



Lisbon School  
of Economics  
& Management  
Universidade de Lisboa

# **MASTER ACCOUNTING**

## **MASTER'S FINAL WORK DISSERTATION**

**HEDGE ACCOUNTING & EARNINGS VOLATILITY IN FINNISH  
MANUFACTURING COMPANIES**

**ANTON LUCAS AHONEN**

**MARCH - 2023**



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**SUPERVISION:  
MÁRIO NUNO VICENTE FREIRE**

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## ABSTRACT

This dissertation assesses how hedge accounting impacts earnings volatility of Finnish publicly listed manufacturing companies. By separating the gains and losses from derivatives and comparing them to the degree of hedge accounting application, this paper evaluates how hedge accounting affects earnings volatility. Results suggest that there is a negative, statistically significant relationship between the degree of hedge accounting application and earnings volatility from derivatives.

**KEYWORDS:** Hedge Accounting; Derivatives; IFRS 9.

## RESUMO

Esta dissertação afere como a contabilidade de cobertura afeta a volatilidade dos lucros de empresas manufatureiras finlandesas. Ao separar os ganhos e perdas dos derivados e compará-los com o grau de aplicação da contabilidade de cobertura, este trabalho analisa como a contabilidade de cobertura afeta a volatilidade dos lucros. Os resultados sugerem que existe uma relação negativa e estatisticamente significativa entre o grau de aplicação da contabilidade de cobertura e a volatilidade dos rendimentos gerados pelos derivados.

**PALAVRAS-CHAVE:** Contabilidade de Cobertura; Derivados; IFRS 9

## ACKNOWLEDGMENTS

First, I wish to thank Professor Freire for flexibility, patience, and recommendations.

I am also grateful to my girlfriend who helped me more than she could imagine, simply by being there for me.

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## GLOSSARY

CFO – Chief Financial Officer

COGS – Cost of Goods Sold

EBT – Earnings Before Taxes

EBITDA – Earnings Before Interest, Taxes, Depreciation and Amortization

FVOCI – Fair Value through Other Comprehensive Income

FVTPL – Fair Value through Profit and Loss

FX – Foreign Exchange

IAS – International Accounting Standards

IFRS – International Financial Reporting Standards

OCI – Other Comprehensive Income

PwC – PricewaterhouseCoopers

SEK – Swedish Krona

US – The United States of America

USD – US Dollar

## 1. INTRODUCTION

Earnings refer to net income or net profit and are of great importance for entities. Graham et al. (2005) document that earnings is the most important performance metric for executives. In their survey, earnings are clearly more important than sales and cash flows which follow in importance. Executives are willing to sacrifice economic value to an extent in order to have less volatile, smoother earnings. This approach can be harmful for companies when regarding long-term value creation. The importance of earnings is understandable as markets often punish companies which do not meet earnings expectations or for which earnings are hard to predict. The consequence of missing expected earnings can result in decreased stock price, increased information risk and a bad reputation for executives and the company (Graham et al., 2005). It is understandable that for many executives earnings are of high importance. Since earnings are a priority for companies, it comes with no surprise that Glaum and Klöcker (2011) report that also in financial risk management, reducing earnings volatility is the main goal.

Entities can decrease earnings volatility and make earnings smoother and more predictable with hedging. Hedging implies building an offsetting position to a risk in financial hedges with financial instruments or in operational hedges by adjusting operations. Although Kim et al. (2006) conclude that operational- and financial hedges are complementary, this paper focuses on financial hedges, more specifically, derivatives. From an economic perspective, hedging decreases earnings volatility when implemented correctly.

When considering earnings, the relevant financial risks are those that affect income statement. Foreign exchange (FX) risk can affect sales, cost of goods sold (COGS), and financing income and expense. Interest rate risk can affect financing income and expense. Commodity price risk can affect COGS in higher raw materials prices and sales in lower product prices. Changes in any of those line items will affect taxable earnings and influence tax rates which ultimately influence earnings. FX risk can affect multiple income statement items and is a concern for many entities operating in global markets. It is no surprise that the FX risk is the most relevant risk for non-financial companies (Servaes et al., 2009., Glaum and Klöcker, 2011). By hedging risks related to income

statement line items, an entity can decrease earnings volatility and increase earnings predictability. The problem with derivatives is how they are accounted for.

As hedging relationships can continue for multiple accounting periods, under general accounting principles derivatives must be fair valued in each accounting period and changes in the fair value of the derivatives affect earnings. If an entity for example has recorded a gain from a certain derivative in a former accounting period, they will record a loss in the hedging instrument or the hedged item, when the derivative matures. The earnings effect of derivatives reporting can quickly become material when the amount of derivatives on the balance sheet increases. Financial analysts struggle to predict the earnings effect of derivatives. Not because derivatives are complex in nature, but because how they are reported (Chang et al., 2016). The derivatives market is continuously growing and in 2017 European derivatives markets grew by 9% (Muller, 2020). Hedge accounting offers a way to postpone gains and losses from derivatives and reclassify them to earnings when the hedging relationship matures.

Hedge accounting is an optional alternative for derivatives accounting. If an entity can meet certain criteria and provide necessary documentation, they can apply hedge accounting for single transactions. In hedge accounting the gains and losses of the hedging derivative in accounting periods preceding to maturity are recorded in equity where they do not alter earnings. The value changes are collected in a reserve from where they are reclassified to earnings when the hedging relationship ends, offsetting the gains and losses of the hedged risk. Theoretically hedge accounting is a great option but the main problems are that it requires separate documentation (Comiskey & Mulford, 2008), it is costly (Comiskey & Mulford, 2008) and instruments that provide optimal economic hedges, level 3 financial instruments, do not qualify (Ramirez, 2015).

Commonly, when the relationship between hedge accounting and earnings volatility is studied, the dependent variable is the volatility of earnings. Earnings can be affected by virtually any operational factors and controlling for everything except hedge accounting is complicated. This paper will separate the earnings of derivatives and test how the degree of hedge accounting application affects the earnings from derivatives.

The sample consists of 15 Finnish publicly listed manufacturing companies. Manufacturing companies face various financial risks and are more likely to have a wider

variety of hedges. Results from a GLS model confirm that an increase in the degree of hedge accounting application does decrease the amount of derivatives gains and losses in profit and loss. This study contributes to an already existing literature of hedge accounting and earnings volatility by directly demonstrating that the gains and losses of derivatives decrease when hedge accounting is applied to a greater extent.

The following chapter is a literature review which explains the rules of hedging under general accounting principles and how they create earnings volatility. Hedging under general accounting refers to hedging when hedge accounting is not applied. Then the framework of hedge accounting is covered and how it may decrease earnings volatility. Third chapter explains the methodology: the sample, the variables and the model used in the study. The fourth chapter indicates the results of the study, and the fifth chapter brings forward the study's conclusions.

## 2. LITERATURE REVIEW

### *2.1. Hedging*

Market risk is the risk of adverse price fluctuations in exchange- or interest rates and in commodity- or equity prices for an entity. According to Ramirez (2015) market risk is most often reduced or mitigated with derivatives. In a study by Servaes et al. (2009) CFOs reported that out of all the risks a non-financial company faces, the highest risk is a FX risk. Out of financial risks, Glaum and Klöcker (2011) also found that the FX risk dominated in their sample. An entity can hedge their exposure to market risk with derivatives where the underlying is the risk being hedged. If an entity is hedging for example a FX rate with a derivative, the value change in the derivative goes to the opposite direction than the value change of the hedged item. If appreciation of EUR leads to less sales in euros due to a sale in a foreign currency, the derivative generates the cash flows lost due to the currency changes.

Under International Financial Reporting Standard (IFRS) 9 Financial Instruments, derivatives are measured at Fair Value through Profit and Loss (FVTPL). Prior to the issuance of International Accounting Standard (IAS) 39, which was the standard for accounting of financial instruments preceding to IFRS 9, derivatives were often measured at historical cost. The fair value of a derivative at inception is often zero or close to zero. "Derivatives often reflect at their inception only a mutual exchange of promises with little

or no transfer of tangible consideration” (FASB, 1998). When derivatives were measured at historical cost, financial statement users could not know the level of exposure that the derivatives brought to an entity. Melumad et al. (1999) showed that shareholders preferred companies to report derivatives at fair value. When fair value is used in measuring derivatives, on average it shows an entity’s financial position more accurately than when historical cost is used. But when a company is hedging a future cash flow, financial statement users cannot tell how much of the change in derivative fair value will be offset by the hedged risk and thus accuracy falls (Gigler et al., 2007). When it comes to IFRS 9, it is irrelevant whether the hedging instrument is a derivative or a non-derivative since non-derivative hedging instruments are also measured at FVTPL (Singh, 2017), if the hedging instrument is a financial instrument under the scope of IFRS 9.

A successful hedge will decrease riskiness and make earnings more predictable in an economic sense, but under general accounting rules the value changes of a hedging instrument before the hedge is realized, can lead to earnings volatility and make earnings less predictable. To understand how a hedge can create earnings volatility, I introduce a fictitious case where a future sale is hedged under general accounting principles.

#### *2.2.1 Case 1: Hedging FX risk under general accounting principles*

On 1 September 20X3, a Finnish manufacturing company “ABC” is forecasting a future sale to its US client. The goods will be delivered on 1 February 20X4 and on 1 May 20X4 the client will pay USD 5 million. On 1 September 20X3 the EUR-USD spot rate is 1.07 (1 EUR can be exchanged to 1.07 USD) and if the sale and the payment would occur on 1 September 20X3, ABC would receive EUR 4.673 million. The risk management of ABC has decided that there is a FX risk (appreciation of EUR relative to the USD) regarding the future sale and decides to hedge the FX risk with a forward contract from bank “XYZ”. The maturity of the forward contract is when ABC receives the USD from its client, 1 May 20X4. The future rate is 1.10 and the forward is settled by a physical delivery meaning that on 1 May 20X4 ABC will deliver USD 5 million and XYZ will deliver EUR 4.545 million.

		<b>FX forward terms</b>	
		Start date	1 September 20X3
		Counterparties	ABC & XYZ
		Maturity	1 May 20X4
<b>Sale</b>		ABC sells	USD 5 million
1 September 20X3	Sale is anticipated	ABC buys	EUR 4.545 million
1 February 20X4	ABC delivers goods	Forward rate	1.10
1 May 20X4	Client pays USD 5 million	Settlement	Physical delivery

In the forward contract no collateral is exchanged so nothing is recorded in the financial statements on 1 September 20X3. ABC has only one financial reporting date which is on 31 December. On 31 December 20X3 the forward contract is remeasured as derivatives are reported in FVTPL. The spot rate of EUR-USD is used to measure the fair value of the forward. The spot rate on the reporting date is 1.3 and with that spot rate ABC would receive EUR 3.846 million from USD 5 million which is EUR 0.699 million less than it will receive from XYZ in the maturity of the forward. The fair value of the forward is roughly EUR 0.699 million and is recorded under other financial income of the income statement in the following way:

Forward contract (Asset)	699,301	
Other financial income (P&L)		699,301

The forward increased ABC's net income in 20X3 by EUR 0.699 million even though the sale has not taken place yet. On 1 February 20X4 ABC sells its inventory to the US client and records the sale using the spot rate on that date which is 1.25. ABC records a sale of EUR 4 million in the following way:

Accounts receivable (Asset)	4,000,000	
Sales (P&L)		4,000,000

COGS is ignored in this case as it is not relevant regarding the hedge. On 1 May 20X4 ABC receives the USD 5 million from the US client and is valued at the current spot rate of 1.20. The EUR 4.167 million received from the client is recorded in the statement of financial position the following way:

USD cash in euros (Asset)	4,166,667	
Accounts receivable (Asset)		4,166,667

On 1 May 20X4 also the forward with XYZ is settled by physical delivery where ABC delivered USD 5 million and received EUR 4.545 million and is recorded in the statement of financial position the following way:

EUR cash (Asset)		4,545,455	
USD cash in euros (Asset)			4,166,667
Forward contract (Asset)			378,788

On 1 May 20X4 as the forward is settled it is derecognized and as the payment has been received, accounts receivable is balanced in the following way:

Accounts receivable (Asset)		166,667	
Other financial expenses (P&L)		153,846	
Forward contract (Asset)			320,513

The impact on statement of income from the date the sale was forecasted to the date the forward was settled is as follows:

<b>Statement of income effect on sale of</b>		<b>4,545,455</b>	
<b>20X3</b>	Other financial income	699,301	
<b>20X4</b>	Sales	4,000,000	
<b>20X4</b>	Other financial expenses	153,846	
<b>20X4 net</b>		<b>3,846,154</b>	

In an economic perspective ABC company had a sale of 4.545 million in 20X4 where it successfully hedged the FX risk. In a reporting perspective ABC reported a derivative gain of 0.699 million in 20X3, a derivative loss of 0.154 million in 20X4 and a sale of 4 million in 20X4 due to the accounting rules in derivative reporting. The former case shows how hedging under general accounting rules can create earnings volatility. Although most literature focuses on earnings volatility, there is also another crucial issue with hedging under general accounting principles, which is what Ramirez (2015) defines as “EBITDA volatility”.

EBITDA volatility refers to the fact that single line items in the statement of income are being affected due to hedging. In the previous case, the value increase in the derivative decreased the number of reported sales. If EUR would have depreciated, ABC would have reported higher sales. Any changes in the hedged risk would have led to changes in reported sales even though it is economically irrelevant whether there is no change in EUR, an appreciation or a depreciation as ABC would have received the 4.545 million in



any case. If ABC would have hedged the commodity price of raw materials, COGS would have been affected. Many line items in the statement of income are in popular ratios, such as interest coverage ratio, asset turnover ratio and operating margin. Higher EBITDA volatility leads to less accurate projections of an entity. Earnings volatility and EBITDA volatility can be decreased or completely avoided by using hedge accounting.

## *2.2. Hedge Accounting*

Hedge accounting is a voluntary reporting tool to match the earnings of the hedging instrument and the hedged item in the same reporting period. There are two ways to use hedge accounting depending on the hedged item, a cash flow- or a net investment hedge and a fair value hedge. In a cash flow- or net investment hedge an entity is hedging a future cash flow and, in that case, it will defer the gains and losses of the hedging instrument in Other Comprehensive Income (OCI) until the hedge is realized. The gains and losses of the hedging instrument are later reclassified to profit and loss and will offset the gains and losses of the hedged item in the same reporting period. The situation described in case 1 would have been considered a cash flow hedge as the hedged item was the FX risk of a future sale and the derivative gain in 20X3 would have been deferred to 20X4. A fair value hedge is done in an opposite way.

In a fair value hedge the hedged item is an item that is recognized on the balance sheet of the entity and the fair value changes of that item are being hedged. The hedging instrument is reported in FVTPL as in without hedge accounting, but the hedged item is also reported in FVTPL so that the value changes in the hedging instrument and the hedged item are reported in the same accounting period. An entity could, for example, hedge the fair value changes of a financial instrument measured at amortized cost or the fair value changes of a non-financial asset measured at historical cost for example. Entities do not necessarily have to apply hedge accounting for a fair value hedge to obtain the benefits. IFRS 9 provides an option to report financial instruments at FVTPL. If an entity has a financial instrument where they want to hedge the fair value changes, they can use the fair value option and avoid hedge accounting criteria and compliance costs. The requirement for the fair value option is that the financial instrument is reported at FVTPL from inception until it is derecognized. Theoretically, hedge accounting is a great

tool to reduce earnings volatility but its shortcoming is that hedge accounting requires strict criteria to be implemented.

According to PricewaterhouseCoopers (PwC, 2017) hedge accounting standards are some of the hardest standards to apply and understand. To get a more practical understanding of hedge accounting and its rules I will apply the case 1 of a future sale hedge, not under general accounting principles, but instead under hedge accounting rules.

*2.2.1 Case 2: Hedging FX risk under hedge accounting*

		<b>FX forward terms</b>	
		Start date	1 September 20X3
		Counterparties	ABC & XYZ
		Maturity	1 May 20X4
<b>Sale</b>		ABC sells	USD 5 million
1 September 20X3	Sale is anticipated	ABC buys	EUR 4.545 million
1 February 20X4	ABC delivers goods	Forward rate	1.10
1 May 20X4	Client pays USD 5 million	Settlement	Physical delivery

At inception of hedge accounting some formal documentation is required. Table I below from PwC (2017) presents the necessary documentation. Even though the documentation is simple in its content, it requires administrative work from an entity as every hedging relationship where hedge accounting is used needs to be documented.

TABLE I

FORMAL DESIGNATION AND DOCUMENTATION OF HEDGE ACCOUNTING

**Formal designation and documentation of:**

- Risk management objective and strategy
- Hedging instrument
- Hedged item
- Nature of risk being hedged
- Hedge effectiveness (including sources of ineffectiveness and how the hedge ratio is determined)

Source: PwC (2017).

In this case the risk management objective is simple, ABC is protecting its future USD sale from the appreciation of EUR with a forward. The strategy in risk management is to

use forward contracts to remove the negative effects of FX rate fluctuations towards the statement of income. Hedging instrument is the forward contract and the details of the contract would be added. The hedged item is the future sale of USD 5 million and the details of the sale would be added. Nature of risk being hedged is the FX risk and more specifically the appreciation of EUR towards USD. The hedge is effective and can become ineffective if the sale is no longer at USD 5 million, the timing of the sale changes, the sale is cancelled or XYZ bank defaults. The hedging instrument and hedged item need to be eligible for hedge accounting under IFRS 9. In this case, both are, but it will be discussed in more detail later.

At inception, and in every reporting period, the hedge effectiveness must be measured and certain factors have to be assessed. The factors are whether an economic relationship exists, credit risk must not dominate value changes in the hedging instrument or the hedged item and the hedge ratio must be the same as it is in risk management strategy. In this case, the economic relationship is clear as the value of the forward contract goes to the opposite direction than the EUR value of the sale and the economic relationship can be qualitatively assessed. When the economic relationship is not as clear, quantitative methods, in some cases complicated statistical models, need to be used and often a mere correlation is not sufficient to prove an economic relationship (Ramirez, 2015). Credit risk does not dominate the value changes in this case if both the US client and XYZ bank are not expected to default. The hedge ratio is 1:1 in both the hedge and the risk management strategy as the value changes in the derivative are the same as in the future sale. In the case of future transactions, the probability of that transaction taking place must be at least “highly probable” for it to qualify for hedge accounting. Figure 1 below from Ramirez (2015) shows when a future transaction is permitted as a hedged item. Highly probable indicates a probability of 75% or more (Ramirez, 2015).

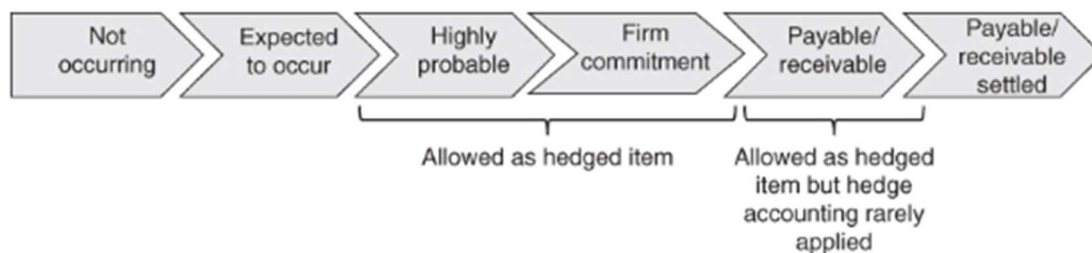


FIGURE 1 – Future transactions in hedge accounting

Source: Ramirez (2015).

On 1 September 20X3 nothing is recorded as there is no collateral in the forward contract. On 31 December 20X3 the forward contract is remeasured, but as hedge accounting is being applied, the derivative is not measured in FVTPL but in Fair Value through Other Comprehensive Income (FVOCI). As mentioned before, the hedge effectiveness must be measured in every reporting period by fair valuing the hedged item and comparing the fair value with the derivative. As the hedged item is a future cash flow in a cash flow hedge, most commonly a hypothetical derivative is used to measure the fair value of the hedged item (Ramirez, 2015). In this case the hedge ratio is still 1:1. If hedge ineffectiveness occurs, the ineffective part is measured in FVTPL and the effective part in FVOCI. In this case there is no hedge ineffectiveness as the hedge ratio is 1:1. The fair value of the forward is EUR 0.699 million and is recorded in OCI in the following way:

Forward contract (Asset)	699,301	
Cash flow hedge reserve (Equity)		699,301

On 1 February 20X4 ABC sells its inventory to the US client and records the sale using the spot rate on that date which is 1.25. ABC records a sale of EUR 4 million in the following way:

Accounts receivable (Asset)	4,000,000	
Sales (P&L)		4,000,000

The sale has taken place so the forward has to be remeasured in the spot rate of 1.25. The fair value of the forward has decreased by EUR 0.154 million and is now valued at EUR 0.545 million. The change is recognized in the OCI in the following way:

Cash flow hedge reserve (Equity)	153,847	
Forward contract (Asset)		153,847

The hedge was on the FX risk of the sale and as the sale is recognized in the statement of income, the deferred gains of the forward must be reclassified to profit and loss in the following way:

Cash flow hedge reserve (Equity)	545,455	
Sales (P&L)		545,455

On 1 May 20X4 ABC receives the USD 5 million from the US client and is valued at the current spot rate of 1.20. The EUR 4.167 million received from the client is recorded in the statement of financial position the following way:

USD cash in euros (Asset)	4,166,667	
Accounts receivable (Asset)		4,166,667

On 1 May 20X4 also the forward with XYZ is settled by physical delivery where ABC delivered USD 5 million and received EUR 4.545 million and is recorded in the statement of financial position the following way:

EUR cash (Asset)	4,545,455	
USD cash in euros (Asset)		4,166,667
Forward contract (Asset)		378,788

On 1 May 20X4 as the forward is settled it is derecognized and as the payment has been received, accounts receivable is balanced in the following way:

Accounts receivable (Asset)	166,667	
Forward contract (Asset)		166,667

The impact on statement of income from the date the sale was forecasted to the date the forward was settled is as follows:

<b>Statement of income effect on sale of</b>		<b>4,545,455</b>	
20X3	No impact	0	
20X4	Sales	4,545,455	

Due to the application of hedge accounting ABC was able to avoid the earnings- and EBITDA volatility in 2013. The benefits of hedging can often be seen by outsiders only if hedge accounting is applied (Glaum & Klöcker, 2011). Even though the former cases

were simplified and exaggerated examples of hedge reporting when applying or not applying hedge accounting, they should give an idea of how hedging under general accounting principles can increase earnings volatility and how hedging under hedge accounting principles can mitigate that.

IFRS 9 does not allow hedge accounting for net positions. For example, if company ABC has multiple transactions of buying different materials and selling different finished goods with its Swedish suppliers and clients where it has both revenues and expenses in Swedish krona (SEK), most efficient way of hedging the FX risk would be to only hedge the net part of incomes and expenses in SEK. As hedge accounting application requires a clear economic relationship between the hedging instrument and the hedged item, hedges can only contain single items (micro-hedging) (Glaum & Klöcker, 2011). International Accounting Standards Board has been working on a separate project for macro-hedging for a decade now but the project is still in progress.

Multiple authors have noted that accounting standards have led to companies changing their economical hedging strategies, for two main reasons (Tessema, 2016, Glaum & Klöcker, 2011, Chen et al, 2012, Melumad et al, 1999). Firstly Tessema (2016) found that under SFAS 133 (the US GAAP equivalent for IAS 39) companies are hedging more carefully to avoid earnings volatility. Secondly, due to strict criteria for hedge accounting applicability, companies must use economically sub-optimal hedging strategies to qualify for hedge accounting (Glaum & Klöcker, 2011). The desire to qualify for hedge accounting comes with no surprise as Graham et al. (2005) document that less volatile earnings are often a priority over economic value for CFOs. More complicated derivatives are often easier to be tailored for specific hedges but are not eligible as hedging instruments. Entities have to select between an economically optimal hedging strategy or an economically sub-optimal hedging strategy depending on what is their tolerance of earnings volatility. Figure 2 from Ramirez (2015) shows the trade-off between hedge accounting applicability and economic benefit.

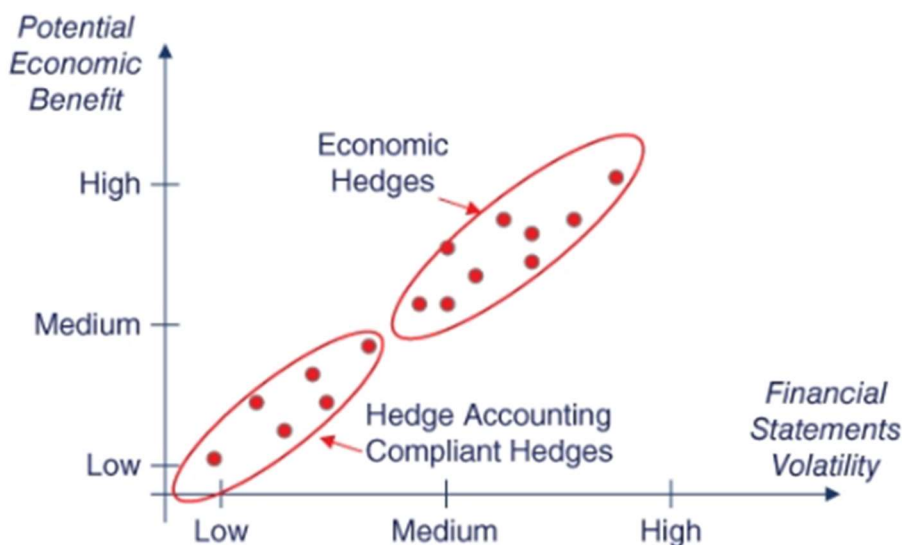


FIGURE 2 – Economic- versus hedge accounting hedges

Source: Ramirez (2015).

The benefits of hedge accounting have been established in previous literature. Panaretou et al. (2013) found that when hedge accounting is applied, earnings are more predictable, and Pierce (2020) found that hedge accounting decreases earnings volatility. The problem when studying the effect of hedge accounting on earnings volatility where earnings volatility is the dependant variable, is that countless different variables can affect earnings and it is arguably impossible to control all other variables than hedge accounting. The correlation between hedge accounting and decreased earnings volatility that Pierce (2020) found does not necessarily mean causation.

Fama & French (1993) argue that large and mature companies have less earnings volatility. Mature companies have regular sales and expenses which lead to earnings that are less volatile and more predictable. Beneda (2013) and Glaum & Klöcker (2011) show that companies that use hedge accounting are larger on average. Larger companies are more likely to have staff that are qualified to apply hedge accounting and can make use of economies of scale to decrease costs associated with hedge accounting application (Pierce, 2020). Compliance costs of hedge accounting is the main reason companies decide to pass over hedge accounting (Comiskey & Mulford, 2008). Common sense indicates that larger companies would probably have less earnings volatility even if they would not apply hedge accounting. This paper will investigate whether companies that

use hedge accounting to a greater extent have less earnings volatility due to the hedge accounting or due to other factors. The expectation is what previous literature has claimed, that hedge accounting is indeed the reason for decreased earnings volatility.

*H1: Hedge accounting decreases income statement gains and losses of derivatives.*

### 3. METHODOLOGY

Entities divide balance sheet derivatives in two categories, to those that are under hedge accounting rules (designated) and to those that are not (undesignated). Undesignated derivatives include all derivatives that are not reported under hedge accounting, regardless of their intended use. Undesignated derivatives are reported under general accounting principles. Entities under IFRS must report undesignated derivatives in FVTPL and gains and losses on undesignated derivatives must be specified. The earnings effect of undesignated derivatives can be separated in financial statements and thus I use that earnings effect as a dependent variable DEREFFECT. DEREFFECT is the percentage effect on earnings before taxes (EBT) which shows the absolute value of how many percentages EBT have increased or decreased due to gains and losses in undesignated derivatives. EBT is used since derivative gains and losses affect the effective tax rate. Absolute value is used as, from an earnings volatility perspective, it is irrelevant whether earnings increase or decrease. Due to the offsetting principle of derivatives, gains of hedging instrument in current accounting period lead to losses in the hedged item in a future period, and vice versa.

To study how the degree of hedge accounting application affects DEREFFECT, following Pierce (2020) HAUSE is used as an independent variable to see how an increase in the degree of hedge accounting application affects earnings from undesignated derivatives. HAUSE is the sum of absolute values of derivative assets and derivative liabilities reported under hedge accounting divided by the sum of absolute values of all derivative assets and liabilities. HAUSE shows which percentage of derivatives on the balance sheet is designated for hedge accounting and which percentage is undesignated.

There are three main factors that affect gains and losses of undesignated derivatives, namely the underlying risk, the direction of the derivative in relation to the underlying risk and the notional value of the derivatives. As details concerning single derivatives are not communicated to outsiders by entities, the only information available regarding these



factors is the value of derivatives. DERAMOUNT will be used as a control variable as the value of derivatives on the balance sheet has a direct effect on gains and losses of derivatives. DERAMOUNT is the sum of absolute values of derivative assets and derivative liabilities divided by total assets.

The sample period is from 2017 to 2021. IFRS 9 replaced IAS 39 and became effective for periods starting in 2018 with a possibility of early adoption. The accounting standard brought updates in accounting of financial instruments and hedge accounting. Both the derivative accounting- and the hedge accounting rules influence all study variables mentioned formerly. All sample companies report under IFRS and are affected. The culture of accounting also changes with time where auditors may start accepting and denying certain accounting methods and defining the norms of the industry. Accounting rules and culture consider all entities reporting under IFRS and they change with time. To control for the changes in accounting rules and culture, fixed time effects are added to the model.

The effect of the degree of hedge accounting application on gains and losses of undesignated derivatives is estimated using following regression:

$$DEREFFECT_{i,t} = \beta_0 + \beta_1 HAUSE_{i,t} + \beta_2 DERAMOUNT_{i,t} + \sum YEAR_t$$

where  $\beta_0$  is a constant and  $\beta_1-2$  are the coefficients.

The sample is a random sample of publicly listed Finnish manufacturing companies obtained from Orbis. I chose manufacturing companies as their operations often share similar market risks, namely FX risk, interest rate risk and commodity price risk. I chose 40 companies from a five-year period, from 2017 to 2021 with expectations to receive at least 100 firm-year observations. Out of 40, seven companies were instantly dropped as they were not listed in Nasdaq Helsinki after double checking. 14 companies did not have any derivatives on their balance sheet in 2021 or 2020 and were dropped. One company said they use forwards and swaps for hedging but did not provide any other information regarding derivatives and was dropped. One company had derivatives on their balance sheet, but their earnings were not affected by them, the earnings were affected only on parent company level and was thus dropped. Two companies did not provide any information on how derivatives affected earnings even though they even applied hedge

accounting and were thus dropped. The final sample has 15 companies with 69 firm-year observations.

Only the company names were obtained from Orbis, the data of variables was manually collected from financial statements. Out of 15 sample companies, 10 applied hedge accounting and 5 did not. All companies that applied hedge accounting applied it in all five sample years except for one company which applied it in three out of five years. One company applied hedge accounting to all of its derivatives in four out of five firm-years.

#### 4. RESULTS

Table II below reports descriptive statistics. It shows that on average, 3.2% of EBT is increased or decreased due to undesignated derivatives and ineffective hedges. Arguably 3.2% is a number which should not raise too many concerns. Zero would be ideal but is unrealistic. There were some observations where DEREFFECT was 0% and in most of those cases the degree of hedge accounting application was 100% or close.

TABLE III

##### DESCRIPTIVE STATISTICS

Variables	Obs	Mean	Median	Std. Dev.	Min	Max
DEREFFECT	69	.032	.018	.04	0	.22
HAUSE	69	.342	.211	.366	0	1
DERAMOUNT	69	.006	.005	.007	0	.038

Hedge accounting is applied on average for 34% of derivatives. When only companies that do apply hedge accounting are considered, they apply hedge accounting for 53% of their derivatives. The median of HAUSE compared to the mean shows that HAUSE is positively skewed showing that a part of sample companies apply hedge accounting to a clearly greater extent which increases the mean. The mean is clearly higher than the median even when 25 observations are 0 (five companies which do not apply hedge accounting).

Sample companies have on average derivatives on their balance sheet equalling to 0.6% of their total assets. It is hard to estimate a reasonable benchmark but as a face value, 0.6% sounds reasonable. The largest value for DERAMOUNT was 3.8% for Neste Oyj

which is an oil refining company. Energy companies are known for hedging to a great extent.

Table III below shows the Pearson correlation coefficients between variables. None of the variables are significantly correlated. Even though there is no statistical significance, the matrix reproduces what one could expect. When the degree of hedge accounting increases, the earnings effect of undesignated derivatives decreases. When the relative amount of derivatives on the balance sheet increases, the earnings effect of undesignated derivatives increases. When the degree of hedge accounting increases, the relative amount of derivatives on the balance sheet increases, which implies that companies which hedge more, are also more likely to apply hedge accounting.

TABLE IIIII

PEARSON CORRELATION MATRIX

Variables	(DEREFFECT)	(HAUSE)	(DERAMOUNT)
DEREFFECT	1.000		
HAUSE	-0.159	1.000	
DERAMOUNT	0.028	0.069	1.000

Table IV provides results from a generalized least squares (GLS) regression with fixed time effects. First an ordinary least squares (OLS) regression was run which indicated that the model was not significant and was not suitable. Multicollinearity was tested and no multicollinearity was detected. Heteroscedasticity was tested by the Breusch-Pagan test which found that heteroscedasticity is present. Serial correlation was tested by Wooldridge test for autocorrelation in panel data, and no serial correlation was detected. For panel data with heteroscedasticity or autocorrelation GLS should arguably be a fitting model since the model is robust in both. GLS was run with fixed time effects and the model was statistically significant.

TABLE IV  
GLS REGRESSION

VARIABLES	Expected Signal	(1) DEREFLECT
HAUSE	-	-0.014** (0.007)
DERAMOUNT	+	0.662 (0.441)
Constant		0.037*** (0.009)
Year Fixed Effects		Yes
Observations		69
Prob > chi2		0.000

Standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The regression implies that hedge accounting does indeed decrease the earnings volatility from undesignated derivatives on a statistically significant level.

To test for robustness I did a model variation test where I randomly subtracted 50% of the sample (34 observations out of 69). I randomly sorted the sample in Stata and then removed the first 34 observations. After running tests for multicollinearity, heteroskedasticity and autocorrelation, the results indicated that GLS model should be used again. Table V below shows the results.

TABLE V  
GLS REGRESSION WITH A SMALLER SAMPLE

VARIABLES	(2) DEFECT
HAUSE	-0.020** (0.010)
DERAMOUNT	0.054 (0.829)
Constant	0.057*** (0.012)
Year Fixed Effects	Yes
Observations	35
Prob > chi2	0.000

Standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The robustness test suggests that the results are significant. The model complements previous research and shows that as companies increase the degree of hedge accounting application, the degree of earnings volatility decreases. When companies have more derivatives on balance sheet, the degree of earnings volatility can increase but that association is not statistically significant.

When collecting the sample, I noticed that some assumptions regarding EBITDA volatility were not correct. I implied in the text that when hedge accounting is not used, entities always report the gains and losses of derivatives in other financial expenses which creates EBITDA volatility. When collecting the sample, I noticed that when derivatives matured, the sample companies reported the gains and losses in the line item of the hedged item, as they do in hedge accounting. This practice was universal in the sample and must be within approved reporting standards. It seems that in real life EBITDA volatility is not an issue comparable to earnings volatility and should not be held at a high interest.

## 5. CONCLUSION

Derivative financial instruments are effective in hedging financial risks when applied appropriately. Derivatives reporting evolved as the use of derivatives increased. IAS 39 introduced financial instrument reporting standards where derivatives are reported in FVTPL. The standards created a problem where derivatives increase gains and losses in periods which are not economically justifiable. To tackle this issue, derivatives reporting standards gave entities an option to match the economic and accounting impact of derivatives by applying hedge accounting.

Hedge accounting is theoretically a great tool to decrease accounting earnings volatility but its deficiencies are strict documentation, high compliance costs and low applicability in economically optimal instruments. This paper separated the earnings effect of those derivatives which are not reported under hedge accounting and tested whether the degree of hedge accounting application influences the earnings volatility of undesignated derivatives.

A sample of 15 Finnish publicly listed manufacturing companies was included in the study. With a 95% confidence level there is a statistically significant decrease in earnings volatility from derivatives when the degree of hedge accounting application increases. Although this study focused on Finnish manufacturing companies, to an extent, these results can be generalized to all entities reporting under IFRS. This study complements the findings of Pierce (2020) and confirms that an increase in hedge accounting application decreases earnings volatility from derivatives. Therefore, the hypothesis is supported.

The main limitation in the study is a relatively small sample size. Collecting data manually is time-consuming and the observations of the sample were enough to provide a significant result. A larger sample might provide more significant results. I think future research should focus on how the hedge accounting standards can be improved in a way that increases the application of hedge accounting, decreases its compliance costs, and allows more economically benefitting instruments as hedging instruments.

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APPENDICES

APPENDIX I

LIST OF SAMPLE COMPANIES

Company Name	Observations
FISKARS OYJ ABP	5
GLASTON OYJ ABP	4
HKSCAN OYJ	5
HUHTAMAKI OYJ	5
KONE OYJ	5
NESTE OYJ	5
NOKIA OYJ	5
RAISIO OYJ	5
RAPALA VMC OYJ	5
ROBIT OYJ	1
SCANFIL OYJ	5
STORA ENSO OYJ	5
SUOMINEN OYJ	5
TERVEYSTALO OYJ	4
UPONOR OYJ	5
Total	69