Are there Simple Indicators as to Which IPOs Outperform the Market over the Long Term?

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Authors' contributions

This work was carried out in collaboration between both authors. Authors DEV and BM collaborated throughout the research, data collection and writing of this study. Both authors have read and approved the final manuscript.

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ABSTRACT

Aims: Most companies making an Initial Public Offering (IPO) underperform the market over the long term. Is this because investors are so enamored with IPOs that hope triumphs analysis? If investors are willing to invest in companies likely to underperform the market, someone will take them public. This raises the question as to whether there are simple indicators that can be used to identify IPOs likely to under or over perform the market over the long term.
Place and Duration of Study: This study is based on publically available information on Compustat, Hoovers On-line IPO Central, and the US Securities and Exchange Commission website www.sec.gov.
Methodology: This study analyzes the long term performance of 820 companies that went public in the United States from 1998 to 2007 and tracks their performance for an average of three and a half years. About 48.41% beat market returns defined as the Standard & Poor's 500. Companies with the best and worst quintile of Underwriter Reputation, Assets, Revenue, EBITDA and EBITDA to Assets where compared, as were industries.
Results: The following factors were found to be statistically significant in identifying IPOs likely to outperform the market: (i) Underwriter Reputation (P <.01), (ii) Industry statistical significance varies among the 17 industries in the study, (iii) Assets (P <.01), (iv) Revenue (P<.01), (v) EBITDA (P <.01), and (vi) the ratio of EBITDA to Assets (P <.01). Simulation analysis using the Wilcoxon Sign Rank test confirms that by avoiding companies likely to underperform, a superior portfolio of IPO companies can be constructed (P = .05).

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Conclusion: This study found there are simple indicators for identifying IPO companies likely to outperform the market. No prediction is made as to specific companies, but results can be used to construct superior portfolios.

1. INTRODUCTION

Who benefits from Initial Public Offerings (IPOs)? Is it just insiders and investment banks that harvest profits and get out? Insiders, those who started and built the company and early investors often sell out at many times their invested capital. Investment bank fees can range from millions to hundreds of millions. Institutional investors that purchase at the IPO price harvest additional millions by flipping stock after the first day "pop." But, what about long term investors? Work by Carter [1], Ritter [2] and Loughran [3] documents the long term underperformance of companies' post-IPO which implies a loss of value.

There is, however, another hypothesis; and that is market underperformance represents the triumph of hope over analysis. As long as the public is willing to purchase inferior goods at above market prices someone will supply those goods. This may be as true for IPOs as it is for merchandise. It could be that investors are so enamored with IPOs that they neglect meaningful analysis. This leads to the question of whether there are reliable, straight-forward performance indicators that are being ignored.

This study analyzes the long term performance of 820 companies that went public in the United States over the ten year period from 1998 to 2007. Their performance as public companies was followed for an average of three and a half years. About 48.41% beat the market over that period. The market was defined as the Standard & Poor's 500.

Underwriter reputation, industry, and selected financial indicators were found predictive of which companies would outperform. Yet slightly more than half of IPOs underperformed, so at least some investors may be relying on hope more than analysis.

The contributions of this study are to (i) test for straight-forward means of separating long term winners and losers, and (ii) confirm the efficacy of such means with a portfolio simulation.

2. METHODOLOGY

2.1 Literature Review

Research has found that average post-IPO performance declines over the long term. This decline has been observed in return on assets, the ratio of cash flow to assets, in market to book value, price to earnings ratio, in earnings per share [4] and operating performance [5]. Declines in IPO performance have occurred internationally [6]. The three-year under-performance of IPO stocks has been found to be about 20% relative to the market [1] and about 29% relative to matching firms [2]. Over a five-year period, IPOs were found to have an annual return of 5% versus 12% for matching firms [3]. One reason postulated for the decline is that insiders pursue opportunistic behavior at the expense of outsiders [4].

Insiders may also time an IPO so it occurs after achieving favorable performance that cannot be sustained [5].

In summary, the literature seems to support the conclusion that long term investors, those who ultimately provide the capital for companies to expand, and for economies to grow, seem to be net losers. But, confidence in markets can be restored if investors have clear simple rules to gauge which IPOs are likely to outperform the market and which are not.

2.2 Data

Hoovers Online - IPO Central [7] was used to generate a list of United States companies going public. Financial data were extracted from Compustat [8].

Carter [1,9,10] and Chan [11] hypothesized that Underwriter Reputation may be a critical predictor of success because the best underwriters tend to attract the best companies while screening out companies that are not likely to perform. The lead underwriter for U.S. IPOs is found in the SEC registration statement, usually Form S-1 or SB-2 available on the SEC website www.sec.gov. Underwriter reputation was added from Professor Ritter's underwriter ranking website [12].

Companies were classified by industry using the Fama and French Industry Classification system [13,14,15] and then aggregated into larger Industry Groups as shown in Appendix A. A total of 820 IPO firms survived three full years of operations as public companies.

IPO yield is the compound annual return from the IPO offer price to the closing price December 31 of the third full year of public company operations plus dividends from the IPO date to the closing date as shown in equation (1).

$$\text{IPO Yield} = ((\text{Close Price} + \text{Dividends})/\text{Offer Price})^{(1/3.5)} - 1) \qquad (1)$$

The period over which the compounding occurs is 3.5 years which consists of three full years of operations as a public company plus a half for the IPO year following the half year convention widely used in accounting.

The compound annual yield on the S&P500 uses the same formula, but with different input data. The terms Close Price + Dividends is replaced by the S&P500 index on the same 12/31 date as the IPO stock being measured. The S&P500 value at the midpoint of the IPO year replaces the Offer Price. The period over which the yield is calculated, 3.5 years, remains the same. The dependent variable Excess Returns is the IPO Yield less the S&P500 yield for the same period.

3. RESULTS AND DISCUSSION

Table 1 IPO Data Overview summarizes the characteristics of the dependent variable Excess Returns as well as the characteristics of the independent variables Underwriter Reputation, Assets, Revenue, EBITDA, and the ratio EBITDA to Assets. These independent variables could all have been gleaned from prospectus data prior to a company going public. Quintile 1 is the upper one fifth of the data (upper meaning the best values) and Quintile 5 is the lowest (worst) fifth of the data.

Excess Returns are the return from IPO date to 12/31 of the third full year of operations as a public company less the comparable period return on the S&P500. Quintile 1 is the upper one fifth of the data (upper meaning best) and Quintile 5 is the lowest (worst) fifth of the data. Independent variables could be gleaned from the prospectus.

Table 1. IPO data overview

	Mean	Quintile 1	Median	Quintile 5
Dependent Variable				
Excess Returns	-1.88%	21.96%	-1.10%	-15.00%
Independent Variables				
Underwriter Reputation	7.869	9.001	9.001	7.001
Assets	1,698.96	793.72	182.08	65.4
Revenue	658.77	531.77	98.3	23.26
EBITDA	108.72	91.91	15.68	-6.15
EBITDA to Assets	2.96%	18.40%	16.34%	-9.23%

3.1 Underwriter Reputation

The hypothesis of Carter [1], [9], [10] that underwriter reputation is a predictor of success may be tested with a binomial distribution. Professor Ritter has developed an underwriter reputation rating system [12]. The maximum rating in that system is 9.001. About 471 of the 820 IPOs in this study were taken public by underwriters with a 9.001 rating. The remaining 349 companies were taken public by lower rated underwriters.

3.1.1 Hypothesis I

IPOs with a higher underwriter rating will not have a higher long term performance than companies with a lower underwriter rating.

Of the 471 companies taken public by the highest rated underwriters, 240 or about 50.96% outperformed the market. Of the 349 taken public by lower rated underwriters 157 or about 44.99% outperformed the market. Data for the binomial distribution is summarized in Table 2 Underwriter Reputation.

The lead underwriter for every IPO is in the prospectus. Underwriter reputation is based on Professor Ritter's underwriter classification system. The maximum underwriter rating is 9.001.

Table 2. Underwriter reputation

Condition	n	Number of companies beating the market	Percent companies beating the market
IPOs with Underwriter Reputation = 9.001	471	240	50.96%
IPOs with Underwriter Reputation <9.001	349	157	44.99%
Totals	*820*	*397*	*48.41%*

Equation (2) was used to compute the binomial distribution. Where P is the percentage of highly rated underwriters that outperformed the S&P500, Pi is the percentage of less highly

rated underwriters that outperformed the market and n is the number of companies taken public by the highest rated underwriters. These data produces a Z value of -2.5916 (P <.01).

$$Z = (P_i - P) / ((P \times (1 - P) / n)^{.5}) \qquad (2)$$

Hypothesis I must be rejected. There is a statistically significant difference between the long term IPO performance of companies taken public by the highest rated underwriters as compared to all other underwriters. The fact that so much is invested in companies with less than the highest rated underwriters is some evidence that underwriter reputation is either being ignored or inappropriately discounted.

3.2 Industry Analysis

There are striking differences in IPO performance by industry as shown in Table 3 Industry Analysis. Insurance industry IPOs outperformed the market 83.33% of the time; utilities outperformed 75.00% of the time, and Energy outperformed 65.00% of the time. By contrast, Telecommunications IPOs only outperformed the market 37.14% of the time, Business Services only outperformed 38.75% and Lab and Medical Equipment only outperformed 39.13% of the time.

Table 3. Industry analysis

Industry group	n	Average revenue	Average assets	Mean excess	Companies beating the market	Percent beating the market
Banks (Bnk)	39	382.8	2,641.4	10.33%	21	53.85%
Business Services (BSv)	157	239.7	419.0	-8.82%	61	38.85%
Chips (Chp)	59	244.5	303.1	-1.68%	28	47.46%
Computers (Com)	50	263.9	247.8	-2.58%	24	48.00%
Cons. Discretionary (Des)	40	559.4	682.9	0.10%	19	47.50%
Drugs (Drg)	66	48.5	154.7	-1.10%	30	45.45%
Energy (Egy)	40	711.1	911.4	7.36%	26	65.00%
Financial (Fin) [i]	59	767.2	5,883.8	2.78%	31	52.54%
Industrial (Ind)	64	1,224.7	1,289.5	-3.01%	30	46.88%
Insurance (Ins) [ii]	30	70,356.4	448,968.3	12.46%	25	83.33%
Lab & Medical Equip. (Lab)	46	248.8	265.2	-6.63%	18	39.13%
Personal Services (PSv)	15	172.3	129.7	-0.19%	8	53.33%
Retail & Wholesale (ReW)	58	806.1	336.2	5.29%	28	48.28%
Consumer Staples (Sta) [iii]	25	1,941.7	73,281.0	-6.23%	10	40.00%
Telecommunications (Tel)	35	464.5	1,554.5	-10.42%	13	37.14%
Transportation (Trn)	21	1,801.6	1,602.7	3.99%	13	61.90%
Utilities (Utl)	16	3,035.1	3,065.7	9.49%	12	75.00%
Total	*820*				*397*	*48.41%*

[i] Goldman Sachs accounted for $250.2B of assets in this group or about 72.7% ($250.2B / $344.58B).

[ii] MetLife and Genworth Financial accounted for $255.0B and $103.9B of assets in this group respectively or about 79.9% of assets ($358.9B/$449.0B).

[iii] Mondelez International, formerly Kraft Foods, accounted for $55.8B of assets in this group or about 76.1% ($55.8B/$73.3B).

3.2.1 Hypothesis II

There are no statistically significant differences in long term post IPO performance among companies in different industries.

Companies were originally classified using the Fama and French system and then aggregated into larger industry groups. The market is defined as the comparable period returns on the S&P500.

Table 4 Differences by Industry, shows there are statistically significant differences in long term performance among industries. This is probably due to differences in industry business models and how industries are regulated. Statistical significance was computed using the binomial distribution shown in equation (2).

Table 4. Differences by industry

Part I								
Industry	**Bnk**	**BSv**	**Chp**	**Com**	**Des**	**Drg**	**Egy**	**Fin**
Banks (Bnk)	NA							
Business Services (BSv)	.03	NA						
Chips (Chp)	.21	.01	NA					
Computers (Com)	.23	<.01	.47	NA				
Consumer Discretionary (Des)	.21	<.01	.50	.47	NA			
Drugs (Drg)	.15	.04	.38	.36	.40	NA		
Energy (Egy)	.08	<.01	<.01	<.01	<.01	<.01	NA	
Financial (Fin) [i]	.48	<.01	.22	.26	.26	.12	.05	NA
Industrial (Ind)	.19	.02	.46	.44	.47	.41	<.01	.19
Insurance (Ins) [ii]	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Lab & Medical Equip. (Lab)	.03	.47	.10	.10	.14	.15	<.01	.02
Personal Services (PSv)	.48	<.01	.46	.23	.23	.10	.06	.45
Retail & Wholesale (ReW)	.24	<.01	.10	.48	.32	.32	.01	.25
Consumer Staples (Sta) [iii]	.04	.40	.13	.13	.17	.19	<.01	.03
Telecommunications (Tel)	.02	.33	.06	.06	.10	.09	<.01	<.01
Transportation (Trn)	.16	<.01	.01	.02	.03	<.01	.34	.07
Utilities (Utl)	<.01	<.01	<.01	<.01	<.01	<.01	.09	<.01
Part II								
Industry	**Ind**	**Ins**	**Lab**	**PSv**	**ReW**	**Sta**	**Tel**	**Trn**
Industrial (Ind)	NA							
Insurance (Ins) [ii]	<.01	NA						
Lab & Medical Equip. (Lab)	.11	<.01	NA					
Personal Services (PSv)	.15	<.01	.02	NA				
Retail & Wholesale (ReW)	.25	<.01	.10	.35	NA			
Consumer Staples (Sta) [iii]	.14	<.01	.45	.46	.10	NA		
Telecommunications (Tel)	.06	<.01	.39	.10	.05	.39	NA	
Transportation (Trn)	<.01	<.01	<.01	.25	.02	.01	<.01	NA
Utilities (Utl)	<.01	.11	<.01	.05	<.01	<.01	<.01	.11

[i] Goldman Sachs accounted for $250.2B of assets in this group or about 72.7% ($250.2B / $344.58B).
[ii] MetLife and Genworth Financial accounted for $255.0B and $103.9B of assets in this group respectively or about 79.9% of assets ($358.9B/$449.0B).
[iii] Mondelez International, formerly Kraft Foods, accounted for $55.8B of assets in this group or about 76.1% ($55.8B/$73.3B).

Companies were originally classified using the Fama and French system and then aggregated into larger industry groups. The percentage of each industry group that outperformed the market was computed. A binomial distribution was used to determine whether there were statistically significant differences among industry groups. Table entries are P values.

Hypothesis II must be rejected. There are statistically significant differences in long term IPO performance among industries based on the percentage of companies that outperformed the market as detailed in Table 3 Industry Analysis. Industry selection is therefore an important factor in creating a portfolio of IPO companies. The fact that industry performance varies so widely indicates this variable may have been ignored or inappropriately discounted as an indicator of likely performance.

3.3 Financial Data

Financial data provide relatively simple straight-forward clues as to which companies are likely to outperform the market and which are not. But unlike Underwriter Reputation which is the highest or not, or industry which is binary (Insurance or Not Insurance, Transportation or Not Transportation), financial data are continuous.

Line drawing and selection of cutoff points is a recurring problem in research involving continuous variables. In medical research, one approach is to compare two different, non-adjoining sub-sets of data. For example, a recently published study in *Neurology* [16] compared stroke risk in a group of men with the highest quartile of lycopene to the stroke risk in men in the lowest quartile of lycopene. Based on this analysis they were able to forecast that high levels of lycopene decreased the risk of stroke in the study population. A similar approach is used to analyze whether financial data are predictive as shown in Table 5 Analysis of Financial Variables. The highest (best) and lowest (worst) quintiles were compared based on the percentage of each quintile that outperformed the market. A binomial distribution was used to compute statistical significance as shown in equation (2).

3.3.1 Hypothesis III

IPOS with the highest Assets, Revenue, EBITDA and ratio of EBITDA to Assets will not have a higher long term performance than companies with the lowest Assets, Revenue, EBITDA and ratio of EBITDA to Assets.

Table 5. Analysis of financial variables

Variable	Quintile 1		Quintile 5		Z	P
	Number beating S&P500	Percent beating S&P500	Number beating S&P500	Percent beating S&P500		
Assets	99	60.37%	52	31.71%	7.8870	<.01
Revenue	95	57.93%	45	27.44%	8.7501	<.01
EBITDA	97	59.15%	44	26.83%	9.3407	<.01
EBITDA to Assets	97	59.15%	46	28.05%	8.8649	<.01

Quintile 1 contains the highest (best) values for a given variable; Quintile 5 contains the lowest (worst) values. There are 820 IPOs in this study; each quintile contains 164 companies.

The fifth of companies with the most assets (Quintile 1) outperforms the fifth of companies with the lowest assets (Quintile 5) at statistically significant levels (P <.01). It could be that high asset companies have economies of scale, market power, and more resources to fall back on during economic downturns or if they make a strategic error. Speculation as to why high asset companies tend to outperform the market could be the subject of other research. This study focuses on whether financial clues are being ignored or discounted inappropriately.

Companies in the upper quintile of Revenue, EBITDA and the ratio of EBITA to Assets also outperform those in the lowest quintile by statistically significant margins. EBITDA is Earnings Before Interest, Taxes, Depreciation and Amortization. It can be thought of as an estimate of cash generated by operations.

Hypothesis III must be rejected because there are statistically significant differences among the long term post-IPO performance of companies based on financial indicators of Assets, Revenue, EBITDA and the ratio of EBITDA to Assets as shown in Table 5 Analysis of Financial Indicators.

People continue to invest in IPO companies that are not likely to outperform the market. This provides some evidence that available performance indicators are being ignored or discounted, and suggests that hope and enthusiasm for IPOs triumphs over analysis.

3.4 Simulation Analysis

When constructing a portfolio, picking winners is hard, uncertain work. But by avoiding investment in inferior companies, the mean return on a portfolio of IPOs will rise. If portfolio returns can be improved by avoiding the low quintile of selected values, those effects should show up in a simulation analysis. Tables 3 and 4 indicate that performance varies significantly by industry. So, for simulation analysis to be meaningful, it must be done on an industry by industry basis.

3.4.1 Hypothesis IV

There are no statistically significant differences between portfolios consisting of all IPOs in an industry and a portfolio in which the IPOs with the lowest quintile of selected variables were avoided for that industry.

Table 6 Return Simulation compares the return of a portfolio of all companies in a given industry to returns for portfolios of companies in which the low quintile of a given variable had been avoided. For example, the Chips (Chp) industry had Excess Returns of -1.68% when all Chp IPOs were considered meaning it would have underperformed the market by 1.68%. However, if IPOs with the lowest quintile of Underwriter Reputation had been avoided, Excess Returns would have been 1.60%. If companies in the lowest quintile of Assets had been avoided, underperformance could have been reduced to -1.05%. If companies in the lowest quintile of Revenue, EBITDA and EBITDA to Assets had been avoided, excess returns would have risen to 2.59%, 2.24% and 2.18% respectively.

This table compares the Excess Returns on a portfolio of all IPOs in a given industry to the Excess Returns of theoretical portfolios of companies in which the lowest quintile of Underwriter Reputation, Assets, Revenue, EBITDA and EBITDA to Assets had been

avoided. Excess Returns are defined as the three and a half year yield on an IPO less the yield on the comparable period S&P500.

Avoiding the low quintile of selected variables does not always improve portfolio performance, for example, avoiding the low quintile of Underwriter Reputation or Assets for Bank IPOs would have lowered the resulting portfolio. On the other hand, avoiding bank IPOs with the low quintile of Revenue, EBITDA and EBITDA to Assets would have improved a portfolio of Bank IPOs. Across all industries, avoiding the lowest quintile of a given variable would have raised average portfolio performance 73 out of 85 times or about 85.9%. If only Assets, Revenue and EBITDA were considered, avoiding the low quintile of these variables would have increased portfolio performance 50 out of 51 times or about 98.0% of the time.

Table 6. Return simulation

| Industry group | n | ---------Return if lowest values avoided------------ | | | | | |
		All IPOs	Underwriter reputation	Assets	Revenue	EBITDA	EBITDA to assets
Banks (Bnk)	39	10.33%	4.75%	9.64%	11.77%	10.38%	10.70%
Business Services (BSv)	157	-8.82%	-6.07%	-5.50%	-5.29%	-4.70%	-4.32%
Chips (Chp)	59	-1.68%	1.60%	-1.05%	2.59%	2.24%	2.18%
Computers (Com)	50	-2.58%	-5.66%	-1.49%	-0.95%	-1.58%	-2.89%
Consumer Discretionary (Des)	40	0.10%	6.15%	0.86%	-1.47%	-0.38%	-1.57%
Drugs (Drg)	66	-1.10%	3.39%	0.14%	-0.53%	-1.51%	-2.09%
Energy (Egy)	40	7.36%	9.07%	10.08%	9.26%	10.23%	9.75%
Financial (Fin) [i]	59	2.78%	5.02%	5.97%	5.55%	3.82%	6.37%
Industrial (Ind)	64	-3.01%	5.16%	1.25%	2.73%	4.92%	5.24%
Insurance (Ins) [ii]	30	12.46%	13.61%	14.25%	15.96%	18.36%	18.66%
Lab & Medical Equip (Lab)	46	-6.63%	-7.88%	-5.41%	-1.95%	-2.47%	-5.67%
Personal Services (PSv)	15	-0.19%	1.77%	3.52%	10.53%	9.65%	9.65%
Retail & Wholesale (ReW)	58	-5.29%	-5.72%	-3.42%	-3.08%	-2.24%	-3.06%
Consumer Staples (Sta) [iii]	25	-6.23%	-7.71%	-4.90%	-0.84%	0.96%	-0.95%
Telecommunications (Tel)	35	**-**10.42%	-7.14%	-10.10%	-9.86%	-9.21%	-9.21%
Transportation (Trn)	21	3.99%	11.28%	9.88%	10.87%	12.24%	7.56%
Utilities (Utl)	16	9.49%	10.39%	10.39%	9.83%	10.45%	14.36%
Total	820						

[i] Goldman Sachs accounted for $250.2B of assets in this group or about 72.7% ($250.2B / $344.58B).
[ii] MetLife and Genworth Financial accounted for $255.0B and $103.9B of assets in this group respectively or about 79.9% of assets ($358.9B/$449.0B).
[iii] Mondelez International, formerly Kraft Foods, accounted for $55.8B of assets in this group or about 76.1% ($55.8B/$73.3B).

A Wilcoxon Sign Rank Test can be used to determine whether improvements in industry portfolios are statistically significant. A Wilcoxon Sign Rank test requires pairs of variables. For example, the Excess Returns for all Industrial IPOs (-3.01%) was paired with the Excess Returns for a portfolio of Industrial IPOs when investments in companies with the low quintile of Underwriter Reputation was avoided (5.16%). This procedure was repeated for all 17 industry groups. The differences were computed. The absolute value of the differences

ranked and the signs returned to the ranked numbers. Positive and negative ranks are separately summed. The Rank Sum is the absolute value of the ranks. The Wilcoxon parameter T is the maximum value that the smaller of the two Rank Sums may have at any given level of significance [17]. This procedure was repeated for Assets, Revenue, EBITDA and EBITDA to Assets. The result was five tests of statistical significance summarized in Table 7 Return Simulation Statistical Significance.

Table 7. Return simulation statistical significance

Quintile 5 variable avoided	Rank sum	T	P
Underwriter Reputation	34	41	.05
Assets	3	27	<.01
Revenue	5	27	<.01
EBITDA	5	27	<.01
EBITDA to Revenue	11	27	<.01

The issue is whether there is a statistically significant difference between a portfolio of all companies in an industry and a portfolio in which the low quintile of an attribute was avoided. This table summarizes the results of five separate Wilcoxon Sign Rank Tests, one each for the variables Underwriter Reputation, Assets, Revenue, EBITDA and EBITDA to Assets. Sign Rank Tests require pairs of variables. For each industry Excess Returns for a portfolio of all IPOs was paired with a portfolio of IPOs where the lowest ranks of a particular variable was avoided. T is the absolute value of the smaller of the two sums. N=17 for 17 Industries. As can be seen from Table 7 avoiding IPOs in the lowest quintile of Underwriter Reputation, Assets, Revenue, EBITDA and EBITDA to Assets provides a statistically significant improvement in portfolio returns. Hypothesis IV must therefore be rejected.

While Table 6 shows that avoiding investment in the lowest rank of companies with selected variables usually raises industry portfolio performance, Table 8 shows that improving an industry's portfolio performance may not be enough to outperform the market. For example, a portfolio of all Bank IPOs outperforms the market 53.85% of the time, whereas a portfolio that avoided underwriters in the lowest quintile of reputation would have only outperformed the market 45.16% of the time. Overall, avoiding IPOs with the low quintile of variables in this study would have enabled the resulting portfolios to beat the market 51 of 85 times or about 60.0%.

This table analyzes to extent to which IPOs would have outperformed the S&P500 if IPOs with the lowest quintile of Underwriter Reputation, Assets, Revenue, EBITDA and ratio of EBITDA to Assets had been avoided. Only one of the five variables was considered at a time.

Table 8. Outperform simulation

| Industry group | n | --------All IPOs-------- | | ---Percent beating the market if low values avoided--- | | | | |
		Number beating market	Percent beating market	Underwriter reputation	Assets	Revenue	EBITDA	EBITDA to assets
Banks (Bnk)	39	21	53.85%	45.16%	54.84%	54.84%	54.84%	54.84%
Business Services (BSv)	157	61	38.85%	42.06%	43.65%	43.65%	43.65%	43.65%
Chips (Chp)	59	28	47.46%	53.19%	51.06%	57.45%	55.32%	55.32%
Computers (Com)	50	24	48.00%	45.00%	52.50%	50.00%	52.50%	47.50%
Consumer Discretionary (Des)	40	19	47.50%	56.25%	50.00%	46.88%	46.88%	46.88%
Drugs (Drg)	66	30	45.45%	54.72%	47.17%	49.06%	43.40%	43.40%
Energy (Egy)	40	26	65.00%	65.63%	68.75%	65.63%	65.63%	65.63%
Financial (Fin) [i]	59	31	52.54%	55.32%	61.70%	55.32%	53.19%	61.70%
Industrial (Ind)	64	30	46.88%	56.86%	52.94%	54.90%	56.86%	56.86%
Insurance (Ins) [ii]	30	25	83.33%	87.50%	87.50%	91.67%	95.83%	95.83%
Lab & Medical Equip (Lab)	46	18	39.13%	40.54%	40.54%	43.24%	43.24%	37.84%
Personal Services (PSv)	15	8	53.33%	58.33%	58.33%	66.67%	66.67%	66.67%
Retail & Wholesale (ReW)	58	28	48.28%	45.65%	50.00%	52.17%	52.17%	50.00%
Consumer Staples (Sta) [iii]	25	10	40.00%	40.00%	45.00%	50.00%	50.00%	50.00%
Tele-communi-cation (Tel)	35	13	37.14%	39.29%	39.29%	35.71%	39.29%	39.29%
Transport-ation (Trn)	21	13	61.90%	70.59%	64.71%	64.17%	70.59%	70.59%
Utilities (Utl)	16	12	75.00%	76.92%	76.92%	76.92%	76.92%	76.92%
Total	820	397	48.41%					

[i] Goldman Sachs accounted for $250.2B of assets in this group or about 72.7% ($250.2B / $344.58B).
[ii] MetLife and Genworth Financial accounted for $255.0B and $103.9B of assets in this group respectively or about 79.9% of assets ($358.9B/$449.0B).
[iii] Mondelez International, formerly Kraft Foods, accounted for $55.8B of assets in this group or about 76.1% ($55.8B/$73.3B).

4. CONCLUSION

Prior research has found that long term post-IPO performance declines when compared to peers and the market. This result ought to discourage rational investors from investing in IPOs. However, it could be that investor enthusiasm for IPOs is so great that hope triumphs over analysis. As long as the public is willing to accept inferior goods at above market prices, someone will supply those goods. This may be the case with IPOs. This leads to the

question of whether there are clear simple rules that can differentiate between IPO firms that are likely to underperform or outperform the market.

An analysis of Excess Returns for 820 companies that went public between 1998 and 2007 found the mean return over a three and a half years period was -1.88% and the median return was -1.10%, meaning IPOs overall failed to outperform the market.

Publically available clues with statistically significant predictive power include (i) Underwriter Reputation (ii), Industry Classification, (iii) Assets, (iv) Revenue, (v) EBITDA and the (vi) the ratio of EBITDA to Assets. Companies taken public by top rated underwriters, outperform the market. Companies in selected industries such as insurance, utilities and energy outperform the market. Companies with the highest Revenue, Assets, EBITDA and ratio of EBITDA to assets also tend to outperform the market. However, no single indicator should be relied upon. The prudent person would consider multiple indicators in any analysis.

Picking winners is an uncertain business, but by avoiding losers, the performance of a portfolio of IPOs can be improved. Simulations in which the low quintile of selected variables were avoided improved the performance of the remaining industry portfolios in a statistically significant way. The overall conclusion is that there are clear simple rules as to how to construct a portfolio of IPOs that outperforms the market over the long term. These findings should give investors confidence and make it easier for management to raise capital in the public marketplace by lowering the risk of investment.

CONSENT

All data in this study is publically available. No consent needed.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX A

Standard Industrial Codes were used to classify companies into Fama and French defined industries [13]. These industries were further aggregated into 17 industry groups. Three Fama and French companies identified as Misc were reclassified into more appropriate industries based on descriptions of company operations.

Industry Group	Industry Abbreviation	Fama and French Classifications
Banks	Bnk	Banks
Business Services	BSv	Business Services
Computer Chips	Chp	Chips
Computers	Com	Computers, Miscellaneous
Consumer Discretionary	Des	Cloths, Fun, Meals, Toys
Drugs	Drg	Drugs
Energy and Coal	Egy	Energy, Coal
Financial Services	Fin	Financial, Real Estate, Miscellaneous
Industrial	Ind	Aero, Autos, Agricultural, Building Materials, Boxes, Chemicals, Construction, Electrical Equipment, Gold, Machinery , Paper, Rubber, Ships, Steel
Insurance	Ins	Insurance
Lab and Medical Equipment	Lab	Lab Equipment, Medical Equipment
Personal Services	PSv	Personnel Services
Retail and Wholesale	ReW	Retail, Wholesale
Consumer Staples	Sta	Beer, Food, Health, Household
Telecommunications	Tel	Telecommunications
Transportation	Trn	Transportation
Utilities	Util	Utilities