



The impact of interest rate and exchange rate volatility on banks' stock returns and volatility: Evidence from Turkey

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ABSTRACT

This paper investigates the effects of interest rate and foreign exchange rate changes on Turkish banks' stock returns using the OLS and GARCH estimation models. The results suggest that interest rate and exchange rate changes have a negative and significant impact on the conditional bank stock return. Also, bank stock return sensitivities are found to be stronger for market return than interest rates and exchange rates, implying that market return plays an important role in determining the dynamics of conditional return of bank stocks. The results further indicate that interest rate and exchange rate volatility are the major determinants of the conditional bank stock return volatility.

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1. Introduction

In recent years, the liberalization of financial markets has caused exposure to many sources of risk. The impact of interest rate and exchange rate changes on banks' stock returns has been of major interest to bank managers, regulatory authorities, academic communities and investors, since the failure of numerous banks has been especially attributed to the adverse impacts of fluctuations in interest rates and exchange rates.

The sensitivity of bank stock returns to interest rate and exchange rate changes can be theoretically explained with several models and hypothesis. Initially, with reference to the intertemporal capital asset pricing model (ICAPM) of Merton (1973), the interest rate risk may be included in the model (ICAPM) as one-possible extra market factor, since a change in the interest rate may represent a shift in the investment opportunity set. Therefore, investors require additional compensation for bearing the risk of such changes. Also, the implications of Arbitrage Pricing Theory (APT) can provide evidence of whether interest rate (Sweeney and Warga, 1986) or exchange rate risk are priced factors in the equilibrium price of bank stocks. In equilibrium, interest rate (Yourougou, 1990) and exchange rate

sensitivities exert a significant impact on the common stocks of financial institutions,¹ including banks.

The nominal contracting hypothesis (Kessel, 1956; Bach and Ando, 1957; French et al., 1983) has also been used to explain the interest rate sensitivity of banks, given the composition of their balance sheets (Flannery and James, 1984). This hypothesis suggests that the interest rate sensitivity of a bank's common stock return depends on the amount of net nominal assets held by the bank. A bank's holdings of nominal assets and nominal liabilities affect its common stock returns through wealth distribution effects caused by unexpected inflation.² Since the internationalization process of most financial institutions have not been completed, it is more likely that both interest and exchange rate sensitivity would vary among banks. Therefore, the nationality and financial operations of the banks will affect the extent to that variation. Maturity mismatch between the assets and liabilities of banks and unexpected change in interest and exchange rates are

¹ Theoretical justification of stock returns sensitivity to different types of risks can be explained in terms of risk aversion. A risk averse investor relates decision process on portfolio holdings to the covariance of the portfolio's return with market factors and other types of risks (i.e. interest rate and exchange rate changes). An investor will always choose the portfolio that provides a better hedge against unfavorable shifts in risk factors. As a result, in equilibrium asset prices (and expected returns) will differ due to changes in risk factors.

² Since unexpected inflation will redistribute wealth from creditors to debtors which results in a benefit to stockholders in firms with more nominal liabilities than nominal assets, the equity of firms with positive net nominal assets should decline.

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considered as the key factors that lead to increase the risk exposure of the banks. Additionally, most financial analysts and economists agree that the revenues, costs and profitability of banks are directly influenced by the unexpected changes in interest rates and exchange rates (Saunders and Yourougou, 1990). With the financial market liberalization process, most of the banks generally carry out their operations in foreign countries and are exposed to the interest rate risk because of volatile financial market conditions in recent years. Therefore, interest rate and exchange rate changes could have an adverse effect on the viability of banks because their impacts cannot be eliminated through risk management techniques (Gilkenson and Smith, 1992).

Banking institutions can reduce their interest rate and exchange rate risk exposures by engaging in various off-balance sheet activities and implementing effective risk management techniques. However, financial institutions in emerging countries are more vulnerable due to their inadequacy in such instruments and techniques. It is not surprising that these countries are more often faced with serious financial crises. Hence it is worthwhile to investigate the interest rate and exchange rate exposures of banks in emerging market countries as the results can have important implications on financial stability and policy formulation for banking and regulatory communities.

Despite the clear importance of an understanding of the impact of interest and exchange rates on the bank stock returns, surprisingly, only a few papers have investigated explicitly the joint interaction of the interest and exchange rates on bank stock returns and volatility in the context of emerging markets. However, the majority of studies on this issue have been concentrated in developed markets. Hence, the objective of this study is to contribute to the related literature by studying the sensitivity of bank stock returns to interest and exchange rates changes using data from a major emerging market. Turkey, which is considered an emerging market, has witnessed significant developments in its banking system since financial crisis of 2001. As is the case in most emerging markets, the high interest rates and exchange rate fluctuations have been characteristics of the Turkish economy for a long time. The large maturity gaps and short positions in foreign exchange on the balance sheets and duration gaps during the crisis resulted in a significant amount of erosion of their capital. Hence, the main objective of this study is to investigate the sensitivity of a sample of Turkish banks' stock returns to interest rate and exchange rate changes over the period 1999–2009, using both standard OLS method and GARCH model. The contribution of this paper to the related literature is three-fold: first, to the authors' best knowledge, this is the first study that has conducted an in-depth investigation regarding joint interest rate and exchange rate risks on the Turkish banks' stock returns. The study is based on daily data rather than monthly data, since daily data provide stronger evidence of the sensitivity of bank stock returns to both interest rate and exchange rate changes. Second, it utilizes two different econometric approaches, the standard OLS and GARCH model, to enhance the analysis. In this way, the comparison of the empirical results dictates the extent to which the empirical results are reliable and also the usefulness of the estimated parameters. Third, the time period examined covers a unique large and recent data set, which is characterized by the inclusion of financial and economic crises in Turkey.

The remainder of paper is organized as follows. Section 2 presents the literature review. Section 3 discusses the data. Methodology is presented in Section 4. Section 5 discusses the empirical results. Finally, Section 6 provide conclusions.

2. Literature review

Most of the existing studies concentrate on the interest rate and exchange rate sensitivity of bank stock returns separately by employing different methodologies. This variation in turn gives rise

to different empirical results. By using cash flow approach with US bank stocks, Flannery (1981) found that they were not affected by interest rate fluctuations since these changes did not have a significant impact on the costs and profits. Prior empirical studies of banks' interest rate sensitivity include the works of Stone (1974), Lloyd and Shick (1977), Lyngge and Zumwalt (1980), Chance and Lane (1980), Flannery and James (1984), Booth and Officer (1985), Scott and Peterson (1986), and Bae (1990). By employing a two-index factor model (including both market and interest rate factors) on the bank stock returns under the assumption of constant variance error terms, the empirical findings were dissimilar regarding the direction and magnitude of the effect. The empirical findings of Lloyd and Shick (1977) and Chance and Lane (1980), which provided a weak evidence of interest rate impact on the return generating process of the stocks of financial institutions, were challenged by the results of Lyngge and Zumwalt (1980), Flannery and James (1984), Booth and Officer (1985), Scott and Peterson (1986), and Bae (1990). The latter authors reported that stock returns of financial institutions were negatively affected by interest rate changes.

Despite a vast amount of literature on interest rate sensitivity, few empirical studies have dealt with foreign exchange rate sensitivity of bank stock returns. Since unexpected movements in exchange rates can affect the banks directly by generating translation gains or losses based on the net foreign position, the exchange risk could be another important determinant of bank stock returns. The first empirical studies that attracted particular attention to foreign exchange exposure on banks' return generating process were Grammatikos et al. (1986) and Chamberlain et al. (1997). The results of these studies showed that US banks were exposed to the exchange rate risk. By using both daily and monthly data, Chamberlain et al. (1997) compared the exchange rate sensitivities of US banks with those of Japanese banks. They found that stock returns of a significant portion of the US banking companies appeared to be sensitive to exchange rate changes, whereas only a few of the Japanese bank stock returns moved with the exchange rate.

While most of the research has generally analyzed the impacts of either interest rates or exchange rates on bank stock returns, Choi et al. (1992) and Wetmore and Brick (1994) applied a three index model to the US bank stock returns which jointly estimated the impact of market, exchange rate and interest rate factors under the assumption of constant variance error terms. Even though the results of Choi et al. (1992) provided much stronger evidence of interest rate sensitivity than exchange rate sensitivity, Wetmore and Brick (1994) found a controversial result for US banks. In addition, by employing the same three-factor model to the return generating process of Korean banks, Hahm (2004) concluded that Korean bank stock returns were sensitive to those factors.

As aforementioned, these studies have mainly employed linear estimation methods, such as OLS and GLS, and do not consider that bank sensitivities to market, interest rate, and exchange rate factors are time-varying. Due to the volatility clustering, the leverage and ARCH effects of the high frequency data, the linear (OLS) estimation methods produce biased and inconsistent results and therefore, it would be unwise to assume constant volatility in any analysis. Based on the assumption of a time-dependent conditional variance, few empirical studies have used ARCH-type models to capture time-varying risk properties in these data. Song (1994), who employs ARCH estimation models, suggests that ARCH-type modeling is the most appropriate framework in determining bank stock returns. The empirical findings of Mansur and Elyasiani (1995), who investigated the effect of changes in both level and volatility of interest rates on the bank stock returns applying ARCH estimation models, revealed that both level interest rate and their respective volatilities were likely to influence bank stock returns. Flannery et al. (1997), by employing a two-factor GARCH model originally developed by Engle et al. (1990), showed that though both the market and interest rate risks

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