



Contents lists available at SciVerse ScienceDirect

Journal of Financial Economics

journal homepage: www.elsevier.com/locate/jfecInnovative efficiency and stock returns[☆]David Hirshleifer^a, Po-Hsuan Hsu^b, Dongmei Li^{c,*}^a Paul Merage School of Business, University of California, Irvine, CA, United States^b School of Economics and Finance and School of Business, University of Hong Kong, Hong Kong^c Rady School of Management, University of California, San Diego, CA, United States

ARTICLE INFO

Article history:

Received 6 December 2010

Received in revised form

28 November 2011

Accepted 22 December 2011

JEL classification:

G12

G14

O32

Keywords:

Innovative efficiency

Limited attention

Research and development

Market efficiency

ABSTRACT

We find that innovative efficiency (IE), patents or citations scaled by research and development expenditures, is a strong positive predictor of future returns after controlling for firm characteristics and risk. The IE-return relation is associated with the loading on a mispricing factor, and the high Sharpe ratio of the Efficient Minus Inefficient (EMI) portfolio suggests that mispricing plays an important role. Further tests based upon attention and uncertainty proxies suggest that limited attention contributes to the effect. The high weight of the EMI portfolio return in the tangency portfolio suggests that IE captures incremental pricing effects relative to well-known factors.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

Recent studies provide evidence suggesting that, owing to limited investor attention, prices do not fully and immediately impound the arrival of relevant public

information, especially when such information is less salient or arrives during a period of low investor attention (e.g., Klibanoff, Lamont, and Wizman, 1998; Huberman and Regev, 2001; DellaVigna and Pollet, 2009; Hirshleifer, Lim, and Teoh, 2009; Hou, Peng, and Xiong, 2009). Several papers, therefore, argue that limited attention results in underreaction and return predictability. Theoretical models also predict that limited investor attention affects stock prices and can cause market underreaction (Hirshleifer and Teoh, 2003; Hirshleifer, Lim, and Teoh, 2011; Peng and Xiong, 2006).

These studies consider the processing of news about current performance such as earnings announcements. However, we would expect investors to have even greater difficulty processing information that is less tangible and that is about firms whose future prospects are highly uncertain. For example, information about the prospects of new technologies or other innovations should be especially hard to process, because the significance of such news depends upon strategic options and major

[☆] We thank James Ang, Jan Bena, Frederick Bereskin, Lorenzo Garlappi, Joao Gomes, Bronwyn Hall, Zoran Ivković, Danling Jiang, Josef Lakonishok, Michael Lemmon, Xiaoji Lin, Alfred Liu, Siew Hong Teoh, Allan Timmermann, Sheridan Titman, Rossen Valkanov, Neng Wang, Lu Zhang, Lu Zheng, Bill Schwert (the editor), Theodore Sougiannis (the reviewer), and seminar and conference participants at the American Finance Association Annual Meeting 2012 (Chicago, IL), University of California, San Diego, the Center for Research in Security Prices (CRSP) Forum 2010 (Chicago, IL), Florida State University, the European Finance Association Annual Meeting 2011 (Stockholm, Sweden), California State University at Fullerton, the 2011 Q Group conference, and the University of Minnesota for valuable discussions and comments. We also thank Lu Zhang for sharing the investment and profitability factor returns.

* Corresponding author.

E-mail address: dongmei@ucsd.edu (D. Li).

shifts in industrial organizational structure.¹ If so, there will on average be price drift after the arrival of non-salient public news about the prospects for firms' innovations. In other words, on average there will be positive (negative) abnormal returns after good (bad) news.

In this study, we examine the relation between innovative efficiency and subsequent operating performance as well as stock returns. By innovative efficiency, we mean a firm's ability to generate patents and patent citations per dollar of research and development (R&D) investment. The denominator, R&D, measures resource input to innovation. Patents and citations are measures of innovative output, because innovations are usually officially introduced to the public in the form of approved patents. US firms have increasingly recognized the necessity to patent their innovations and, hence, have been especially active in patenting activities since the early 1980s (Hall and Ziedonis, 2001; Hall, 2005) owing to the creation of the Court of Appeals for the Federal Circuit in 1982 and several well-documented patent lawsuits (e.g., the Kodak-Polaroid case). Patents are thus the most important measure of contemporary firms' innovative output (Griliches, 1990), and they are actively traded in intellectual property markets (Lev, 2001).

A firm's past innovative efficiency can be less salient to investors than explicitly forward-looking information about the prospects for the particular R&D projects that the firm is undertaking. For example, investors devote considerable attention to analyst reports and news articles about the potential outcomes of clinical phase trials conducted by a biotech and pharmaceutical firm, while historical performance of past R&D efforts receives less media attention. According to Kahneman and Lovallo (1993, p. 17), people tend to consider the judgment or decision problem they are facing as unique and, in consequence, "neglect the statistics of the past in evaluating current plans." Kahneman and Lovallo call a focus on the uniqueness of the problem the "inside view" and a focus on relevant statistical performance data from previous trials the "outside view." An excessive focus on the inside view implies that people will tend to be over-optimistic about prospects for success when they neglect unfavorable non-salient statistical information and tend to be less optimistic, and perhaps over-pessimistic, about the prospects of success, when they neglect favorable statistical information.²

Furthermore, extensive evidence exists that individuals pay less attention to, and place less weight upon,

¹ For example, a firm might not invest in converting approved patents to final products immediately upon approval owing to capital budget constraints, extent of competition, and market demand.

² Lovallo and Kahneman (2003) emphasize that the inside view tends to promote overoptimism on the part of managers because they are required to weave scenarios, imagine events, or gauge their own levels of ability and control, all of which are susceptible to organizational pressure and cognitive biases such as overoptimism, anchoring, and competitor neglect. The argument for optimism of managers does not necessarily extend to stock investors, who have much less of a personal attachment to the firm's projects. In any case, our focus is on how the degree of optimism or pessimism varies with statistical performance information, not the overall average degree of optimism.

information that is harder to process (see, e.g., the review of Song and Schwarz, 2010). Information about innovations is hard to process, because it requires developing and applying a theory of how the economic fundamentals of a firm or its industry are changing. It also requires an analysis of the road from patents to final products on the market, the profit of which can be highly uncertain and long deferred. We would expect such hard-to-process information to be underweighted unless there is some offsetting effect (such as high salience).

These considerations suggest that investors will underreact to the information content in innovative efficiency because of the difficulty evaluating the economic implications of patents and patent citations. If so, then firms that are more efficient in innovations will be undervalued relative to firms that are less efficient in innovations. Therefore, we expect a positive relation between innovative efficiency and future stock returns and operating performance.

An alternative argument for why innovative efficiency would predict higher future returns derives from the *q*-theory (Cochrane, 1991, 1996; Liu, Whited, and Zhang, 2009). Firms with higher innovative efficiency tend to be more profitable and have higher return on assets. All else equal, the *q*-theory implies that higher profitability predicts higher returns because a high return on assets indicates that these assets were purchased by the firm at a discount (i.e., that they carry a high risk premium).

Specifically, suppose that the market for capital being purchased by a firm is competitive and efficient. When a firm makes an R&D expenditure to purchase innovative capital, the price it pays is appropriately discounted for risk. For concreteness, we can think, for example, of a firm that acquires a high-tech target at a competitive market price.³ In this scenario, a firm on average achieves higher return (large number of patents, resulting in high cash flows) on its innovative expenditures as fair compensation if its purchased innovative capital is highly risky, and it receives low return if capital is relatively low-risk. Past innovative efficiency is, therefore, a proxy for risk, so firms that have high past innovative efficiency (IE) should subsequently be productive in patenting (Dierickx and Cool, 1989) and earn higher profits and stock returns.⁴ In other words, *q*-theory also predicts a positive IE-return relation.

To test our key hypothesis that innovative efficiency is positively associated with contemporaneous stock market valuation and positively predicts future operating performance, market valuation, and stock returns, we use two measures of innovative efficiency in year *t*: patents granted in year *t* scaled by R&D capital in year *t*–2

³ Firms that make acquisitions can, under appropriate circumstances, book part of the expenditure as "in process R&D."

⁴ Other possible rational risk arguments are consistent with a positive relation between past innovative efficiency and future stock returns. A high level of innovative activity, even if successful in the past, is likely to be associated with greater economic uncertainty and possession of real options and, therefore, high risk and expected return. See, e.g., Greenwood and Jovanovic (1999), Berk, Green, and Naik (2004), Hsu (2009), Pastor and Veronesi (2009), Garleanu, Kogan, and Panageas (2012), and Garleanu, Panageas, and Yu (2012).

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات