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## The long-term performance of new product introductions

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## ABSTRACT

This study investigates the long-term stock market performance of firms following announcements of new product introductions (NPIs). We find that firms announcing NPIs experience significantly positive abnormal stock returns in the three- and five-year post-announcement periods. Further, firms' marketing capabilities and industry background, firm size, and the timing new products are introduced significantly affect shareholder gains from NPIs. The Carhart four-factor model, the zero-investment portfolio method, and the buy-and-hold return procedure yield consistent results. Our findings show that investors on average do not fully capture the valuation impact of new products nor incorporate the information contained in the initial announcements.

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## 1. Introduction

A new product introduction (NPI) is an important part of a firm's innovation. It plays a crucial role in improving firm profitability and prevents the product lines from becoming obsolete (Sok & O'Cass, 2015; Sorescu & Spanjol, 2008). Successful NPIs create opportunities for differentiation and competitive advantages that other firms are unable to duplicate (Crawford & Di Benedetto, 2003). Nevertheless, product innovations are inherently risky, suffering from a high failure rate ranging from 40% to 75% (Sok & O'Cass, 2015). Furthermore, even successful NPIs may not necessarily generate financial benefits because of the huge development costs involved and the possibility of diminishment in competitive advantages due to rapid imitation by competitors (Chuang, Morgan, & Robson, 2015). Therefore, whether or not NPIs enhance shareholder wealth in the long-term has been of great interest to researchers as well as practitioners.

Most previous studies investigate the announcement effects of NPIs to measure the overall wealth created (e.g., Lee, Chen & Hartmann, 2016; Sorescu & Spanjol, 2008). However, focusing on stock returns at the time of initial announcements of new product innovations may be inadequate to measure the overall impact on wealth. Several theoretical works use a modeling approach to show how investors may underreact or overreact to a corporate event or strategy announcements (e.g., Lewellen & Shanken, 2002; Odean, 1998). The valuation following innovation announcements is likely to be more challenging since most innovative activities, due to inherent tacitness and complexity, are subject to severe information asymmetry between managers and external investors (Lindaas & Simlai, 2014; Markovitch & Steckel, 2012). Eberhart, Maxwell & Siddique (2004) and Gu (2016) provide evidence that investors are slow to recognize the benefits of increases in

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research and development (R&D) expenditure during the announcement period. Alternatively, [Chen and Wang \(2013\)](#) find that while many R&D investment announcements are initially associated with positive excess returns, a majority of them witness declining post-announcement stock performances. Previous literature also shows that many capital expenditure announcements exhibit initial stock market reactions that are qualitatively different from post-announcement long-term stock performances (e.g., [Titman et al., 2004](#); [Vogt, 1997](#)). Therefore, the collective evidence suggests that an extended period of time, beyond the announcement period, is required to learn the full impact of product innovations on firm value. The long-run performance of a new product, however, has not been investigated in the literature before.

This paper studies the long-term impacts of NPIs using a sample of 4633 announcements made by 735 U.S. firms across 157 industries based on 3-digit SIC classification. By applying Carhart's four-factor model, we find strong evidence that NPIs bring about a significant increase in stock value, using either a three-year or a five-year assessment period. This finding is robust to different calendar-time-portfolio measures, and remains unchanged under the alternative matched-firm approaches. Our results echo [Eberhart et al. \(2004\)](#) and [Gu \(2016\)](#) who find that investors do not completely capture the valuation impacts of firm innovations via R&D investments during the announcement periods.

Based on this new evidence, we further investigate the factors that determine a firm's ability to achieve a better post-announcement stock performance. First, we argue that marketing investment may be essential as higher advertising expenditures may enhance a firm's abilities to manage the product launch process ([Crawford & Di Bendetto, 2003](#); [Markovitch & Steckel, 2012](#)). Further, NPIs may deliver more value to smaller firms compared to large ones because product innovation could be more crucial for the survival of small firms ([Chen, Ho, Ik, & Lee, 2002](#)). Our empirical results show that post-announcement stock returns are significantly positively (negatively) associated with advertising investments (firm size), thereby supporting the above arguments. We further find that firms operating in high-tech industries gain more, and new products introduced in earlier phases of product cycle generate higher abnormal returns than those introduced in later phases. On the other hand, the number of new products introduced, product types, and the technical capabilities of announcing firms are found to be insignificant in explaining the post-announcement stock returns. Taken together, the insignificant effect of technical capabilities along with a great impact of advertising investments supports the notion that the value created by NPIs is more dependent on marketing capability than on R&D technologies ([Kelm et al., 1995](#); [Datta, Mukherjee, & Jessup, 2015](#)).

This study contributes to the existing literature by providing the first empirical evidence of the change in long-term stock value following NPIs. Prior research mainly studied the announcement period abnormal returns. To the best of our knowledge, this paper is the first that investigates post-announcement long-term stock performance. Such an ex-post perspective can be essential to have a more objective assessment of the value created by product innovations as such a highly information-asymmetric event cannot always be correctly assessed by public stock-market investors during the initial announcement period. [Daniel and Titman \(2006\)](#) indicate that investors react incorrectly only to intangible information but not to tangible information during the announcement period. Our finding of a significant increase in post-announcement stock value suggests that stock markets underreact to the benefit of intangible information associated with the marketing and commercialization capabilities of new product-announcing firms. This finding provides an informative comparison with [Eberhart et al. \(2004\)](#) and [Gu \(2016\)](#) who find a significant change in long-term stock value after announcements of innovation by firms that increase their R&D expenditure. Our findings suggest that compared with R&D investments, NPIs materialize at the later stage of innovations and even though the financial markets initially under-react during the announcement period, they gradually capture the full value brought on by new products. In other words, a longer timeframe is necessary to incorporate investors' ex-post correction of assessment, whereby a more complete assessment of the value created by product innovations is better assured.

The rest of the paper proceeds as follows. [Section 2](#) describes the data sources and methodology. [Section 3](#) shows the empirical results. [Section 4](#) includes the conclusion.

## 2. Methodology and sample

### 2.1. Measuring abnormal performance

To examine the abnormal performance, we use the four-factor model proposed by [Carhart \(1997\)](#), as per [Gu \(2016\)](#), and [Morse et al. \(2011\)](#) etc.

$$R_{pt} - R_{ft} = \alpha + \beta_m(R_{mt} - R_{ft}) + \beta_S(SMB_t) + \beta_hHML_t + \beta_uUMD_t + \varepsilon_{pt} \quad (1)$$

where  $R_{pt}$  is the portfolio return for month  $t$ ;  $R_{ft}$  is the risk-free interest rate;  $(R_{mt} - R_{ft})$  is the market excess return;  $SMB_t$  is the difference in returns between a portfolio of small and large stocks;  $HML_t$  is the difference in returns between a portfolio of high and low book-to-market stocks; finally,  $UMD_t$  is a momentum factor measured by return on high momentum stocks minus the return on low momentum stocks. The intercepts  $\alpha$  in [Eq. \(1\)](#) represent the abnormal return estimates. We test the abnormal stock performance in the three-year and five-year periods after the announcement of NPIs. Thus, a sample stock is included if month  $t$  is within the 36-month or 60-month period following the issuing date. Both equal- and value-weighted (by equity market value) calendar-time portfolio returns are calculated.

We note that some potential issues could bias the empirical results when applying the calendar-time portfolio approach. First, in our sample, some firms make multiple announcements of NPIs, which may cause an overlapping bias as the subse-

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