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Systematic risk behavior in cyclical industries: The case of shipping ☆

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ABSTRACT

This study explores macroeconomic and industry-level effects on corporate systematic risk (or beta) for the international shipping industry. We document the extent to which stock market betas fluctuate over time in this asset-intensive and cyclical industry. Moreover, we analyze the fundamental determinants of systematic risk. We find evidence for high levels of systematic risk in shipping stocks, which match the fundamental risk characteristics of the industry (such as high financial and operating leverage). Shipping firms exhibit distinct industry-specific beta dynamics compared to firms from benchmark sectors or the average firm in the S&P 500 index. Changes in both economic conditions and industry-specific risk factors explain large proportions of beta variation in the cross-section of firms and over time.

1. Introduction

In modern finance, betas, or sensitivities of asset returns to the underlying sources of risk, are the central concept to model and control an asset's sources of systematic risk. The stock market beta is a major determinant of expected stock returns in both the Capital Asset Pricing Model, or CAPM (Sharpe, 1964; Lintner, 1965; Mossin, 1966), and its descendents such as the intertemporal CAPM (ICAPM; Merton, 1973) and multifactor (beta pricing) models (Ross, 1976; Fama and French, 1993, 1995). It is widely used by both academics and practitioners to compute a firm's cost of equity, assess single investment projects, and evaluate the entire company. Given the importance of betas for investors and corporate managers, it is crucial to examine empirically how betas are determined. Empirical evidence suggests that systematic risk and its determinants may differ substantially across industries (Fama and French, 1997). Contributing to the empirical literature on industry-specific systematic risk levels, we analyze the shipping sector as a specific case of a cyclical and risk-loaded industry.

Although the shipping industry is a key sector in the international economy, it has hardly been studied in an asset pricing context.[1] However, especially in light of the industry's recent financial problems a fundamental understanding of its stock mar-

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[1] A notable exception is the recent study by Panayides et al. (2013), who estimate liquidity risk premiums for US water transportation stocks. They show that illiquidity risk is priced in the water transportation sector beyond the Fama and French (1993) and market-wide illiquidity risk factors, indicating the existence of a risk premium and higher average returns for stocks with higher illiquidity measures.

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ket risk seems of particular relevance. The ongoing shipping crisis accompanied by its low forecasted future returns (Greenwood and Hanson, 2014) and the Basel III equity capital regulation for banks have led to a lack of available bank financing for new vessels.[2] A consequence of the lower levels of available bank credit is that more and more shipping firms have approached the international capital markets during recent years. Therefore, knowledge about both the level and the drivers of systematic risk is of eminent importance for corporate financial managers. Specifically, they are needed to estimate the cost of equity capital, which are a key input parameter to evaluate and identify profitable investment decisions. In this study, we address both issues. First, we analyze the time-series and cross-sectional dynamics of systematic risk levels in the shipping industry based on a comprehensive sample of internationally-listed shipping companies. Second, we provide a detailed analysis of the industry's fundamental market risk determinants. Our results show that shipping companies feature beta characteristics and systematic risk levels that are substantially different from other industries, both in terms of its time-series dynamics and its underlying factors.

According to asset pricing theory, the stock market beta reflects a firm's incremental business risk. The CAPM assumes that investors are well-diversified, and thus the only risk an investor perceives in an investment is the risk that cannot be diversified (i.e., market risk or systematic risk). The stock market beta is the model's measure of systematic risk contribution.[3] In particular, the CAPM proposes that investors only care about stock market betas because these measure the risk components which investors who hold a fully diversified portfolio (or the market portfolio) cannot diversify.

Early empirical studies emphasize that accounting measures of risk related to uncertainty in firms' cash flows are positively correlated with their systematic risk levels (Beaver et al., 1970; Logue and Merville, 1972; Melicher, 1974).[4] More recent work by Campbell and Mei (1993) supports the idea that betas are determined by shocks to their cash flows (and shocks to their discount rates). Campbell (1993, 1996) and Campbell and Vuolteenaho (2004) propose a version of the ICAPM, in which investors care more about cash flow-driven movements than about temporary discount rate-driven movements in the aggregate stock market. In their model, the required return on a stock is not determined by its overall beta, but by two separate betas, one with permanent cash flow shocks to the market and another with temporary shocks to market discount rates.[5] While these studies rely on cross-sectional analyses or consider only some arbitrarily chosen sub-periods of time, their results are consistent with the view that varying levels of cash flow risk are reflected in firms' stock market betas. However, they cannot provide direct evidence on the behavior of systematic risk over time, and are also not able to identify factors that drive the time variation in stock market betas.

Focusing on the time-dimension of beta, Bos and Newbold (1984) argue that both changes in microeconomic factors (the business risk specific to a firm's operations) and macroeconomic conditions (the changes in global economic conditions or industry-related factors) affect systematic risk levels. This notion is closely related to recent theoretical work by Gomes et al. (2003) and the empirical asset pricing literature on time-varying betas (Bollerslev et al., 1988; Jagannathan and Wang, 1996; Lettau and Ludvigson, 2001b; Lewellen and Nagel, 2006). Market betas tend to be higher during bad economic regimes, and lower during good economic states. Such business cycle effects on systematic risk are expected to be stronger if a firm operates in sectors that exhibit a higher exposure to fluctuations in global business conditions, thus providing an explanation for industry-specific differences in systematic risk dynamics. Isolating the cash flow impact on betas, i.e., the beta effects associated with changes in expectations about future cash flows, Campbell and Mei (1993) find that cash flow induced risk in betas is substantially higher for cyclical industries. This argument for industry-dependent macroeconomics effects on beta is further supported by Gomes et al. (2003). Their theoretical model predicts higher cross-sectional beta dispersion during weak economic conditions.

Shipping has always been a volatile business (Drobetz et al., 2012; Kalouptsidi, 2014; Greenwood and Hanson, 2014). The demand for seaborne transport is a direct derivative of global trade and consequently industry cash flows in shipping are tightly linked to the business cycle. Moreover, the shipping industry exhibits high financial and operating leverage (Drobetz et al., 2013). Given these fundamental business risks, asset pricing theory would suggest that shipping firms exhibit substantially time-variable and relatively high stock market betas compared to other industries. Focusing purely on the average systematic risk level in shipping stocks, however, existing studies report surprisingly low market betas. Empirical work that explores the level of systematic risk in the shipping industry include a series of studies by Kavussanos and Marcoulis (1997a,b, 1998, 2000a,b, 2005) and Kavussanos et al. (2003). They report betas close to one for their samples of listed shipping companies. Drobetz et al. (2010) test multifactor models in a stochastic discount factor setup. They also document that shipping stocks exhibit remarkably low stock market betas. A caveat in all these studies is the OLS-based evaluation of

[2] Some shipping banks even left the market, and the remaining ones have become very selective on their core clients. Commerzbank, Germany's second largest banking house, is a prominent example. For many years, it ranked second in terms of the volume of outstanding shipping loans among German lenders. The bank announced to pull out of ship finance" as part of a strategic review promoted by the financial crisis and tougher capital requirements under the Basel III rulebook" (Financial Times, 2012).

[3] An investment's cost of equity is lower when it offers diversification benefits for an investor holding the market portfolio, i.e., it requires less reward for less risk contribution. The contribution to the overall portfolio risk is the market beta of a firm – a measure of the firm's toxicity. A stock that decreases in value when the market decreases in value, and increases when the market increases, has a positive beta – it is toxic, and investors avoid it. In contrast, a stock with a low beta helps an investor who holds the market portfolio to reduce the overall investment risk.

[4] Nickel and Rodriguez (2002) provide a review on the accounting relationship between risk and return.

[5] Campbell and Vuolteenaho (2004) call the first beta with respect to cash flow shocks 'bad beta', because investors demand a high risk premium to hold assets that covary with the market's cash flow news. The second beta with respect to discount rate shocks is called 'good beta'. Poor returns driven by increases in discount rates are partially compensated by improved prospects for future returns, thus investors remand a relatively low price of risk.