Bank Profitability: The Impact of Foreign Currency Fluctuations

Ling T. He
University of Central Arkansas

Alex Fayman
University of Central Arkansas

K. Michael Casey
University of Central Arkansas

Given the global nature of business, and in particular banking, we should find that financial institutions are impacted by foreign currency movements. In this paper, we investigate whether the performance of 22 large U.S. commercial banks is affected by foreign exchange fluctuations over a 40-year period. We find that these large U.S. banks are exposed to foreign exchange risk and that specific bank performance is related to the value of the dollar relative to market baskets of other currencies. These results can potentially be used to mitigate some of this risk and/or alter investment portfolios given various foreign currency movements.

INTRODUCTION AND LITERATURE REVIEW

The popular press contains numerous references to the impact of foreign exchange movements on U.S. banks. For example, in an article by Boyd (2011) he states that Fitch Ratings indicated that U.S. banks had substantial exposure to the Euro related to the European debt crisis. In fact, by the end of 2010 the combined U.S. bank exposure to the Greek debt crisis alone was at least $41 billion according to the Bank of International Settlements.

Additional data from the Office of the Comptroller of the Currency (OCC) indicates that U.S. banks generate substantial trading revenue from foreign exchange. In the second quarter of 2011, the revenue from foreign exchange was $491 million. However, in comparison with the second quarter of 2010 the U.S. bank revenue from foreign exchange was $4,261 million. The year-to-year volatility highlights the risk exposure of U.S. banks to foreign exchange movements. When the derivative exposure is added to this equation, the amounts of risk attributable to foreign exchange can be staggering with many estimates ranging in the hundreds of billions of dollars (Durden, 2011).

Given the recent popular press attention to foreign exchange risk of big commercial banks it warrants academic investigation. Is bank performance truly impacted by foreign exchange risk? The purpose of this research is to investigate that claim using 30 years of recent data to evaluate the exposure of large U.S. banks to fluctuations in foreign exchange.

A number of academic studies have addressed banks and foreign exchange exposure. For example, Bracker et al (2009) identified the change in the value of the U.S. dollar as one of the six primary sources

of bank risk. Bracker's study focus on the sensitivity of bank stock returns to various risk factors. The findings were not consistent however with some time periods generating positive relationships and other generating negative relationships between bank holding company returns and exchange rates. However, their study did identify foreign exchange risk as significant overall.

Other research by Chamberlain et al (1997) and Choi et al (1992) finds that bank stock returns are impacted by foreign exchange movements. However, Chamberlain's findings did not extend to Japanese bank stock returns but instead only held for U.S. based banking firms. Choi et al determined that whether a bank had "money-center status" was a primary factor affecting whether exchange rates impacted bank stock returns. A later study by Elyasiani and Mansur (2005) find conflicting results in their study of Japanese banks. Exchange rates information did impact Japanese bank stock returns and this information was found to be impounded into financial ratios. All 52 Japanese banks in their sample were impacted by exchange rates.

One study by Atindéhou and Gueyie (2001) focuses on Canadian banks and their exposure to exchange rate risk. Their findings indicate that Canadian bank stock returns were sensitive to foreign currency fluctuations over the period 1988-1995. However, the sensitivity of those returns varied substantially over that time period. Much of this variation was attributed to investor reactions. Merikas (1999) similarly finds that stock returns of Greek banking institutions are also impacted by exchange rate fluctuations. However, this study looks at only eight larger banks in Greece and does an individual analysis of each bank.

According to Chow et al (1997), most prior studies of the impact of foreign exchange risk on any firm have found little or no relationship. However, their study attributes that to using short-term time horizons. In their study they used a 12-year time horizon and found stock returns to be responsive to fluctuations in exchange rates. The Chow et al study was not limited to bank stocks but instead looked at a broader data set that included 65 different industry groups. Their findings indicate that the short run impact of changes in real exchange rates on earnings is negative yet turns positive when viewed over long time periods.

As indicated by previous research there is little consensus regarding whether foreign exchange fluctuations impact firm performance. In most of these studies, the researchers focused on stock returns as their performance metric. However, we contend that a better performance metric is net income when limiting the analysis to bank stocks. Limiting the sample to a specific industry (banking) will also limit the impact of differential accounting treatments. The highly regulated nature of banks should make accounting comparisons valid. In addition, given the importance of the global financial system to all firms, it is useful to understand how bank performance is affected by foreign currency fluctuations. In this paper, we evaluate the impact of fluctuations in exchange rates on the performance of 22 large U.S. banks over a 30-year period. In addition, we evaluate the impact on changes in net income for these large banks instead of changes in stock price. Using net income as our performance metric removes the idiosyncrasies and other noise associated with stock price movements.

DATA

The quarterly data for all unit banks that furnished Call Reports for the period of 1978-2008 was collected from the Federal Reserve Board of Chicago website. The data for the individual unit banks was then aggregated based on the highest bank holding company code. A sample of forty largest banks was selected in the fourth quarter of 2008 and those forty banks were traced back to 1978 through every quarter in order to comprise a balanced panel dataset. Of the forty banks, it was determined that twenty-two continuously provided Call Reports to the Federal Reserve for the entire period investigated in this study. The financial ratios analyzed were then calculated for the final sample of twenty-two banks. Additionally, data pertaining to the value of the U.S. dollar versus baskets of various currencies was obtained from the Federal Reserve Bank of Atlanta website.

METHODOLOGY

As the globalization process has picked up its speed in the past three decades, large U.S. banks, as well as their major corporate clients, keep increasing their international exposure. As a result, profitability of those large banks might be significantly affected by fluctuations in exchange rates. Initially, we tried three major currency indexes, U.S. Dollar, Euro, and Asia, to represent three largest economic blocks in the world. However, two indexes, U.S. Dollar and Euro, are almost perfectly correlated with each other over the sample period. The correlation coefficient is 89%. Regression results also reveal serious multicollinearity problems when both indexes are included in a regression model. Therefore, only the U.S. Dollar and Asia indexes are used as proxies for exchange rate risk in this study.

We estimate the following model to assess the influence of exchange rates on bank performance:

$$Earnings_t = \alpha + \beta_b ALLL1_t + \beta_s Asia_t + \beta_d Dollar_t + \varepsilon_t \tag{1}$$

where *Earnings$_t$* is the percentage change in net earnings for each bank and *Asia$_t$*, and *Dollar$_t$* are currency indexes for Asia and U.S. dollar, respectively. ALLL1 is the one quarter-lagged trade-weighted overall dollar index against world major currencies compiled by the Atlanta Fed.

Bank performance is certainly affected by additional firm-specific variables. Therefore, we selected three important variables from the balance sheet to control for variation in *Earnings$_t$* caused by these micro variables.

$$Earnings_t = \alpha + \beta_b ALLL1_t + \beta_s Asia_t + \beta_d Dollar_t + \beta_e TETA_t + \beta_f FLTA_t + \beta_g FADA_t + \varepsilon_t \tag{2}$$

where:
TETA$_t$ is a ratio of Total Equity/Total Assets
FLTA, is the ratio of Foreign Loans/Total Assets
FADA$_t$ represents Foreign Assets/Domestic Assets.

Both Equations (1) and (2) are estimated by the pooled cross-section heteroskedasticity and time-wise autoregressive method described in Greene (2000). This method calculates a panel-corrected covariance matrix of the coefficient estimates and uses panel-corrected standard error. In order to detect potential multicollinearity problems embedded in the regression models, we conduct a principal components and factor analysis. Results do not indicate any strong linear dependencies among the independent variables in a variance decomposition proportions matrix.

RESULTS

We relate quarterly change in net income (EARNING) of largest U.S. banks relative to changes in various currency indices. It is valuable to evaluate how bank earnings respond to changes in values of foreign currencies relative to the U.S. dollar. A significant relationship may indicate that, in the increasingly global business environment, U.S. banks are not isolated from levels of international economic activity. From the first table, it is evident that, indeed, change in U.S. banks' income is related to both dollar index, an index which measures the value of U.S. dollar relative to the basket of international currencies, and is also significantly related to the Asian index which is comprised of a basket of Asian currencies as well as a European index.

Table 1 presents a correlation matrix of the variables utilized in the regression analysis. From the results, there is a very high correlation between the basket of European currencies (EUL1) and the U.S. dollar (0.882) and a smaller correlation between the U.S. dollar(ALLL1) and ASIAL1 (0.467). Therefore, in order to avoid multicollinearity, EUL1 and ALLL1 will not be included in the same models as independent variables. It is interesting to note that the correlation between the ALLL1 and ASIA1 is much higher than the correlation between ASIAL1 and the EUL1 (0.105).

TABLE 1
DESCRIPTIVE STATISTICS:
QUARTER 2 OF 1978 TO QUARTER 4 OF 2008 (2706 OBSERVATIONS)

	Mean	Std. Deviation	Minimum	Maximum
EARNING	0.3110	1.8735	-28.137	39.032
TETA	0.0813	0.0427	0.0000	0.8051
FLTA	0.0500	0.0870	0.0000	0.4092
FADA	0.1942	0.3631	-0.0183	2.4144
ALLL1	-0.0023	0.0311	-0.0656	0.0636
EUL1	-0.0016	0.0456	-0.1390	0.1234
ASIAL1	0.0015	0.0509	-0.0813	0.4497

Correlation Matrix of Variables

	EARNING	TETA	FLTA	FADA	ALLL1	EUL1	ASIAL1
EARNING	1.000						
TETA	0.013	1.000					
FLTA	-0.041	-0.091	1.000				
FADA	-0.027	0.026	0.758	1.000			
ALLL1	0.059	-0.011	0.019	0.004	1.000		
EUL1	0.043	-0.009	0.019	-0.009	0.882	1.000	
ASIAL1	0.045	0.014	0.003	0.025	0.467	0.105	1.000
	EARNING	TETA	FLTA	FADA	ALLL1	EUL1	ASIAL1

EARNING= Quarterly percentage changes in net earnings.
TETA= ratio of total equity to total assets.
FLTA= ratio of foreign loans to total assets.
FADA= ratio of foreign assets to domestic assets.
ALLL1= One quarter-lagged trade-weighted overall dollar index against world major currencies compiled by the Atlanta Fed.
EUL1= One quarter lagged trade-weighted dollar index against major European currencies compiled by the Atlanta Fed.
ASIAL1= One quarter lagged trade-weighted dollar index against major Asian currencies compiled by the Atlanta Fed.

Table 2 presents three panels of regression results that evaluate the relationship between currency indices and quarterly percent change in earnings of the largest U.S. based commercial banks. The currency indices are lagged one quarter, as the analysis aims at measuring the effect of an earlier quarter currency fluctuation on the current quarter's bank earnings. Panel A demonstrates three simple models where the independent variables are simply the currency indices. From the results, ALLL1 is positively related to percent change in bank earnings (3.318, t-statistic=3.56), as are EUL1 and ASIAL1 (1.270, t-statistic=1.95; and 1.356, t-statistic=2.14, respectively). Thus, as the value of the U.S. dollar rises relative to the value of the basket of global currencies, U.S. banks profit. It is indeed an intriguing result, if one is to assume that a strong currency is a reflection of increased economic activity. The U.S. doing well relative to the world improves profit generation for U.S. based financial institutions. Therefore, we can see that U.S. banks perform better as the dollar rises in value against both European and Asian currencies.

TABLE 2
REGRESSION RESULTS (DEPENDENT VARIABLE: EARNING)

Constant	ALLL1	EUL1	ASIAL1	TETA	FLTA	FADA	Buse R^2
Panel A							
0.331 (11.20)***	3.318 (3.56)***						0.050
0.331 (11.17)***		1.270 (1.95)*					0.046
0.325 (10.82)***			1.356 (2.14)**				0.046
Panel B							
0.268 (7.334)***	3.353 (3.62)***			1.050 (4.28)***	-0.446 (-2.19)**	-0.016 (-0.34)	0.062
0.269 (7.29)***		1.272 (1.97)**		1.050 (4.22)***	-0.454 (-2.21)**	-0.014 (-0.29)	0.058
0.263 (7.05)***			1.307 (2.06)**	1.052 (4.20)***	-0.432 (-2.09)**	-0.019 (-0.40)	0.058
Panel C							
0.326 (10.93)***		1.168 (1.77)*	1.288 (2.02)**				0.048
0.265 (7.15)***		1.181 (1.81)*	1.244 (1.94)*	1.037 (4.15)***	-0.436 (-2.12)**	-0.018 (-0.38)	0.060

***, **, * Represent the 1, 5, and 10% significance level, respectively.
t-statistics are in parenthesis.
Buse R^2= Buse raw-moment R-squared.
EARNING= Quarterly percentage changes in net earnings.
TETA= ratio of total equity to total assets.
FLTA= ratio of foreign loans to total assets.
FADA= ratio of foreign assets to domestic assets.
ALLL1= One quarter-lagged trade-weighted overall dollar index against world major currencies compiled by the
     Atlanta Fed.
EUL1= One quarter lagged trade-weighted dollar index against major European currencies compiled by the Atlanta
     Fed.
ASIAL1= One quarter lagged- trade-weighted dollar index against major Asian currencies compiled by the Atlanta
     Fed.

In panel B of Table 2, we include three bank ratios to further investigate the strength of the relationship between currency indices and the percent change in earnings of the U.S. banks. The results indicate that the inclusion of additional variables into the model does not impact the strength or the direction of the relationship between currency indices and the profits of U.S. banks. ALLL1 is positively related to EARNING (3.353, t-statistic=3.62), as are EUL1 and ASIAL1 (1.272, t-statistic=1.97; and

1.307, t-statistic=2.06, respectively). Furthermore, it is evident that the ratio of equity to total assets is positively related to EARNING, for example TETA is positively related to EARNING in the ALLL1 model (1.050, t-statistic=4.28). Thus, higher capitalization and lower risk are positively related to bank performance. It is interesting that foreign loans as a percentage of total assets (FLTA) are negatively related to EARNING in all three models of Panel B. For example in the model relating EUL1 to EARNING, the relationship between the two variables is negative (-0.454, t-statistic=-2.21). The implication is simple. All three models in Panel B do not demonstrate a significant relationship between foreign assets as a percent of domestic assets. From this, we can extrapolate that foreign lending is a true source of risk and perhaps foreign direct investment by the U.S. banks is not significant enough to impact bank profits, especially when controlling for foreign lending of the largest U.S. based commercial banks.

Panel C of Table 2 demonstrates the results of two additional models. As previously mentioned, the correlation matrix in Table 1 showed a low correlation between EUL1 and ASIAL1. Therefore, we include both variables in a single model. This would serve as a robustness check. The results in Panel C of Table 2 show that EUL1 and ASIAL1 are positively related to EARNING (1.181, t-statistic=1.81; and 1.244, t-statistic=1.94, respectively). Additionally TETA is positively related to EARNING (1.037, t-statistic=4.15) and FLTA is negatively related to EARNING (-0.436, t-statistic=-2.12). Thus, the results of the models in Panels A and B of Table 2 are supported by the findings in Panel C.

CONCLUSIONS

From these results, it is evident, that the value of the dollar relative to a basket of global currencies, a basket of European currencies and a basket of Asian currencies, is positively related to the returns generated by the largest U.S. based banks. The results are based on a balanced panel of the largest 22 U.S. commercial banks over a forty-year period (1978-2008). Additionally, because the indices values used in the regression are lagged one quarter, we can conclude that the rise in the value of the U.S. dollars versus various baskets of foreign currencies will enhance the earnings of U.S. based institutions in the future quarter. From the recent financial crises, the world has learned that an increased understanding of the risks associated with bank profits, and/or predictability of bank profits can enhance the ability of regulators, bank executives and shareholders to mitigate any future economic downfalls. The findings of this paper serve that purpose.

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