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Market states and the risk-based explanation of the size premium

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ABSTRACT

The distress risk explanation of the size effect implies that payment for distress risk ought to occur in up market periods, not in down market periods where distress risk ought to depress the price of securities with such risk. We find that, given the influence of the market beta, the relationship between size and returns is significant only in down markets. Further, we find a size effect in January regardless of the market state. In months other than January, a small-firm effect exists in down markets, but a large-firm effect exists in up markets. Out results are robust to different definitions of up and down markets using credit spreads and various estimations of beta. These results suggest that if payment to size is based on systematic risk then some other explanation should be developed. Alternatively, the explanation of the size effect may depend on payment to idiosyncratic risk or it might be associated with behavioral factors. In all cases, current methods of risk adjusting in academic studies are questioned.

1. Introduction

Since Banz (1981) and Reinganum (1981) first published the evidence that small-firm securities outperform large-firm securities even after adjustments for market risk, much effort has been expanded on explaining this phenomenon. Despite this voluminous literature, the cause of the size effect remains a matter of debate. Following Fama and French (1992) there has been widespread albeit implicit acceptance of the proposition that the premium payment made to small firm securities represents a payment for risk. Indeed, the widespread adoption of the Fama–French model, which risk-adjusts returns using a variable to measure the impact of systematic risk associated with firm size, attests to the support for the supposition that size is paid for risk. Questions exist, however, pertaining to this payment for risk hypothesis.

In his survey article on the size effect, van Dijk (2011) identifies two critical issues that argue against the acceptance of the risk-based explanation of the size premium. First, although Fama and French (1995, 1996) develop empirical results consistent with a connection between the size premium and risk payments, they do not develop a theoretical explanation for the supposition that size receives a payment for risk. Rather, the supposition largely rests on the presumption of market efficiency. Other authors have suggested that small-firm securities experience higher distress risk (see for example Vassalou and Xing, 2004), but empirical tests of this and similar hypotheses have been met with mixed results. The second critical issue challenging the risk-based explanation of the size effect is the extremely strong seasonal bias in the payment to size. Virtually all the premium paid to size is paid in the month of January.

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It seems contrary to reason that the premium paid to size represents a payment for risk on the basis of a presumption of market efficiency if this payment is inefficiently paid primarily in one month of the year.

Given these well-known concerns, the dominance of Fama–French models in risk-adjustment procedures as cited above appears puzzling. This is especially true in the light of work by Ferson and Harvey (1999) and Daniel and Titman (1997), which argue against the efficiency of the Fama–French model in measuring systematic risk. Ferson and Harvey show that factor loading on the (SMB) portfolio have no predictive power for portfolio returns in the presence of a set of macro-economic variables. Daniel and Titman show that factor loading on the (SMB) portfolio have no predictive power for portfolio returns in the presence of the variable directly measuring a security's size. In both cases these studies reject the model's measurement of risk associated with a small-firm security rather than directly rejecting the hypothesis that payment to size represents a payment to risk. Indeed, the results of these two studies do not directly reject the use of the Fama–French model, because the model may conveniently correlate with the underlying risk factors whether embodied in macro-economic variables or firm specific factors identified by the studies.

In this paper we test the distress risk explanation of the size effect which suggests high returns to small firm portfolios in up markets and low return to small firm portfolios in down markets. Our results show that, contrary to the distress risk argument, the size premium is paid primarily in down markets in the presence of market beta. Further, we find a size effect in January regardless of the market state. In months other than January, a small-firm effect exists in down markets, but a large-firm effect exists in up markets. Our findings are robust to different definition of up and down markets and various estimation of beta. These findings lead us to reject the distress risk explanation of the size effect. The rest of the paper is organized as follows: In the next section we develop the hypotheses to be tested and we review relevant literature. In Section 3 we report our empirical results. Section 4 of the paper provides a conclusion.

2. The size effect and risk payments

The earliest studies of the size effect, such as those by Banz (1981) and Reinganum (1981), report that small-firm securities earn returns in excess of predicted returns given market beta risk but offer little suggestion as to the cause of the size effect. There was no assertion in these studies that the excess returns to small-firm securities represent a payment for risk. Indeed, the finding that small-firm securities outperformed large-firm securities was widely viewed as an anomaly based on belief in the validity of the Sharpe–Lintner–Black Capital Asset Pricing Model (CAPM). The first suggestion of a connection between risk and the size effect came indirectly from studies developing multi-factor models as an alternative to the CAPM such as the model developed by Chan et al. (1985) which used various macroeconomic variables to measure risk. They assert the superiority of their model to the CAPM in part because their model is able to explain the size effect. By implication, their results and arguments suggest that the size effect results from payments for risk. The first direct assertion that size proxies for risk, however, is found in Fama and French's seminal study of 1992.

In this study, Fama and French (1992) argue that size and book-to-market (BtM) ratios explain cross-section returns but beta does not. These findings, coupled with the assumption of rational pricing behavior, lead Fama and French to conclude that beta does not measure risk but that size and BtM proxy for some undefined risk factor. In subsequent studies Fama and French (1993, 1995, 1996) develop their widely used three-factor model and demonstrate the model's ability to explain cross-section returns of portfolios formed on the basis of size and value. The exact nature of the risk for which size and BtM proxy, however, remains unexplained. As van Dijk (2011) argues in his survey of the size effect, this omission allows skepticism concerning the argument that the size premium represents payment for risk.

Van Dijk also notes a more general skepticism concerning the size effect. Given reports provided by Brown et al. (1983), and Gompers and Metrick (2001) among others, that the size effect is inconsistent over time, other studies (for example, Black, 1993) have argued that the size effect may merely be a result of data snooping. This concern has been addressed by Hou and van Dijk (2011), who argue that the disappearance of the size premium after the early 1980s was due to unexpected profitability shocks to small and large firms. Adjusting for these shocks, they find a robust size effect in returns across time periods.

Ironically, intertemporal inconsistency in the size effect is required if payment to size results from payment for risk. If small-firm securities always outperform large-firm securities, there would be no risk for which to pay a risk premium. The rationale for this position follows from previous work testing the relationship between beta and returns in states where beta should be rewarded for risk and other market states where high beta risk should associate with low returns.

Pettengill et al. (1995) argue that previous tests of the relationship between beta and returns were misspecified because these tests assumed that the relationship between beta and realized returns should always be positive. In fact, if high-beta securities have high risk they must exhibit this risk by experiencing lower returns than low-beta securities under certain market conditions. By inference from the CAPM, high-beta securities should underperform low-beta securities when market excess return is negative. Tests applying these principles show a significant positive relationship between beta and returns in up markets and a significant negative relationship between beta and returns in down markets. Following similar logic, in some market states, small-firm securities should experience lower returns than large-firm securities if payments to size represent payments for risk. Unfortunately, while the nature of market risk specified in the CAPM allows prediction of the relationship between beta and realized return, no generally accepted theoretical specification exists to predict the relationship between size and realized return. Thus, before we test whether payment to firm size represents payment for risk, we must specify the nature of the variation of payment to size across market conditions.

A number of authors have suggested that the size premium represents payment for some sort of distress risk. Campbell and Vuolteenaho (2004) suggest that the payment to small firms represents payment for a greater sensitivity to cash flow risk. Other authors (see for example Chan et al. (1985) and Vassalou and Xing (2004)) have suggested that the size premium may exist because