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THE EFFECT OF MEASURING DERIVATIVE FINANCIAL INSTRUMENTS ON THE FINANCIAL POSITION AND PROFITABILITY - THE CASE OF BANKS IN CROATIA

ABSTRACT

Purpose: The purpose of this paper is to determine whether the effects of measuring derivative financial instruments affect the financial position and profitability of banks operating in the Croatian banking sector.

Methodology: The survey covered all banks in Croatia that recognized derivative financial instruments in their financial statements in the period from 2017 to 2020. Descriptive statistical methods and correlation analysis were used to determine the impact of measuring derivatives on the financial position and profitability of Croatian banks.

Results: The results of the research showed that banks that recognized the effects of measuring derivative financial instruments in their financial statements make up more than 80% of total assets of the Croatian banking sector. The share of the effects of measuring derivatives in total assets of banks that have recognized these effects is less than 0.5%. The results of the research also showed a medium-strong positive correlation between derivative financial assets and total bank assets and a medium-strong negative correlation between derivative financial liabilities and total bank assets. Furthermore, the results showed a weak positive correlation between derivatives and return on assets (ROA) and a weak negative correlation between derivative financial liabilities and ROA.

Conclusion: The effects of measuring derivatives are recognized mainly in the financial statements of large banks. The results of the research showed that the effects of measuring derivative financial instruments did not have a more serious effect on the financial position and profitability of Croatian banks in the period from 2017 to 2020.

Keywords: Derivative financial assets and liabilities, financial position, profitability, banks, Croatia

1. Introduction

Derivative financial instruments are a special type of financial instruments whose value depends on the value of the underlying variable such as the market value of a debt or equity financial instrument, the price of other assets, the interest rate, the value of the stock index, etc. (Ramirez, 2007, p. 7). Derivative financial instruments were originally designed to manage risk exposure and were originally introduced to the Chicago Mercantile Exchange back in 1972 (Pilbeam, 2005, p. 334; Brealy et al., 2004, p. 640). Since then, the market for derivative financial instruments has been growing rapidly and has had a constant growth trend in the last 20 years (Bank for International Settlement, 2022). In today's globalized financial market, there are different types of derivative financial instruments, but in general, there are four main types of derivative financial instruments, and these are futures, terms, options and swaps (Brealy et al., 2004, pp. 640-679; Pilbeam, 2005, pp. 334-431). Each derivative financial instrument is primarily designed to provide protection to business entities from a particular risk, although it may also be used for speculative purposes (Brealy & Myers, 2003, p. 773). The large use of derivative financial instruments in the business sector has caused the need to set appropriate criteria for their recognition and measurement in the financial statements of business entities. Therefore, the International Accounting Standards Board (IASB) and the Financial Accounting Standards Board (FASB) in the United States have developed an accounting framework for the recognition and measurement of derivatives. The first International Accounting Standard to define the accounting framework for derivatives at the international level was International Accounting Standard 39 - Financial Instruments: Recognition and Measurement (IAS 39). IAS 39 defined general criteria for the recognition and measurement of derivatives, but also specified a specific accounting framework for derivatives defined as a hedging instrument. Because the criteria for applying hedge accounting were too complex and based on rules under IAS 39, many entities did not apply hedge accounting. Therefore, the effects of the entity's risk management activities are not properly presented in the financial statements (International Accounting Standards Board, 2014, p. 25). To improve the accounting framework for financial instruments in general, and hedge accounting in particular, the IASB developed Inter-

national Financial Reporting Standard 9 - Financial Instruments (IFRS 9), which replaced IAS 39 and imposed criteria based on the principles of hedge accounting. Therefore, the current recognition criteria and methods for measuring derivatives are defined in IFRS 9. Because the implementation of hedge accounting is complex, "IFRS 9 permits an entity to choose as its accounting policy either to apply the hedge accounting requirements of IFRS 9 or to continue to apply the hedge accounting requirements in IAS 39" (International Accounting Standards Board, 2014, p. 25).

Derivative financial instruments are widely used in the banking sectors, especially in developed countries. Previous studies have shown that in EU countries, derivative financial instruments are widely used in the banking sectors of developed EU countries, while their use in EU developing countries is very low (Türel & Türel, 2014, p. 171; Huan & Apostol, 2014, p. 74). Therefore, the effects of measuring derivatives significantly affect the financial position of banks in developed EU countries, but do not have a significant impact on the financial position of banks in developing countries (Türel & Türel, 2014, p. 171). The main objective of this paper is to investigate whether the effects of measuring derivatives affect the financial position and profitability of banks in Croatia. In addition, this paper aims to investigate the extent to which derivative financial instruments are used in Croatian banks, which derivative financial instruments are most commonly used in Croatian banks, the purpose of using derivatives in Croatian banks and the correlation between the effects of measuring derivative financial instruments and the financial position and profitability of Croatian banks. The research covers the period from 2017 to 2020. Based on the objectives of the research, three hypotheses are set:

H1: The effects of measuring derivative financial instruments affect the financial position of banks in Croatia.

H2: There is a strong or medium-strong correlation between the effects of measuring derivative financial instruments and the financial position of banks in Croatia.

H3: There is a strong or medium-strong correlation between the effects of measuring derivative financial instruments and the profitability of banks in Croatia.

Descriptive statistical methods and correlation analysis are used to achieve research objectives and test research hypotheses. The data required for the survey were collected from publicly published annual reports of banks in Croatia.

2. Theoretical framework and literature review

2.1 Recognition and measurement of derivative financial instruments

Under IFRS 9, a derivative financial instrument is recognized in the accounting ledgers and a statement of financial position (a balance sheet) “when, and only when, the entity becomes party to the contractual provisions of the instrument” (IFRS 9, 2022, p. A365). A derivative financial instrument may be recognized in the statement of financial position as a derivative financial asset or derivative financial liability depending on the terms of the contract and changes in its fair value between the two reporting dates. A derivative financial asset is derecognized “when, and only when, the contractual rights to the cash flows from the derivative financial asset expire”, or when the derivative financial asset is transferred to another entity, i.e. when all the risks and rewards of ownership of the derivative have been transferred (IFRS 9, 2022, p. A367-A368). A derivative financial liability is derecognized “when, and only when, it is extinguished - i.e. when the obligation specified in the contract is discharged or cancelled or expires” (IFRS 9, 2022, p. A372).

A single derivative financial instrument (and an embedded derivative that is separate from the host contract) is generally classified as a financial asset or liability at fair value through profit or loss and is initially measured at fair value excluding transaction costs (IFRS 9, 2022, p. A378). Subsequently, an individual derivative financial instrument is also measured at fair value, and the difference between the fair value at the reporting date and the initial fair value (carrying amount) is recognized in profit or loss (IFRS 9, 2022, p. A385). Because changes in the fair value of a derivative are recognized in the financial statements, they may have a material effect on the entity’s financial position and performance.

Derivative financial instruments designated as hedging instruments in all types of hedge accounting are also measured at fair value at both initial recognition and subsequent measurement. Changes in the fair value of derivatives in fair value hedges are

recognized in profit or loss, except in those hedging relationships in which the hedged item is an equity instrument measured at fair value through other comprehensive income. In these hedges, changes in the fair value of derivatives are also recognized in other comprehensive income (IFRS 9, 2022, p. A393). Changes in the fair value of derivatives in cash flow hedges and hedges of net investments in foreign operations are recognized in equity if the hedge is determined to be highly effective while the ineffective portion of the gain or loss on the hedging instrument is recognized in profit or loss (IFRS 9, 2022, pp. A394-A395).

The measurement of derivatives can seriously affect the financial position and performance of the entity, especially in banks and other financial institutions where financial instruments make up a significant part of total assets (Perčević & Gulinić, 2012).

2.2 Review of previous studies

Derivative financial instruments have been the subject of numerous studies since their initial appearance. There are many studies that have investigated the use of derivatives and their impact on the financial position and operations of banks. Brewer et al. (1996) found that the use of derivatives in depository institutions has a positive effect on their financial performance (Brewer et al., 1996, p. 495). de Peretti & Keffala (2002) investigated the effect of the use of derivatives on accounting risk in banks in emerging and recently developed countries. They concluded that “in general, the use of forwards and swaps decrease bank risk while the use of options positively affects bank risk, and finally the use of futures has a mildly significant effect on bank risk” (de Peretti & Keffala, 2002, p. 49). Keffala et al. (2013) also investigated the impact of the use of derivatives on bank performance in developing and recently developed countries and identified the negative impact of derivatives on bank performance in such countries (Keffala et al., 2013, p. 2). Türel & Türel (2014) conducted a comparative analysis of the effect of derivatives on the financial position of banks in Turkey and the EU and concluded that “the reported fair values of derivatives on the balance sheet have a considerable impact on the financial positions of the banks in the EU”, but “have no significant effect on the financial position” of banks in Turkey because the total volume of transactions with derivatives in Turkish banks is very low (Türel & Türel, 2014, p. 185). However, a later study showed that the use

of derivatives in the Turkish banking sector is increasing (Çiftci, 2020, p. 311). These results on the use of derivatives in banks in developing countries were corroborated by a study conducted among the banks in Romania (Huian & Apostol, 2014, p. 82). A study conducted in the banks in Hungary showed that the use of forwards, futures and swaps tends to slightly increase liquidity risk, leverage and credit risk, while options negatively affect leverage, liquidity and credit risks in Hungarian banks (Toth, 2014, p. 698). Efanga et al. (2019) "examined the impact of derivative instruments on risk management in the Nigerian banking sector between 2014 and 2018" and concluded "that financial derivatives impacted positively and significantly on risk management in the Nigerian banking sector" (Efanga et al., 2019, p. 323). Topaloğlu & Korkmaz (2019) identified in their study "that there is a significant and negative relationship between the use of derivatives for speculative purposes and systematic risk," but "there was no relationship identified between the use of derivatives for hedging purposes and systematic risk" in banks trading on Borsa Istanbul in Turkey (Topaloğlu & Korkmaz, 2019, p. 152).

However, there are also numerous studies that have investigated the use and effects of derivatives in the non-financial sector. Barton (2001) proved in a sample of 500 non-financial unregulated companies in the United States that managers use derivatives for smooth earnings (Barton, 2001, p. 24). Klersey et al. (2005) examined the effects of the derivative usage on security returns of companies from different industries and found out that "in general investors perceive a difference in the information content of earnings when a firm uses derivatives, and that difference translates into a positive, significant impact on security prices" (Klersey et al., 2005, p. 123). Nguyen & Faff (2010) tested whether the use of a particular type of derivative financial instrument affects the value of a company in a sample of listed Australian companies and concluded that the use of swaps contributed to the discount while the use of options was not harmful to company's value (Nguyen & Faff, 2010, p. 683). Beneda (2013) identified "a strong association between the low reported earnings volatility and the firm use of derivative instruments for hedging in companies in the USA" and confirmed that derivatives used as hedging instruments contributed to a decrease in earnings volatility (Beneda, 2013, p. 165). The study conducted among Pakistani and Malaysian listed companies found out that "the

usage of derivative instruments significantly minimizes firm's risk, with respect to operating cash flow variability in both Pakistan and Malaysia". The results also showed that the use of derivatives had a negligible effect on the value of the company in Malaysia, but significantly increased the value of the company in Pakistan (Alam & Afza, 2017, p. 221). The study conducted among Nigerian non-financial companies also suggested "that derivative instruments are positively associated with firm risk" (Firmansyah, 2020, p. 81). The study conducted among non-financial companies listed at the Nairobi Securities Exchange in Kenya revealed that "the use of derivatives in efficiency in trading influences the financial performance of companies" (Waswa & Wepukhulu, 2018, p. 15). Vu et al. identified that risk management control is the strongest factor influencing the intention to use derivatives in listed companies in Hanoi, Vietnam (Vu et al., 2020, p. 805).

The results of the above studies show that derivative financial instruments can affect the financial position and performance of business entities from different industries. Therefore, these findings were the basis for the research objectives and hypotheses of this paper.

3. Methodology

The initial objective of this paper is to investigate whether the effects of measuring derivatives affect the financial position and profitability of Croatian banks. In addition, this paper aims to provide answers to these questions:

1. How many banks in Croatia have recognized in their financial statements the effects of measuring derivatives?
2. Which derivative financial instruments are most often used in Croatian banks?
3. For what purposes are derivative financial instruments used in Croatian banks?
4. Do the effects of measuring derivatives affect the financial position and profitability of Croatian banks?

Based on the main goal of the paper, three hypotheses are set. The first hypothesis (H1) claims that the effects of measuring derivative financial instruments affect the financial position of Croatian banks. The second hypothesis (H2) claim that there is a strong or medium-strong correlation between

the effects of measuring derivative financial instruments and the financial position of Croatian banks. The third claims that there is a strong or medium-strong correlation between the effects of measuring derivative financial instruments and the profitability of Croatian banks. The research covers the period from 2017 to 2020. The research population consists of all banks that operated in Croatia during the research period. According to the Croatian National Bank (CNB), there were 25 banks operating in the Croatian banking sector in 2017, 21 in 2018, and 19 in 2019 and 2020 (Croatian National Bank, 2019, p. 7; Croatian National Bank, 2022). The data required for the implementation of the survey were collected from publicly published annual reports of banks available on bank websites. For research purposes, the effects of measuring derivatives relate to changes in the fair value of derivatives that are recognized in the statement of financial position as derivative financial assets and derivative financial liabilities, and in the income statement as unrealized gains and losses. The financial position is represented by total assets, while profitability is measured by the rate of return on assets (ROA). For each bank that operated in the Croatian banking sector during the research period, all these variables (necessary for conducting research) were taken

from the publicly available financial statements of banks. Descriptive statistical methods and correlation analyses based on the Pearson correlation coefficient were applied to achieve the research objectives and test the research hypotheses. The first hypothesis is tested by calculating the share of derivative financial assets and liabilities in total assets of Croatian banks that recognized these derivatives in their financial statements. The second hypothesis is tested based on the results of correlation analysis between derivative financial assets/liabilities and total assets. The third hypothesis was tested based on the results of correlation analysis between derivative financial assets/liabilities and ROA.

4. Results and discussion

The results of the analysis of annual reports of Croatian banks show that in 2017, 7 banks recognized the effects of measuring derivative financial instruments in their financial statements, while 8 banks recognized these effects in 2018, 2019 and 2020. The number and percentage of banks in the Croatian banking sector that recognized the effects of measuring derivatives and their share in total assets and profits or losses of the Croatian banking sector are shown in Table 1.

Table 1 Number and percentage of banks in Croatia that recognized the effects of measuring derivatives and their share in total assets and profit or loss of the Croatian banking sector from 2017 to 2020

Year	Number of banks presenting derivatives in financial statements	Percentage of banks presenting derivatives in financial statements	Share of assets of banks presenting derivatives in the financial statements in total assets of the banking sector	Share of profit or loss of banks presenting derivatives in the financial statements in total profit or loss of the banking sector
2017	7	28.00%	80.85%	103.76%
2018	8	38.10%	93.41%	98.99%
2019	8	42.11%	94.06%	96.73%
2020	8	42.11%	94.46%	95.54%

Source: Authors' calculation

Table 1 shows that 7 banks that recognized the effects of measuring derivatives in their financial statements in 2017 represented 28% of the total number of banks in Croatia in 2017, and their share in total assets of the Croatian banking sector was 80.85%, while their profit or loss represented 103.76% of total profit or loss of the Croatian banking sector. In 2018, 2019 and 2020, 8 banks in Croatia recognized in their financial statements the effects of measuring deriva-

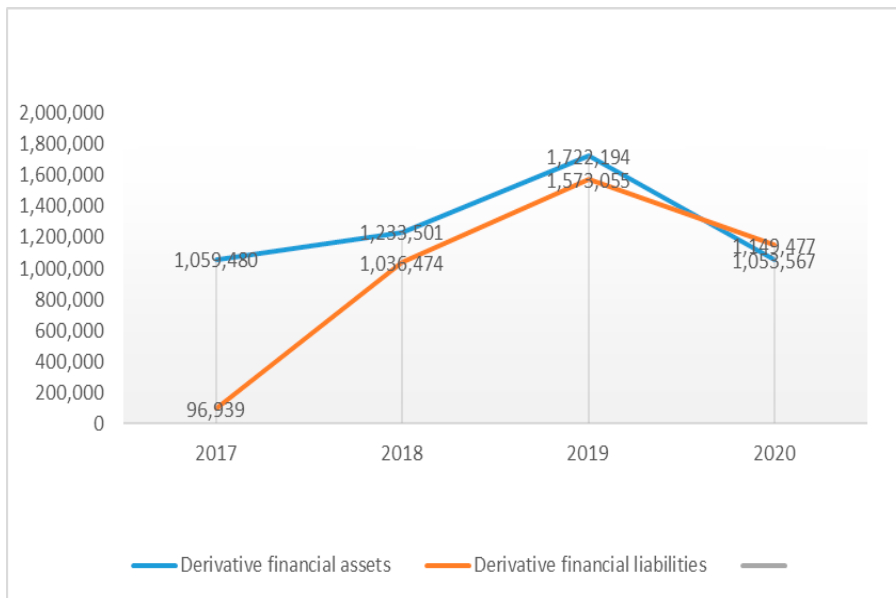
tive financial instruments. These 8 banks represented 38.10% of the total number of banks in Croatia in 2018 and their share in total assets of the Croatian banking sector was 93.41%, while their profit or loss represented 98.99% of total profit or loss of the Croatian banking sector in 2018. The same 8 banks represented 42.11% of the total number of banks in Croatia in 2019 and 2020. Their share in total assets of the Croatian banking sector in 2019 and in 2020 was

94.06% and 94.46%, respectively, while their profit or loss accounted for 96.73% of total profit or loss of the Croatian banking sector in 2019 and 95.54% in 2020. The results presented above show that the effects of measuring derivatives are recognized in less than 50% of Croatian banks, but banks that have recognized these effects hold more than 80% of total assets of the Croatian banking sector and their profit or loss represents more than 95% of total profit or loss of the Croatian banking sector. The analysis of annual reports of banks in Croatia showed that the effects of measuring derivatives were recognized mainly in

the financial statements of large, internationally related banks in Croatia, while small domestic banks in Croatia did not recognize these effects in their financial statements.

The effects of measuring derivative financial instruments relate to changes in the fair value of derivatives between the two reporting dates that are recognized in the statement of financial position as derivative financial assets and derivative financial liabilities. The amount of derivative financial assets and liabilities in the Croatian banking sector for the research period is shown in Figure 1.

Figure 1 Derivative financial assets and liabilities in Croatian banks in the period from 2017 to 2020 (in 000 HRK)



Source: Author's calculation

Figure 1 shows that in 2017, 2018 and 2019 the amount of derivative financial assets in Croatian banks was higher than the amount of derivative financial liabilities, while in 2020 the amount of derivative financial liabilities was higher than the amount of derivative financial assets. Based on this, it can be concluded that in 2017, 2018 and 2020 changes in the fair value of derivative financial instruments contributed to an increase in total profit of the Croatian banking sector, while changes in the fair value in 2020 contributed to a decrease in total profit.

According to information disclosed in the annual reports of banks in Croatia, no bank that

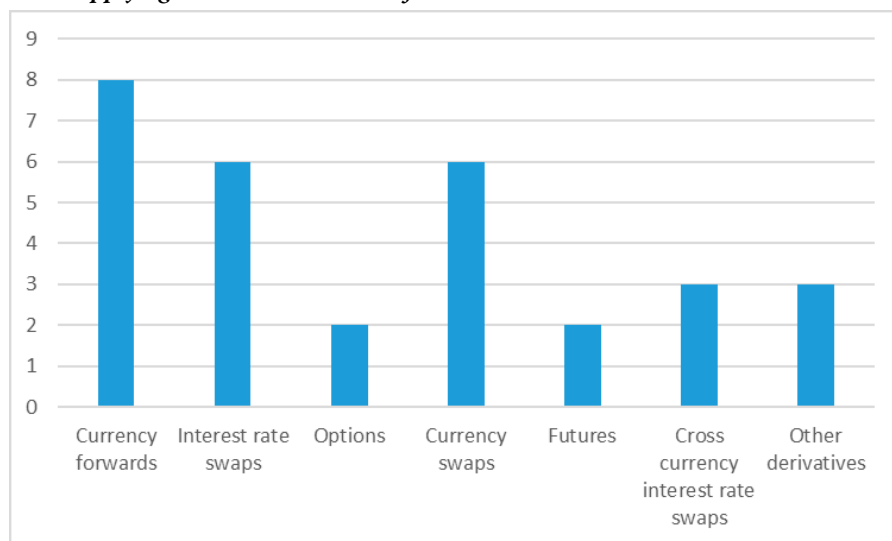
recognized the effects of measuring derivative financial instruments in its financial statements used derivatives for speculative purposes but for hedging purposes. Derivative financial instruments are mainly used to manage interest rate and currency risk. Despite the fact that derivative financial instruments in Croatian banks are used for hedging purposes, most derivative financial instruments are recognized as stand-alone derivatives and not as hedging instruments because the hedge accounting criteria have not been met. Only 2 banks in 2017 and 3 banks in 2018, 2019 and 2020 applied hedge accounting and recog-

nized the hedge accounting effects in the financial statements.

The effects of measuring derivative financial instruments recognized in the financial statements of Croatian banks relate to the following types of de-

derivatives: currency forwards, currency and interest rate swaps, cross currency interest rate swaps, options, futures and other derivatives. Figure 2 shows the types of derivatives used in Croatian banks and the number of banks using each derivative financial instrument.

Figure 2 Types of derivative financial instruments applied in Croatian banks and the number of banks applying individual derivative financial instruments



Source: Authors' calculation

Figure 2 shows that currency forwards are applied in all 8 banks, currency and interest rate swaps in 6 banks, cross-currency interest rate swaps in 3 banks, and options and futures in 2 banks, while 3 banks also apply other derivative financial instruments. Currency forwards and currency swaps are used to manage currency risk exposure, interest rate swaps are designed to manage interest rate risk exposure, while cross-currency interest rate swaps are used to manage both currency and interest rate risk exposure. Options, futures and other derivatives are designed to manage currency risk or interest rate risk.

In order to investigate the impact of measuring derivatives on the financial position and profitability of banks in Croatia and to test research hypotheses, the effects of measuring derivatives are expressed as a percentage of total assets of banks in Croatia that recognized these effects in their financial statements. Table 2 shows the share of the effects of measuring derivatives recognized as derivative financial assets and liabilities in the statement of financial position of banks in total assets of banks in Croatia that recognized these effects.

Table 2 Derivative financial assets and liabilities expressed as a percentage of total assets of banks in Croatia that recognized these assets and liabilities in the period from 2017 to 2020

Item / Years	2017	2018	2019	2020
Derivative financial assets as a percentage of total assets	0.32%	0.32%	0.43%	0.24%
Derivative financial liabilities as a percentage of total assets	0.03%	0.27%	0.39%	0.27%

Source: Authors' calculation

Table 2 shows that in all observed years the amount of derivative financial assets and liabilities is less than 0.50% of total assets of those banks in Croatia that have recognized in the financial statements the effects of measuring derivative financial instruments. The largest share of derivative financial assets and liabilities in total assets was recorded in 2019, when derivative financial assets and derivative financial liabilities accounted for 0.43% and 0.39% of total assets, respectively, of those banks in Croatia that recognized derivative financial assets

and liabilities. These results indicate that the effects of measuring derivatives do not form a significant part of total assets of those banks that have recognized these effects in their financial statements. As these effects may vary among banks, Table 3 shows measures of central tendencies and variations for the share of derivative financial assets and liabilities in total assets of those banks that have recognized derivative financial assets and liabilities in their financial statements.

Table 3 Measures of central tendencies and variations for the share of derivative financial assets and liabilities in total assets of those Croatian banks that have recognized derivative financial instruments in the period from 2017 to 2020

Measures of central tendencies and variations	2017		2018		2019		2020	
	Derivative financial assets	Derivative financial liabilities	Derivative financial assets	Derivative financial liabilities	Derivative financial assets	Derivative financial liabilities	Derivative financial assets	Derivative financial liabilities
Mean	0.15%	0.04%	0.17%	0.13%	0.21%	0.20%	0.17%	0.20%
Standard deviation	0.0029856	0.00054805	0.0031626	0.00272813	0.0043257	0.0039413	0.0019691	0.002048
Min	0.000%	0.000%	0.001%	0.002%	0.004%	0.002%	0.000%	0.000%
Max	0.94%	0.18%	0.99%	0.85%	1.35%	1.23%	0.56%	0.57%
Median	0.03%	0.01%	0.04%	0.02%	0.04%	0.04%	0.10%	0.11%

Source: Authors' calculation

The average share of derivative financial assets in total assets of the bank ranged from 0.15% in 2017, 0.17% in 2018, 0.21% in 2019, to 0.17% in 2020. The average share of derivative financial liabilities ranged from 0.04% in 2017, 0.13% in 2018, to 0.20% in 2019 and 2020. In all observed years, the standard deviation for both derivative financial assets and liabilities is high, which indicates a large dispersion of the share of derivative financial assets and liabilities in total assets among Croatian banks that have recognized derivative financial instruments in their financial statements. Therefore, the median is calculated. The median share of derivative financial assets in total assets of the bank ranged between 0.03% in 2017, 0.04% in 2018 and 2019, and 0.10% in 2020. The minimum share of derivative financial assets in total assets of the bank was 0.000% in 2017, 0.001% in 2018, 0.004% in 2019, and 0.000% in 2020. The maximum share of derivative financial assets in total assets of the bank ranged from 0.94% in 2017, 0.99% in 2018, 1.35% in 2019, to 0.56% in 2020. The median, minimum and maximum values indicate

that the largest share of derivative financial assets in total assets of the bank is concentrated in a small number of banks in Croatia.

The median share of derivative financial liabilities in total assets of the bank ranged from 0.01% in 2017, 0.02% in 2018, 0.04% in 2019, to 0.11% in 2020. The minimum share of derivative financial liabilities in total assets of the bank was 0.000% in 2017, 0.002% in 2018 and 2019, and 0.000% in 2020. The maximum share was 0.18% in 2017, 0.85% in 2018, 1.23% in 2019, and 0.57% in 2020. The median, minimum and maximum values also show that the largest share of derivative financial liabilities in the bank's total assets is concentrated in a small number of banks in Croatia.

The results presented above confirm that the effects of measuring derivative financial instruments do not form a significant part of total assets of Croatian banks. Based on these results, it can be concluded that the effects of measuring derivatives do not have a serious impact on the financial position

of banks in Croatia. These results are based on the results of a previous study on the application of derivatives in the Croatian banking sector, which also showed that derivative financial instruments did not have a significant impact on the financial position of the Croatian banking sector (Perčević & Gulin, 2012). Furthermore, previous research results showed that the average percentage of derivative financial assets in total assets of banks in developed EU countries ranged from 8.08% in 2006 and 10.72% in 2007 to 23.75% in 2008, while the average percentage of derivative financial liabilities ranged from 8.81% in 2006 and 11.45% in 2007 to 24.07% in 2008 (Türel & Türel, 2014, pp. 172-181). Unlike banks in Croatia, the effects of measuring deriva-

tive financial instruments in banks in developed EU countries make up a significant part of total bank assets and can significantly affect their financial position. Since the research results do not support the hypothesis that the effects of derivative measurements affect the financial position of banks in Croatia, the first hypothesis (H1) is rejected.

This paper also aims to determine a correlation between the effects of measuring derivatives and the financial position (i.e. total assets) of banks and a correlation between the effects of measuring derivatives and the profitability of banks measured by return on assets (ROA). The results of correlation analysis based on the Pearson correlation coefficient are shown in Table 4.

Table 4 Correlation analysis between derivative financial assets and liabilities and total assets and ROA of banks in Croatia in the period from 2017 to 2020

Items	Pearson correlation coefficient	
	Total assets	ROA
Derivative financial assets	0.692959883	0.169777980
Derivative financial liabilities	-0.671962809	-0.199172610

Source: Authors' calculation

The values of the Pearson correlation coefficient show that there is a medium-strong positive correlation between the fair value of derivative financial assets and total assets and a medium-strong negative correlation between derivatives and total assets of banks in Croatia that recognized the effects of measuring derivatives in their financial statements. These results suggest that an increase in the fair value of derivative financial assets is likely to seriously contribute to an increase in total bank assets, while an increase in the fair value of derivative financial liabilities would seriously contribute to a decrease in total bank assets. Since the results of correlation analysis support the hypothesis that there is a medium-strong correlation between derivative financial instruments and the financial position of Croatian banks, the second hypothesis (H2) is accepted. These results correspond to the results of previous similar studies conducted in the banking sector of Turkey (Türel & Türel, 2014, p. 184), and in banks in Romania (Huian & Apostol, 2014, p. 74). The values of the Pearson correlation coefficient show that there is a weak positive correlation be-

tween the fair value of derivatives and ROA and a weak negative correlation between the fair value of derivatives and ROA banks in Croatia that recognized the effects of measuring derivatives in their financial statements. These results show that changes in the fair value of derivative financial instruments are unlikely to seriously affect the ROA of banks in Croatia. Based on these results, the third research hypothesis (H3) is rejected. Previous similar studies have shown that derivatives negatively affect bank performance in emerging and recently developed countries (Keffala et al., 2013, p. 2), but positively affect bank performance in developed countries (Brewer et al., 1996; Keffala et al., 2013, p. 2).

5. Conclusion

Derivative financial instruments are widely used in banks and other financial institutions, primarily in those operating in developed financial markets. The initial purpose of this paper was to investigate whether the effects of measuring derivatives seriously affect the financial position and profitability

of banks in Croatia. The research covers the entire research population, i.e. all banks that operated in Croatia in the research period from 2017 to 2020. The research results showed that derivative financial instruments are mostly used in large banks in Croatia, which constitute more than 80% of total assets and generate more than 95% of total profit or loss of the Croatian banking sector. Small banks in Croatia do not use derivative financial instruments. Derivative financial instruments in banks in Croatia are primarily used for hedging purposes, but hedge accounting is not widely used due to the fact that most banks in Croatia that use derivative financial instruments do not meet the criteria for hedge accounting. Therefore, derivative financial instruments are generally treated as stand-alone instruments and are classified into the category of financial assets at fair value through profit or loss. Banks in Croatia mainly use currency forwards and currency swaps to manage currency risk exposure, interest rate swaps to manage interest rate risk exposure, and cross-currency interest rate swaps to manage both currency and interest rate risk exposure.

The research results showed that the effects of measuring derivative financial instruments do not affect the financial position and profitability of those banks in Croatia that have recognized these effects in their financial statements. However, the results of correlation analysis indicate a medium-strong correlation between the effects of measuring derivative financial instruments and the financial position of Croatian banks. According to the results of correlation analysis, if the use of derivative financial instruments in Croatian banks were intensified, the effects of measuring derivatives would significantly affect the financial position, but not the profitability of banks.

This paper contributes to previous findings in the field by establishing that derivative financial instruments are not widely used in Croatian banks, so the effects of their measurement do not affect the financial position and profitability of banks in Croatia. This is an advantage in the conditions of market turbulence since the value of derivatives is very variable, but it also indicates that Croatian banks do not use derivatives sufficiently for hedging purposes. By using derivatives for hedging purposes, Croatian banks could further optimize their financial performance. Therefore, this paper contributes to accounting practice by recommending the use of derivative financial instruments as hedging instruments within the hedge accounting criteria defined in IFRS 9. Therefore, the effects of risk management would be properly identified in the financial statements and would also optimize financial performance.

It is also important to note that this research has certain limitations. The study covered a period of four consecutive years, which is relatively short for correlation analysis. The survey was conducted only among banks in Croatia. Although all large banks in Croatia use derivative financial instruments, there are a large number of banks in Croatia that do not use derivative financial instruments. In addition, the use of derivative financial instruments in large banks is still not at the level of banks in developed EU countries, so data on the effects of measuring derivatives are lacking. The research did not provide an answer to the question why derivative financial instruments are not widely used in Croatian banks. Therefore, future research on this topic will address this issue. In addition, future research will focus on the application of derivative financial instruments in the non-financial sector and identify the impact of measuring derivatives on the financial position and performance in the non-financial sector.

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