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Do industries matter in explaining stock returns and asset-pricing anomalies?

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ABSTRACT

Industry returns cannot be explained fully by well-known asset pricing models. This study reveals that common factors extracted from industry returns carry significant risk premiums that go beyond the explanatory power of size, book-to-market (BM) ratios, and momentum. In particular, this study shows that (1) the small-firm effect is significant only for firms whose market capitalization is below their industry average; (2) the BM effect is an intra-industry phenomenon; (3) a one-year momentum effect is significant only for firms whose BM ratio is smaller than the industry average and limited to non-January months; and (4) there is seasonality in all effects that cannot be explained by risk-based asset-pricing models. Neither rational nor behavioral theories alone can explain industry returns, and it is perhaps too hasty to attribute asset pricing anomalies to a single driving force.

1. Introduction

Despite its popularity in practice, industry analysis has received limited academic attention in finance. Microeconomics holds that the market supply of a product is determined by a group of firms that produce homogenous products (i.e., industry). But in financial economics, the supply (or demand) of an asset is infinitely elastic, because all assets are perfect substitutes. Popular models, whether rational or behavioral, simply grant no role to industries.[1] Nevertheless, researchers commonly control for the "industry effect" in empirical studies, without any theoretical foundation for doing so (e.g., Kahle and Walkling, 1996).[2]

Theoretically, an industry refers to a group of firms producing homogenous products or close substitutes; practically, a firm rarely produces just one product. Broad industry classifications, such as standard industrial classification (SIC) codes, thus have been used widely to identify homogeneous groups of firms that engage in practice in "close" businesses. These classification schemes generally reflect broad attributes, such that firms of the same industry may be competitive when they produce close substitutes but cooperative when their products are complements. Firms, even in the same industry, therefore may respond differently to information, whether it is market-wide, industry-specific, or firm-specific in nature. Because the product mixes or even the business units of a firm could span a wide range, both vertically and horizontally, it is difficult to foresee how firms might respond to relevant information. In this sense, industry classifications such as SIC codes are far from satisfactory.[3]

The discrepancy in the definitions of industry casts doubt on the applicability of the micro-based industry analysis. Does a practical industry classification system actually provide any information about stock returns? Theoretical evidence indicates that industry structure affects capital structure, but does it also affect asset prices? If industries really matter in asset pricing, how and why are they related to asset prices? In particular, does industry-related information help explain asset pricing anomalies such as size, book-to-market (BM) ratios, and momentum? We explore such questions in this article.

Our motivation stems from recent research that has identified industry-related patterns that standard asset pricing models cannot explain effectively. For example, Fama and French (1997)

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[1] For example, consider the one-factor Sharpe–Lintner–Black capital asset pricing model (CAPM), the macroeconomic-based model of Chen et al. (1986), the three-factor model by Fama and French (1993), or the characteristic-based model advocated by Daniel and Titman (1997), among others. Although theoretical studies have examined the impact of industry structure on capital structure or financial structure (e.g., MacKay and Phillips, 2005; Miao, 2005), standard asset-pricing theories suggest that neither technical nor fundamental analysis is important.

[2] Kahle and Walkling (1996) identify 81 articles published in the five top-tier finance journals during a four-year sample period (1992–1995) that use industry classifications.

[3] Bhojraj et al. (2003) and Chan et al. (2007) provide comparisons of alternative industry classification schemes.

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find that neither the CAPM nor their three-factor model provides precise estimates for the industry cost of equity. Lewellen et al. (2010, hereafter LNS) show that several risk-based asset pricing models are rejected because they fail to explain the cross-section of returns on industry portfolios. Hou and Robinson (2006) reveal that firms in concentrated industries earn lower returns, even after they control for size, BM, and momentum. Moskowitz and Grinblatt (1999) also show that individual stock momentum is largely driven by industry momentum and that stocks within an industry tend to be more highly correlated than stocks across industries.[4] Finally, according to Chan et al. (2007), higher return comovement is more pronounced for large-cap stocks that belong to the same industry classification compared with that for small-cap stocks of the same industry.

Such higher within-industry return comovements might be driven by rational or behavioral forces. Rationally, firms of the same industry exhibit higher return comovements because they share more common fundamentals. In this case, large firms lead small firms of the same industry because the former respond to information more quickly. Hou (2007) confirms that the lead-lag effect is predominantly an intra-industry phenomenon and also drives the industry momentum anomaly. The higher within-industry return comovements can also behaviorally driven if industries were treated as styles by investors (see Barberis and Shleifer, 2003; Barberis et al., 2005; Kumar and Lee, 2006). In this case, the return comovements reflect non-fundamental forces, such as investor sentiment, that induce negative lead-lag relations among securities.

How do higher within-industry comovements relate to asset pricing? Intuitively, return comovements within an industry imply potentially nondiversifiable risk. Asset pricing models such as the CAPM or the arbitrage pricing theory (APT, Ross, 1976) suggest that assets are correlated through their relations to the market portfolio or common factors. If existing pricing factors fail to capture excess within-industry comovements, additional common factors might be needed, and the industry-related comovements must represent a non-negligible proportion of the variation in stock returns. In contrast, if the excess within-industry comovements are behavioral, no systematic pricing would be associated with the industry-related patterns.

Although existing empirical evidence suggests that industry plays a role in stock returns, it is not clear if the industry-related patterns are consistent with standard asset pricing theories. The first objective of this study therefore is to explore the role of industry in explaining the cross-section of stock returns from rational viewpoints.

Specifically, we examine the role of industry in an APT framework. Motivated by Connor and Korajczyk (1988) who propose the use of asymptotic principal components to extract common factors from individual stock returns, we use principal components analysis to extract various factors from industry portfolios, and examine whether they bear significant factor risk premiums. We find that two industry-based risk factors, constructed on the last two of the five principal components, bear significant risk premiums in explaining the cross-section of stock returns. However, based on the Fama and MacBeth (1973) cross-sectional regression, we find that the industry-based factors do not subsume the explanatory ability of size, BM, or momentum.

In a stochastic discount factor (SDF) setting, we also examine the validity of various asset-pricing models based on Hansen's test of overidentifying restrictions, along with the Gibbons et al. (1989, hereafter GRS) *F*-test to determine if there are significant deviations from the pricing relation implied by the pricing models. The results indicate that all models, including the Sharpe–Lintner–Black CAPM, the Fama–French three-factor model, Carhart's (1997) four-factor model, and two industry-related factor models, fail to fully explain returns on an extended sample composed of the 25 size-BM portfolios and 48 industry portfolios.

Since industries as rational factors cannot explain the asset pricing anomalies, we turn to potential behavioral explanations and explore how industries interact with firm characteristics on size, BM, and past returns. Motivated by the empirical evidence that the momentum effect is an intra-industry phenomenon (Moskowitz and Grinblatt, 1999; Hou, 2007), we examine if the premiums on size, BM, and momentum are the same for firms within and across industries. Motivated as well by recent behavioral evidence regarding risk attitudes toward gains and losses (e.g., Kahneman and Tversky, 1979), we also examine if the premiums on size, BM, and momentum exhibit asymmetric patterns for firms whose characteristics rank them above or below their industry averages. For example, Fiegenbaum and Thomas (1988) and Fiegenbaum (1990) document a negative (positive) association between risk and return for firms whose accounting returns fall below (above) the industry median. To the extent that size, BM, and past returns reflect a firm's future prospects, premiums on these firm characteristics may exhibit asymmetric patterns over some industry reference points.

The empirical evidence reveals interesting patterns that appear inconsistent with risk-based theories. First, the small-firm premium is significant only for firms whose market capitalization falls below their industry average. Thus, the size effect is essentially a "below-industry" phenomenon. Second, the BM premium is significant only for stocks within an industry, not for stocks across industries, which means the value effect is an intra-industry phenomenon. Third, the one-year momentum effect is significant only for firms across industries, yet this across-industry effect disappears when we adjust the returns for risk. What remains is a below-industry momentum effect for 11 months of the year but reveals a strong reversal in January. In turn, we identify a January-based seasonality in size and BM effects that we cannot explain using popular risk-based asset-pricing models.

Summarizing, we identify several unique industry-related patterns that appear to be new in the literature. The empirical findings indicate that industry returns reflect both significant rational and behavioral components, but neither rational nor behavioral theories alone can fully explain industry returns. The results indicate that industries play a dual role in explaining stock returns that deserves further exploration.

The remainder of this article proceeds as follows: Section 2 describes the sample. Section 3 reports the correlations for stocks within and across industries over various return intervals. In Section 4, we present the empirical results regarding the validity of various asset pricing models for explaining returns on industry portfolios. In Section 5, we present the empirical results on behavioral patterns, then we combine our analysis to consider the interaction of rational and behavioral roles in industry returns. After outlining some robustness tests in Section 7, we conclude with a summary of our findings.

2. Data

The data used in this study are ordinary common equities of all firms listed on the NYSE, AMEX, and NASDAQ return files from the Center for Research in Security Prices (CRSP) from July 1963 (1973 for NASDAQ firms) to December 2006. The accounting data come from the COMPUSTAT database. To mitigate the survivorship bias, we require that firm data must be available on COMPUSTAT for at least two years (Fama and French, 1993).

[4] In contrast, Grundy and Martin (2001), Lewellen (2002) and Wang and Wu (2011) assert that industry effects do not explain momentum.