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Troy Strader
Drake University

Richard Carter
Iowa State University

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CHARACTERISTICS OF ONLINE SERVICE AND SOFTWARE FIRM IPOs

Troy J. Strader
Drake University
Troy.Strader@drake.edu

Richard B. Carter
Iowa State University
rbcarter@iastate.edu

ABSTRACT

Physical goods creation involves significant variable costs while online service provision and software development often do not. The objective of this study is to investigate whether these cost structure variations lead to differences in the characteristics of initial public offerings (IPOs) for traditional firms versus online service and software firms.

KEYWORDS

Initial Public Offering (IPO), Software Industry, Online Services, Cost Structure

INTRODUCTION

Initial Public Offering (IPO) studies commonly group all firms together for the purpose of identifying the factors that affect returns, risk, and likelihood of failure (see Ritter and Welch, 2002, for a synopsis of IPO research). As the number of Information Technology (IT) related products and services has grown considerably in the past decades, it has become apparent that the cost structures of these new ventures differ quite dramatically when compared with more traditional physical product manufacturing, distributing, and retailing firms. Traditional firms must manage marginal costs such as materials and labor that are very different from online service and software (OSS) firms. But does this result in differences for IPO firms across these product and service sectors? If there are differences, then perhaps IPO firms should be first categorized and then separately analyzed to predict their results. Loughran and Ritter (1997), for example, show that firms that issue seasoned securities have falling operating profit to asset ratios following the offering and are worse for the small issues. However, nearly 15% of the firms were in OSS industries. The cost structures of these firms and their product market may have been an important factor in explaining the drop in operating profit.

For companies that provide online services (e.g., America Online, eBay, career services companies, telecommunications companies, etc.), or for software development companies like Microsoft, marginal costs are low or nearly non-existent. For example, the cost for eBay to add its millionth user is nearly zero. This is a favorable situation for these firms as they grow, but the downside is that these same firms typically have a large up-front fixed cost that is incurred for offering the service or software to even one

user. Because of these differences in the relative degree of fixed versus marginal costs of doing business, there are inherent differences in each firm's risk in their early years (Wilbon 2002). More of a traditional firm's costs are incurred later as production increases while much more cost is incurred earlier by online service and software firms. Said another way, traditional firms have a better match between revenue and cost as their sales increases. This relative comparison is summarized in Table 1.

	Fixed Cost	Marginal Cost	Relative Risk
Traditional Firm	Lower	Higher	Lower
Online Service Firm	Higher	Lower	Higher
Software Firm	Higher	Lower	Higher

Table 1. Relative Cost Structures

Given the differences identified above, it would be expected that the characteristics of firms at the time of their IPO will vary according to their relative cost structures and associated risks. In fact there is evidence that differences in firm characteristics, and not market irrationality, were largely to blame for the so-called *dot-com bubble* (Ljungqvist & Wilhelm 2003). Moreover, much of the research concerning online service and software firms treat them more as *technology* firms than in a more fundamental cost-structure framework (see, for example, Schill and Zhou 2001 and Viswanathan 2005).

In this study we examine the characteristics of IPOs of OSS firms versus traditional firms as they relate to cost structure. Specifically, we address the following questions. First, are OSS firms different from traditional firms at the time of their IPOs? And second, are there differences between OSS firms themselves at the time of their IPOs? The following section provides a theoretical foundation for why there may be differences in success and failure for OSS firms versus traditional firms. Subsequent sections present the research methodology and data collected, the tests of hypotheses, and the implications and conclusions arising from the findings of this study.

A MODEL: OSS VERSUS TRADITIONAL FIRMS

A model developed by Ronnen (1991), where firms enter a quality-regulated market by choosing a particular level, can be applied to our IPOs with only minor adjustments. In the Ronnen model, minimum quality standards are imposed. Firms choose quality levels and enter the market based on their ability to expend fixed costs. If the standards are too high, such that fixed costs are beyond the means of all firms, none enter. But as the quality standards are relaxed more firms can participate. If the quality standard is low enough but the overall range narrow, firms tend to compete less on quality and more on price such that consumers, overall, are better off. Because marginal costs are exogenous in Ronnen's model it is fixed cost that prevents some firms from raising their quality level and attempting to compete with high-quality firms. Those that try to compete at a level beyond their means fail when price competition obliterates profits.

In our adaptation of the Ronnen model, the OSS firms have a minimum quality standard set, not by regulators, but based on the previously developed hardware that dominates the medium. As Ronnen argues, the minimum quality also results in consumers choosing higher quality than they would without the standard. Because marginal cost in Ronnen's model is exogenous, it plays no role in reaching equilibrium and consequently is consistent with our assumption of OSS firms' cost structures.

Ronnen's firms choose quality levels based on their ability to expend fixed costs as do our OSS firms. We can expand upon Ronnen's fixed cost assumption by recognizing that our OSS firms, like most firms,

have varying abilities to pay fixed costs which may be based upon, among other things, economies of scale, expertise, or existing resources. Hence those firms with lower fixed costs cannot compete at higher quality levels. As Ronnen shows, for those that do, subsequent price competition eventually results in failure.

As an alternative, firms choose a quality level consistent with their fixed cost. Consumers will gravitate toward firms with at least some minimum quality level which becomes the industry standard. Firms with a lower-quality product will eventually disappear. Unfortunately for these firms, exactly what that standard is may not be known at the outset.

While non-OSS firms may also have the ability to enter markets at varying quality levels based on their ability to cover fixed costs, there are two fundamental differences from the OSS firms. The first is that marginal costs play a more important role in general. As a result, in the long-run, other factors influence which firms survive and are successful. The other difference is the lack of quality standards. Hence a broader range of firms will enter the market. Because their products are not as likely to be all or nothing—the industry standard or shunned—in general they are less likely to be smaller start-ups at their IPO and less likely to need capital to continue.

We can make predictions based on the model, made formal in the following hypotheses:

- H1: OSS firms are younger at the IPO than traditional firms
- H2: Total assets for OSS firms are lower at the IPO than traditional firms
- H3: Revenues for OSS firms are lower at the IPO than traditional firms
- H4: Net income for OSS firms is lower than traditional firms
- H5: Return on assets for OSS firms are lower than traditional firms
- H6: OSS firms are riskier than traditional firms

METHODOLOGY AND DATA

The sample for the study consists of IPOs with offer dates from 1998 through 2002. IPOs issued during these years were identified from the Thomson Financial SDC database which includes all U.S. domestic IPOs. We removed unit offerings, financial institutions, closed-end funds, REITS, limited partnerships, and stocks with offering prices of less than \$2.

For each IPO we identified a set of characteristics of the offer and the firm. We focused primarily on the firm characteristics at the time of the offer. Offering particulars such as the offer price and number of shares offered were found in the SDC database. After-market prices and returns are from CRSP and accounting information is from *S&P Compustat*. After removing firms with missing data we are left with a total sample of 1,231 IPOs. As our study is an examination of the differences in characteristics between two distinct types of firms, our analysis primarily employs differences in means tests. Table 2 provides an overall summary for the sample firms for the five year period.

Characteristic	Mean	Standard Deviation
<i>Offer</i>		
Proceeds (\$million)	147.2	487.7
Offer Price (\$/share)	14.3	6.3
Shares (millions)	7.5	20.8
<i>Firm</i>		

Age	10.3	19.8
Total Assets (\$million)	2749.5	27898.8
Revenues (\$million)	913.0	5004.7
Net Income (\$million)	4.1	311.8

Table 2. Summary of 1998-2002 IPO Offer and Firm Characteristics (n=1231)

EMPIRICAL ANALYSIS: OSS VERSUS TRADITIONAL FIRM IPOs

As discussed, online service and software firms share a common cost structure where much of their cost is incurred to either implement their network infrastructure or develop the software. Costs to provide service to additional users or distribute a copy of the software are very low. Traditional firms have a more varied cost structure and are less likely to face a market with minimum quality standards. The result, detailed in the six hypotheses above, is that OSS firms are younger, smaller, riskier and less developed in terms of net income and revenues than traditional firms.

Age of the firm at the IPO, the size of the firm (total assets), and revenues have also been used to estimate risk (Ritter 1984). As a result these variables may also be estimates of risk inherent in a firm. In addition, risk may also be measured using the beta—a quantitative measure of the volatility relative to the overall market. For this study beta is measured as the slope of a regression where the return of the individual stock is regressed on the market (the equally-weighted NASDAQ index) return from 20 market days to 150 market days. The hypotheses are tested using a difference in means test. Results are summarized in Table 3.

	Online service and software firms			Traditional firms			Difference in means	
	n	mean	std	n	mean	std	t stat	sig.
Age (years)	525	5.63	6.96	706	13.81	24.95	7.308	***
Total Assets (\$million)	525	441.31	2861.49	706	4480.68	36739.74	2.513	**
Revenues (\$million)	525	158.79	946.58	706	1479.82	6517.17	4.608	***
Net Income (\$million)	525	-35.06	118.14	706	33.70	397.64	3.838	***
Return on Assets	525	-0.36	0.91	706	-0.16	0.89	3.821	***
Beta (6 months)	525	2.43	1.56	706	1.45	1.38	-11.442	***

NOTE: *** = 99%, ** = 95%

Table 3. OSS vs. Traditional Firm IPO Comparison

All six of the hypotheses are supported by the data. It is clear that the characteristics of OSS firms at the time of their IPO vary significantly from their traditional firm counterparts. Online service and software firms are younger, riskier, smaller, and less developed at the IPO in terms of revenues and net income than traditional firms.

ONLINE SERVICE VERSUS SOFTWARE FIRM IPOs

The next question to consider is whether there are differences between online service firms and software firms. It is expected that these firms should share many similarities because of their common cost structure. Online service firms and software firms should be equally risky ventures. This leads to the following additional hypotheses.

At the time of their IPO:

- H7: Online service firms and software firms have similar ages,
 H8: Total assets for online service firms are not different from software firms,
 H9: Revenues for online service firms are not different from software firms,
 H10: Net income for online service firms is not different from software firms,
 H11: Return on assets for online service firms are not different from software firms, and
 H12: Beta for online service firms is not different from software firms:

As in the previous analysis, these hypotheses are tested using a difference in means test. Results are summarized in Table 4.

	Software firms			Online service firms			Difference in means	
	n	mean	std	n	mean	std	t stat	sig.
Age (years)	182	6.75	5.44	343	5.03	7.59	-2.721	***
Total Assets (\$million)	182	231.26	981.81	343	553.83	3469.32	1.252	
Revenues (\$million)	182	152.92	788.47	343	161.95	1022.77	0.118	
Net Income (\$million)	182	-28.11	137.04	343	-38.86	106.45	-1.337	
Return on Assets	182	-0.29	0.50	343	-0.39	1.07	-1.245	
Beta (6 months)	182	2.22	1.56	343	2.53	1.60	1.800	

NOTE: *** = 99%

Table 4. Software vs. Online Service Firm IPO Comparison

The results support the six hypotheses in all but the age hypothesis. Online service firms and software firms are not significantly different when comparing total assets, revenues, net income, return on assets, or the beta measure. Software firms are older than the online service firms at the time of the IPO, but the difference of about 1.72 years is relatively small. Overall, online service firms and software firms share many of the same characteristics because of their similar cost structures.

CONCLUSIONS AND IMPLICATIONS

The primary conclusion made from this study is that cost structure does matter when categorizing firms for financial analysis. OSS firms are quite different from traditional firms at the time of their IPO. And as expected, online service firms and software firms are very similar at the time of their IPOs. The findings of this study have practical implications for financial analysts and also indicate some future directions for IPO research.

From a practical perspective, the results of this study indicate that investment analysts and underwriters must first consider cost structure when analyzing firms. There are inherent risk differences across the OSS and traditional sectors and the factors that predict various outcomes may vary accordingly. This may effect decisions to underwrite IPOs as well as buy/hold/sell recommendations.

For IPO research the next step is to investigate each firm category separately to identify whether there are differences in models that predict outcomes such as long-run return, risk, and likelihood of failure. The question to address is whether different factors significantly affect these dependent variables using results from past IPOs. Our study focuses on the 1998 through 2002 period. We chose this period because of the rapidly increasing number of OSS firms that went public. However, in the latter years this time frame includes the *dot com bubble*, a period of falling stock prices and a general decline in the number of IPOs. By expanding the period of study we can also establish a baseline for other low marginal cost firms pre-Internet to identify differences, if any, which have occurred when online service firms began to appear.

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