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Deductible and retention level decisions in
corporate liability Insurance: A theory–practice
comparison in large Finnish companies

School of Accounting and Finance
Master's Thesis in Economics
Master's Degree Programme in
Economics

Vaasa 2026

UNIVERSITY OF VAASA**School of Accounting and Finance**

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Title of the thesis:	Deductible and retention level decisions in corporate liability Insurance: A theory–practice comparison in large Finnish companies		
Degree:	Master of Science in Economics and Business Administration		
Degree Programme:	Master’s Degree Programme in Economics		
Supervisor:	Stephen Onifade		
Year:	2026	Pages:	63

ABSTRACT:

This thesis examines how liability insurance retention levels are determined in large Finnish companies. In this study, the term refers to publicly listed companies with global liability insurance programmes and annual revenue exceeding EUR 1 billion. Retention refers to the portion of loss exposure that a company retains through a deductible or another risk retention arrangement. The study aims to identify the factors affecting retention decisions, the methods and information sources used in decision-making, and the extent to which corporate practices correspond with perspectives presented in the insurance economics and risk management literature.

The study employed a qualitative research design. The empirical data consisted of eight semi-structured expert interviews. Five participants were risk and insurance professionals working in internationally operating Finnish listed companies, two represented insurance brokerage firms, and one was a liability insurance professional from the insurance sector. The participants were selected through purposive sampling, and the interview data were examined using thematic analysis.

The findings indicate that retention levels are generally not determined through a formal optimisation process conducted each year. Instead, the existing insurance programme and its current deductible typically provide the starting point for decision-making. The retention level is reassessed particularly when the company’s business activities, risk profile, loss experience, or insurance market conditions change. The principal factors affecting the decision include the company’s risk-bearing capacity, historical loss experience, the effect of deductible changes on insurance premiums, available market alternatives, internal organisational acceptability, and claims-handling practices. The primary information sources are company-specific loss histories, insurance quotations, market and benchmarking information provided by insurance brokers, and expert judgement. Advanced quantitative methods are available, but the findings suggest that their use is not an established part of annual retention decisions in most of the companies represented in the study.

The findings demonstrate that theory and practice are more closely aligned in terms of the factors considered than the methods applied. Although companies consider many of the economic factors identified in the literature, these factors are rarely integrated into a single formal optimisation model. In practice, retention levels result from the interaction of financial judgement, insurance market conditions, and organisational feasibility. Accordingly, the findings suggest that identifying material changes may help determine when a more detailed reassessment of the existing retention level is appropriate.

KEYWORDS: liability insurance, risk retention, deductible, risk financing, risk-bearing capacity, corporate insurance, risk management

VAASAN YLIOPISTO**Laskentatoimen ja rahoituksen yksikkö**

Tekijä:	Jooseppi Vesala		
Tutkielman nimi:	Deductible and retention level decisions in corporate liability Insurance: A theory–practice comparison in large Finnish companies		
Tutkinto:	Kauppätieteiden maisteri		
Oppiaine:	Taloustiede		
Työn ohjaaja:	Stephen Onifade		
Valmistumisvuosi:	2026	Sivumäärä:	63

TIIVISTELMÄ:

Tässä tutkielmassa tarkastellaan, miten riskinpidätyksen taso määritetään suurissa suomalaisissa yrityksissä. Tässä tutkimuksessa suurilla yrityksillä tarkoitetaan pörssiyrityksiä, joilla on globaalit vastuuvakuutusohjelmat ja joiden vuotuinen liikevaihto ylittää miljardi euroa. Riskinpidätyksellä tarkoitetaan sitä osaa vahinkoriskistä, jonka yritys pitää omalla vastuullaan omavastuun tai muun riskinpidätysjärjestelyn kautta. Tutkimuksen tavoitteena on tunnistaa omavastuutasoa koskeviin päätöksiin vaikuttavat tekijät, päätöksenteossa käytettävät menetelmät ja tietolähteet sekä arvioida, missä määrin yritysten käytännöt vastaavat vakuutustaloustieteen ja riskienhallinnan kirjallisuudessa esitettyjä näkökulmia.

Tutkimus toteutettiin laadullisena tutkimuksena. Empiirinen aineisto koostui kahdeksasta puolistrukturoidusta asiantuntijahaastattelusta. Viisi haastateltavista oli kansainvälisesti toimivissa suomalaisissa pörssiyrityksissä työskenteleviä riski- ja vakuutusalan ammattilaisia, kaksi edusti vakuutusmeklariyrityksiä ja yksi oli vakuutusallalla työskentelevä vastuuvakuutusasiantuntija. Osallistujat valittiin harkinnanvaraisella otannalla, ja haastatteluaineisto analysoitiin temaattisen analyysin avulla.

Tulokset osoittavat, että omavastuutasoja ei yleensä määritetä vuosittain toteutettavan muodollisen optimointiprosessin avulla. Sen sijaan päätöksenteon lähtökohtana toimii tyypillisesti olemassa oleva vakuutusohjelma ja sen nykyinen omavastuutaso. Omavastuutasoa arvioidaan uudelleen erityisesti silloin, kun yrityksen liiketoiminnassa, riskiprofiilissa, vahinkohistoriassa tai vakuutusmarkkinoiden olosuhteissa tapahtuu muutoksia. Päätökseen vaikuttavia keskeisiä tekijöitä ovat yrityksen riskinkantokyky, historiallinen vahinkokehitys, omavastuun muutosten vaikutus vakuutusmaksuihin, markkinoiden saatavilla olevat vaihtoehdot, ratkaisun hyväksyttävyyden organisaaion sisällä sekä vahinkojen käsittelyyn liittyvät käytännöt. Tärkeimpiä tietolähteitä ovat yrityskohtainen vahinkohistoria, vakuutustarjoukset, vakuutusmeklareiden tarjoama markkina- ja vertailutieto sekä asiantuntija-arviot. Kehittyneitä kvantitatiivisia menetelmiä on saatavilla, mutta tulosten perusteella niiden käyttö ei ole vakiintunut osa vuosittaista omavastuutasoja koskevaa päätöksentekoa useimmissa tutkimuksessa edustetuissa yrityksissä.

Tulokset osoittavat, että teoria ja käytäntö vastaavat toisiaan paremmin huomioon otettavien tekijöiden kuin käytettyjen menetelmien osalta. Vaikka yritykset huomioivat monia kirjallisuudessa tunnistettuja taloudellisia tekijöitä, niitä yhdistetään harvoin yhdeksi muodolliseksi optimointimalliksi. Käytännössä omavastuutasot muodostuvat taloudellisen harkinnan, vakuutusmarkkinoiden olosuhteiden ja organisatorisen toteutettavuuden yhteisvaikutuksesta. Tulosten perusteella olennaisten muutosten tunnistaminen voi siten auttaa arvioimaan, milloin olemassa olevan omavastuutason perusteellisempi uudelleenarviointi on tarkoituksenmukaista.

AVAINSANAT: vastuuvakuutus, riskinpidätys, omavastuu, riskirahoitus, riskinkantokyky, yritysvakuutus, riskienhallinta

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1 Introduction

Companies face different risks in their operations. Managing these risks is an important part of protecting business continuity and company value. One central area of risk management is risk financing. Risk financing concerns how the company ensures that financial resources are available after a loss and how its loss exposures are covered at a reasonable cost (International Risk Management Institute [IRMI], n.d.). Determining the retention level in the company's liability insurance programme is one of these decisions. It affects both the company's risk management and the structure of the insurance programme.

1.1 Background of the study

The insurance retention level determines how much of possible losses remains with the company and how much is transferred to the insurance market. The decision affects the company's own risk exposure, the cost of the insurance programme, and the financial protection provided against serious losses. The purpose of determining the retention level is therefore to find a balance between the company's own risk retention, the scope of insurance coverage, and the total cost of insurance (Actuarial Standards Board, 2017). The importance of a liability insurance programme is connected to the company's wider management of liability risks. International operations, connected supply chains, and a more complex business environment have increased the number of situations in which a company's operations, products, contractual obligations, or subcontracting chains can lead to liability for damages. Liability risk differs from many other corporate risks because the damage is primarily suffered by an external party, while the financial consequences are realised by the company through liability for damages, legal and investigation costs, and possible reputational effects. Serious liability losses can cause financial losses and affect business continuity and operating ability. Managing these risks requires the company to identify its liability risks and assess which risks can be prevented, which can be transferred through insurance, and which should be retained (Juvonen et al., 2023).

Retention decisions are relevant for large Finnish companies with international operations because liability insurance programmes are often arranged at group level and cover several countries. The programme design must therefore consider the company's full risk profile, its international operating environment, and practices in different countries. Determining the retention level is not only a technical decision concerning one insurance policy. It is part of the company's wider risk management and risk financing structure (Marsh, 2014).

Insurance economics and risk management literature have examined corporate insurance from several perspectives. Earlier research has discussed the economic reasons for insurance, corporate demand for insurance, optimal insurance coverage, and different methods for evaluating retention levels (e.g. Mayers & Smith, 1982; Cummins, 1976; Cozzolino, 1978). The theory–practice comparison in this study uses several theoretical perspectives, including Mossin's (1968) analysis of full and partial insurance, Cummins's (1976) CAPM-based approach to corporate retention, and Cozzolino's (1978) risk-adjusted cost approach. However, less attention has been given to how large companies combine economic, organisational, and insurance market factors in practical liability insurance retention decisions.

The thesis is structured as follows. Chapters 2 and 3 present the theoretical framework. Chapter 2 discusses the key concepts, definitions and economic rationales. Chapter 3 describes the determining of the retention level in theory and presents the quantitative approaches. Chapter 4 presents the research methodology, data collection, and analysis method. Chapter 5 presents the empirical findings by theme and analyses them in relation to the theoretical framework. Finally, Chapter 6 presents the conclusions, discusses the limitations of the study, and gives suggestions for further research.

1.2 Purpose of the study and research questions

The purpose of this study is to improve understanding of how liability insurance retention levels are determined in large Finnish companies. The study examines the factors that companies consider when determining their retention levels and the extent to which practical decision-making corresponds with the views presented in insurance economics and risk management literature. Based on the interview data, the aim is to provide an overall description of how liability insurance retention decisions are made in practice in large Finnish companies. The main research question is:

How are liability insurance retention levels determined in large Finnish companies?

The main research question is examined through the following sub-questions:

1. *Which factors affect the determination of liability insurance retention levels in large Finnish companies?*
2. *What methods and information sources do companies use when making retention decisions?*
3. *To what extent does practical decision-making correspond with the views presented in insurance economics and risk management literature?*

2 Literature Review: Concepts, Definitions & Economic Rationale

This chapter defines the main concepts and explains the role of liability insurance in corporate risk management and economic rationale behind corporate insurances.

2.1 Main concepts of the study

The main concepts of this study include liability insurance, retention level, deductible, self-insured retention, policy limit, captive, and group-level liability insurance programme. These concepts are connected to corporate risk financing, which refers to the ways in which a company decides to finance risks arising from its operations. A company can transfer some risks to the insurance market, retain some risks, or use a combination of these (Baranoff et al., 2009). The main issue in this thesis is how a company sets the boundary between its own risk retention and the risk transferred to the insurance market through the retention level.

2.2 Insurance

Insurance is a form of risk financing transfer. The company pays a premium, and the insurer agrees to reimburse the company for losses covered by the insurance contract. The financial consequences of these losses are therefore transferred partly from the company to the insurer. However, the company normally continues to retain some risk through deductibles, policy limits, and losses that are not covered by the insurance programme (Frees, 2025).

2.3 Liability insurance

Liability insurance is relevant when the insured may become legally responsible for harm suffered by another party. Unlike insurance covering the insured's own property or person, liability insurance responds to claims arising from this legal responsibility. Estimating

liability exposures can be difficult because the final amount of a claim depends not only on the harm itself but also on liability rules, the assessment of damages, and the development of claims. The range of costs included in compensation may also be broad (Baker, 2004). According to Baranoff, et al. (2009), legal liability means a legal obligation to compensate another person or organisation for damage. Liability can be based, for example, on a contract, tort liability, or negligence, and it can lead to monetary compensation for the injured party.

Commercial general liability (CGL) insurance can be seen as the basic form of corporate liability insurance because it covers many corporate liabilities. According to Baranoff et al. (2009), the main coverage areas of CGL insurance include bodily injury and property damage liability and personal and advertising injury liability. Bodily injury and property damage coverage concerns the insured's liability for injury to other persons or damage to their property. A CGL policy may also include the insurer's duty to defend the insured against claims seeking compensation for covered bodily injury or property damage. Liability insurance therefore protects the company not only against possible compensation liability but can also be relevant for claim investigation and legal defence.

Product liability is a specific liability risk within CGL insurance. According to Baranoff et al. (2009), product liability can be based on negligence, breach of warranty, or strict liability when a sold product is defective and causes damage. A manufacturer or seller may be liable if a product is defective and causes bodily injury to the user or damage to the user's property. A special feature of product liability is that liability can continue during the useful life of the product. This can be especially important for products with a long useful life (Baranoff et al., 2009).

Product liability risk can also differ from a single loss event because the same product or cause of loss can result in several similar claims. According to Baranoff et al. (2009), a large number of people may be injured by the same product or condition in a mass tort situation. Product liability risk can therefore be difficult for a company to predict because

the final extent of the loss may depend both on the number of claims and on how liability is legally assessed.

2.3.1 Global liability insurance programmes

The liability insurance of a large international company can be organised through group-level and local insurance policies. A common structure is a controlled master programme, in which local policies are coordinated with a master policy issued for the group. Other alternatives include purchasing separate policies in different countries or using one worldwide policy. The chosen structure must also take into account local insurance regulations in the countries where the company operates. This is necessary for managing liability losses and complying with local requirements. In a controlled master programme, local admitted policies are normally designed to follow the terms of the master policy as closely as possible. The master policy typically includes difference in conditions and difference in limits (DIC/DIL) coverage. It can therefore supplement the terms or limits of a local policy when the local coverage is narrower than the master policy or its limit is not sufficient (Marsh, 2014).

This programme structure is relevant to the retention level because the company's retained risk can consist of deductibles, local insurance arrangements, risk layers carried by a captive, and layered insurance coverage. In large companies, the liability insurance retention level must therefore be examined as part of the whole multinational insurance programme and not only as the deductible term of one insurance policy (Airmic, 2015).

2.4 Retention level

A deductible determines the part of a covered loss that remains payable by the insured. With a straight deductible, the insurer pays only the amount exceeding the agreed deductible. This leaves smaller losses with the policyholder and reduces the number of minor claims that the insurer must handle. As a result, the deductible can also reduce the insurance premium. Because the insured continues to bear part of the financial

consequences of a loss, a deductible may also encourage more careful risk behaviour. It can therefore be understood as part of the risk retained by the company (Rejda et al., 2021).

Insurance literature uses several related but separate concepts for the part of risk that remains with the insured. Brown and Schmitz (2006) discuss deductibles, while Anderson (2021) explains the distinction between a deductible and a self-insured retention. The Actuarial Standards Board (2017) uses risk retention as a broader concept covering the assessment, management, and financing of retained risk. In this thesis, retention level is used as a general term for the amount of liability risk retained by the company within its risk financing arrangement.

A deductible and a policy limit divide each loss into the part retained by the insured and the part paid by the insurer. In the model presented by Mohamed et al. (2010), the insured pays the full amount when the loss is below the deductible. When the loss is higher than the deductible, the insurer pays the amount above it up to the policy limit. The insured remains responsible for the deductible and for any part of the loss exceeding the combined amount of the deductible and the policy limit. These terms therefore change the distribution of losses retained by the insured.

A deductible is not only a technical word used in claim negotiations. It is also an important mechanism for dividing risk between the insured and the insurance company. According to Brown and Schmitz (2006), under a deductible arrangement the insured is generally responsible for the first agreed amount of each loss. In first-party insurance, the insurer normally deducts the deductible from the payment made to the insured. In third-party liability insurance, the arrangement can work differently because the injured party is a third party. The insurer may pay compensation to the third party and later recourse the deductible amount from the insured. In liability insurance, a deductible is therefore both a financial and a claims-handling arrangement. The insurer may participate in claims handling even when part of the cost remains with the insured.

The theoretical basis of a deductible is connected to the logic of partial insurance. In classical insurance economics, buying insurance can be examined as a choice between the benefit of risk transfer and the insurance price. Mossin (1968) shows that full insurance can be optimal for a risk-averse policyholder when insurance is actuarially fairly priced. However a positive premium loading can make partial insurance a rational. Arrow's (1974) analysis of optimal insurance contracts also supports the idea that insurance coverage can be directed particularly to losses above a certain deductible level. A deductible therefore has an economic basis and is not only a policy term. It makes partial risk transfer possible when transferring the full risk to the insurance market is not economically reasonable.

A self-insured retention (SIR) is an agreed amount that the insured pays before the liability insurer's payment obligation begins. An SIR differs from a traditional deductible particularly because, under a deductible arrangement, the insurer's responsibility may start from the first amount of the claim and the insured reimburses the deductible to the insurer afterwards. Under an SIR, the insurer is generally responsible only for costs above the SIR level (Anderson, 2021).

2.5 Policy limit

A policy limit is the maximum amount up to which the insurer is responsible for covered losses. In liability insurance, the limit is the upper boundary of the insurer's payment obligation. If one loss or the aggregate amount of losses during the policy period exceeds the agreed limit, the amount above the limit generally remains with the insured or can be covered by higher insurance layers. According to Baranoff et al (2009), policy limits in commercial general liability insurance determine the insurance companies maximum responsibility in certain insured situations. CGL limits can apply to different coverages and to a general aggregate limit that restricts the total amount paid by the insurer during the policy period. The policy limit therefore sets the upper boundary of coverage and

the risk layer above which liability is no longer covered without separate excess insurance (Baranoff et al., 2009).

Liability insurance coverage can also consist of several insurance layers. According to Baranoff et al. (2009), a CGL limit may be insufficient for many companies, in which case the company can purchase commercial umbrella liability insurance above the primary policy. In this structure, the primary liability policy covers losses up to its own limit. After that, umbrella or excess insurance may cover losses within its own limit. So, company's risk is not determined only by whether liability insurance exists. It also depends on the deductible, the policy limit, and possible additional insurance layers.

2.6 Risk-bearing capacity

In this thesis, risk-bearing capacity means the company's ability to carry risk without the realisation of the risk materially threatening its financial position or business continuity. In the definition based on the COSO ERM framework, risk capacity means the maximum amount of risk that an organisation can absorb while pursuing its strategy and business objectives (COSO & WBCSD, 2018).

2.6.1 Risk appetite

In the COSO ERM framework, risk appetite is broadly defined as the types and amount of risk that an organisation is willing to accept or reject in pursuing value. This thesis separates risk-bearing capacity and risk appetite so that risk-bearing capacity describes how much risk the company can carry, while risk appetite describes how much risk it wants or accepts to carry. This distinction is important for the retention level. A company may be financially able to carry a higher deductible but may still select a lower retention level (COSO & WBCSD, 2018).

2.7 Economic reasons for corporate insurance

This section examines corporate insurance as part of risk financing. It first discusses the economic reasons for corporate insurance, then the choice between insurance and self-insurance, and finally the use of a captive insurance company as a risk financing option.

2.7.1 Why companies buy insurance

Corporate demand for insurance is different from demand for personal insurances. In a company, the policyholder is not an individual whose wealth is tied to one risk object. The owners of a company can generally diversify their investments across several companies and industries (Mayers & Smith, 1982). Corporate insurance can be examined as part of the wider theory of corporate risk management. According to Smith (2008), the value of corporate risk management cannot be justified only by a reduction in the variability of company value because diversified investors can diversify company-specific risks in their own portfolios. Risk management can increase company value when it affects cash flows, investment decisions, taxes or contracting costs for example. Its value is then connected to market imperfections and to the fact that unhedged risks can cause financial distress, delayed investments, or other costs that cannot be removed through the owners' personal diversification (Smith, 2008).

One mechanism discussed by Smith (2008) is the underinvestment problem. If an unhedged risk reduces company value or cash flow, the company may be unable to make otherwise profitable investments, or some of the investment benefit may be transferred to creditors. Risk management can then increase company value by reducing financial disruption and protecting the company's ability to invest. In the insurance context, this means that insurance can be valuable when a large loss could reduce cash flow, increase financing costs, or limit the company's ability to make profitable investments. According to Mayers and Smith (1982), corporate demand for insurance can also be explained by the costs of financial distress, tax factors, contractual and incentive problems, and services offered by insurers, such as risk assessment and claims handling.

In the risk-shifting problem, shareholders may have an incentive to prefer riskier decisions when the possible benefit of risk-taking is mainly received by shareholders but part of the losses is carried by creditors. Insurance can reduce this conflict between shareholders and creditors and lower the agency costs connected to risk shifting. It can limit the effect of a large loss on the value of company assets and the position of creditors (Mayers & Smith, 1982; MacMinn & Garven, 2013, p. 488).

Smith (2008) also states that corporate risk management should not be examined only from the shareholders perspective. A company has several stakeholder groups, including creditors, employees, suppliers, and customers. Their position may become weaker if the company's risk level increases. These stakeholders may not be able to diversify company-related risk in the same way as shareholders. Risk management can therefore reduce contractual and incentive costs and support the company's ability to maintain business relationships. This is relevant to liability insurance because a serious product liability loss can have significant financial and operational consequences. According to Marsh (2014), a product defect or contamination can result in regulatory fines, expensive legal proceedings, product recalls, and reputational damage.

According to Smith (2008), risk management decisions must also consider the cost of risk management. Risk management instruments are not free. They involve transaction costs, administrative costs, and management time. It is therefore not reasonable for a company to transfer all risks to external markets without considering the benefits in relation to the costs. This is directly connected to the retention level: the company must decide which losses it retains and which losses it transfers to the insurance market.

2.7.2 Insurance or self-insurance

Risk retention means that the company remains financially responsible for losses within the retained part of the risk. Depending on the chosen arrangement, these losses can be paid directly from operating cash flow, from funds accumulated before losses occur, or

through borrowing after a loss. Each method has financial consequences for the company. Keeping funds available for possible losses creates an opportunity cost because the same capital cannot be used for investments or other business purposes. If the available funds are not sufficient, the company may also need to obtain additional financing after a major loss. Risk retention is therefore not cost-free, even if it reduces the insurance premium (Frees, 2025).

2.7.3 Captive insurance company

A captive is an insurance or reinsurance company created within a corporate group to finance risks arising from the group's own operations. It allows risks from different business units to be combined in a group-level insurance arrangement. The captive can carry part of these risks and transfer another part to external reinsurers. From the perspective of retention, this means that the group can retain risk within its own captive while using the reinsurance market for the part of the risk that it does not wish to carry (Picard & Pinquet, 2013).

2.7.4 Why companies buy liability insurance

As discussed above, a company needs liability insurance because its operations can cause damage to third parties and lead to liability of an uncertain amount. Through liability insurance, the company can transfer the financial consequences of covered liability to an insurer and reduce the effect of large liability losses (Baker, 2004).

Shavell (2000) examines liability insurance from two main perspectives: the allocation of risk and the incentive to prevent losses. Liability insurance improves risk allocation because it protects a against uncertain liability. By paying an insurance premium, the insured can transfer part or all of the financial risk of covered liability to the insurer. However, insurance may also affect the insured's incentive to take precautions. In Shavell's model, if the insurer can observe the insured's level of care and reflect it in the insurance premium, full insurance does not necessarily remove the incentive to prevent losses.

Safer behaviour can then lead to a lower premium. If the insurer cannot observe the level of care, full insurance may weaken the incentive because the insured does not bear the financial consequences of a loss. Partial insurance can reduce this problem by leaving part of the liability with the insured (Shavell, 2000).

Demand for liability insurance is also affected by the limited wealth of the party causing the loss. The judgment-proof problem refers to a situation in which the injurer is legally liable for the loss but does not have sufficient assets to pay full compensation. The company may then not carry all financial consequences of the damage it causes, which can weaken its incentive to prevent losses (Shavell, 2000).

Limited wealth can also affect the demand for liability insurance. If the potential liability is greater than the company's assets, the company may be unable to pay the part of an uninsured loss that exceeds those assets. Full insurance would still require the company to pay a premium for coverage of the entire potential liability. The company may therefore prefer less than full coverage. This mechanism can help explain why insurance contracts include an upper limit on the amount paid by the insurer (Huberman et al., 1983; Shavell, 2000).

Taken together, Shavell (2000) and Huberman et al. (1983) suggest that voluntary demand for liability insurance does not necessarily result in coverage of the full potential loss. Although liability insurance increases the funds available to compensate injured parties, a company with limited liability may have a weaker incentive to purchase coverage for losses exceeding the value of its own assets.

3 Literature Review: Determining the retention level (theoretical & quantitative approach)

The literature examines retention decisions from several perspectives. Mossin (1968) and Arrow (1974) analyse how risk aversion, insurance pricing, and contract design affect the choice between full and partial insurance, including deductibles. Later studies focus on more specific parts of corporate retention decisions. Cozzolino (1978) presents a method for comparing the risk-adjusted cost of different retention levels. Cummins and Freifelder (1978) compare methods for estimating maximum probable yearly aggregate losses. Brockett et al. (1986) examine insurance and self-insurance as alternative ways of financing losses.

From the company's perspective, deductible alternatives involve a balance between the insurance premium and the risk retained by the company. A higher deductible may reduce the premium, but it also increases the amount of losses paid by the company. Cozzolino (1978) compares the alternatives by adding the insurance premium to the risk-adjusted cost of retained losses. The preferred alternative is the one with the lowest total risk-adjusted cost. The company must also consider whether it has sufficient financial resources to pay large retained losses (Brockett et al., 1986).

After deciding to use insurance, a company must choose how much risk to retain and how much to transfer to the insurance market. It must also choose the policy limit. Arrow (1974) shows that insurance covering losses above a deductible can be an optimal form of insurance. Brockett et al. (1986) state that financially minor losses may be retained and paid from normal cash flow, while losses with large financial consequences require more careful analysis. Cummins and Freifelder (1978) also argue that catastrophic exposures should generally be insured rather than included in a retention programme.

Arrow (1963) examines insurance when medical costs are uncertain. The study states that an individual prefers full insurance when the premium is actuarially fair. When the

premium includes a fixed proportional loading, the preferred policy has a deductible and provides full coverage above it. Arrow (1974) extends the analysis by allowing the marginal utility of income to depend on the state of the world. When the utility of income is independent of the state, the model again results in full coverage above a deductible.

Mossin (1968) analyses insurance decisions using expected utility theory. The models consider the insurance premium, the probability distribution of losses, the policyholder's wealth, and risk aversion. In the proportional coverage model, full insurance is optimal when the premium is actuarially favourable or fair. If the premium is actuarially unfavourable, full insurance is not optimal. Mossin also examines the choice of a deductible. In this model, a positive premium loading makes a positive deductible optimal if the policyholder purchases insurance. The policyholder may also choose not to purchase insurance. The article mainly examines individual insurance decisions, although it also includes a model of reinsurance purchased by an insurance company.

Empirical research also indicates that retention decisions are not based only on a company's financial capacity. Strupczewski et al. (2016) examined the determinants of risk retention among medium-sized and large companies in Poland in the context of property insurance. Their results showed that higher insurance premiums and a low tolerance for future premium increases were associated with greater risk retention. In addition, companies that considered the benefits of retention important retained more risk, whereas greater satisfaction with insurance services, particularly claims settlement, was associated with lower retention. Company size, measured by revenue and number of employees, was not included as a significant determinant in the final model, while the company's industry was found to have an effect. The results therefore suggest that retention decisions are influenced by insurance costs, the perceived benefits of retention, the quality of insurance services and the company's operating context (Strupczewski et al., 2016). However, the findings concern property insurance in the Polish market and cannot be directly generalised to liability insurance or Finnish companies

Recent survey evidence suggests that corporate insurance decisions in large companies are not always governed by formally documented policies. In a 2021 survey of large Japanese companies, which consisted overall 57 large companies, Yanase (2025) found that 70% managed insurance purchasing centrally. However, only 20% had formulated basic policies concerning insurance terms and conditions, including coverage, policy limits, and self-insured retention, and only 11% had documented such policies. Almost half of the companies applied existing criteria on a case-by-case basis. Although the study concerns corporate insurance generally rather than liability insurance retention specifically, it indicates that centralized insurance management does not necessarily entail fully formalized decision rules for insurance terms.

3.1 Quantitative methods

Cummins (1976) applies the Capital Asset Pricing Model (CAPM) to corporate risk management decisions. The purpose of the study is to include risk management variables in the theory of the firm and to develop decision rules that are consistent with the firm's objectives. Cummins notes that a decision that appears reasonable from a narrow risk management perspective may not be optimal in relation to the wider objectives of the firm. The model is used to develop decision rules for proportional retention, aggregate deductibles, and reserving policies.

In the CAPM model, the company's market value in the first period is presented as follows:

$$P_j = \frac{E(\tilde{V}_j) - S_m \rho_{jm} \sigma(\tilde{V}_j)}{1 + R_f}.$$

In the equation, P_j is the company's market value at the beginning of the first period and $\tilde{V}_j$ is its random market value at the beginning of the second period. R_f is the risk-free rate, S_m is the market price of risk for one unit of standard deviation, and ρ_{jm} is the correlation coefficient between the returns of the company and the market portfolio. The risk adjustment deducted from company value therefore depends on both the variability

of company value and the strength of the correlation between the company's return and the market portfolio return (Cummins, 1976, p. 590).

When applying the model to risk management, Cummins examines the retention decision as a choice between expected value and risk. A higher retention can increase the expected value of the company if the reduction in the insurance premium exceeds the increase in expected retained losses and claims-handling costs. At the same time, a higher retention increases the variability of the company's result. When it is assumed that the retention decision of one company does not change the market price of risk or the correlation between the returns of the company and the market, the decision rule for optimal retention can be presented as follows:

$$\frac{\partial E(\tilde{V}_j)/\partial D}{\partial \sigma(\tilde{V}_j)/\partial D} = S_m \rho_{jm},$$

where D represents the company's retention. According to the decision rule, retention should be increased until the ratio between the marginal increase in expected value and the marginal increase in risk equals the market price of risk multiplied by the correlation between the company and market returns. After this point, the increase in expected value is no longer sufficient to compensate for the increase in risk (Cummins, 1976, pp. 591–592).

Cummins also applies the decision rule separately to an aggregate deductible, which means the maximum amount of annual aggregate losses retained by the company. A necessary but not sufficient condition for using an aggregate deductible is that the marginal reduction in the insurance premium exceeds the marginal increase in expected retained losses. This net saving must also be large enough to compensate for the increase in the variability of retained losses. If the premium is actuarially fair at the margin, increasing the aggregate deductible is not justified in the model because the company would carry more variability without a corresponding increase in expected value (Cummins, 1976, pp. 595–596).

Cummins states that the model is theoretical and is based on simplifying CAPM assumptions. These include perfect capital markets, risk-free borrowing and investing, and symmetric return distributions. The article therefore does not provide a directly applicable or generally valid formula for an optimal deductible. The main importance of the model is that it shows that a retention decision depends not only on expected cost savings but also on the increase in risk carried by the company. It also connects the decision to maximisation of company value (Cummins, 1976, pp. 588–589, 607–608).

3.1.1 Firm value, incomplete markets and retained risk

Sprecher and Pertl (1980) continued the CAPM-based research by combining a change in company value with a criterion based on the probability of loss. In the model, expected cost savings from a higher deductible are necessary but are not alone a sufficient reason to select the higher deductible. The decision must also consider how the additional risk connected to the higher deductible affects the present value of the company. An acceptable probability of loss, derived from the CAPM parameters and corresponding to the market relationship between risk and return, acts as a constraint when deductible alternatives are selected.

A deductible can therefore be accepted only if its cost saving increases company value after the additional risk is considered and if the probability-of-loss condition is met. When the probability distribution of losses is known, it can be used to evaluate the loss probabilities connected to different deductible levels. Sprecher and Pertl apply the approach to both per-loss deductibles and aggregate deductibles. The main point of the model is that a deductible is not selected only on the basis of expected cost savings. The relationship between risk and return required by the market is also considered (Sprecher & Pertl, 1980).

Schlesinger and Doherty (1985) extend the analysis of insurance decisions to incomplete insurance markets. Insurance markets are incomplete when insurance contracts are not

available for all risks faced by an individual or a company. A decision concerning one insurable risk cannot then be made separately from uninsured background risks. Dependencies between risks can change the results of models that assume complete markets and only one risk. For example, actuarially fairly priced insurance does not necessarily lead to full insurance in an incomplete market. In some situations, remaining uninsured can also be optimal for the decision-maker.

According to Schlesinger and Doherty, uninsured background risk can arise from risks that are difficult to diversify, such as war, earthquake, and nuclear risks, as well as from general market risk, information asymmetry, and transaction, information, and search costs related to insurance. Adverse selection can result in a premium that does not correspond to the actual risk level of an individual policyholder. Insurance may then become too expensive especially for low-risk members of a group, which can encourage them to retain the risk. The costs of purchasing insurance, collecting information about alternatives, and searching for suitable coverage can also restrict the use of insurance (Schlesinger & Doherty, 1985).

The relationship between the insurable risk and general market risk is also relevant to corporate insurance decisions. According to Schlesinger and Doherty (1985), optimal insurance coverage depends on the correlation between the insurable risk and the market portfolio, or the beta of the risk. Other factors being equal, optimal insurance coverage is higher when the beta of the insurable risk is lower. The insurable risk should therefore be examined as part of the total risk position of the company and its owners and not separately from other risks.

In connection with deductibles, it is useful to distinguish risk financing from actions that reduce the underlying loss risk. Ehrlich and Becker (1972) use self-insurance to describe measures that reduce the amount of a loss if it occurs. Self-protection describes measures that reduce the probability of a loss. Their model shows that greater use of market insurance tends to reduce the demand for self-insurance. The relationship

between market insurance and self-protection is different. Under some conditions, market insurance may increase rather than reduce the use of self-protection (Ehrlich & Becker, 1972)

These concepts do not have the same meaning as a deductible or retained risk in this thesis. A deductible determines how much of a realised loss the company finances itself. In the models discussed above, self-insurance and self-protection describe actions that change the size or probability of a loss. Dionne and Eeckhoudt (1985) show that greater risk aversion increases self-insurance in their model. However, greater risk aversion does not always increase self-protection. In some cases, a more risk-averse decision-maker may spend less on reducing the probability of a loss. For the purposes of this thesis, risk financing, reduction of loss size, and reduction of loss probability are treated as separate decisions.

3.1.2 Prospective actuarial cost estimation

Estimating future retained costs is an important part of quantitative retention analysis. The Actuarial Standards Board's ASOP 53 concerns the estimation of future costs in connection with the transfer or retention of property and casualty risks. Its scope includes insurance, reinsurance, self-insurance, and other risk transfer or risk retention arrangements. The standard does not determine an optimal company deductible. It provides guidance for preparing an actuarial estimate of future costs (Actuarial Standards Board, 2017).

The measure used in the estimate depends on its purpose and intended use. The estimate can be presented, for example, as an expected value, the sum of expected value and a risk margin, a reasonable range, or a selected percentile of a distribution. Included cost items can consist of losses and loss adjustment expenses, operating and administrative expenses, reinsurance costs, and the cost of capital. Estimates based on historical losses must also be adjusted to reflect future conditions. This can require developing open losses to their estimated ultimate level and considering changes in loss

frequency, loss severity, exposure, and the operating environment (Actuarial Standards Board, 2017).

The same forward-looking principle appears in the property and casualty ratemaking framework presented by Werner and Modlin (2016). Historical experience is used only to the extent that it provides information about expected future costs. Historical data may need to be adjusted for inflation, operational changes, changes in the structure of the insurance portfolio, legal changes, and changes in price levels. The cost of open claims must also be estimated to its ultimate level, and trends in loss costs must be considered. Werner and Modlin mainly discuss insurance ratemaking, but the same forward-looking calculation logic can also be used when estimating retained costs.

Applied to retention analysis, these principles suggest that different alternatives should be compared on the same forward-looking basis. The comparison may include expected ultimate retained losses, loss adjustment and administrative expenses, insurance premiums, and the relevant cost of capital. Historical loss data should be developed to their ultimate value and adjusted for the conditions expected during the future period. An analysis based only on paid or currently reported losses may exclude unreported losses and later loss development. It may therefore provide an incomplete view of future retained costs (Actuarial Standards Board, 2017; Werner & Modlin, 2016).

In this study, prospective actuarial cost estimation is used as a theoretical comparison point. It is used to assess whether companies systematically estimate future retained costs and how historical loss data, market information, and expert judgement are used in retention decisions.

3.1.3 Frequency–severity analysis and aggregate loss distribution

In quantitative retention analysis, loss risk can be described by an aggregate loss distribution for a given period, one year for example. In the collective risk model, the aggregate loss for the period consists of the number of losses and the amounts of individual

losses (Cummins & Wiltbank, 1983; Mohamed, Razali & Ismail, 2010). If N is the number of losses and X_i is the amount of one loss, aggregate loss can be presented as:

$$S = \sum_{i=1}^N X_i.$$

In the basic model, the individual loss amounts are assumed to follow the same distribution and to be independent of each other and of the number of losses (Mohamed et al., 2010).

The frequency distribution describes the number of losses, while the severity distribution describes the amounts of the individual losses. Combining these distributions produces the aggregate loss distribution, which describes the probability distribution of total losses during the selected period (Mohamed et al., 2010). Cummins and Wiltbank (1983) extend this analysis to situations involving several loss processes. Their model allows dependencies between the different components to be considered, as these dependencies can affect the distribution of total annual losses. The total loss distribution and its frequency and severity components can also be used to evaluate reinsurance and deductible programmes.

Cummins and Freifelder (1978) examine maximum probable yearly aggregate loss (MPY), which describes a high level in the distribution of total annual losses. MPY applies to a portfolio of exposures and concerns the total amount of losses during one year. If L represents total annual losses and α is the selected probability level, MPY is defined as follows:

$$P(L \geq \text{MPY}) \leq \alpha$$

The article uses ($\alpha = 0.01$) as the traditional probability level. This means that the selected MPY is expected to be equalled or exceeded with a probability of no more than one per cent. MPY therefore concerns the total loss amount accumulated during the

year and not the maximum amount of one individual loss (Cummins & Freifelder, 1978, pp. 28–29).

Cummins and Freifelder (1978) examine analytical methods, simulation, and different approximation methods for estimating MPY. They compare estimates produced by the approximation methods with estimates produced by simulation. Their results show that the estimated MPY can be highly sensitive to the selected loss distribution. In their empirical example, changing the assumed severity distribution resulted in a large change in the MPY estimate. MPY is therefore based on the selected statistical model and is not a directly observed loss amount. In this study, MPY is used as a theoretical measure for describing the right tail of the annual aggregate loss distribution.

3.1.4 Monte Carlo

When an aggregate loss distribution cannot be formed reasonably with analytical methods, it can be approximated with Monte Carlo simulation. In each simulation round, the number of losses is first drawn from the selected frequency distribution. A monetary amount is then drawn for each loss from the severity distribution, and the simulated losses are added together. When the process is repeated sufficiently many times, the simulated annual aggregate losses form an empirical distribution. The distribution can be used to estimate the expected value, variability, and selected tail quantiles (Mohamed et al. 2010).

Simulation does not remove the importance of distribution assumptions. The results of Cummins and Freifelder (1978) show that the MPY estimate can change materially depending on the selected severity distribution. Simulation results must therefore be interpreted in relation to the data and the assumptions concerning the frequency and severity distributions. In this study, Monte Carlo simulation is an example of a quantitative method presented in the literature. The practical evaluation methods described in the interviews can be compared with it.

3.1.5 Retained loss modelling under deductible and limit structures

Monte Carlo simulation can be used to form a distribution of annual aggregate losses. Evaluating the retention level also requires a definition of how the simulated losses are divided between the insured and the insurer under different deductible and limit structures.

If X is the amount of an individual loss, d is the deductible, and u is the policy limit, the loss retained by the insured, Y , can be presented as

$$Y = \begin{cases} X, & X < d, \\ d, & d \leq X \leq d + u, \\ X - u, & X > d + u. \end{cases}$$

When a loss is below the deductible, the insured pays it in full. When the loss exceeds the deductible, the insured generally retains the deductible amount and the insurer pays the amount above it up to the policy limit. If the loss exceeds the combined amount of the deductible and policy limit, the amount above the policy limit also remains with the insured. The insurance payment is then the difference between the loss and the insured's retained share, $X - Y$, and the maximum payment is u (Mohamed et al., 2010).

Mohamed et al. (2010) apply a similar structure to annual aggregate loss. If S is the annual aggregate loss, d^* is the aggregate deductible, and u^* is the aggregate policy limit, the annual aggregate loss retained by the insured, V , can be presented as

$$V = \begin{cases} S, & S < d^*, \\ d^*, & d^* \leq S \leq d^* + u^*, \\ S - u^*, & S > d^* + u^*. \end{cases}$$

An aggregate deductible applies to the total amount of losses during the year, while a per-loss deductible applies separately to each loss. These structures can therefore produce different distributions of retained losses even when the monetary limits are equal (Mohamed et al., 2010).

In the simulation example in the article, alternative deductible and limit structures are compared on the basis of the expected value and standard deviation of retained loss, the 95 per cent maximum probable value, the insurance premium, and mean total cost. The premium in the example is not an observed market price. It is calculated from simulated claim costs and predetermined cost loadings. The results therefore illustrate the method and the comparison of alternatives, but they do not show one generally optimal deductible (Mohamed et al., 2010).

3.2 Economic evaluation of the retention level

The previous sections described how frequency and severity can be used to form aggregate loss and retained loss distributions for different insurance structures. A distribution or its simulation does not, however, show which retention alternative is economically most suitable for the company. The choice requires an evaluation basis that combines the insurance premium, retained losses, cost variability, and other risk financing costs. The following sections discuss two complementary approaches: Cozzolino's (1978) utility-based valuation of retained risk and Vaughn's (1996) simulation of risk financing costs and cash flow variability.

3.2.1 Cost-based comparison of retention alternatives

Forming or simulating a loss distribution does not itself provide a decision rule for selecting a retention level. Cozzolino (1978) presents a utility-based method in which risk is evaluated with a risk-adjusted cost measure. In Cozzolino's definition, risk-adjusted cost is the negative of the certainty equivalent of an uncertain loss distribution. It gives the monetary cost corresponding to the loss distribution under the selected utility function and level of risk aversion. Risk-adjusted cost depends on both the loss distribution and the selected level of risk aversion (Cozzolino, 1978).

In a comparison between full risk retention and full risk transfer, Cozzolino states that risk retention is optimal if the premium for full risk transfer exceeds the risk-adjusted cost of full retention. Otherwise, full risk transfer is the better alternative. The result depends on the loss distribution, utility function, and level of risk aversion used in the analysis (Cozzolino, 1978).

When partial risk transfer is evaluated, the original loss distribution is changed into a distribution that includes only the insured's retained share. Risk-adjusted cost is calculated for this retained loss distribution, and the premium for the insurance alternative is added to it. Different deductible and aggregate retention alternatives are compared on the basis of their total risk-adjusted costs. At each level of risk aversion, the best alternative is the one with the lowest sum of the insurance premium and the risk-adjusted cost of the retained loss distribution. The ranking of retention levels can therefore change when the company's level of risk aversion changes (Cozzolino, 1978). Cozzolino also states that losses should be valued at the present value of discounted cash flows so that the time value of money is considered. This is especially important for liability risks, where a long time can pass between the loss event and the payment of compensation. The cost of risk retention should also include the costs of investigating losses and administering the self-insurance arrangement because insurance may include similar services as part of the risk transfer (Cozzolino, 1978).

3.2.2 Risk financing cost and cash flow variability

Vaughn (1996) examines simulation models for self-insurance and SIR arrangements in which a company combines a retained share with excess insurance above it. As stated above, an SIR is normally defined as a monetary retention per claim or occurrence, and specific excess insurance covers the amount above this level up to the policy limit. The evaluation of a risk financing programme should consider not only forecast cost but also cost variability over several years.

According to Vaughn, the main cost items in a simulation model are aggregate retained losses, insurance premiums, and administrative expenses. Administrative expenses can include costs related to information systems, loss prevention, actuarial evaluation, and claims handling. A wider model can also consider random inflation, insurance market cycles, and management's ability to change the structure of excess coverage when conditions change (Vaughn, 1996).

Simulation can produce a probability distribution of total risk financing cost for each year on both a cash basis and an accounting basis. In the cash-basis model, annual costs include retained losses paid during that year. In the accounting-basis model, the costs of losses occurring during the year are included regardless of when they are paid. This distinction is especially important for long-tail risks, where several years can pass between the loss event and the payment of compensation (Vaughn, 1996).

According to Vaughn, the model can compare the relative cost savings and cost stability of different risk financing solutions over several years. The cash-basis model can also estimate the probability that cash outflows from risk financing exceed the company's cash reserves, credit limit, or other short-term sources of finance. Self-insurance increases short-term cash flow variability and can therefore increase the company's need for net working capital (Vaughn, 1996).

In Vaughn's approach, simulation does not itself determine one optimal retention level. It can, however, compare the costs and cash flow variability of alternative risk financing arrangements and connect this information to the company's financial planning (Vaughn, 1996).

The evaluation of retention alternatives also depends on insurance market capacity and pricing. Gron's (1994) findings on property and casualty insurance markets support a capacity-constraint explanation of insurance market cycles. Unexpected reductions in insurer capacity can lead to higher insurance prices. From the retention perspective, this

means that the price of transferred risk and the available alternatives can change with market conditions. Vaughn (1996) states that self-insurance can partly reduce a company's dependence on the underwriting cycle in the primary insurance market. The company is still exposed to changes in the price and availability of excess insurance or reinsurance. Market conditions and the company's own loss experience can then affect the attachment point and policy limit of excess insurance. The retention level is therefore not based only on the company's internal economic evaluation. It is also part of the risk financing structure that is actually available in the insurance market.

3.3 Theoretical summary

The literature reviewed above does not provide one generally applicable model for determining a retention level. A retention decision can examine the relationship between the insurance premium and retained risk, the company's risk-bearing capacity and risk preferences, and the total cost of risk financing. In quantitative analysis, frequency and severity can be used to form aggregate loss and retained loss distributions for different deductible, aggregate retention, and policy limit structures. These distributions can be used to compare alternatives on the basis of expected costs, cost variability, risk-adjusted cost, and cash flow effects (Cummins, 1976; Cummins & Freifelder, 1978; Cozzolino, 1978; Vaughn, 1996).

In this study, the approaches presented in the literature form a framework for examining the empirical data. The interview data are used to assess the factors, information, and methods that companies use when determining retention levels. The analysis also examines the extent to which the decision-making includes the cost, loss distribution, risk-bearing capacity, and cash flow perspectives identified in the literature.

4 Research method and data

The empirical data were collected through semi-structured expert interviews. A total of eight insurance and risk management experts participated. They had experience in corporate insurance, risk management, or decision-making related to liability insurance. The participants were selected through *purposive sampling*, where participants are selected on the basis of their knowledge and experience of the research topic. This method was suitable because the purpose was to reach persons who participate in decisions concerning liability insurance deductibles and policy limits or work with these decisions in an expert role (Palinkas et al., 2015).

The company-side participants were selected from publicly listed Finnish companies with global operations. All represented companies had annual revenue exceeding EUR 1 billion. The use of revenue as a size criterion is also in line with earlier corporate insurance research, as Yanase (2025) reports a survey that was directed at the 2,000 largest Japanese companies by sales. This criterion was used because companies of this size and international scope were expected to have global liability insurance programmes and to make decisions concerning liability insurance retention levels. That criteria was used because companies of this size and international scope were expected to have global liability insurance programmes and to make decisions concerning liability insurance retention levels. All companies represented in the study were confirmed to have a global liability insurance programme. The insurer and broker participants were selected based on their professional roles and experience working with large corporate clients and global liability insurance programmes. The broker and insurer representatives were contacted through the researcher's professional network. The company representatives were approached partly through the professional network and partly through LinkedIn.

The number of interviews was considered sufficient for the scope of this study. Guest et al. (2006) found that the basic elements of the main themes were already present after six interviews. Their findings do not establish a universal minimum number of interviews,

but they indicate that a relatively small sample can provide sufficient thematic coverage when the research topic is focused. In this study, the eight purposively selected participants had direct professional knowledge of liability insurance and retention decisions, and the main themes were repeated across the interviews. Therefore, the data were considered sufficient for answering the research questions, although the study does not aim at statistical generalisation.

Semi-structured interviews were suitable for data collection because they allowed the same predefined themes to be discussed in all interviews while also leaving room for follow-up questions and the participants' own points of emphasis (Hirsjärvi & Hurme, 2001). In expert interviews, the main issue is not statistical representativeness but the participants' special knowledge of the research topic and their position in the practices being studied (Bogner, Littig & Menz, 2009). The eight purposively selected experts represented different parties involved in retention decisions. They included corporate risk management and insurance professionals, insurance brokers, and a representative of the insurance sector. The sufficiency of the data was evaluated in relation to the research questions, the amount of relevant content in the interviews, and the repetition of the main themes in several interviews. The aim was not statistical generalisation but an in-depth examination of the practices and reasons connected to liability insurance retention decisions.

Five participants worked in risk management or corporate insurance roles in Finnish listed companies with international operations. Two represented international insurance brokerage organisations and were responsible for advising clients and designing liability insurance solutions. One participant represented the insurer perspective and brought experience of liability insurance underwriting and insurance company operations to the study.

Table 1. The interview participants

Sample	Role / background	Organization type
Interview 1	Insurance broker representative	Insurance brokerage firm
Interview 2	Risk and insurance professional	Large company
Interview 3	Risk and insurance professional	Large company
Interview 4	Risk and insurance professional	Large company
Interview 5	Insurance broker representative	Insurance brokerage firm
Interview 6	Risk and insurance professional	Large company
Interview 7	Liability insurance professional	Insurance company
Interview 8	Risk and insurance professional	Large company

The interviews were conducted in Microsoft Teams. All interviews were recorded with the participants' consent and transcribed with the automatic transcription tool in Teams. The interviews were conducted and transcribed in Finnish. The transcripts were reviewed against the recordings, and errors arising from the automatic conversion of spoken Finnish into written text were corrected manually. The interview data were analysed in Finnish. The interviews lasted from approximately 35 to 90 minutes, and the average duration was about one hour. In total, the data included approximately eight hours of expert discussion. This made it possible to examine the topic from several perspectives.

Personal data and possible confidential company-specific information were removed or anonymised during transcription and analysis. The participants and their organisations are not named in the thesis. The findings are reported in an aggregated form so that an individual participant or company cannot be identified.

The interviews followed a prepared interview guide, but the semi-structured method also allowed follow-up questions and a more detailed examination of the participants' experiences and views. The discussions were relatively open. Several participants described their organisation's practices, decision-making processes, and liability insurance experience in detail. The data therefore include both operational and strategic perspectives on liability insurance deductible and policy limit decisions.

4.1 Data analysis

The interview data were analysed with thematic analysis using the approach presented by Braun and Clarke (2006). The method was suitable because the purpose was to identify and understand practices, views, and decision-making factors related to liability insurance deductible levels across different expert groups.

The analysis was conducted in stages. First, the interviews were transcribed, and the researcher became familiar with the full data by reading the transcripts several times. The purpose was to form an overall view of the opinions presented in the interviews and to identify observations relevant to the research questions.

Second, key statements, observations, and views related to the research topic were identified. They were grouped into preliminary codes concerning, for example, risk-bearing capacity, the use of loss history, the effect of the insurance market, the role of insurance brokers, and the importance of premiums in determining the deductible level. Third, individual codes were combined into wider themes by comparing the views of different participants. The analysis considered both similarities and possible differences between the expert groups. Particular attention was given to how corporate risk management professionals, insurance brokers, and the participant with an insurer background described decision-making related to deductible levels.

In the final stage, the identified themes were connected to the theoretical framework. The main focus was the extent to which the practices described in the interviews

corresponded with views on deductible determination in insurance economics and what differences could be observed between theory and practice.

The analysis identified several recurring themes. They were mainly related to risk-bearing capacity, the importance of loss history, the use of external market information, and the effect of the insurance market on decisions concerning liability insurance deductible levels.

5 Findings and analysis

Based on the interview data, the determination of a liability insurance retention level can be described as conditional reassessment rather than optimisation that starts from the beginning every year. The current insurance programme and its deductible normally form the starting point. The level is changed if loss development, business changes, insurance market conditions, cost pressure, or the company's risk-bearing capacity give a sufficient reason. If there is no such reason, the programme is normally renewed mainly without changes.

Five related areas were identified in the data: the effect of the current insurance programme and organisational decision-making practices, the company's risk-bearing capacity and risk profile, the use of loss data and expert information, insurance market pricing, and the operational effects of the retention structure. The participants are referred to below with the codes H1–H8.

5.1 The retention level as part of the existing insurance programme

The retention level was not usually described as a separate annual decision. It was one part of the wider insurance renewal process. Especially in existing programmes, the current deductible was the comparison point, and a recognised need for change was required to move away from it. H1, who represented an insurance broker, stated that insurance tenders normally also continue "with the old deductible arrangement unless there is some specific need to change it". A similar view appeared in several company interviews. The deductible was reviewed during renewal, but an annual review did not mean that the level was determined again.

The importance of the current level made decision-making partly path-dependent. A previously selected deductible may have become an internal company standard even when the original reasons for the decision were no longer known. This was especially relevant in companies that had grown, completed acquisitions, or changed their

business structure. The historical deductible did not then necessarily correspond with the company's current size or risk-bearing capacity. Changing it still required an active decision and an explanation of the new solution within the organisation.

The retention level received a more detailed review especially when a new insurance programme was established, a corporate transaction took place, a new risk or line of insurance was introduced, loss development was significant, or insurance market conditions changed materially. Cost-saving targets could also start a review. The data included situations in which deductibles had been increased as part of wider cost reductions and situations in which an insurer required a higher deductible as a condition for continuing coverage. Retention was therefore evaluated most actively at points of change and not necessarily during a normal annual renewal.

The formality of decision-making differed between companies. In some companies, the risk management or insurance function prepared and in practice decided deductible questions with support from the insurance broker. Continuing the current arrangement did not normally require a separate top management decision, but a material change could be taken to the chief financial officer or finance director for approval. In one company, insurance was guided by a written insurance policy and a management risk committee. In other interviews, general risk appetite statements were not seen as extending to the deductible of an individual liability policy. The role of company boards was limited in the data.

The limited organisational attention was partly connected to the relative financial importance of the deductible. Liability insurance was not the most significant part of the insurance portfolio by cost in every company, and a change in the deductible could be small compared with the total size of a large company. H8 described insurance as a "hygiene factor" that must exist but whose individual structural elements do not normally reach strategic decision-making. Under a tight renewal schedule, continuity of

coverage, policy terms, and the policy limit could be prioritised over fine-tuning the deductible.

The data also showed that limited time and resources supported continuation of the current arrangement. Risk management functions were often small, and insurance was only one part of their responsibilities. Detailed modelling would require data collection, expert work, and internal review of alternatives. The additional benefit was not always seen as sufficient compared with the amount of work. Decision-making also had a personal element. The view of an individual risk management or insurance professional and trust in the broker or insurer expert could affect the solution.

The established nature of the arrangement cannot, however, be interpreted only as a lack of analysis. Continuity of the insurance programme makes responsibilities clearer, supports cost forecasting, and reduces the need for internal change. Keeping the current deductible can therefore be reasonable from an organisational perspective even if the level has not been derived from a formal optimisation model.

5.2 Risk-bearing capacity, risk profile, and the purpose of insurance

The company's risk-bearing capacity was a central constraint on retention, but it did not normally produce one deductible level directly. Risk-bearing capacity was evaluated through company size, balance sheet, cash flow, liquidity, and the financial materiality of a loss. In some companies, the evaluation also considered credit rating, solvency, or variability in production costs. More commonly, it was a practical assessment of the loss size that the group could normally carry.

Some participants considered the liability insurance deductibles of large companies low compared with their financial capacity. In these views, the main purpose of insurance was protection against rare and financially material losses, while small losses were costs that the company could carry itself. In one company, this view of insurance as catastrophe protection had led to consistently high deductibles across several lines of

insurance. Other companies had significant risk-bearing capacity but had not increased the liability deductible because the premium saving was small or the change would have been difficult to implement within the organisation.

Risk-bearing capacity and risk appetite must therefore be separated. A company may be financially able to carry a larger loss but may not want to include this variability in its result or allocate it to its business units. In the data, general risk appetite statements were often strategic and concerned risks larger than the deductible. The final retention level was therefore determined by other factors within the possible range set by risk-bearing capacity.

The company's industry, business model, and loss profile affected the retention that was possible in practice. In operations with many frequent losses, the effect of the deductible could be evaluated differently from operations where liability losses were rare but possibly severe. The interviews distinguished, for example, general operational liability losses, product liability, bodily injury, recall risks, and liability risks connected to the United States. The deductible was therefore not necessarily the same in all countries or parts of the coverage. A lower deductible could be preferred for bodily injury because of the insurer's expertise, while recall or other special coverage could have a higher deductible.

Based on the findings, risk-bearing capacity mainly determines how much risk the company could retain. The final solution is also affected by the type of risk, the expected number of losses, the organisation's ability to handle claims, and the price at which the risk can be transferred to the insurance market.

5.3 Loss data, benchmarking information, and quantitative methods

The company's own loss history was the most common information source used in retention decisions. The typical analysis was backward-looking. Losses from earlier years were reviewed, and the company estimated how much would have been retained under

alternative deductible levels. This additional cost was compared with the premium saving offered by the insurer or otherwise estimated. The analysis was therefore a historical recalculation of alternative deductibles and not an actual estimate of a future loss distribution.

The usefulness of loss history depended on the amount and quality of the data. Several companies had only a small number of liability losses, in which case a few individual losses could dominate the analysis. Historical data did not necessarily correspond with the current business if the company's operations, geographic distribution, or products had changed. Losses and claims below the deductible could also be missing from the insurer's statistics and be documented inconsistently within the company. H8 stated that they had not seen a company database containing all claims that could potentially fall under liability insurance, including rejected claims and cases below the deductible.

The data also showed that the distribution of earlier losses cannot necessarily be directly applied to a materially higher deductible. The nature of losses may change between loss layers. Common causes of the smallest losses do not necessarily explain rare large losses in higher layers. This limits the use of simple historical recalculation especially when a material increase in the deductible is being considered.

In addition to loss history, companies used market and benchmarking information provided by insurance brokers. The comparison could concern the deductibles of companies of a similar size or in the same industry, premium developments, and general insurance market conditions. Company representatives considered this information useful, but its availability and transparency varied. Benchmarking did not itself show that the solution of a peer company was optimal for the company being examined because the deductibles could be based on different historical and organisational reasons.

The use of quantitative methods varied considerably. Most company participants did not describe Monte Carlo simulation, frequency–severity modelling, or an aggregate loss

distribution as part of their annual decision-making. H2 described the practical approach mainly as a common-sense assessment based on company size, industry, and typical losses. According to H1, detailed deductible calculations were also performed for only a small number of clients.

The data do not, however, support the conclusion that advanced methods are unavailable or not used at all. One broker participant described models using company balance sheet information and loss history, global industry data, Monte Carlo simulation, volatility, and the cost of capital. These models can examine deductibles, policy limits, captive structures, and the total cost of risk. According to the participant, this type of analysis is used especially with more demanding large companies that use analytics. Other participants stated that the tools were still developing, were mainly used in special situations, or were not visible to companies.

Quantitative analysis appeared more often as support in special situations than as an automatic annual decision rule. Its possible value was emphasised when a new insurance programme was established, during corporate transactions, in connection with new risks, when evaluating the feasibility of a captive, or when the insurance market did not offer the same coverage as before. The methods were also seen as useful for explaining a change to management. Their use was limited by incomplete data, lack of skills and time, the cost of analysis, and uncertainty about whether the result would change the final decision.

The use of liability loss data is also made difficult by the small number of losses, different loss mechanisms, and the potentially long development period of claim costs. Historical losses do not therefore necessarily describe future loss costs directly. The interviews did not describe systematic adjustments for these factors as part of the annual retention decision. Instead, incomplete loss data were supplemented with industry information, scenarios, and expert assessments from brokers and insurers. This partly explains why

practical decision-making differs from the prospective loss cost estimation discussed in the theoretical section (Actuarial Standards Board, 2017; Werner & Modlin, 2016).

5.4 Insurance premium and market alternatives

The direct economic reason for changing a deductible was the change in the insurance premium. The participants assessed whether a higher deductible produced sufficient savings compared with the additional retained loss cost and uncertainty. H4 described situations in which the deductible was not increased because the benefit was considered too small. If the insurer offered a lower deductible at almost the same price, there was no reason for the company to carry more risk only because it had the financial capacity to do so.

The relationship between the deductible and premium did not appear linear or fully transparent. In addition to company loss history, pricing was affected by the insurer's competitive position, portfolio objectives, industry loss development, availability of capacity, and reinsurance structure. The participant with an insurer background described how reinsurance pricing models can limit the premium credit that a primary insurer can give a client for a higher deductible. Underwriter judgement also remained part of the individual pricing of large clients.

The effect of the market worked in two directions. A hard market or poor loss development in a certain risk could force the company to accept a higher deductible. In a soft market, a low deductible could be available so cheaply that there was no incentive for higher retention. One broker participant emphasised that the insurance market does not normally determine a large company's deductible alone. A change is usually the client's own choice. Market-driven increases are more common in certain special coverages and risks with poor loss frequency. The market therefore determined the price and availability of alternatives, while the company decided whether changing the retention was reasonable.

The current premium and deductible also acted as anchors in negotiations. In a tender, new quotations were compared with the existing programme instead of always pricing the risk from a completely new basis. Increasing the deductible also raised the question of whether the change could later be reversed. Some participants considered that it could be difficult or expensive to obtain the earlier lower deductible again. This increased caution towards changes with only a small short-term benefit.

5.5 Organisational feasibility, claims handling, and captive

The perspectives of the group and its business units sometimes differed. A loss that was small for the group could have a material effect on the result of a small subsidiary or business unit. Increasing the deductible then required internal communication and explanation. This partly explains why the company's financial risk-bearing capacity did not automatically lead to higher retention. Keeping the current level was administratively easier and reduced resistance from different units.

The retention structure also affected claims handling. In this context, the difference between a traditional deductible and a self-insured retention was important. The monetary amount alone did not always determine when the insurer participated in handling a claim. Participation depended on the policy structure and the agreed claims-handling model. Under an SIR arrangement, the company normally has greater responsibility for investigating claims within the retention. This requires internal legal and claims-handling capabilities, cost monitoring, and procedures for reporting claims that may exceed the SIR.

Insurer participation had both positive and negative aspects. A company could benefit from the insurer's expertise in liability and bodily injury claims or want to outsource claims handling. On the other hand, the company could want to keep control of negotiations when the other party was an important customer or supplier. In one interview, aggressive recovery action by the insurer was considered capable of damaging a business relationship. Claims handling was therefore part of both the economic and

operational retention structure, although a separate monetary value was not normally calculated for it.

Captive structures provided a way to separate the group's external and internal retention. Not all companies used a captive, but where it formed part of the insurance programme, its role was material. The group could retain a significant loss layer in the captive and purchase external insurance only above that layer, while the deductibles visible to business units remained lower. A captive therefore allowed higher group-level risk retention without allocating the full additional risk directly to the results of individual business units.

Captive arrangements were also connected to more formal decision-making. The amount of captive retention could be evaluated on the basis of solvency, capitalisation, loss history, and the price of external insurance. Captive governance also brought financial management into the decision-making. At the same time, the interviews identified administrative challenges caused by the long-tail nature of liability claims and the allocation of responsibility between policy years. A captive did not remove uncertainty from the retention decision, but it provided more alternatives for arranging internal and external risk sharing.

A captive can also increase the flexibility of the insurance programme in a hard market because the group can retain the first loss layers and reduce its dependence on the price and availability of external capacity.

5.6 Relationship between theory and practice

Based on the interview data, the correspondence between theory and practice was stronger for decision factors than for the methods used. The trade-off between the insurance premium and retained risk described by classical insurance economics was clear in the interviews. An increase in the deductible was considered reasonable only if carrying the additional risk produced a sufficient economic benefit (Mossin, 1968; Arrow,

1974). The company's risk-bearing capacity, the financial importance of losses, and the purpose of insurance as catastrophe protection also corresponded with views in the corporate insurance literature (Cummins, 1976; Mayers & Smith, 1982).

These findings are also partly consistent with Strupczewski et al. (2016), who found that retention decisions were influenced not only by financial factors but also by insurance pricing and satisfaction with claims settlement. Similarly, the interviews in this study showed that a company's ability to retain more risk does not alone lead to a higher retention. The decision also depends on the premium saving offered by the insurance market and the value placed on the insurer's role in claims handling. However, the studies are not directly comparable, as Strupczewski et al. examined property insurance among Polish companies, whereas this study focuses on liability insurance in Finnish large companies.

In practice, these factors were not normally combined into one model optimising total cost of risk or company value. An explicit decision rule based on risk preferences, such as Cozzolino's (1978) risk-adjusted cost, was not described as part of normal company decision-making. Cash flow variability, working capital needs, and administrative expenses were also not normally modelled in the way presented by Vaughn (1996), although company liquidity, the workload caused by claims, and cost variability appeared as qualitative evaluation factors in the interviews.

The findings are somehow consistent with Yanase's (2021) survey of large Japanese companies. Although 70% of the surveyed companies managed insurance purchasing centrally, only 20% had formulated basic policies concerning insurance terms and conditions, including self-insured retention, and only 11% had documented such policies. Furthermore, 47% reported that existing criteria were applied on a case-by-case basis. A similar pattern emerged in the present study: retention decisions were generally not based on a formally documented annual optimisation process but relied on the existing insurance programme, company-specific information, and expert judgement. While

Yanase examined corporate insurance more broadly and in a different national context, both studies suggest that centralised insurance management does not necessarily imply a highly formalised approach to determining insurance terms.

The clearest difference concerned the use of loss distributions. In the approaches presented by Cummins and Freifelder (1978) and Mohamed et al. (2010), frequency and severity are combined into an aggregate loss distribution that can be used to compare retention structures. In the interviewed companies, loss data were more often used for descriptive historical recalculation than as the basis of a forward-looking stochastic model. This also differed from the principle of prospective cost estimation, under which historical data should be adjusted for loss development and changes in exposure (Actuarial Standards Board, 2017; Werner & Modlin, 2016).

The gap between theory and practice was not absolute, and the views expressed in the interviews were not entirely uniform. H6 described a more formal insurance governance model based on a CEO-approved insurance guideline and a management risk committee, and H4 reported simple calculations in which historical losses were examined under alternative deductible levels. H8 described decision-making related to captive arrangements in a previous organisation as being based on more thorough analysis. None of the company participants described a formal quantitative optimisation model that was regularly used in liability insurance retention decisions. H6 reported an analysis of the relationship between insurance premiums and retention in a captive-related property insurance decision, indicating that more advanced quantitative practices existed in related risk-financing contexts. The broker interviews also differed: H5 described models using global loss data, Monte Carlo simulation, and the cost of capital, whereas H1 stated that a dedicated retention optimisation tool was not yet in use. Several company participants also considered broker analytics to be insufficiently visible or proactively offered. The data therefore suggest a gap between analytical capabilities and their routine provision or application, rather than disagreement about the factors relevant to retention decisions.

Based on the findings, the difference between theory and practice is not only a difference in operationalisation but also a difference in the decision environment. Theoretical models compare alternatives with defined loss distributions, risk preferences, and costs. In practice, the decision is made within the existing insurance programme, with incomplete data, and on the basis of alternatives actually offered by the market. The solution is also affected by internal acceptability, claims-handling capability, negotiating position, and available time and expertise.

6 Conclusion

The purpose of this study was to examine how liability insurance retention levels are determined in large Finnish companies, what information and methods are used in decision-making, and to what extent practical decision-making corresponds with the views presented in insurance economics and risk management literature.

The main research question can be answered by stating that the interviewed companies normally determine liability insurance retention levels through conditional reassessment of the existing insurance programme. The current deductible is the starting point, and the level is not normally determined again each year with a formal optimisation model. A change is considered especially when the company's business or risk profile changes, loss development differs from earlier experience, insurance market conditions change, or the insurance programme faces cost pressure.

The retention level is affected especially by the company's risk-bearing capacity and risk profile, earlier loss experience, the premium response to a change in the deductible, alternatives offered by the insurance market, and the organisational and operational feasibility of the solution. Risk-bearing capacity mainly determines how much risk the company could financially retain. It does not alone show which deductible the company should select. A higher retention must also produce sufficient economic benefit, and its effects must be manageable from the perspectives of the group, business units, and claims handling.

The findings also show path dependence in retention decisions. A previously selected deductible can become an established part of the insurance programme even if the company's size, business, or risk-bearing capacity later changes. Keeping the current solution cannot, however, be interpreted only as a lack of analysis. Programme continuity can clarify responsibilities, support cost forecasting, and reduce the need for internal change. Continuity becomes problematic mainly if the suitability of the current level is not reassessed when material changes occur.

The company's own loss history is the most important source of information in decision-making. In practice, earlier losses are often examined under alternative deductible levels, and the change in retained loss cost is compared with a possible premium saving. This information is supplemented with market and benchmarking information from brokers, quotations from insurers, industry knowledge, and expert judgement.

The use of loss data is limited by the small number of liability losses, differences between losses, the potentially long development period of claim costs, and incomplete documentation of losses below the deductible. Historical data may also not correspond with the company's current business or future risk profile. Loss history therefore supports decision-making but does not alone determine a reasonable retention level.

The use of advanced quantitative methods varied. Monte Carlo simulation, frequency–severity modelling, and total cost of risk models were not described as normal annual decision-making methods in most interviewed companies. The data do not, however, show that these methods are unavailable. Based on the broker interviews, they are used especially with large companies that focus on analytics and when evaluating a new insurance programme, captive structure, or materially changed risk. The use of quantitative methods is limited by the availability and quality of data, the cost of analysis, available skills and time, and uncertainty about whether the analysis would affect the final decision.

The importance of the insurance market is seen especially in the price and availability of alternatives. A higher deductible is not reasonable only because the company can carry more risk. The premium saving must also be sufficient compared with the additional retained loss cost and its uncertainty. The relationship between the deductible and premium is not necessarily linear or fully transparent to the company. Pricing is also affected by the insurer's competitive position and portfolio objectives, industry loss development, the reinsurance structure, and general insurance market conditions.

The retention solution also has an operational dimension. A traditional deductible and a self-insured retention can have different effects on claims handling. The insurer's participation depends not only on the deductible amount but also on the contract structure and the agreed claims-handling model. The company may want to use the insurer's expertise or outsource claims handling, but it may also want to keep control especially in claims involving business partners. Captive structures make it possible to separate the group's actual risk retention from the deductible visible to business units.

The correspondence between theory and practice is stronger for decision factors than for the methods used. Practical decision-making considers mainly the same factors as the theoretical literature: insurance premium, retained losses, risk-bearing capacity, loss variability, and the cost of risk transfer. These factors are not normally combined into one model optimising company value or total cost of risk. In practice, the decision is made within the existing insurance programme, partly with incomplete data and on the basis of alternatives actually offered by the insurance market.

The theoretical relevance of the study is connected to explaining the practical applicability of models presented in insurance economics and risk financing literature. The study does not test the optimal retention levels produced by these models. Instead, it shows the organisational and market-based decision environment in which the factors identified by the models are evaluated in practice. Based on the findings, determining a retention level is not mainly formal optimisation. It is the combination of economic judgement, market conditions, and organisational feasibility.

From a practical perspective, the findings support regular reassessment of the retention level, especially when the company's size, business model, loss profile, or insurance market conditions change materially. A more detailed review may also be useful when the company considers a new insurance programme or captive arrangement, when a corporate transaction changes its risk profile, or when the same retention structure has been in place for many years. Regular review does not mean that a full optimisation

analysis must be carried out every year. If the same solution has been used for a long time, the company, broker, and insurer may all have become used to it. Earlier decisions and current practices may then guide the assessment too strongly. The company could therefore look again at the reasons for the current retention level and compare it with other available options. In addition to the premium saving, the review can consider the amount and variability of retained losses, claims-handling costs, and the internal effects of the solution. The comparison can be based on the company's loss history, insurance quotations, and market information from brokers. If possible, the loss data should also include losses below the current deductible. If company-specific data are limited, benchmarking and scenario analysis can provide additional support. However, the deductibles used by similar companies may not be suitable for the company. Higher retention is not automatically a better alternative. Its reasonableness depends on whether the company receives sufficient benefit from carrying the additional risk and can manage the financial and operational consequences. The purpose is to assess whether the current retention level is still reasonable, not necessarily to find an exact mathematical optimum.

6.1 Limitations and further research

The empirical data consisted of eight purposively selected expert interviews. The participants represented companies, insurance brokers, and the insurance sector. The data therefore included views on retention decisions from different parties involved in decision-making. The interviews provided varied data for the research questions, and the main themes were repeated in the descriptions of several participants. As is typical for qualitative research, the purpose was not statistical generalisation to all large Finnish companies. The purpose was an in-depth examination of the practices, reasons, and experiences behind retention decisions.

Purposive sampling and the way the participants were recruited may have caused selection bias. As mentioned earlier, the broker and insurer representatives were contacted through the researcher's professional network. The company representatives were

approached partly through the professional network and partly through LinkedIn. These methods may have reached people who were more experienced, more interested in insurance, or more active in working with brokers than other possible participants. The views of the broker participants were also mainly based on companies that use brokerage services. These companies may give more attention to insurance decisions and have more developed insurance practices than companies with less broker involvement. This risk was limited by using the same predefined selection criteria for all company participants and by including the views of companies, brokers, and the insurer. The participants were not selected based on whether they used formal or quantitative methods. However, the possible selection bias cannot be fully removed. The results may therefore give more weight to companies with developed insurance practices or active broker relationships. They should not be understood as representing all large Finnish companies.

The companies differed in industry, insurance programme, international operations, and use of captive structures. Because of the small data set, differences between industries or company types could not be compared systematically. Differences between the views of brokers, companies, and the insurer can be described on the basis of the data, but they are not a complete description of the practices of these groups.

The study is based on the participants' descriptions of decision-making. It did not examine company insurance documents, loss data, insurance quotations, or calculation models possibly used in decision-making. The study therefore cannot assess whether the current retention levels are economically optimal or compare the participants' descriptions with actual calculations or decision documents. The interviews also describe decision-making at one point in time, although insurance market pricing and capacity can change with the market cycle.

Further research could examine retention decisions with actual company loss and premium data. A quantitative study could compare the effects of different deductibles on the expected value and variability of retained losses, insurance premiums, and total

risk financing costs. It could also assess in which companies advanced modelling methods produce material additional value compared with the cost of using them.

Liability insurance decision-making could also be studied more widely than only through the retention level. The determination of policy limits, sublimits, excess layers, and policy terms is an important topic for further research. Limit decisions are connected to maximum protection against rare but potentially very serious losses, capacity available from the insurance market, and the company's assessment of the liability loss that could threaten its financial position or business continuity.

Further research could also examine how individual decision-makers and organisational decision structures affect insurance programmes. This study indicated that risk and insurance functions can have a small number of employees even in large companies. The risk perceptions and earlier experiences of individual experts and their trust in external advisers can then affect how the insurance programme develops and continues over time. This connection could be studied with a larger interview data set or by comparing company decision-making practices over several years.

6.2 Use of artificial intelligence in the study

OpenAI's ChatGPT artificial intelligence model was used to support this Master's thesis. It was used particularly to translate the thesis text from Finnish into English and to support the understanding of source materials. It was also used in source analysis, language editing, and the development of research ideas. The rules and instructions of the University of Vaasa concerning the use of artificial intelligence were considered. All material produced with artificial intelligence was critically reviewed and edited when necessary. The author is responsible for the final quality and content of the thesis.

References

- Actuarial Standards Board. (2017). Actuarial Standard of Practice No. 53: Estimating future costs for prospective property/casualty risk transfer and risk retention. Actuarial Standards Board. https://www.actuarialstandardsboard.org/wp-content/uploads/2018/01/asop053_190.pdf
- Airmic. (2015). *Compliance of multi-national insurance programs*. Airmic. <https://www.airmic.com/technical/library/compliance-multi-national-insurance-programs>
- Anderson, M. M. (2021, January 4). Treatment of deductibles and self-insured retentions in bankruptcy. Business Law Today. American Bar Association. https://www.americanbar.org/groups/business_law/resources/business-law-today/2021-january/treatment-of-deductibles-and-self-insured-retentions/
- Arrow, K. J. (1963). Uncertainty and the welfare economics of medical care. American Economic Review, 53(5), 941–973. <https://pubmed.ncbi.nlm.nih.gov/15042238/>
- Arrow, K. J. (1974). Optimal insurance and generalized deductibles. Scandinavian Actuarial Journal, 1974(1), 1–42. <https://www.rand.org/content/dam/rand/pubs/reports/2008/R1108.pdf>
- Baker, T. (2004). Insuring liability risks. The Geneva Papers on Risk and Insurance, 29(1), 128–149. <https://link.springer.com/article/10.1111/j.1468-0440.2004.00277.x>
- Baranoff, E., Brockett, P. L., & Kahane, Y. (2009). *Risk management for enterprises and individuals*. Saylor Foundation. https://open.umn.edu/opentextbooks/textbooks/risk-management-for-enterprises-and-individuals?utm_source
- Bogner, A., Littig, B., & Menz, W. (Eds.). (2009). Interviewing experts. Palgrave Macmillan.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>

- Brockett, P. L., Cox, S. H., & Witt, R. C. (1986). Insurance versus Self-Insurance: A Risk Management Perspective. *The Journal of risk and insurance*, 53(2), 242-257.
<https://doi.org/10.2307/252374>
- Brown, B. Z., & Schmitz, M. C. (2006, July). Study note on deductibles. Casualty Actuarial Society.
https://www.casact.org/sites/default/files/database/studynotes_brownschmitz_jul06.pdf?utm_source
- Committee of Sponsoring Organizations of the Treadway Commission & World Business Council for Sustainable Development. (2018). *Enterprise risk management: Applying enterprise risk management to environmental, social and governance-related risks*. COSO & WBCSD.
- Cozzolino, J. M. (1978). A Method for the Evaluation of Retained Risk. *The Journal of risk and insurance*, 45(3), 449-471. <https://doi.org/10.2307/251768>
- Cummins, J. D. (1976). Risk management and the theory of the firm. *The Journal of risk and insurance*, 43(4), 587-609.
- Cummins, J. D., & Freifelder, L. R. (1978). A comparative analysis of alternative maximum probable yearly aggregate loss estimators. *The Journal of Risk and Insurance*, 45(1), 27–52.
- Cummins, J. D., & Wiltbank, L. J. (1983). Estimating the total claims distribution using multivariate frequency and severity distributions. *The Journal of Risk and Insurance*, 50(3), 377–403. <https://doi.org/10.2307/252434>
- Dionne, G., & Eeckhoudt, L. (1985). Self-insurance, self-protection and increased risk aversion. *Economics Letters*, 17(1–2), 39–42.
- Dionne, G., & International Association for the Study of Insurance Economics. (2013). *Handbook of Insurance*. Springer New York.
- Doherty, N. A., Schlesinger, H., & (1985). Incomplete Markets for Insurance: An Overview. *The Journal of risk and insurance*, 52(3), 402-423.
<https://doi.org/10.2307/252778>

- Ehrlich, I., & Becker, G. S. (1972). Market Insurance, Self-Insurance, and Self-Protection. *Journal of Political Economy*, 80(4), 623–648.
<http://www.jstor.org/stable/1829358>
- Frees, E. W. (2025). *Constructing insurable risk portfolios*. CRC Press.
<https://doi.org/10.1201/9781003469568>
- Gron, A. (1994). Capacity constraints and cycles in property-casualty insurance markets. *The RAND Journal of Economics*, 25(1), 110–127.
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, 18(1), 59–82.
<https://doi.org/10.1177/1525822X05279903>
- Hirsjärvi, S., & Hurme, H. (2001). *Tutkimushaastattelu: Teemahaastattelun teoria ja käytäntö* [Research interview: Theory and practice of thematic interviews]. Yliopistopaino.
- Huberman, G., Mayers, D., & Smith, C. W., Jr. (1983). Optimal insurance policy indemnity schedules. *The Bell Journal of Economics*, 14(2), 415–426.
- International Risk Management Institute. (n.d.). Risk financing. In *IRMI glossary*. Retrieved August 18, 2026, from <https://www.irmi.com/term/insurance-definitions/risk-financing>
- Juvonen, M., Koskensyrjä, M., Kuhanen, L., Kämppi, P., & Talala, T. (2023). *Yrityksen riskienhallinta* [Corporate risk management] (3rd updated ed.). Aalto University Executive Education.
- MacMinn, R. D. & Garven, J. R. (2013). On the demand for corporate insurance: Creating value. In G. Dionne (ed.), *Handbook of Insurance*. New York: Springer, 487–516. https://doi.org/10.1007/978-1-4614-0155-1_18
- Marsh. (2014). *Managing global product liability risks*. Marsh LLC.
<https://www.marsh.com/content/dam/marsh/Documents/PDF/US-en/Global%20Product%20Liability%20whitepaper-03-2014.pdf>

- Mayers, D., & Smith, C. W., Jr. (1982). On the corporate demand for insurance. *Journal of Business*, 55(2), 281–296.
- Mohamed, A. M., Razali, A. M., & Ismail, N. (2010). Approximation of aggregate losses using simulation. *Journal of Mathematics and Statistics*, 6(3), 233–239.
- Mossin, J. (1968). Aspects of rational insurance purchasing. *Journal of Political Economy*, 76(4), 553–568.
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N. & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research* 42:5, 533–544. <https://doi.org/10.1007/s10488-013-0528-y>
- Picard, P., & Pinquet, J. (2013). Optimal risk financing in large corporations through insurance captives. *The Geneva Risk and Insurance Review*, 38, 48–86.
doi:10.1057/grir.2012.4
- Rejda, G. E., McNamara, M. J., & Rabel, W. H. (2021). *Principles of risk management and insurance* (14th ed., Global ed.). Pearson.
<https://www.pearson.de/media/muster/ext/9781292349763.pdf>
- Shavell, S. (2000). On the social function and the regulation of liability insurance. *The Geneva Papers on Risk and Insurance – Issues and Practice*, 25(2), 166–179
- Smith, C. W., Jr. (2008). Managing corporate risk. In B. E. Eckbo (Ed.), *Handbook of empirical corporate finance* (Vol. 2, pp. 539–556). Elsevier.
<https://doi.org/10.1016/B978-0-444-53265-7.50010-X>
- Sprecher, C. R., & Pertl, M. A. (1980). Risk Retention and the Market Implied Probability of Loss. *The Journal of risk and insurance*, 47(2), 279-290.
<https://doi.org/10.2307/252332>
- Strupczewski, G., Thlon, M., & Fijorek, K. (2016). Corporate insurance versus risk retention: An empirical analysis of medium and large companies in Poland. *The Geneva Papers on Risk and Insurance—Issues and Practice*, 41, 626–649.
<https://doi.org/10.1057/s41288-016-0005-4>

- Vaughn, T. R. (1996). Simulation models for self-insurance. *CAS Forum, Spring 1996*, 269–290. Casualty Actuarial Society.
- Werner, G., & Modlin, C. (2016). Basic ratemaking (5th ed.). Casualty Actuarial Society.
- Yanase, N. (2025). Enterprise risk management and corporate insurance: Issues and practice based on survey on risk managers in Japan. In T. Iwaisako (Ed.), *Japan's financial system: New perspectives and potential risks in the post-global financial crisis era* (pp. 231–257). Springer Nature Singapore. https://doi.org/10.1007/978-981-97-9258-0_9

Appendices

Appendix 1. Interview guide

Interview Questions

Background and Role

1. Could you briefly describe your role in the company's risk management and insurance activities?
2. Who participates in decisions concerning the retention or deductible level of the company's liability insurance?

Concepts and Structure of the Liability Insurance Programme

3. How are the concepts deductible, retention, and self-insured retention understood in your company?
4. When a liability insurance programme is structured, how are the deductible, retention level, and insurance limit taken into account?
5. How is the deductible or retention level of liability insurance determined in practice in your company?
6. What are the most important factors affecting the selected retention or deductible level?

Loss Data and Quantitative Tools

7. How is loss history used when assessing the retention level of liability insurance?
8. Is the analysis separated between loss frequency and loss severity?
9. Does your company use quantitative methods to assess the retention level?
10. When different deductible, retention, or limit options are evaluated, are they compared quantitatively?

Financial Risk-Bearing Capacity

11. How does your company assess how much loss risk it can retain on its own balance sheet?

Insurance Market, Brokers, and Insurance Companies

12. How do insurance market conditions affect the determination of the retention level?

13. To what extent does the previous structure of the insurance programme affect the current retention level?

Theory in Relation to Practice

14. To what extent is the determination of the retention level based on systematic analysis compared with experience, market practice, and negotiation?

15. Is there anything else that you consider important in determining liability insurance retention levels that we have not yet discussed?