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Exchange rate risk in the US stock market

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ABSTRACT

Kolari et al. (2008) show that exchange rate risk measured by contemporaneous exchange rate changes is priced in the US stock market. However, by construction, their exchange rate risk factor has a strong correlation with the size factor, and their exchange rate sensitivity portfolios have a strong factor structure. To test whether their results are spurious, we carry out two sets of tests. The first set is motivated by Lewellen et al. (2010), where the second set is motivated by the voluminous literature which suggests that stock returns are heavy-tailed (e.g. Rachev and Mitnik, 2000). Different from Kolari et al. (2008), we find that exchange rate risk measured by contemporaneous exchange rate changes is not priced in the US stock market if we use industry portfolios which do not have a strong factor structure as the testing assets or if we use more robust methods to estimate firm-specific exchange rate sensitivity. Our findings therefore suggest that researchers take a new perspective on exchange rate risk.

1. Introduction

In theory, Stulz (1984), Smith and Stulz (1985), and Froot et al. (1993) among others suggest that exchange rate movements can affect firms' cash flows. In practice, many firms are indeed impacted by exchange rate fluctuations. For instance, Hung (1992) finds that the loss due to exchange rate fluctuations for US manufacturing firms per year is about $23 billon or 10% of gross profits in 1980s; Francis et al. (2008) cite a recent Philadelphia Fed survey which finds that "over 45% of US firms

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reported that they are affected by currency movements (p. 177); Nucci and Pozzolo (2010) "document a statistically significant effect of exchange rate variations on employment, hours worked and wages in a representative panel of Italian manufacturing firms." (p. 121) Therefore, exchange rate risk is widely believed to be relevant to stock returns. Following Adler and Dumas (1983), empirically, researchers typically focus on contemporaneous exchange rate changes, and estimate exchange rate exposure by regressing stock returns on such changes. This approach, in general, finds that exchange rate risk is not priced (e.g. Jorion, 1990, 1991).[1]

A recent study by Kolari et al., 2008 (KMS), however, finds evidence suggesting that exchange rate risk measured by contemporaneous exchange rate changes is priced in the US stock market. Consistent with previous studies (e.g. Jorion, 1990), KMS first estimate the exchange rate sensitivity of each firm by regressing stock returns on contemporaneous exchange rate changes as well as Fama–French–Carhart (1997) four factors in a rolling fashion. Unlike previous studies, KMS further construct an exchange rate mimicking factor portfolio (along the same line as Fama and French, 1992, 1993), which is a zero investment portfolio that takes long positions in stocks with significant sensitivity (in absolute value) to contemporaneous exchange rate changes and short positions in stocks without significant sensitivity. They find that this exchange rate risk factor can reduce mean pricing errors for the portfolios formed on exchange rate sensitivity and carries a significantly negative (nonlinear) risk premium.

It is important to note that the stocks with significant exchange rate sensitivity in KMS are predominantly the smallest stocks. For instance, the average size of the stocks in the two KMS extreme portfolios (with significant sensitivity in absolute value) is $116 million, while that of the stocks in other 23 portfolios is $938 million (see Table 1 of KMS, p. 1080). Therefore, by construction, the KMS exchange rate risk factor has a strong correlation with the size factor, and the KMS foreign exchange sensitivity portfolios have a strong factor structure.

Lewellen et al. (2010) show that any (spurious) factor can seem to be relevant if it is correlated with the size (or value) factor and the testing assets have a strong factor structure. Therefore, an important question to ask is whether the KMS exchange rate risk factor is merely spurious.[2] To answer this question, we carry out two sets of tests in this paper. The first set is motivated by Lewellen et al. (2010) who recommend researchers use the assets such as industry portfolios that do not have a strong factor structure in empirical tests. We therefore repeat the tests in KMS with the 30 industry portfolios. Our findings suggest that the KMS exchange rate risk factor may be spurious. First, the KMS exchange rate risk factor cannot reduce pricing errors when industry portfolios are used as testing assets. Second, the KMS exchange rate risk factor does not carry a significant risk premium either when industry portfolios are used.

The second set of tests is motivated by the voluminous literature which suggests that stock returns are heavy-tailed (e.g. Rachev and Mitnik, 2000). KMS use two-year rolling periods to estimate exchange rate sensitivity of each firm. Given such a short estimation window, outliers are likely to have significant effects and therefore lead to spurious correlation. We therefore use alternative methods to obtain more robust firm-specific exchange rate sensitivity estimates. First, we still use two-year rolling periods but exclude the returns outside the three standard deviation bands. Second, we use five-year rolling periods instead of two-years as in KMS to mitigate the effects of outliers. Third, we use two-year rolling periods and the least absolute deviations (LAD) regression which is robust to outliers to estimate firm-specific exchange rate sensitivity. In all three cases, we find that the exchange rate risk factor (formed in the KMS fashion) based on more robust firm-specific exchange rate sensitivity estimates is not priced even when the exchange rate sensitivity portfolios are used as the testing assets. Therefore, all the evidence suggests that exchange rate risk measured by contemporaneous exchange rate changes is not priced in the US stock market, and that researchers take a new perspective on exchange rate risk.

[1] See also Khoo (1994), Bartov and Bodnar (1994), Allayannis (1997), Chow et al. (1997), Vassalou (2000), Bodnar and Wong (2003), Bartram (2004), Bartram and Bodnar (2005), Martin and Mauer (2005), and Bartram and Sohnke (2007).

[2] We discuss the significance of KMS and the implications of our results in more details in Section 3.3.