THE EFFECT OF DERIVATIVE FINANCIAL INSTRUMENTS ON BANK RISKS, RELEVANCE AND FAITHFUL REPRESENTATION: EVIDENCE FROM BANKS IN HUNGARY

Tóth Kornél
Department of Finance and Controlling, Faculty of Economics and Business Administration, University of Debrecen, Debrecen, Hungary
kornel.toth@econ.unideb.hu

Abstract
In a continuously changing business environment accounting data have to provide useful information in order to achieve relevant and faithful representation in financial statements. Since global markets have changed radically, growing international trade means the horizons of investors and borrowers have now become global, which has increased the level of their risks. Concerning international trade and investment, one of the most important risks is uncertainty about future foreign currency exchange rates and interest rates. Changes in financial markets have increased the use of derivative instruments (such as forwards, futures, swaps, and options) to hedge risk exposure worldwide, while the related accounting standards have not kept pace with those changes. Because of the complexity and variety of these instruments, reporting on derivatives faces many difficulties, since a different framework and different accounting concepts are required to present useful financial information. For these reasons the growing use of derivative financial instruments and the challenges of the global financial system have intensified and sharpened debates about whether derivative instruments increase or decrease the risk of banks, affecting faithful representation based on their financial statements and decision usefulness of the reported information. This study aims to describe the transformation of accounting concepts and its effect on fair value accounting for derivative financial instruments in the information economy. The research question of the paper is whether the advantages of fair value accounting exceed the disadvantages, especially in the case of derivatives, in reducing the uncertainty and risk associated with financial reporting. Based on this question, the purpose of the empirical research is to assess the level of different risks which banks operating in Hungary face when using derivative financial instruments and to investigate how and to what extent relevance and faithful representation is affected. To answer this, a random effect regression model is conducted to verify whether or not the banks under consideration in Hungary were at risk or not as a result of their use of derivatives during the period from 2003 to 2012. The results indicate that the use of futures, forwards, and swaps tend to mildly increase liquidity, leverage, and credit risks, while options negatively affect leverage, liquidity and credit risks. Other derivatives have a negative effect on bank risks as well. There is some evidence that the relationship between the use of derivatives and overall risk is not significant; hence the banks in the sample are not put at risk by using different derivatives. In sum, it can be concluded that fair valuation of these instruments satisfies the fundamental requirements of useful financial information.

Keywords: accounting concepts; fair value; derivative financial instruments; bank risks; panel data regression

JEL classification: G21; G32; M41

1. Introduction

Over the past few decades accounting has gone through significant changes in line with financial globalization, and as a result accounting concepts appear to be undergoing transformation. In a continuously changing business environment accounting information have to be useful to achieve relevant and faithful representation on the financial position of business entities. Because of the challenges in measuring certain balance-sheet items, the valuation method is much more based on fair value rather than on book value, in order to increase the usefulness of annual reports. In recent years the shift in accounting measurement has been driven by market-based measures, especially in the case of financial instruments. The two main standard setters, the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) also underline the importance of incorporating market values in accounting information systems. Improving the conceptual framework for financial reporting is directed towards better performance of both functions within the conventional accrual system of accounting through the use of fair value (Rayman, 2007:211).

Over the last few decades global markets have changed radically. Growing international trade has resulted in increased import and export activities, and the horizons of investors and borrowers have become global, which has increased the level of their risks. One of the most important risks associated with international trade and investments is uncertainty about future foreign currency exchange rates and interest rates. Practices and markets have developed which help firms manage the added risks of doing business abroad (Crawford et al., 1997). Changes in global financial markets and related financial innovations have led to the increasing use of derivative instruments (such as forwards, futures, swaps, and options) to hedge risk exposure arising from changes in both exchange rates and interest rates. The main problems with these instruments is that accounting standards have not kept pace with these changes; it is, however, very important to improve financial information about derivatives and related activities (Wilson and Smith, 1997). Reinstein and Lander (2000) also emphasise that the accounting for derivatives has also created uncertainties for preparers, auditors, regulators, and users of financial statements. Because of the complexity and variety of these instruments, reporting on derivatives is difficult. Developing consistent accounting rules is extremely challenging since derivative instruments under the different accounting systems may be carried at historical cost, fair value, or some hybrid of fair value and historical cost (Reinstein and Lander, 2000). Over the last decade the increasing use of derivative financial instruments and the challenges of the global financial system have intensified and sharpened debates about whether derivative instruments increase or decrease the risk of banks, affecting faithful representation based on their financial statements and decision usefulness of the reported information. According to Hitz (2007) opponents of fair value measurement criticize the relevance of fair value measures, since if there are no market prices available, they mainly rely on management's expectations and projections; however the use of fair value accounting has grown considerably in financial reporting in the last decade. The movement towards global accounting convergence has been a driving force behind the increased use of fair value, especially in the case of financial instruments.

The research question of the paper is whether the advantages of fair value accounting exceed the disadvantages, especially in the case of derivatives, in reducing the uncertainty and risk associated with financial reporting. Based on this question, the purpose of the empirical research is to assess the level of different risks that banks operating in Hungary face when using derivative financial instruments and to investigate how and to what extent relevance and faithful representation were affected during the period from 2003 to 2012. The paper also aims to verify whether the banks in Hungary under consideration are put at risk or not by using derivatives.

2. Value-based accounting for derivative instruments: literature review

Today's challenges and transformations in accounting could be captured in the move towards value-based accounting from traditional cost-based accounting, since in a historical perspective fair value measurement of financial instruments might be regarded as one specific form of value-based accounting, which is predominantly focused on available-for-sale financial assets and derivative financial instruments (Ishikawa, 2005, Mirza and Holt, 2011). By analysing the economic background of accounting for these instruments, it can be concluded that their usage embodies a different type of capital, which, unlike industrial or commercial capital, represents financial claims. Similarly to Shortridge and Smith (2009), Ishikawa (2005) also emphasises that the original accounting (conceptual) framework with its emphasis on historical cost and realization was essentially designed to capture the flow of real capital (i.e. the production and sale of goods and services), and a different framework and different accounting concepts are required to adapt to the quantitative and qualitative development of capital markets in the information economy. Derivative financial instruments exactly tailored to avert risk in the marketplace represent a further stage in this development (Ishikawa, 2005). In sum, the challenge of accounting for derivatives was a vital transformative facilitator in the history of fair value because it required a return to fundamentals and was a test case for the objectivity and coherence of conceptual frameworks for accounting (Power, 2010).

In the nineteenth century accounting was shaped by industrial capital, while at the end of the twentieth century it was considerably influenced by the expansion of financial claims. Operating and financial assets involve different processes in creating value. The value of operating assets is created and realized through a firm's operations, while in the case of financial assets the returns and risks are determined by market expectations and macroeconomic trends, and they are subject to larger risks caused by changes in the market environment. Currently fair valuation of certain financial instruments has become a leading trend, but there is no ultimate theoretical agreement on how to recognize and measure the value and returns of financial assets – which are different from real assets such as plant, property and equipment – and how to present them accurately in the balance sheet and income statement. For this reason, the valuation and income recognition of financial assets cannot be undertaken by an extension of the traditional accounting framework and concepts; consequently it requires an alternative framework in order to provide useful information on the underlying economic activity. This kind of framework is better able to raise the level of transparency and the faithfulness of financial transactions, the effectiveness of corporate governance, and the efficiency of capital markets (Ishikawa, 2005). In the International Financial Reporting Standards (IFRS) Framework useful financial information is relevant and represented faithfully. This usefulness is enhanced if it is comparable, verifiable, timely and understandable. Relevance and faithful representation are the fundamental qualitative characteristics in financial reporting (IFRS Framework, 2010). Landsman (2007) finds that disclosed and recognised fair values are informative for investors, but the level of informativeness is affected by the amount of measurement error and by the source of the estimates – i.e. from management or external appraisers. In practice, when an active market for the asset or liability does not exist, fair value may not be well defined. In this situation, it becomes difficult to separate an asset or liability's fair value from its value-in-use to the business entity. For example, the estimated fair value of a non-traded swap instrument to a bank depends on the existing assets and liabilities on the bank's balance sheet (Landsman, 2007:20). Blakespoor et al. (2013) prove that the fair values of banks' investment securities, loans, and derivatives are informative for their historical cost equivalents in explaining share prices. Their findings demonstrate that the relationship between credit risk and leverage becomes stronger as the number of financial instruments measured at fair value increases, and fair values are most highly associated with credit risk

determinations (Blakespoor et al., 2013: 1171, 1175). Nowadays many different types of forwards, futures, options, swaps, and other derivatives are regularly traded worldwide by financial institutions, fund managers, and corporate treasurers. A derivative can be defined as a financial instrument whose value depends on the value of other underlying variables. Usually the variables underlying derivatives are the prices of the traded assets (Hull 2009:1). Derivatives are basically designed to achieve an economic result when an underlying security, index, interest rate or commodity moves in price. Futures are standardized contracts in which the purchaser is allowed to buy or sell a specific quantity of a commodity, financial instrument, or index at a specified price. Forward contracts are similar to futures contracts, but they are not traded on an exchange. A swap is an exchange of payment streams between two parties for a certain period of time. An option contract offers the holder the right, and not the obligation, to sell or buy an item at a specified price during an indicated time period (Crawford et al., 1997:112, 113).

In accordance with IAS (International Accounting Standards) 32 (Financial Instruments: Presentation) a financial instrument can be defined as "any contract that gives a rise to a financial asset of one entity and a financial liability or equity instrument of another entity" (Mirza and Holt, 2011:264). IAS 39 (Financial Instruments: Recognition and Measurement) requires derivatives to be measured at fair value to provide more useful information in the balance sheet (Mirza and Holt, 2011). IFRS 13 (Fair Value Measurement) defines fair value as a "price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date" (IFRS 13, 2011 paragraph 9). A published price quotation in an active market is the best evidence of fair value. For assets and liabilities that are not quoted in active markets, fair value is determined by different valuation techniques, such as discounted cash flow models (Mirza and Holt, 2011).

An overview of the related literature shows that several articles have studied the effect of derivatives on bank risks in different countries and regions. Siregar et al. (2013) examine the value relevance of derivative disclosures in U.S. commercial banks; their findings confirm that recognitions of derivatives are value relevant, and quantified derivative disclosures is negatively associated with the value of firms. Keffala and Peretti (2013) find that forwards and swaps decrease bank risk, while options positively affects bank risk, and futures have a mildly significant effect on bank risk in emerging and recently developed countries. According to Yong et al. (2009) the use of derivatives appears to decrease Asia-Pacific banks' short-term interest rate exposure but not their long-term exposure. The results of Augusman et al. (2008) indicate that surveyed Asian countries firm-specific risk is more important than systematic risk. Instefjord (2005) concludes that a financial innovation in the credit derivatives market may raise bank risk. Park et al. (1999) present findings that value differences in available-for-sale and held-to-maturity securities (fair less book value) explain the value of bank equity. Venkatachalam (1996) suggests that fair values have incremental explanatory power over and above the notional amounts of derivatives. Finally, Chaudhry et al. (2000) study the impact of different types of contingent foreign currency claims, and find that options increase all types of bank risk for all banks.

3. Data sample description

Accounting data were obtained from banks' consolidated financial statements prepared in accordance with the International Financial Reporting Standards as adopted by the European Union. The sample represents an unbalanced panel database consisting of 9 banks operating in Hungary, and the study covers the period from 2003 to 2012. In the model derivative financial instruments are separated and presented by contract types (futures and forwards, swaps, options and other derivatives). Other derivatives might

include any types of basic derivatives, as they are not identified in the notes to financial statements. Derivative financial instruments are measured at fair value, and are carried as assets when fair value is positive and as liabilities when fair value is negative.

4. Methodology

4.1. Risk measures

Accounting data from financial statements are used to investigate the effect of the use of derivative instruments on leverage risk, liquidity risk, credit risk, and the volatility of return on assets (overall risk) in banks operating in Hungary. In the model leverage risk is the ratio of equity to total assets. Liquidity risk is defined as the ratio of liquid assets to total assets. Liquid assets are cash, amounts due from banks, and balances with central banks. Credit risks are the ratios of gross loans to total assets and loan loss reserves to total assets. The volatility of return on assets is the standard deviation of return on assets estimated from the figures of the current year and three years before the current year. The return on assets is defined as profit before tax divided by total assets.

4.2. Description of variables

The risk measures are the dependent variables in the model defined by EQTA (leverage risk), LIQATA (liquidity risk), GLTA (credit risk), LLRTA (credit risk), and SDROA (volatility of return on assets). Independent variables are totals of derivative assets and liabilities of each type divided by the total assets (TERM, SWP, OPT, OD, respectively). The control variable is the natural log of total assets (LTA). In my model the dependent variables are regressed on different derivative instruments and the control variable. Table 1 illustrates the variables employed in the empirical research, along with their definitions.

Table 1: Description of variables

Labels	Description	Proxy for
Dependent variables		
EQTA	equity divided by total assets	Leverage risk
LIQATA	liquid assets divided by total assets	Liquidity risk
GLTA	gross loans divided by total assets	Credit risk 1
LLRTA	loan loss reserves divided by total assets	Credit risk 2
SDROA	standard deviation of returns on assets estimated from previous financial statements	Overall risk
Independent variables		
TERM	fair value of futures and forwards divided by total assets	Futures and forwards
SWP	fair value of swaps divided by total assets	Swaps
OPT	fair value options divided by total assets	Options
OD	fair value of other derivatives divided by total assets	Other derivatives
Independent variable: control variable		
LTA	natural log of total assets	Bank size

Source: edited by the author

4.3. Empirical model

The study empirically tests the relationships between accounting measures of bank risk and different derivative instruments by using the following random effect panel regression model for each risk measure:

$$\text{Risk measure} = \gamma_0 + \gamma_1 \text{TERM}_{i,t} + \gamma_2 \text{SWP}_{i,t} + \gamma_3 \text{OPT}_{i,t} + \gamma_4 \text{OD}_{i,t} + \gamma_5 \text{LTA}_{i,t} + u_i + e_{i,t}$$

The model I use follows the methodology adopted by Keffala and Peretti (2013), Agusman et al. (2008), and Chaudry et al. (2000).

5. Empirical results

Tables 2 and 3 present the estimated coefficients of the random effect regression analysis. From these tables it is evident that futures and forwards positively affect liquidity risk and credit risk 1 at a level of significance equal to 5. There is a weak positive relationship between swaps and leverage risk at a significance level of 1 percent, and credit risk 2 is also positively correlated with swaps at a significance level of 10 percent. The association between options and leverage risk, liquidity risk and credit risk 1 indicates a strong negative relationship at a significance level of 5 percent, while options negatively affect credit risk 2 at a significance level of 1 percent. In the case of other derivatives, the results suggest that they negatively and strongly affect liquidity risk at a significance level of 1 percent, while negatively but mildly affecting leverage risk at a significance level of 5 percent. The relationship between derivatives and overall risk is insignificant.

	EQTA (leverage risk)			**LIQATA (liquidity risk)**			**GLTA (credit risk 1)**		
	coefficient	z	P>z	coefficient	z	P>z	coefficient	z	P>z
term	-0.516	-0.44	0.659	2.062**	2.09	0.036	4.626**	2.14	0.033
swp	0.397***	3.73	0	-0.886	-1.57	0.117	0.154	0.12	0.901
opt	-1.574**	-2.55	0.011	-2.448**	-2.5	0.012	-7.282**	-2.02	0.043
od	-0.250**	-2.31	0.021	-1.056***	-2.75	0.006	-0.665	-0.8	0.425
lta	0.006	0.89	0.375	0.006	0.57	0.571	-0.038	-1.37	0.171
_cons	-0.022	-0.2	0.84	0.020	0.11	0.915	1.306	2.95	0.003
R^2 within	0.386			0.247			0.0183		
R^2 between	0.025			0.044			0.655		
R^2 overall	0.134			0.159			0.291		
F (chi^2)	0			0			0		
Number of observations	64			64			64		

Table 2: Estimated coefficients in the random effect model
Notes: *, ** and *** indicate 10%, 5% and 1% levels of significance, respectively.
Source: edited by the author

Table 3: Estimated coefficients in the random effect model (continued)

	LLRTA (credit risk 2)			SDROA (overall risk)		
	coefficient	z	P>z	coefficient	z	P>z
term	-0.031	-0.01	0.989	-0.150	-0.21	0.834
swp	0.540*	1.88	0.06	-0.081	-1.68	0.094
opt	-2.246***	-3.54	0	0.017	0.06	0.954
od	0.396	1.22	0.223	0.113	1.18	0.239
lta	0.022***	3.88	0	0	0.02	0.982
_cons	-0.300	-4.03	0	0.065	0.63	0.531
R^2 within	0.267			0.063		
R^2 between	0.341			0.001		
R^2 overall	0.283			0		
F (chi^2)	0			0.053		
Number of observations	64			61		

Notes: *, ** and *** indicate 10%, 5% and 1% levels of significance, respectively.
Source: edited by the author

6. Conclusion

The paper outlines the transformation of accounting concepts and frameworks in the information economy, emphasising the importance of providing useful information in financial reports. Nowadays the change in accounting measurement is determined by market-based measures, especially in the case of financial instruments, and as a result the use of fair value accounting has grown considerably in the last decade. Major changes in global markets have increased the level of import and export related activities resulting in higher risks for investors and borrowers. These changes have led to an amplified use of derivative instruments to hedge risk exposure; however the key problem is that the related accounting standards have not kept pace with these changes, and this means that a different framework and different accounting concepts are necessary to present useful financial information.

The main purpose of this paper is to determine the effect of derivative instruments on bank risks in Hungary, measured in terms of leverage risk, liquidity risk, credit risk and overall risk. Regarding these effects, the paper also aims to clarify the impact of derivative instruments on the usefulness of reported financial information. Using panel data analysis, the random effect model indicates that the use of futures, forwards, and swaps tends to mildly increase liquidity, leverage, and credit risks. The association between options and leverage, liquidity and credit risk is intensely negative, whereas other derivatives negatively affect leverage and liquidity risks. The overall risk is not expressly affected by the use of derivatives. Based on the results for the control variable, I conclude that size does not increase bank risk. The empirical results show that the banks under consideration do not seem to be at risk when using different derivatives, and therefore the main finding of the paper is that fair valuation of these instruments corresponds to the fundamental qualitative characteristics of useful information in financial reports.

References

Agusman, Agusman, Monroe, Gary S., Gasbarro, Dominic and Zumwalt, J. K. (2008) Accounting and capital market measures of risk: Evidence from Asian banks during 1998–2003, *Journal of Banking & Finance,* 32, pp. 480–488.

Blankespoor, Elizabeth, Linsmeier, Thomas J., Petroni, Kathy R., Shakespeare, Chatherine (2013) Fair Value Accounting for Financial Instruments: Does It Improve the Association between Bank Leverage and Credit Risk?, *The Accounting Review*, Vol. 88, No. 4, pp. 1143-1177.

Chaudhry, Mukesh K., Christie-David, Rohan, Koch, Timothy W. and Reichert, Alan K. (2000) The risk of foreign currency contingent claims at US commercial banks, *Journal of Banking & Finance, 24*, pp.1399-1417.

Crawford, Lil E., Wilson, Arlette C. and Bryan, Barry J. (1997) Using and Accounting for Derivatives: An International Concern, *International Accounting, Auditing & Taxation*, 6(1), pp. 111-121.

Hitz, J.-M. (2007) The Decision Usefulness of Fair Value Accounting – A Theoretical Perspective, *European Accounting Review*, Vol. 16, No. 2, pp. 323–362.

Hull, John C. (2009) *Options, Futures, and other derivatives*, 7th Edition, Pearson Prentice Hall, Upper Saddle River, New Jersey.

IFRS 13 (2011) *International Financial Reporting Standard 13 Fair Value Measurement*, issued by the International Accounting Standards Board, [Online], Available: http://eifrs.ifrs.org/eifrs/bnstandards/en/2013/ifrs13.pdf [8 April 2014]

IFRS Framework (2010) *Conceptual Framework for Financial Reporting 2010 (the International Financial Reporting Standards Framework)* approved by the International Accounting Standards Board, [Online], Available: http://www.iasplus.com/en/standards/other/framework [26 March 2014]

Instefjord, N., (2005) Risk and hedging: Do credit derivatives increase bank risk?, *Journal of Banking and Finance,* 29, pp. 339-345.

Ishikawa, J. (2005) A social science of contemporary value-based accounting: economic foundations of accounting for financial instruments, *Critical Perspectives on Accounting*, Vol. 16, Issue 2, February, pp. 115-136.

Keffala, Mohamed R. and Peretti, Christian de (2013) Effect of the Use of Derivative Instruments on Accounting Risk: Evidence from Banks in Emerging and Recently Developed Countries, *Annals of Economics and Finance*, 14-1, pp. 149-178.

Landsman, Wayne R. (2007) Is fair value accounting information relevant and reliable? Evidence from capital market research, *Accounting and Business Research Special Issue: International Accounting Policy Forum*, Vol. 37(1), pp. 19-30.

Mirza, Abbas Ali and Holt, Graham J. (2011) *IFRS, Practical Implementation, Guide and Workbook*, 3rd Edition, John Wiley & Sons, INC., Hoboken, New Jersey

Nelson, K. K. (1996) Fair value accounting for commercial banks: an empirical analysis of SFAS No. 107, *Accounting Review*, 71(2), pp. 161–182.

Park, M. S., Park, T., and Ro, B. T. (1999) Fair value disclosures for investment securities and bank equity: evidence from SFAS 115, Journal of Accounting, Auditing and Finance, 14(3), pp. 347–370.

Power, Michael (2010) Fair value accounting, financial economics and the transformation of reliability, *Accounting and Business Research*, Vol. 40. No. 3, *International Accounting Policy Forum*, pp. 197-210.

Rayman, R. A. (2007) Fair value accounting and the present value fallacy: The need for an alternative conceptual framework, *The British Accounting Review,* 39, pp. 211-225.

Reinstein, Alan and Lander, Gerald H. (2000) Are the new rules relating to disclosures of derivative financial instruments workable?, *International Advances in Economic Research*, February, Vol. 6, Issue 1, pp. 95-99.

Shortridge, Rebecca Toppe and Smith, Pamela A. (2009) Understanding the changes in accounting thought, *Research in Accounting Regulation* 21, pp. 11–18.
Siregar, Dona, Anandarajan, Asokan, Hasan, Iftekhar (2013) Commercial Banks and Value Relevance of Derivative Disclosures after SFAS 133: Evidence from the USA, *Review of Pacific Basin Financial Markets and Policies*, Vol. 16, No. 1, pp. 1-28.
Venkatachalam, M. (1996) Value-relevance of banks' derivatives disclosures, *Journal of Accounting and Economics,* 22, pp. 327–355.
Wilson, Arlette C. and Smith, G. Robert (1997) Proposed Accounting for Derivatives: Does it Address the Concerns of Current Accounting?, *Accounting Horizons*, Vol. 11. No. 3, September, pp. 69-78.
Yong, Hue Hwa Au, Faff, Robert and Chalmers, Keryn (2009) Derivative activities and Asia-Pacific banks' interest rate and exchange rate exposures, *International Financial Markets, Institutions and Money,* 19, pp. 16–32.