings since their share price would always reflect all available information. Despite the general acceptance of the efficiency paradigm in its various strengths, investment bankers and issuers alike persist in spending great efforts and money in finding the right window of opportunity in the market, where temporary mispricing would optimize the proceeds of their planned financial operations. These two views are not necessarily antagonistic: market efficiency may very well be the rule under normal conditions, breaking down only in some extreme circumstances. The intended contribution of this paper is to investigate the pricing ability of the market in critical limit conditions, such as those prevailing when attempting to price companies which have historically experienced extremely high growth rates. Support for the

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existence of pockets of inefficiency in such pricing environments would reconcile the general acceptance of market efficiency with timing practices.

Standard valuation theory assumes that the price of a share is simply the discounted value of all cash flows accruing to that stock in the future. Under an efficient market hypothesis, the resulting prices should at all times reflect rational expectations about the future, so that the realized returns on such stock holdings should on average be commensurate with their risk level. However, empirical tests in the literature have highlighted many instances in which the pricing of stocks appears to deviate from that which would be expected under efficient markets. A first line of research indicated the existence of abnormal returns for small firms, which, in subsequent investigations, were further shown to occur primarily in early January (what became known as the January effect, although it should more adequately be referred to as the small firm January effect; Banz, 1981; Keim, 1983; Reinganum, 1983; Blume & Stambaugh, 1983; Ritter & Chopra, 1989). Other studies identified additional anomalies including a day-of-the-week effect: statistically significant differences in returns are observed on different days of the week, and in particular largely negative returns during the period from the close of the market on Friday to its close on Monday (French, 1980; Keim & Stambaugh, 1984); the earnings report effect: abnormal returns seem to occur around quarterly earnings announcements which differ markedly from prior analysts' expectations (Rendleman, Jones, & Latane, 1982); and an overreaction/reversal effect: stocks having experienced high returns during one period tend to underperform in subsequent periods, and vice-versa for the underperformers (De Bondt & Thaler, 1985; Clayman, 1987; Chopra, Lakonishok, & Ritter, 1992; Haugen, 1995).

Supergrowth firms, which for the purpose of this study will be defined as the publicly traded firms having experienced the highest annual sales growth over the prior 5-year period, are especially likely to stretch the efficiency concept because: (1) future growth rates are difficult to estimate and very volatile; and (2) most of these firms belong to high beta cohorts where deviations from CAPM pricing have already been outlined in the empirical literature. Moreover, behavioral studies of decision-making under uncertainty indicate a tendency for estimates of future outcomes to be biased by observations of prior outcomes. Anchoring, for example, has been shown to occur where an initial best guess is adjusted upward or downward to predict a future outcome: the resulting estimated ranges tend to be too narrow and biased in the direction of the initial estimate. Issues of small sample size and the representativeness of prior observed experience can lead to further biases in estimates of future outcomes, as investigated by Kahneman, Slovic and Tversky (1982).

The estimation of future growth rates for supergrowth firms can be hypothesized to be unduly affected by investors' observations of recent growth rates, and therefore lead to expectations of stock prices which are biased upward from their intrinsic values. Indeed, a statistically significant over-reaction of this type has been observed by Chopra, Lakonishok and Ritter (1992). The over-reaction effect was found to persist even after adjusting for firm size and risk and was shown to be more pronounced for smaller firms. The noted tendency for individuals to weight recent data more heavily in the making of judgments about the future might be expected to create further deviations from the conformance of observed returns to those predicted by the CAPM.

Even though stock prices at all times should reflect the present value of all future cash flows, it is clear that estimating the cash flows for supergrowth firms is a particularly difficult endeavor. Many of these firms belong to the smaller capitalization decile of the market, and as such may not be as closely followed by institutional investors as larger, more established companies. This lack of scrutiny may lead to a reduction in the quality of information available about the supergrowth stocks as a group and a lack of precision in the market's pricing of these assets (Arbel, 1985). In addition, these stocks tend to exhibit high systematic risk, a factor which has been associated in previous papers with deviations from standard asset pricing models.

The objective of the study is, using simple investment portfolio strategies based on public information, to determine the extent to which abnormal returns could be earned by selectively investing in supergrowth stocks. The arbitrage trades are based on Inc. magazine's annual ranking of the 100 fastest growing public companies in America. It is not claimed here that the Inc.100 ranking is a comprehensive and exhaustive list of the fastest growing public firms in the United States but simply that it is likely to identify a group of companies particularly difficult to price for the market because of their extreme historical rates of growth and their high level of risk.

The results obtained tend to support the general hypothesis: opportunities for statistically significant abnormal returns seem to exist, even after correcting for risk and the possibility of a survivorship bias in the sample. An equally weighted investment in all firms listed in the Inc.100 rankings for the period 1979 through 1990 inclusive would have generated cumulative S&P500 adjusted excess returns of approximately 23% in the 36 months following the ranking (with a *t*-test equal to 3.166 which enables us to reject the hypothesis that abnormal returns are equal to zero with a degree of confidence greater than 1%). The results are generally not consistent with market efficiency for these supergrowth firms, leaving open the possibility of strategic games, such as issue timing, by issuers and investors alike.

These results shed new light on the apparent contradiction between the commonly accepted efficiency paradigm and the observed widespread reliance of issuers and investment bankers alike on market timing practices. If the market is indeed less efficient in the limit conditions that these supergrowth firms embody, then mispricings may occur and timing may be a value-generating exercise.

The study is structured as follows. Section II lays down the research hypotheses and their conceptual justifications. Section III outlines the database created for the purpose of this research program. It is followed by an extensive presentation of the methodologies used to measure abnormal returns in the supergrowth portfolios. Section V provides some descriptive statistics of the sample, and introduces the extensive analyses of the results conducted in Section VI. Conclusions and discussions ensue.

II. RESEARCH HYPOTHESES

The fundamental objective of the paper is to investigate the market's ability to properly price a group of firms characterized by very high historical sales growth rates. As outlined in the introduction, these firms are likely to stretch the market efficiency concept to the limit because of the intrinsic volatility of such firms and the difficulty of forecasting future growth and risk. Testing for pricing errors in supergrowth firms thus becomes a proxy for the larger question of market efficiency in critical (limit) conditions. As such, it will also suffer from the traditional joint hypothesis problem, in the sense that it is not possible to effectively disaggregate the effect of market inefficiency from the misspecification of the return-generating process. All statements about market efficiency should be interpreted in light of that constraint.

Within that broad statement of objectives, a set of more specific hypotheses are analyzed.

Hypothesis 1: Supergrowth firms have higher-than-normal exposure to market risk, i.e. they exhibit statistically higher levels of systematic risk than the market as a whole.

Hypothesis 1 serves important conceptual and methodological purposes. Conceptually, the evolution of market risk exposure for high growth firms is still largely uncharted territory, as outlined by Cotter (1992) and Loughran and Ritter (1994). The common understanding is that firms going public through an IPO, being relatively young and having products with untested futures, have high risk, as mentioned by Loughran, Ritter and Rydqvist (1994). A significant problem with this approach, highlighted in Cotter (1992) and Leleux (1993), is that total risk is often mistaken for market-related risk (systematic or beta risk). In other

words, these firms seem to exhibit large variances in their returns but the sensitivity of these returns to variations in market returns may not necessarily be high. Most of the risk inherent in these young, high-growth firms may be of a non-systematic, firm-specific nature and thus easily diversifiable in a portfolio. These risks may include prototyping and production problems, marketing and logistics constraints, etc., most of which are unconnected to the performance of financial markets as a whole. No return premia should then be expected to carry unsystematic risk, as underlined in the finance literature.

The nature of the risk has important methodological implications for the choice of the returns' adjustment procedure. If the systematic risk measure is close to 1.0 on average, a simple adjustment to the market would be acceptable. On the other hand, if beta is statistically different from 1.0, an additional risk adjustment is required, using some form of risk/return model, usually the CAPM. Hypothesis 1 is set up to investigate such point and provide guidance for the risk-adjustment mechanism required.

Hypothesis 2: Abnormal returns can be observed for supergrowth firms before, upon, or after the Inc.100 rankings publishing dates.

Hypothesis 2 tests the market efficiency concept. In a semi-strong form efficient market, stock prices correctly reflect all publicly available information, so that changes in stock prices around information announcements (such as the publication of the Inc.100 rankings) provide an unbiased assessment of the economic effect of the event on the target/acquiror company's shareholders (Schwert, 1984; Brown & Warner, 1980, 1985). Furthermore, companies only earn normal rates of return over the long-term, where normal is defined with respect to their respective risk cohort.

Hypothesis 3: Cumulative abnormal returns post-ranking can be related to growth-related variables, both historical and forward-looking.

Hypothesis 3 examines various explanatory variables for the performance of the supergrowth firms' arbitrage strategies. It attempts to identify factors driving abnormal returns over the long run in these strategies, factors which the literature indicates could include prior growth rates, growth in net income, market-to-book ratio, price/earning multiple, etc.

III. DATABASE

The Inc.100 ranking of the fastest growing public companies in America, where growth is measured by the average sales growth figure over the previous

5-year period, was first published by *Inc.* magazine in May 1979 and has been a regular feature ever since, with the exception of 1991.[1] All rankings from 1979 until 1990, or 12 complete rankings of the 100 best performing firms, are used here. The post-1990 rankings are ignored because of insufficient post-event time to test for long-term performance.

A number of firms suffered from early delisting, for reasons such as mergers, acquisitions, going-private transactions, bankruptcies, or liquidations. Delisting reasons were investigated to obtain as accurate a picture as possible of the total performance of the arbitrage strategies from setup to delisting. For about 10% of the firms delisted within 36 months of the ranking, it was not possible to trace back the delisting reasons, leaving a bias of unknown direction and magnitude in the sample.

For each firm in the sample, the following information was collected: rank in Inc.100 survey, name of the company, industry code, sales growth in the five years prior to the ranking, revenues and net income in last financial report and prior five years, number of employees in ranking year and prior five years, year the company went public and on which market, salary of CEO, whether the CEO founded the company, and his/her equity ownership. Monthly return and systematic risk data was obtained from Compustat sources and the monthly CRSP tapes from the University of Chicago. Economic series, such as monthly risk-free rates and returns on market indices (Standard & Poors 500 and Dow Jones Industrial) were downloaded from Citibase.

IV. RESEARCH METHODOLOGY

Traditional event study performance analysis is based on the measurement of some abnormal return for the shares investigated over a period of interest. In the case at hand, the objective is to determine to what extent a ranking in the Inc.100 list of the fastest growing public companies in America actually conveys information about future returns, i.e. is it possible to implement, on the basis of the rankings, investment strategies that will earn returns higher than expected under standard risk/return models? This objective implies that the period of interest for the analysis is the post-ranking months, since trading (or arbitrage) strategies must be based on information released in the Inc.100 rankings. These rankings have historically been published in May each year. The month of publication of the ranking is then referred as Month 0 in the event study. All subsequent months are denoted by higher integers, i.e. the third month post-ranking is month 3.

The definition of what constitutes abnormal returns presupposes 1) the knowledge of the return generating process and, 2) market efficiency, in the sense that risk information is indeed reflected in the prices. Accordingly, event

studies are always joint tests of both market efficiency and the particular model being used to represent the return process. Two models are used here for the latter. First, a simple market model is assumed, implicitly positing that the expected return for all stock is the actual return realized on the market for the period. Abnormal returns are then measured by:

$$AR_{i,t} = R_{i,t} - R_{m,t} \tag{1}$$

where $AR_{i,t}$ is the market-adjusted abnormal return on share i in post-event month t, $R_{i,t}$ is the raw return on share i in month t, and $R_{m,t}$ is the corresponding return on the market index. The choice of an adequate market benchmark potentially influences the reported results, so two indices are used here: the Standard & Poors 500 and the Dow Jones 30 Industrial. Additional indices were used in the analysis, such as the CRSP indices, but did not materially affect the results. The second model explicitly incorporates the systematic risk of individual securities in the adjustment procedure, using a CAPM-type risk/return relationship. Abnormal returns are measured as follows:

$$AR_{i,t} = R_{i,t} - [R_{f,t} + \beta_i(MRP)] \tag{2}$$

where $R_{i,t}$ is the raw return on share i in month t, and $R_{f,t}$ is the corresponding return on the risk-free security (proxied here by the return on the U.S. Treasury 90-day bill), β_i is share i's systematic risk coefficient measured over the previous 60 months,[1] and MRP is the ex-post Market Risk Premium.

For each method, an average abnormal return is then calculated for each event month following the Inc.100 ranking, using:

$$AR_t = \frac{1}{n_t} \sum_{i=1}^{n_t} AR_{i,t} \tag{3}$$

where n_t is the number of shares in the cross-section in post-ranking month t. The long-run performance measure involves the cumulating of these abnormal returns over time for each individual firm, followed by cross-sectional averages (Dimson & Marsh, 1986):

$$CAR_{s,T} = \frac{1}{n} \sum_{t=1}^{n} \left[\left(\prod_{t=2}^{T} (1 + AR_{i,t}) \right) - 1 \right] \tag{4}$$

Although this has been the method of choice for many years, Conrad and Kaul (1993) highlighted the potential bias in this procedure, which aggregates not only returns but also individual estimation errors. In general, estimation errors

seem to cancel out, but the potential remains and the magnitude of the problem is unknown. To mitigate the problem, buy-and-hold abnormal returns are also calculated.

V. SAMPLE DESCRIPTIVE STATISTICS

As mentioned above, 1,200 firms entered the 1979–1990 Inc.100 rankings. Of these firms, about 3% could not be located using a combination of Bridge on-line, Compustat, Standard and Poors Stock Listings, Datastream, and Dial-Data Stock Lookup, possibly resulting from typos in the original Inc.100 listings.

The distribution of the sample's sales growth in the five years leading to the ranking are depicted in exhibit 1. Most firms experience average compounded annual growth rates over that 5 year span in excess of 100% (mean=122.85%; median=106%), with the top ranked firms exceeding 500% (maximum=678%). These figures qualify the sample firms as supergrowth firms, justifying the title of the paper. The cumulative distribution of reported net incomes in the ranking years further qualifies these sample firms as growth companies with relatively small current incomes. Indeed, over 80% of the sample firms report net incomes below $5 million in the ranking years (Exhibit 1).

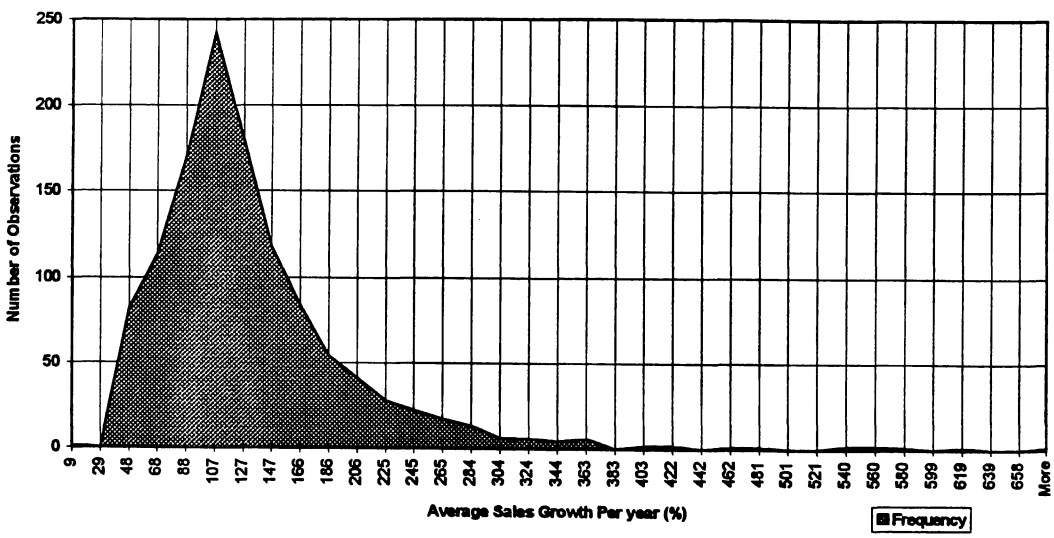

Exhibit 1
Distribution of Average Compounded Annual Growth Rates (in %) in Sales over the 5 Year Period Leading to the Ranking

Growth firms have also gained recognition as the true engines of employment. The distribution of employment among sample firms is instructive in this regard. The sample mean is at 671 employees (Median=216), with a standard deviation of 117 and a non-normal distribution. The sample firms had, on average, only 84 employees (with a standard deviation of 289 and a median of 30) 5 years before the rankings, indicating a compound annual growth rate in employment of 51.52% per year based on the mean figures and 48.41% based on the median employment figures.

The corporate control and governance literature highlights the strong convergence of ownership and control in younger, entrepreneurial institutions as a possible explanation for the superior performance observed. An examination of the distribution of CEO salaries for the firms sampled after 1988[3] shows the mean salary at $229,164 (median=$150,000) with a standard deviation of $391,501. Equally relevant to the control issue is the distribution of CEO ownership in their own companies. For the sample the mean ownership position is at 16.1% (median=10.0%), with a standard deviation of 15%, a minimum of 0% and a maximum of 75%.

The results presented so far are static by design, assuming that the variables described did not significantly change over the period of investigation. In order to analyze changes through time, similar descriptive statistics have been compiled by ranking year. The average sales growth for each cohort year (ranking year) is a statistic that can be interpreted as the average sales growth a firm must have achieved in order to qualify for the Inc.100 ranking. Since all rankings are relative by design, economy-wide factors may determine which firms actually show up in any one particular table. An examination of the data indicates that firms in the 1979 ranking averaged 68% average sales growth per year in the 5 years prior to the ranking year (Median=46%). The firms in the 1990 cohort, for their part, averaged 146% per year (Median=124%) over the same prior 5 years. The *t*-test for the difference of the means in the two cohort years equals 7.88, significant at the 1% level. This indicates that making the ranking has become a much more competitive sport as well.

It is interesting to note the relative lack of evolution in the average number of employees in the Inc.100-listed firms. From an average of 519 employees in 1979 (Median=235), the figure does not change statistically (*t*-test=1.06) throughout the 12-year analysis period, ending with 665 employees on average (Median=285) in the 1990 rankings.

The empirical finance literature highlights the explanatory power of both the market to book ratio and the Price-Earnings Multiple. Both measures are forward-looking in perspective, interpreted as reflections of the growth opportunities of the company. These two measures thus offer a valuable piece of

information to add to the historical-based growth rates and may help understand the future performance of the supergrowth firms.

Exhibit 2 indicates that indeed market-to-book ratios significantly evolve through the post-ranking periods, falling from around 135 in the ranking month to an average of 74 some 36 months following the ranking. These figures can be interpreted in different ways. First, this evolution could be the natural consequence of the growth opportunities being converted over time into assets in place and greater book values. Second, the fall in the ratio could also be interpreted as a consequence of the non-repeatability of the exceptionally high historical growth rates experienced by these firms. Finally, the fall could imply that the capital markets are efficiently arbitraging away market imperfections following the release of relevant information, in this case the Inc.100 rankings themselves. Although it would be pure speculation at this point to support one explanation over the other, it is interesting to note that the average market-to-book ratio remains exceptionally high for the sample firms compared to the ratios prevailing in the stockmarket-listed firms at large. The price-earnings multiples tell a very similar story, although very little trend can be detected in the results there. The observed average price-earnings multiples in the 30–40 range are quite unusual and again indicate the exceptional growth potential of these sample supergrowth firms.

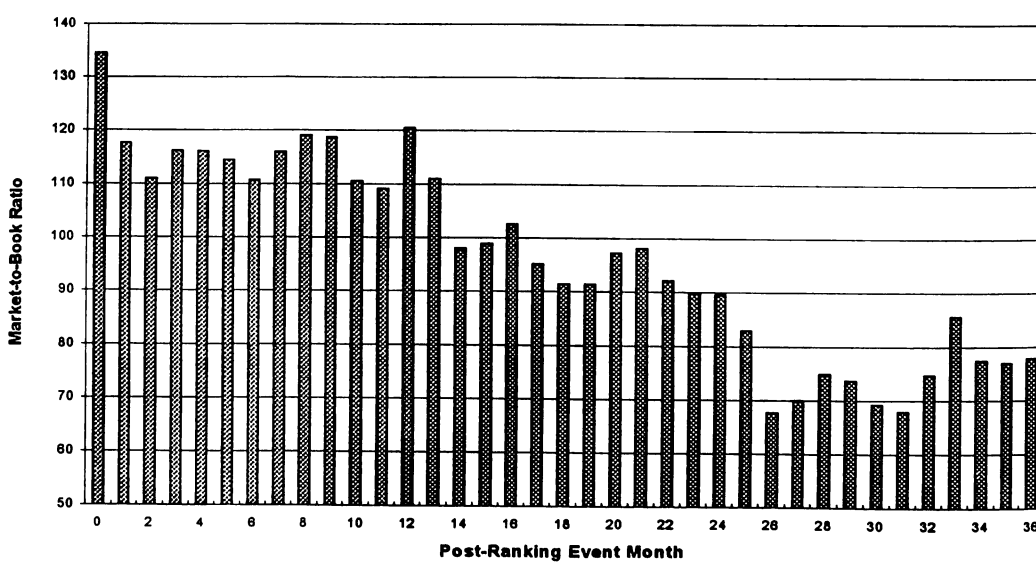

Exhibit 2
Evolution of Market-to-Book Ratios

VI. ANALYSIS OF RESULTS

Systematic Risk of Sample Firms

In order to select the proper risk-adjustment procedure when calculating abnormal returns, it is necessary to test for the level of systematic risk (beta) in the sample firms. Beta is a measurement of the sensitivity of a company's stock price to the overall fluctuations in the stock market, proxied here by the Standard & Poor's 500 Index Price for Industrial Companies. Beta is calculated here for a 5-year (60-month) time period, ending in the ranking month. If less price history is available, beta is calculated for as few as 24 months. Total monthly returns, including dividends received, are used in the calculation. The resulting average betas for each event month around the ranking date are presented in Exhibit 3. Betas are shown to range from 1.25 to 1.43, significantly greater than the market average of 1.00 at the 1% level of significance. These figures support hypothesis 1 and, by direct implication, the use of risk-adjusted returns in complement to the simpler market adjustment, which would be upward-biased in this case.

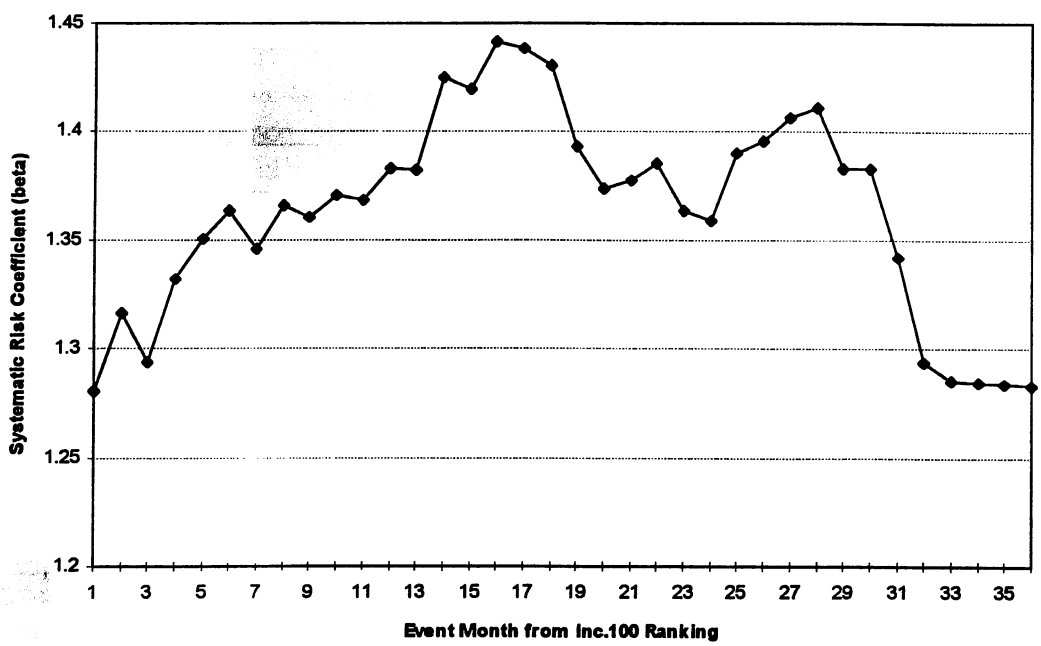

Exhibit 3
Event-Time Evolution of Sample Firms' Systematic Risk Coefficient (Beta)

Monthly Abnormal Returns

The next step in the analysis consists in estimating the monthly abnormal returns in the post-ranking period. To facilitate the analysis, cumulative abnormal returns are reported in Exhibit 4 for a 36-month post-ranking period. Two features stand out in the long-term performance of the shares.

First of all, the Inc.100 rankings are followed by a significant dip, or a period of abnormally negative returns. This temporary underperformance is particularly evident when using the risk-adjusted returns and appears to last for about 10 to 12 months following the rankings. This evidence would tend to support the notion that shares appearing in the Inc.100 rankings may be overbought by investors chasing the next hot company, resulting in prices that are not sustainable over time. The inevitable market correction results in the negative abnormal returns observed through month 10.

Second, following these negative returns, firms tend to experience statistically significant positive abnormal returns. This evidence would tend to support an alternative interpretation: that the market is actually underestimating the future growth potential of the firms listed in the rankings or overestimating their risk and, accordingly, systematically underpricing them. Strategies based

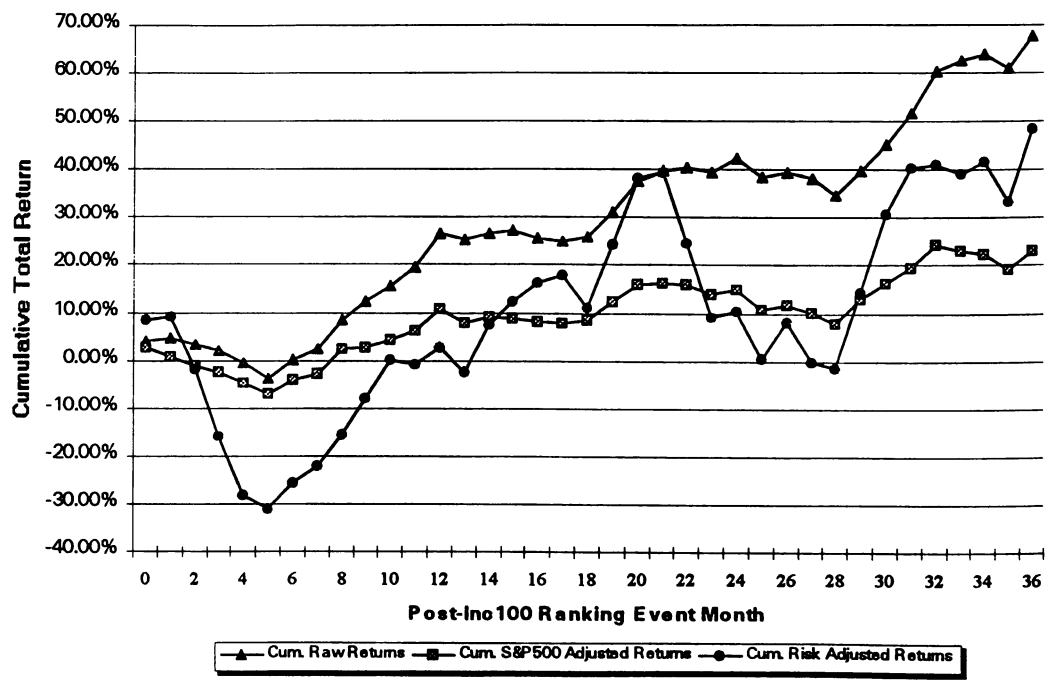

Exhibit 4
Cumulative Abnormal Returns for Inc. 100 Ranked Firms

on purchasing stocks listed in the Inc.100 rankings in the month of the ranking and holding them over 36 months thus generate raw returns of approximately 68% over the period, or some 40% in excess of what would have been expected given the level of risk assumed in the strategy. The *t*-tests for the most conservative of the adjustments, the market-model based correction, indicate that the abnormal returns for the first 36 post-ranking months are significant at the 1% level of confidence.

Keeping in mind the limitations due to the fact that this approach jointly tests the return-generating process and market efficiency itself, these positive cumulative abnormal returns would still tend to support the apparent inability of the market to properly price supergrowth stocks, leaving opportunities for arbitrage profits, either short-selling the list over a short horizon (about 6 months) or buying the stocks and holding them over the long term (up to 36 months).

A critical factor to consider in implementing such simple arbitrage strategies is whether or not the pattern of long-term underpricing is robust with respect to the year of the ranking. To formally test for such factor, long-term cumulative abnormal returns were first analyzed on a year-by-year basis for the same sample of Inc.100-ranked firms. The results of the analyses using unadjusted raw returns indicate that even though the pattern seems present in almost all ranking years, the 1985, 1986 and 1987 cohorts would not have been such great investments over the 36-month horizon considered here. These three cohort years actually include the effect of the broader 1987 stock market crash in their long-term performance.

As mentioned earlier, raw returns are not a proper measure to account for the systematic risk of these supergrowth firms. Exhibit 5 presents the same information but on a market-adjusted basis. Once again, the cohort years 1984, 1985, 1986 and 1987 seem to have been affected by the 1987 stock market crash.

Regression Analyses

The empirical analyses performed above pertain to determining to what extent simple strategies based on public information, in this case the Inc.100 ranking of the fastest growing public companies in America, could be used to generate returns in excess of what a normal risk/return relationship would require. Such deviations are interpreted as supporting the inability of the market to properly price stocks characterized by high systematic risks (beta) and extremely large historical growth rates.

A final step involves the investigation of the factors that may explain the abnormal returns observed in a classic regression methodology. Possible

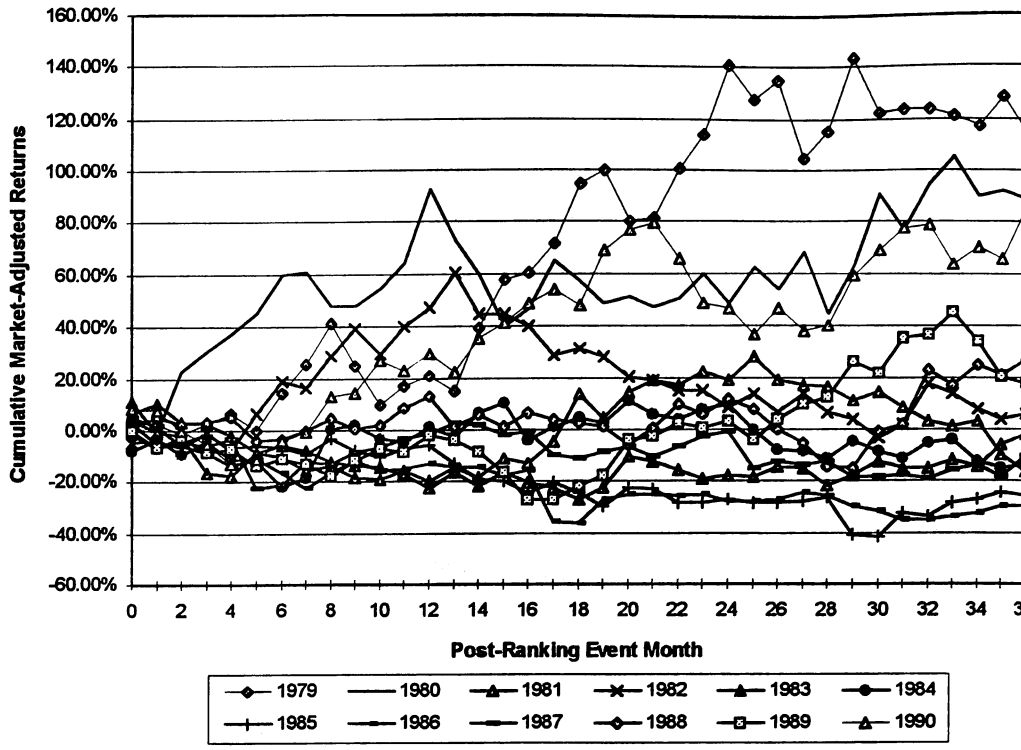

Figure 5.
Cumulative Market-Adjusted Abnormal Returns by Ranking Year

explanatory factors for the cumulative abnormal returns over the 36 months post-ranking period include the growth in sales over the previous 5 years (GSALES5), the growth in net income (GNI5), the growth in the number of employees (GEMPLOY5), the market-to-book ratio at the time of the ranking (MKBKR0), the price-earning ratio at the time of the ranking (PEM0), the owner's salary (SALARY) or equity ownership (EQUITY) in the firm, and whether the current CEO is also the company founder (CEOFD).

To investigate the possible existence of a multicolinearity problem, the Pearson correlation coefficients between factors are presented in Exhibit 6 with the degrees of confidence for rejection of H_0 : the coefficient of correlation is equal to zero. As anticipated, a number of the variables appear to be correlated significantly, such as GSALES5, GNI5, and GEMPLOY5. On the other hand, SALARY and EQUITY appear to be less correlated. Both market-to-book and price-to-earning ratios have little correlation with the other factors and have not been included in the table.

With this multicolinearity problem, it is difficult to evaluate the real explanatory power of each of the correlated variables on the long-term

Exhibit 6
Person Correlation Coefficient and Significance Levels

	GSALES5	*GNI5*	*GEMPLOY5*	*SALARY*	*EQUITY*
GSALES5	1.000	0.365	0.434	0.032	-0.081
	0.000	0.000	0.000	0.657	0.103
GNI5		1.000	0.363	0.203	0.100
		0.000	0.000	0.054	0.147
GEMPLOY5			1.000	0.141	0.125
			0.000	0.051	0.011
SALARY				1.000	0.038
				0.000	0.602
EQUITY					1.000
					0.000

performance of the supergrowth firms in the sample. None of the regressions performed, with either single explanatory factors or combinations thereof, indicate significant relationships. In other words, none of the growth-related historical factors, such as past growth in earnings, sales, net income, employment, or time of ranking appear to significantly determine the stock price performance following the Inc.100 rankings. The two forward-looking variables (market-to-book and price-to-earning ratios at the time of ranking) usually appear in the regressions with negative coefficients, indicating that the firms with the largest ratios actually did worse on the long-term performance variable, but none of these coefficients are statistically different from zero. Hypothesis 3 does not seem to be supported.

VII. CONCLUSIONS

The initial objective of the study was to determine the extent to which the market is able to properly price stocks characterized by very high historical growth rates. A number of arguments can be made to support possible market inefficiencies under these limit conditions. The finance literature focuses on the importance of growth rates and systematic risk in pricing shares, both factors which are likely to be difficult to evaluate for firms having experienced explosive growth in the previous five years. The psychology literature, and in particular, its subset studying human inferences and its biases, highlights the tendency for individuals to diverge from pure rationality, for example by attributing larger probabilities than deserved to events relatively close in time to the present. In other words, humans may not be perfect Bayesian updaters, letting a number of biases taint their inferential processes.

In order to test market efficiency in these conditions, the returns to simple investment portfolio strategies based on public information are investigated.

The portfolios consist of shares in the firms listed in the Inc.100 Ranking of the fastest growing public companies in America. These portfolios are assembled when the rankings are published and held for various lengths of time. The analyses conducted here indicate that significant abnormal returns are generated for these strategies in excess of what would normally be required to compensate for the level of risk incurred. Although the tests could potentially be affected by a form of survivorship bias, supplementary cohort analyses indicate that this is unlikely to be the case. Cross-sectional regressions were not able to single out significant explanatory factors for the long-term performance of these investment strategies.

The results of this study are relevant for both investors and issuers. If indeed the market is not able to properly price high-growth entities, a fact long theorized by growth and new venture specialists, then significant abnormal returns could be earned following simple trading rules. From a company standpoint, such inefficiencies indicate the possibility of windows of opportunity in the market for issuing new shares, a view again long-supported by investment bankers and issuers alike. In other words, periods of overpricing and underpricing of shares may exist, justifying the recourse to, respectively, new issuances or stock repurchases.

The existence of pockets of inefficiency in the market in its high-growth segments puts a serious cap on the generally accepted concept of efficiency as a whole. If indeed the market is efficient under reasonable conditions, deviations from that norm (such as those resulting from explosive growth, bankruptcies, liquidations, major catastrophes, etc.) seem to quickly stretch the ability of the market to analyze and incorporate the new information into the prices. These delayed responses or mispricings open up the door to strategic behavior by issuers and investors alike, something most financial actors have long supported but could not be accommodated by the classical market efficiency paradigm.

It is important also to recognize a number of problems with the analyses performed here. First of all, the existence of abnormal portfolio returns could be due either to market inefficiency or the misspecification of the return generating process. The latter is even more likely given the high level of systematic risk of the securities involved. Second, the regression results are tainted by the lack of availability of information on some of the explanatory variables. The resulting selection bias could not be quantified.

NOTES

1. The lapse was acknowledged by Inc. magazine's research manager for both the Inc.500 and the Inc.100 annual surveys.
2. Or a minimum of 24 months if data are not available for the whole 60 months.

3. Ownership information for the years prior to 1988 is not available.

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