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Product market competition, idiosyncratic and systematic volatility

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ABSTRACT

This study finds that competition increases idiosyncratic volatility relative to systematic volatility. Market power facilitates passing on firm specific cost shocks to customers but is irrelevant to passing on market cost shocks. A firm's competitive advantage in an industry is also more affected by changes in firm specific costs when there are many rivals. The results are robust to significant reductions in import tariff rates that reduce market power and consistent with lower pairwise returns' correlations following such events.

1. Introduction

Firms operating in the same industry behave strategically with one another creating inter-firm dependencies in operational decisions (Hao et al., 2011). A firm's risk depends not only on its own financing and investment decisions, but also on its rivals' strategies and actions, as they compete for market share. If a firm's return is driven by market share, then it is affected by the performance of other firms, creating inter-firm stock-returns dependencies. If one firm incurs losses due to firm specific events, then other firms may gain by diverting market shares to them. An increase in competition increases the chances of driving out the firm from its business if firm specific costs get much out of line with those of its competitors. Many studies show the effect the intensity of competition has on firms' return volatility and risk, but its effect on the ratio of idiosyncratic volatility to systematic volatility is unclear.[1]

Market power enables firms to pass on cost increases to consumers through higher prices. Economic theory suggests that this ability is only relevant for reducing the effect of firm specific cost shocks and not industry wide ones. Changes in firm specific costs influences the firm's competitive position in an industry, but this is not the case for changes in industry wide costs. Thus, changes in idiosyncratic risk could be different than those for systematic risk when competition intensity varies.

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[1] See Subrahmanyam and Thomadakis, 1980; Moyer and Chatfield, 1983; Bernier, 1987; Hou and Robinson, 2006; Gaspar and Massa, 2006; and Irvine and Pontiff, 2009.

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We examine the impact of competition on idiosyncratic volatility relative to its impact on systematic volatility, with the expectation that higher competition increase idiosyncratic volatility. A number of studies have investigated the relation between product market competition and firm risk. Gaspar and Massa (2006) show that competition increases firm level idiosyncratic risk and reduces the share in systematic volatility. Irvine and Pontiff (2009) suggest that competition could be related to cross-country differences in idiosyncratic risk and R-square. In contrast, Subrahmanyam and Thomadakis (1980) provide theoretical reasoning that firms with lower (higher) monopoly power exhibit higher (lower) betas or systematic risk. Moyer and Chatfield (1983) and Bernier (1987) find empirical support for the positive effect of competition on systematic risk. The present paper complements and extends this literature by explicitly showing that competition increases the ratio of idiosyncratic risk relative to systematic risk.[2]

We use the Fama–French three-factor model to measure the idiosyncratic and systematic volatility, although our results are the same when we apply the single factor model.[3] Using a sample of firms in the CRSP/COMPUSTAT Merged Database over the 2005-14 period, we find strong empirical support for this expectation. After controlling for a host of variables that the literature shows to have an effect on return volatility, as well as controlling for firm and time fixed effects, our estimates are highly significant.

Initially, we use the Herfindahl–Hirschman index (*HHI*) to measure competition intensity. *HHI* is widely used as proxy for product market competition and is well-grounded in industrial organization theory (see Tirole, 1988). It has also been extensively used in the finance literature, such as in Hoberg et al. (2014) and Giroud and Mueller (2011). Yet, *HHI* is not a perfect measure of product market competition and suffers from various shortcomings. These include ambiguous definitions for industries and an inability to capture collusion between firms, as well as limitations in available data such as the exclusion of private firm data in COMPUSTAT. In recognition of these shortcomings we examine the robustness of our results by using significant reductions in tariff barriers to measure competitive intensity. Using annual 1989-2005 tariff data for U.S. manufacturing we identify industries that experienced an import tariff reduction.[4] Consistent with our main results, the increase in idiosyncratic volatility is significantly larger than the increase in systematic volatility for these industries.

We also use the average pairwise co-movements in returns as a different way to measure the change in systematic volatility relative to the change in idiosyncratic volatility. Return pairwise correlation can be viewed as the proportion of the shared variation between the return of any two stocks to their total return variations. The total return variation is simply the summation of systematic and idiosyncratic volatility. This suggests that if competition induces a greater increase in idiosyncratic volatility, then the return pairwise correlation should decline. When we compare between the average pairwise return correlations before and after the reduction in tariff rates, we find that on average the pairwise correlation falls, in support of our main hypothesis.

Our results are particularly relevant for two reasons. First, they are important for the management of risk following public policy decisions that aim to increase competition, such as industrial deregulation and free trade agreements, as competition increases firm specific relative to systematic risk. While it is true that idiosyncratic volatility may be naively eliminated in well-diversified portfolios, investors may find such diversification unfeasible because of wealth constraints and transaction costs. In addition, Xu and Malkiel (2003) show that idiosyncratic volatility can explain cross sectional differences in returns of individual stocks. Thus, alternatives to portfolio diversification for reducing idiosyncratic volatility in competitive markets can play an important role in lowering risk and the cost of equity.

Second, the results are important for evaluating the effect of competition on the R-square of the single-index model over time and across countries. Campbell et al. (2001) find noticeable increases in firm level volatility relative to market volatility in the United States over the 1962-97 period. Morck et al. (2000) show that R-square is higher in countries with more opaque information environments, relatively low per capita GDP and less developed financial systems. Irvine and Pontiff (2009) argue that information opacity deters a country's product market competition which in turn raises R-square. They claim that the reduced levels of competition and not the information opacity is the driving force behind the high R-square. The present study supports the claim that competition reduces R-square, as it increases firm specific risk more than systematic risk when competition intensity rises.

Our study adds to at least two streams of literature. First, it introduces product market competition as a new variable that can explain why the R-square and other measures of stock market synchronicity are different across markets. Second, it contributes to the stock-return correlations literature by showing how competition is related to the patterns of co-movements in asset returns. The study of co-movements between stock returns is significant in the finance literature, and has recently received much interest especially in international finance as in Bekaert et al. (2009).

The remainder of the paper is structured as follows. Section 2 explains the main hypothesis, and Section 3 the model, variables and sample. Section 4 presents the descriptive statistics and Section 5 the regression results. Section 6 presents evidence on the main hypothesis emanating from trade deregulation, and Section 7 provides the conclusions.

[2] Menchero et al. (2016) also discuss market (systematic) risk and residual (idiosyncratic) risk in terms of the estimation of beta, and how close the estimated beta is to the true beta. Residual volatility is shown to be minimized when the estimated beta equals the true beta. Nevertheless, they conclude that "…the difference in residual volatility resulting from two distinct beta estimates is likely to be very small". As a result, our estimates of systematic and idiosyncratic volatility are not likely to be affected by errors in the estimation of beta.

[3] We do not, however, use momentum as an additional factor to the Fama-French model, as there is not much support that this factor measures systematic risk. Liew and Vassalou (2000) showed a little support for the relation between WML (winners minus losers) portfolio and the real economy and thus a little evidence to support the risk-based explanation for the WML return factor.

[4] The tariff rate data is available until 2005.