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Asset prices and exchange risk: Empirical evidence from Canada

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ABSTRACT

Asset prices have been found to respond to unpredicted changes in macroeconomic variables in a number of studies. This paper focuses on the relationship between economic factors and the stock market for a small open economy, namely Canada. Exchange risk is observed to have a significant impact on firm value in that country between 1971 and 2004. Inflation risk also played a non negligible role during the seventies and eighties. The role played by market risk is harder to ascertain.

1. Introduction

Preference-free valuation models explain the behavior of asset returns through their link with relevant risk factors. These factors are those that cannot be diversified away. In some cases, the underlying risks are treated as unobserved and the time-varying expected returns are linked to the behavior of one or more latent variables. In other cases, observable macroeconomic economic variables are used as factors to capture some of the systematic risks present in the economy. Examples of these variables are the inflation rate, a market return index, a production index, a measure of aggregate consumption,

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the real rate of interest, and a measure of spread between a long and a short rate or between the return on risky and safe assets.

Two approaches can be used to model the impact of economic variables on asset prices. On one hand, the factor loadings can be treated as constant over time and a simultaneously equation model can be estimated. When the risk factors are made explicit, the result is a highly constrained model. When they are left unspecified, the resulting latent variable model imposes fewer constraints, is not as easily rejected, but the source of risk cannot be identified. In the former case, the part of a return that is not explained by the factor realizations times their factor loading is simply the idiosyncratic risk associated with any given asset. Examples of this type of analysis are found in Ferson and Harvey (1991), Elton et al. (1995), and Harvey et al. (2002) among others. The obvious advantage of this procedure is that all equations are estimated simultaneously, so there is no errors-in-variables problem. The hypothesis of constant factor loadings over long periods of time can be too strong in some cases however.

Fama and Macbeth (1973), Chen et al. (1986), Fama and French (1992), Shanken and Weinsten (2006), Virk (2012) and others use a cross-sectional procedure that presents the opposite problem. The loadings, the betas, are usually estimated from a series of rolling regressions, allowing them to vary over time, or from the entire sample period, implying that they are kept constant over time. The choice between the two procedures is often dictated by the length of the overall sample period, the rolling window method necessitating more observations. The betas are subsequently used as regressors in cross-sectional regressions to determine the size of various risk premia. Since the same data is used to generate the betas and estimate the risk premia, the commonly known errors-in-variables problem is then present and the standard errors associated with the premia are usually underestimated. The results presented in this paper combine both approaches, with specified risk factors, making it an interesting check on the robustness of our empirical findings.

The Capital Asset Pricing Model (CAPM) identifies the correlation between the return on any given asset j and the return on the market portfolio as the relevant factor in the determination of the associated risk premium. It has been observed in a number of papers that the market return is not always statistically significant and/or important as a risk factor when other economic variables are considered simultaneously. In this paper, macroeconomic variables are introduced as risk factors along with the market return, with special emphasis on exchange risk factors since asset returns from a small open economy, Canada, are considered. The two approaches mentioned above are used. The Fama and Macbeth (1973) cross-sectional analysis is first performed to identify factors that could be of importance as well as sub-periods where different macro variables might have played a significant role. The simultaneous equation analysis is then performed with the chosen economic factors and sub-periods.

The paper proceeds as follows. In the next section, the cross-sectional model is introduced and the estimation results are presented. Section 3 characterizes and reports results from the simultaneous model. Finally, conclusions are drawn in the last section.

2. Evaluating risk premia: a cross-sectional model

In this section, a cross-sectional model, similar to the one proposed in Fama and Macbeth (1973), is presented. The estimation procedure is divided in two steps. In the first stage of the analysis, the betas of the model, the multiple regression coefficients related to a set of chosen variables, are generated using a rolling regressions method. The length of the rolling window is fixed. In the second stage, the estimated betas themselves are used as regressors in a cross-section of returns of varying sizes. The corresponding risk premia are then estimated.

The first step can be described by the following set of time series regressions:

$$R_{it} = \sum_j b_{ji} Z_{jt-1} + \mu_{it} \quad i = 1, \ldots, K \tag{1}$$

where R_{it} is the period t return on portfolio i in excess of the risk free rate, the Z_{jt-1}'s are the J information variables used to generate the betas, and μ_{it} is the part of each excess return that is orthogonal to the proposed economic variables. There are K portfolio excess returns. A rolling window of pre-determined length N is used to generate a vector of betas for each time period. The informational