

Modelling Time-Varying Asymmetric Foreign Exchange Exposures

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Standard financial theory implies that exchange rate fluctuations affect a firm's value through the impact those changes have on the firm's cash flows and its discount rate. Moreover there is clear evidence from practitioners that confirms this theory. In the US, for example, BusinessWeek reported in May 2003 that US firms from various industries and with different characteristics had experienced "...sharply higher foreign sales and earnings thanks to dollar induced gains" due to a significantly weakened US dollar. Closer to home, a survey conducted by the Australian Industry Group of the Australian manufacturing sector in late 2003 reported that the exchange rate was the single factor most often identified as impacting negatively on production. Interestingly, approximately 20 per cent of the 800 respondents stated that a persistence of an appreciation in currency value would be enough to drive them to move some of their production offshore.¹

Despite the theoretical expectations and the evidence provided by the market, to date the literature reports limited support of a significant relationship between the value of the firm and exchange rate fluctuations. Some have suggested that this rather puzzling situation is the outcome of models that make unreasonable assumptions regarding the constancy of relationships over time. In particular, only limited work has been done that allows for the time variation in exchange rate exposure.

¹ Survey of Australian Manufacturing, December quarter, 2003

As a consequence, a strand of finance literature has emerged that reports on investigations that address this issue by applying highly quantitative models that allow for non-linear relationships (the so-called “GARCH” model). Although these studies report mixed results, it is well documented that complex versions of this model are well suited to model time varying exposures. Accordingly, our plan is to apply a special variant of this approach to model the dynamic relationship between individual stocks, the market and the exchange rate. In performing this analysis, we:

- allow for imperfections in the data induced by infrequent trading on the ASX.
- accommodate asymmetries – reflecting a view that companies may well find exchange rate appreciations and depreciations to have different strengths of impact on their bottom line performance.
- assess the impact of using alternative bilateral exchange rates (the Australian dollar against the US dollar and against the Japanese yen)

For the technically minded readers, the plan of this project is to extend the existing literature in the following dimensions:

(1) To model time varying exposure for individual Australian stocks with recent data, in particular firm-level, daily data.

(2) To use a multivariate GARCH approach that explicitly allows for time variations in the correlation structure between asset returns, the market return and the exchange rate.

- (3) To test the asymmetric response of stocks to changes in the exchange rate.
- (4) To correct for the thin trading bias in individual stock data using a selectivity correction approach.

Daily data will be collected on stocks in the Australian All Ordinaries Index from January 2003 to December 2005. As a major benchmark index that covers most of the market, stocks in this index are of relevance to investors and fund managers in their investment decision-making. Further, daily data will be collected on the AOI and the exchange rates AUDUSD and AUDJPY. Our choice of the AUDUSD and the AUDJPY is supported by the fact that the US and Japan are Australia's two most important trading partners.

The nature of this research is consistent with research program areas of the Melbourne Centre for Financial Studies. Specifically, its focus is the Australian financial market and the outcomes will be important to practitioners in determining both their hedging and investment strategies.

The outcome of this analysis will be significant for several reasons, specifically:

- It will strengthen our understanding of the Australian stock market (which remains relatively untested in this area of international finance).

- It will investigate a risk parameter that is important to the value of Australian firms, and analyse issues such as a potential asymmetric response of firms to changes in two critical exchange rates - the AUDUSD and the AUDJPY.
- The findings will be important to investors and fund managers in determining their investment strategies.