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Integration vs. Segmentation in the Canadian Stock Market: Discussion

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DISCUSSION

JAMES N. BODURTHA JR.*: Extending the work of Stehle [8], Jorion and Schwartz analyze the market integration and segmentation hypotheses for the Canadian stock market. The important contribution of the paper is its attention to a market which should provide a test of these mutually exclusive hypotheses. There are two major reasons for this.

First, this work examines a relatively small portion of the global market portfolio for segmentation. When a large portion of the global market is tested for segmentation, testing is difficult because this market will be priced both directly, under the segmented market hypothesis, and indirectly, as a major portion of world wealth, under the integrated market hypothesis. The purely domestic stocks in the Canadian market sample made up approximately three percent of the combined U.S. and Canadian market portfolio which is used for integrated market relative pricing. The interlisted stocks on both the Canadian and U.S. markets made up between three and four percent of this portfolio. Therefore, risk unique to the Canadian equities' can be potentially different from global market risk.

Secondly, differential taxes and investment restrictions have existed and do exist between the U.S. and Canadian equity markets. The authors categorize

these restrictions as indirect barriers, such as costs of information, listing, and disclosure, and as legal barriers, such as capital flow restrictions, ownership restrictions and taxes. The authors hypothesize that the existence of legal restrictions will cause all Canadian assets to be priced as though some segmentation exists. However, if only indirect barriers are priced, they point out, then the interlisted equities should not be priced as though they are segmented. Therefore, the two subsets of equities in their sample allow for a test of this.

The testing procedure used follows a nonlinear methodology similar to that proposed by Gibbons [3]. Two models are tested, to allow for the high degree of correlation between the U.S. and Canadian indices. In this procedure, which was originally suggested by Stehle [8], either of the indices is posited as the primary index for estimation and the residuals of the second index, when regressed on this primary index, are used as a second time series pricing factor. The coefficients in this regression are then candidates for pricing in the expected returns relation. The expected returns model in this work, which uses the Canadian market as the primary index is:

$$E(R_j') - E(R_G')\beta_j^C = \delta_0(1 - \beta_j^G) + \delta_2\beta_j^{G \cdot C}$$

The variables follow the standard definitions. Returns are excess returns, and the superscript *C* represents the Canadian index, the superscript *G* represents the combined U.S. and Canadian index, and the superscript *G · C* indicates the residual of the U.S. index when regressed on the Canadian index. Under an integrated market hypothesis, the residual U.S. market risk should be priced ($\delta_2 \neq 0$), and with segmentation, it should not ($\delta_2 = 0$). A similarly defined model holds when the global index is the primary index. Under this specification, integration will imply that residual Canadian market risk is not priced ($\gamma_2 = 0$), and segmentation will imply that it is priced ($\gamma_2 \neq 0$). Homogeneous pricing across both interlisted and domestic Canadian stocks is interpreted as indicating that legal barriers, as opposed to indirect barriers, are being priced. Importantly, the large problems of infrequent trading for many of the firms is treated directly using a Dimson estimation procedure.

The results of the tests support linearity under a χ^2 criterion in all but one case. The interlisted and domestic equities are also found to be priced homogeneously. When the Canadian index is the primary index, the global market residual risk is not significantly priced under an asymptotic *t*-test. When the global index is used as the primary index, the Canadian market index is found to be significantly priced. Therefore, a fairly strong degree of segmentation is supported. Mild market integration is only supported for the interlisted stocks when the Canadian index is used as the primary index. However, the χ^2 statistic in this case rejects linearity.

This particular result highlights a potential extension to this work. Since the study uses a Gibbons methodology, the errors in variables problem associated with using betas in the implicit second pass regression estimation of the risk pricing factors is only limited by portfolio grouping. From the results of Shanken [7] and the simulation results of Amsler and Schmidt [1], we know that the resulting bias can be important. However, this bias will lead to over-rejection of

the hypotheses related to linearity and the homogeneity of the interlisted and domestic equities. Therefore, a Shanken-like correction would possibly reverse the one rejection of linearity for the interlisted Canadian assets.

Nonetheless, a bias will also exist in the t -statistics used to test whether or not a particular factor is priced. Using Shanken's [6] extension of his univariate results for the testing of the significance of the price of risk, we can rewrite the scalar definition of the model as:

$$\vec{R} = [1 - \hat{\beta}^{G.C} \hat{\beta}^G] \begin{bmatrix} \delta_0 \\ \delta_2 \end{bmatrix} + \bar{v} = \hat{X}' \Gamma + \bar{v}$$

and

$$V(\hat{\Gamma}) = (\hat{X}' \hat{\Sigma}^{-1} \hat{X})^{-1} (1 + \hat{\Gamma}' \hat{\Delta}^{-1} \Gamma) + \hat{\Delta}$$

where

$$\begin{aligned} V(\hat{\Gamma}) &= \text{sample variance-covariance matrix of the estimated prices of risk} \\ \hat{\Sigma} &= \text{sample equation errors variance-covariance matrix} \\ \hat{\Delta} &= \text{variance covariance matrix of the factors} \end{aligned}$$

The first term on the right-hand side of the definition of the sample variance-covariance matrix of the estimated prices of risk is the unadjusted estimate, and it is downward biased. As a result, the t -test statistics that are reported are biased toward significance. This bias will potentially reverse the one result supporting integration for the interlisted stocks. Nonetheless, it may even reverse some of the other results. See Bodurtha [2]. However, small sample biases due to this have not been examined.

Therefore, the effect of the errors in variables bias on the significant t -statistics, and the small sample properties in general are potentially interesting questions. It seems unlikely that all of these statistics will drop to insignificance. In the event that some or all do remain significant, then segmentation will be supported. Since support for integration is already lacking, it cannot be supported in this test.

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