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The long or short of it: Determinants of foreign currency exposure in external balance sheets[☆]

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ABSTRACT

A major focus of the recent literature on the determination of optimal portfolios in open-economy macroeconomic models has been on the role of currency movements in determining portfolio returns that may hedge various macroeconomic shocks. However, there is little empirical evidence on the foreign currency exposures that are embedded in international balance sheets. Using a new database, we provide stylized facts concerning the cross-country and time-series variation in aggregate foreign currency exposure and its various subcomponents. In panel estimation, we find that richer, more open economies take longer foreign-currency positions. In addition, we find that an increase in the propensity for a currency to depreciate during bad times is associated with a longer position in foreign currencies, providing a hedge against domestic output fluctuations. We view these new stylized facts as informative in their own right and also potentially useful to the burgeoning theoretical literature on the macroeconomics of international portfolios.

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1. Introduction

The rapid expansion of gross cross-border investment positions has stimulated a new wave of interest in the international balance sheet implications of currency movements. At the same time, recent advances in macroeconomic theory have provided a more nuanced consideration of the general equilibrium characteristics of the portfolio allocation problem than was attained in the earlier wave of “portfolio balance” models (see, amongst others, Devereux and Sutherland, 2009a,b; Tille and van Wincoop 2007; Engel and Matsumoto 2009). A major concern of this new research programme has been to identify the appropriate currency exposure of optimal portfolios.

However, this literature has been constrained by a lack of empirical evidence concerning the currency exposures that are present in the international balance sheet. In a recent work (Lane and Shambaugh, 2009), we have compiled and described the currency composition of foreign asset and liability positions for a broad set of countries over 1990–2004. In that work, we established that the currency profiles of international portfolios show tremendous variation, both across countries and over time.

Accordingly, our goal in this paper is to synthesize two recent advances in the literature—the expansion of knowledge concerning the data on the currency composition of cross-border portfolios and the advances in theory regarding those positions—to study the cross-country and cross-time variation in aggregate foreign currency exposure. We pursue two broad lines of analysis. First, we provide a decomposition of aggregate foreign currency exposure into its constituent elements. This is important, since much of the theoretical literature has focused on particular dimensions of foreign-currency exposure, whereas the valuation impact of currency movements depends on the aggregate foreign currency position. Second, we conduct a panel analysis of variation in foreign currency exposure in order to identify which country characteristics help to explain the cross-sectional and time-series variation in the level of foreign currency exposure.

In the decomposition, we divide aggregate foreign-currency exposure into two primary subcomponents: the net foreign asset position and the level of foreign currency exposure embedded in a zero net foreign asset position. While some models focus on the latter component, the data suggest that the net foreign asset position is the most important determinant of aggregate foreign currency exposure. In addition, the decomposition shows that the structure of foreign liabilities (across portfolio equity, direct investment, local-currency debt and foreign-currency debt) is a key determinant of foreign currency exposure, with the equity share in liabilities more important than the currency composition of foreign debt liabilities. These findings

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point to the importance of analyzing the full set of foreign-currency assets and liabilities, rather than focusing on a particular subcomponent of the data.

We next analyze the panel variation in foreign currency exposures. We find that factors such as trade openness and the level of development help to explain the cross-sectional variation in foreign currency exposure: richer, more open economies take longer positions in foreign currency. This means these countries experience gains when their currency depreciates and losses when it appreciates. Once the cross-sectional variation is eliminated by including a set of country fixed effects in the estimation, we find support for a key general prediction of the theoretical literature: an increase in the propensity for a currency to depreciate during bad times is associated with a longer position in foreign currencies, which acts as a hedge against domestic output fluctuations. Our final contribution is to show that there is substantial heterogeneity in the roles of each regressor in explaining the variation in individual subcomponents of foreign-currency exposure: accordingly, it is important to take a broad perspective rather than examining individual components in isolation.

The structure of the rest of the paper is as follows. Section 2 lays out the conceptual framework for the study, while Section 3 briefly describes our dataset. The analysis of the decomposition of foreign-currency exposure into its constituent elements is presented in Section 4, with the main econometric analysis reported in Section 5. Section 6 provides a summary of the main stylized facts established by our analysis and final conclusions are offered in Section 7.

2. Analytical issues

2.1. Conceptual framework

The role played by nominal exchange rate fluctuations in determining the payoffs to cross-border holdings and the pattern of international risk sharing has long been recognised. In what follows, we present a simple framework (adapted from Davis et al., 2001) to guide our thinking in terms of the role of currency exposure in determining the composition of portfolios.

Consider a two-period small open-economy model. The endowment of the home agent in period 1 is fixed at y_1 but her period-2 endowment y_2 is stochastic. In particular, the process for output is

$$y_2 = \bar{y} + \beta_y S + \varepsilon \tag{1}$$

where S is the period-2 rate of exchange rate depreciation, β_y is the beta from a regression of y_2 on S and ε is the orthogonal stochastic component.

Consumption only takes place in the second period. There are two assets: a domestic-currency asset D which offers a fixed gross return $R_D = \bar{R}$ and a foreign-currency asset F. The domestic-currency return on the foreign asset is

$$R_F = \alpha_F + \beta_F S + \upsilon \tag{2}$$

where β_F is the beta from a regression of R_F on S and υ is the orthogonal stochastic component. With this setup, we can derive the equilibrium holdings of F as a function of β_y, β_F and other factors.

The agent maximises utility over

$$U(c_2) = \left(\frac{1}{1+\delta}\right)\left(\frac{-1}{A}\right)E\exp[-Ac_2] \tag{3}$$

where δ is the discount rate, A is the coefficient of absolute risk aversion and the level of period-2 consumption is

$$c_2 = y_2 + (\omega_D R_D + \omega_F R_F) \tag{4}$$

where ω_D, ω_F are the domestic and foreign portfolio allocations respectively. The joint normality of y_2 and R_F means that we can write the optimality condition as

$$ACov(c_2, R_F) = E(R_F) - R_D = RP \tag{5}$$

where RP is the risk premium. That is, the agent chooses portfolio allocations such that any remaining volatility in consumption that is correlated with the volatility in R_F is compensated through the risk premium.

With an optimal portfolio allocation, equilibrium consumption can be written as

$$c_2 = \alpha + \beta_c R_F + \zeta \tag{6}$$

where $\beta_c = RP/[AV(R_F)]$ is the agent's *desired exposure* to the foreign-currency asset and $V(R_F)$ is the variance of the return on the foreign-currency asset. If the foreign-currency asset offers a risk premium, the agent will want some positive exposure to the foreign-currency asset; if the risk premium is zero, the agent will desire to have a consumption profile that has zero foreign-currency risk.

The agent's *endowed exposure* to the foreign-currency asset is β_y. Accordingly, the optimal portfolio allocation to the foreign-currency asset is

$$\omega_F = \beta_c - \beta_y \tag{7}$$

$$\omega_F = \frac{RP}{AV(R_F)} - \frac{Cov(y_2, S)}{V(S)}. \tag{8}$$

Accordingly, the optimal portfolio foreign-currency position is increasing in the risk premium offered on the foreign-currency asset and declining in the volatility of the exchange rate and the degree of absolute risk aversion A. Importantly, it is decreasing in the covariance between the exchange rate and domestic output. If this covariance is negative (such that the currency depreciates when the domestic endowment is low), then the optimal portfolio share is positive even if the risk premium is zero. In contrast, even if the risk premium is positive, the optimal portfolio foreign-currency position can be negative if the covariance term is sufficiently positive (that is, the currency depreciates when the domestic endowment is high).

While we have analyzed the determinants of foreign-currency exposure in a highly-stylized environment, similar themes have been explored in the new wave of macro-finance models in which cross-border portfolio positions are endogenously determined. In particular, several recent contributions have also emphasised the potential role played by nominal assets and liabilities in contributing to international risk sharing.

The mechanism varies across models. For instance, Devereux and Saito (2007) consider a single-good flexible-price world economy in which home and foreign countries are subject to shocks to endowments and inflation. If it is assumed that the covariance between productivity and inflation is negative (as is empirically the case), a striking result is that complete risk sharing can be achieved if asset trade is restricted to home and foreign nominal bonds. Since the return on nominal bonds is procyclical in this setting, risk sharing is accomplished by the home country taking a long position in the foreign currency bond and a short position in the domestic-currency bond—the portfolio payoff will be high when the home endowment is low.

A similar result is obtained by Devereux and Sutherland (2009a) who consider independent shocks to output and money stocks. In their symmetric model, domestic residents hold a long position in foreign-currency bonds (financed by an opposite position in domestic-currency bonds). The long position in foreign currency is increasing in the relative importance of endowment shocks versus monetary shocks and also

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