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THE COST OF INVESTING IN GOLD – AN ESTONIAN RETAIL INVESTOR’S
PERSPECTIVE

Bachelor’s Thesis

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I have written this Bachelor's Thesis independently. Any ideas or data taken from other authors or other sources have been fully referenced.

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Introduction

Love makes the world go 'round. Yeah, the love of gold.

– Gene Hackman, from the movie *Heist*.

Gold has been a symbol of wealth and status for centuries, is associated with luxury, and is widely used across various industries. It remains a highly valued commodity in today's market, with key applications in finance, jewelry, medicine, aerospace, electronics, and even awards (World Gold Council, 2024). This precious metal is considered by many as the best investment against market turndowns, such as stock market declines and inflation, geopolitical crises and currency devaluation (Ferry, 2020). In fact, nearly all countries use gold as an insurance and reserve fund, according to Ljutova (2018). These gold bullions are usually stored in a highly secure installation, often underground, and with limited access to anyone other than highly vetted individuals. For instance, the largest gold reserve is located in the USA, holding slightly more than 8000 tonnes of gold bullion (BullionByPost, 2024).

Scholars assume that investors used to consider gold more as an inflation hedge and, sometimes, as an asset to protect them only in times of financial crisis. While gold can fulfill these functions, its main value extends beyond these characteristics. Gold provides a unique source of diversification to an investor's portfolio, as it generally has a low correlation with most assets, typically held by both institutional and individual investors, regardless of market conditions. Aside from offering inflation protection gold acts as a currency hedge, and enhances risk management by providing protection against rare but consequential negative events. The global nature of the gold market and its diverse uses make it a unique asset. (Artigas, 2010)

There are various forms of investment in gold, including gold bars, coins, jewelry, purchasing miner's stocks, mutual funds and ETFs, futures and options (Nawaz, 2013). When buying gold, investors might consider exchange-traded funds (ETFs) that track gold prices, as they provide more liquidity and lower costs. However, they come with management fees and may not offer the same security as physical gold (Nawaz, 2013). On the other hand, investing in physical gold involves additional costs such as transaction fees, storage expenses, and taxes, which can impact overall returns (Demidova-Menzel & Heidorn, 2007). Moreover, as Apanovych et al. (2023) highlighted, gold does not generate income (no dividends nor income), and its price can fluctuate in short-term positions due to changes in interest rate, market demand, and currency strength. Investors must carefully weigh these explicit and implicit costs when considering gold as part of their investment strategy, especially if they aim for long-term financial security.

Previous research on gold investments has focused on its role as a financial asset, showing how it acts as a hedge against inflation, a safe haven during market turndowns, and a reliable way to diversify portfolios. Studies of O'Connor et al. (2015), Demidova-Menzel and Heidorn (2007), and Ciner, Gurdgiev, and Lucey (2013) highlight gold's ability to reduce risk, address practical challenges of physical gold ownership, and confirm gold's role as a safe haven during market crisis. While these studies provide valuable insights into gold performance and primarily highlight its benefits, they underestimate practical challenges faced by private investors, associated with owning physical gold, such as storage, dealing with insurance and taxes, and other integral expenses. This leaves a gap in understanding and admitting the practical side of physical gold investments, especially for private investors, who face these challenges directly.

This thesis aims to estimate the costs associated with investing in physical gold from the perspective of an Estonian retail investor. The analysis is based on the range of physical gold products available on the Estonian market. It will consider both direct costs, such as storage, insurance, and taxes, and indirect costs, all of which have an impact on the overall investment expenses. To achieve this aim, the author has set the following tasks:

- to determine direct and indirect costs associated with investment in general;
- to identify physical gold investment products and provide an overview of previous studies based on gold-based investments products;
- to assess direct and indirect expenses associated with investing in physical gold;
- to calculate costs based on the collected data, associated with physical gold investments;
- to conduct an analysis of these costs to evaluate the overall expense of investing in physical gold for Estonian investors;
- to conclude and present findings on the costs associated with physical gold investments for Estonian investors.

This thesis is structured into two chapters: theoretical and empirical chapters. The theoretical part provides an overview of key concepts, including direct and indirect costs associated with investments, and studies various gold-based investment instruments. It also reviews previous studies on the role of gold as an investment. The empirical section details the methodology for evaluating how rising costs affect investment returns and presents a comprehensive data analysis, by quantifying these costs as percentage ranges relative to the investment value. Findings are compared with prior research to identify key similarities and

differences. As an outcome, the thesis will present a percentage range that reflects the total cost burden for Estonian retail investors, helping them assess whether such investments align with their financial goals and risk preferences.

Keywords: gold investment, physical gold, direct costs, indirect costs, investors.

1. Understanding the cost of investing in physical gold – theoretical foundations

1.1. Direct and indirect costs associated with financial investment

Investing is a crucial component of building wealth and securing financial stability. When choosing an investment, many investors mostly focus on interest rate level, growth perspectives of a company they buy shares from, past performance of the investment fund and potential capital gain (Bodie, Kane & Marcus, 2018). However, all investments come with costs that investors tend to neglect or underestimate, but this element can have a huge impact on their investment performance over time (Galas et al., 2024). Providers of financial services, including account management, product development, security trading, fund management, and advisory services, rarely send the detailed invoices but charge their clients fees and commissions (Galas et al., 2024).

However, transparency in these firms is limited, with certain costs being explicitly listed and others not clearly indicated, as well as these charges vary widely: some are one-time fees, others recurring, some fixed, and others variable (Bodie, Kane & Marcus, 2018). The financial sector emphasizes performance, but often underemphasizes costs, and since investment returns are impacted by high fees, optimizing success starts with minimizing these diverse, sometimes hidden, direct and indirect costs (Bodie, Kane & Marcus, 2018). Before directly diving into expenses associated with gold, it is important to identify key fees related to investments in general.

Direct costs, in the context of investing, are explicit and easily recognized expenses directly related to purchasing, managing, or selling an investment. These expenses play a crucial part in investment processes and usually appear during particular transactions, like the purchase or selling of securities. They are visible, easily linked to a specific investment, and important in defining its actual financial impact. Assessing the overall performance result of investments requires an understanding of direct costs. (Business News Daily, 2024)

Figure 1 summarizes the key direct and indirect costs associated with investments, compiled by the author through an analytical analysis of literature review and industry reports. Drawing on sources such as Becker et al. (2012), Martin et al. (2001), and many others referenced in the following paragraphs, the author identified and systematized the most relevant cost components that affect the investment outcomes. This classification is not a

repetition of any source but a synthesis created to reflect the full range of costs, both direct and indirect, that investors should consider. The figure serves as a foundational framework for the following discussion on how these costs form investment performance and decision-making.

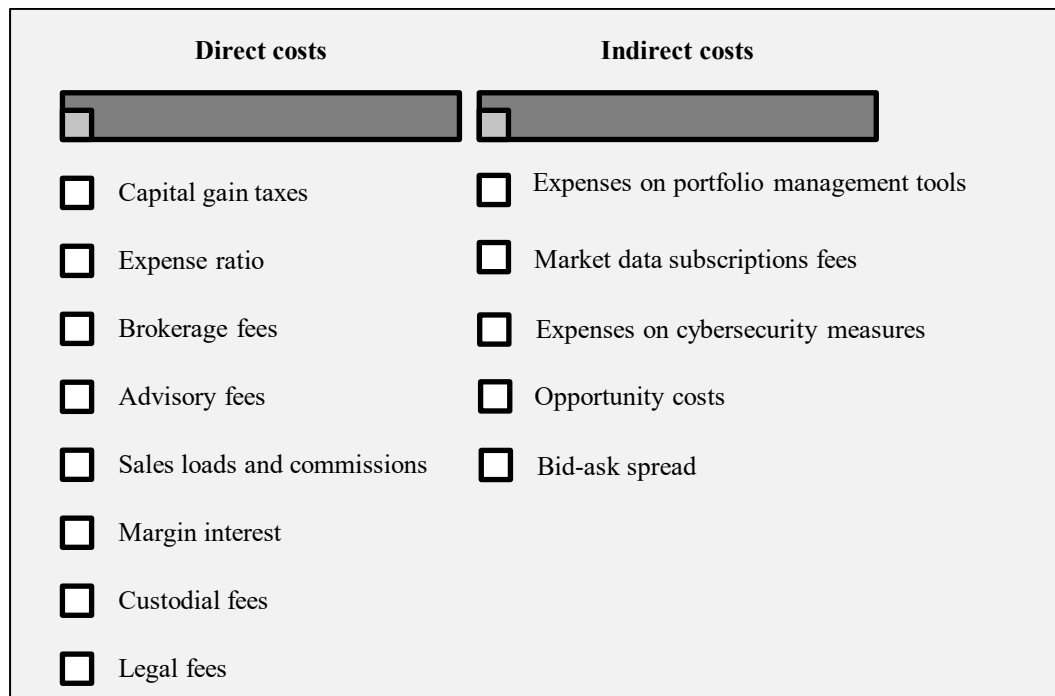


Figure 1. Breakdown of gold investment costs: direct and indirect

Source: compiled by the author

As shown in Figure 1, several costs associated with investing might not be so explicit, yet have a great impact if not considered. First, capital gain taxes are direct costs associated with investment, specifically payout taxes, which significantly influence both individual and corporate investment-related decisions. According to Becker, Jacob, and Jacob (2012), payout taxes, when applied to dividends and capital gains, can noticeably influence investing behavior. High payout taxes prevent businesses from paying out the profits to shareholders, often leading to keeping earnings or poor reinvestment choices. Similarly, Becker et al. (2012) highlight that investors may shift their capital allocation preferences as a result of these taxes by picking growth stocks or tax-advantaged investment vehicles. When stocks or bonds in funds or ETFs are sold and replaced, investors are required to pay out taxes on capital gains, even without selling the funds themselves (Becker et al., 2012). High turnover increases taxable transactions, which enhances the growth of the tax burden and can affect the efficiency of capital markets and the broader economic allocation of resources.

Next, the expense ratio, which is paid by an investor for owning a mutual fund, which can affect investors' return in the future (Martin et al., 2001). Mutual funds require various

financial resources in order to establish and manage them, and these costs are usually covered by operating expenses charged to investors, which collectively are represented by the expense ratio, a standardized measure that reflects the proportion of a fund's average assets allocation to cover its operating expenses (Martin et al., 2001). According to Low (2017), the lower the fund expense ratio, the higher the return investors receive. Many investors mostly rely on the fund's past performances and future returns, which are volatile and can hardly be predicted with certainty. As quoted in Haslem (2004, p. 8), "A low expense ratio is the single most important reason why a fund does well." According to Martin et al. (2001), investors should consider the fund expense ratio as one of their criteria in selecting funds for their investments.

Furthermore, brokerage fees are the compensation for the professional service of brokers and advisors who navigate the selection of funds for investors. These services may include subscriptions for premium research and investing data or additional trading platforms (NerdWallet, 2023). Bergstresser et al. (2009) claimed that possible reasons for people who invest to choose brokers are following: brokers can be helpful in saving time, and money, customizing the customer's portfolio so that it would fit their risk-tolerance and overall boosting the confidence in client's investment decisions.

There is also a case of advisory fees, which are paid to professionals for managing investment portfolios, serving as compensation for the expertise and high-level management provided by the advisor and act as a quality assurance tool, encouraging fund managers to align their interests with those of investors and to optimize their portfolios (Bergstresser et al., 2009). These fees are typically calculated as assets under management (AUM) fees, based on the amount invested and range from 0.30% to over 1% annually, and even if the advisor's level of involvement is constant, this recurring fee rises as the value of the investment grows (Investopedia, 2023).

There is also a case of sales loads and commissions, which are common costs associated with investment funds, varying by structure and application; a front load is a one-time charge that investors pay at the beginning of the purchase, while a back load or deferred load is paid at the time of sale (Panis & Padmanabhan, 2023). A level load, recurring as long as the fund is held, typically covers 12b-1 or distribution fees and is included in a fund's expense ratio (Panis & Padmanabhan, 2023). Waham (2022) highlighted that commissions also differ based on an investment product, for instance, for annuities, brokers charge commissions ranging from 1% to 7%, with surrender chargers often applied to recover these fees if early withdrawals were made. In the case of mutual funds, sales charges can go up to 5.75%, significantly impacting large investments, e.g., 5750€ on a 100000€ investment

(Waham, 2022). The most cost-efficient options are “no-load” funds, with no sales charges, especially suitable for mutual funds or ETFs (Waham, 2022). Despite the fact that these fees increase the overall cost of investing, they also encourage better management and can enhance long-term returns, if properly structured.

Interest on borrowed funds, also known as margin investing, involves borrowing money from brokers to purchase additional securities in order to enhance potential returns. Scholars explain that this strategy introduces margin costs, which are perceived in the form of interest on a borrowed fund, which directly impacts the profitability. The interest rate is determined by the broker and varies based on multiple factors (loan amount, investor’s creditworthiness, market rates, etc.). Margin investing can not only bring positive returns but also increase risk due to interest accumulation regardless of the investment's performance. (Garivaltis, 2019)

Next are legal fees, which are important to consider, particularly in the contract and property law framework. As outlined by MacNeil (2012), contract law makes investment smoother by reducing transaction risks and ensuring that contracts will be enforced. For investors, this is essential since legal clarity reduces the possibility of unpredicted expenses while guaranteeing the protection of the rights. Furthermore, contract law reduces transaction costs through the use of default rules and standard contract terms, simplifying agreements and reduces the need for extensive legal negotiation and documentation (MacNeil, 2012). Property law is also important in defining ownership rights and the transfer of securities, ensuring that investments can be purchased, sold, and transferred safely. MacNeil (2012) also mentioned, that high legal fees, especially in complex investments, can significantly increase an investment’s overall cost and impact its profitability. Therefore, reducing direct investment costs requires a legal framework that guarantees efficient and seamless interactions while lowering transaction costs.

Financial institutions responsible for the safekeeping and administrative management of investors’ assets charge custodial fees, which include services such as record-keeping, account maintenance, transaction settlements, and ensuring regulatory compliance. Custodial fees can also vary widely depending on the institution, the value of assets under management, and the type of services offered, as well as, some custodians may charge flat fee, while others base their fees on a percentage of of the portfolio’s value. (Galas et al., 2024)

The variability makes it crucial for investors to compare providers and assess if the services are worth the costs because in large portfolios, even slight differences in fees can have a great impact on long-term investment returns, making transparency and cost

management important considerations for optimizing returns (Galas et al., 2024). According to the website Faster Capital (2024), a custodial fee of 0.25% applied to a 100,000€ portfolio with an annual return of 5% would effectively lower the return to 4.75%. Over 20 years, the cumulative effect of this reduction could result in thousands of euros in lost earnings, diminishing the overall portfolio value significantly.

According to Madsen (2003), there are also two main ways inflation limits investments. First, because tax depreciation allowances are based on historical expenses, inflation lowers their real worth, which raises the effective tax rates on capital. Businesses are discouraged from making capital expenditures by this higher tax burden, which lowers the after-tax profitability of new investments. Second, real accounting profits are reduced by inflation, especially for highly leveraged corporations, which is why real profitability is decreased when nominal revenues, such as interest expenses, increase in line with inflation. This creates liquidity constraints, making external financing costly or inaccessible during inflationary periods, which also affects international investments by depreciating currencies, raising the cost of importing capital goods, and deterring foreign investors. (Madsen, 2003)

On the other hand, indirect costs, in the context of investing, include the broader costs that are related to the operation of investment activities; these are the remaining costs that are left over after calculating the direct investment costs and are necessary for the normal operation of a business (Witherell, 2015).

Despite the experience and knowledge of the workers that provide various services to their clients, modern investment firms heavily rely on advanced software and tools for portfolio management, trading platforms (MetaTrader), and communication tools, which enable timely coordination across teams (Lytras et al., 2009). Advanced portfolio management tools, such as BlackRock's Aladdin platform, allow firms to monitor risks, allocate assets, and generate performance analytics (Froot & Waggoner, 2011). Various communication tools, like Microsoft Teams, provide an easily accessible way to interact between team members, allowing investment decisions to be coordinated across multiple locations. Market data subscriptions, such as Bloomberg Terminal (Hendershott et al., 2011), are another fundamental platform that provides real-time financial data, market analytics, and investment insights, which help firms to identify market trends and make weighted decisions. Hendershott et al. (2011) highlight how algorithmic trading systems, use real-time data to enhance market efficiency and liquidity, providing time and information accuracy.

Previous literature authors emphasized that breaches in cybersecurity systems can cause severe damage to both organization and their clients. This threat pushes firms to deploy

advanced protective measures, including encrypted data systems, which ensure that sensitive data, like client information and trade details, is converted into a secure format and can only be accessed by authorized individuals. Also, intrusion detection systems, which continuously monitor network traffic and respond to unauthorized access attempts or unusual activity. Firms protect themselves by implementing 24/7 monitoring services that provide real-time threat detection and immediate response. Multi-factor authentication and, regular vulnerability assessments, and penetration testing are integral cybersecurity protection systems that enable organizations to operate safely as well. (Kopp et al., 2017)

Moreover, opportunity cost and liquidity risk, which are not directly tied to the purchase, sale, or management of the investment, still represent broader financial influence or risks, which may occur as a result of choosing a specific investment. The potential gains that investors lose when they decide, for instance, to invest in a low-risk saving account rather than in stocks are known as opportunity costs (Aizenman & Marion, 2003). Opportunity costs can be applied in various aspects of decision-making, understanding which is crucial to make informed decisions and ensuring the maximizing of wealth (Aizenman & Marion, 2003).

On the other hand, liquidity risk is the challenge of quickly selling an asset without losing value (Holmström & Tirole, 2000). Certain assets, such as government bonds or equities, are very liquid and may be sold almost immediately. However, other assets, like collectibles or real estate, have higher liquidity risks since it takes time and money to find buyers or complete transactions (Holmström & Tirole, 2000). According to Dong, Feng, and Sadka (2019), less liquid assets often suffer in volatile markets, where selling takes more time or result in lower prices, as well as, this delay can limit an investor's ability to shift funds to more profitable or urgent opportunities quickly.

Alongside the previously mentioned costs, the bid-ask spread is also considered an indirect cost because it indicates embedded transaction costs incurred during the purchase or sale of financial assets. The difference between the lowest price a seller is ready to accept (ask) and the highest price that a buyer is willing to pay (bid) is reflected in this spread, and market liquidity, volatility, and the variety of traded assets are some of the aspects that affect it (Wyart et al., 2008). Wider spreads are typical in illiquid or volatile markets and increase investment costs, whereas narrow spreads are common in liquid markets with lower transaction costs.

To conclude, investing is an important channel of wealth, but the returns should not come at the risk of managing the return costs. This subchapter highlights direct costs, such as capital gain taxes, brokerage fees, advisory charges, and custodial expenses, and indirect

costs like administrative overhead, employee salaries, cybersecurity measures, opportunity costs, and liquidity risks. While direct costs are clear and linked to specific transactions, indirect costs often operate behind the scenes, but are just as important to maintain operational efficiency, compliance, and data security. When taken as a whole, these expenses highlight how investors must manage their funds comprehensively, maintaining a balance between cost-effectiveness and quality in order to maximize profits. Investors may improve decision-making, reduce inefficient expenditures, and ensure consistent portfolio growth by carefully analyzing both direct and indirect costs. Given the variety of gold-based investment products, it is crucial to identify both direct and indirect costs in order to guide investors toward the most suitable gold investment strategies for their financial goals.

1.2. Previous empirical studies review and physical gold investment products

This part will review previous empirical studies relevant to gold-based investment products, focusing on gold's behavior as an asset, the associated investment costs, and incorporating physical gold into investment portfolios. The following studies, O'Connor et al. (2015), Demidova-Menzel and Heidorn (2007), and Ciner, Gurdgiev, and Lucey (2013), were selected for their valuable insights and contributions to understanding gold investments. Following Table 1 provides a summary of key researches that lie as foundation for this thesis. Three key aspects of the previous empirical studies are presented in the table, such as scope which helps to determine the context of the study, including the geographic focus, sample size, time period, and specific aspects of the topic. Key findings in the table highlight the primary findings showing what was discovered and how it contributes to what already studied. This helps to identify various patterns, agreements and disagreements across studies. Limitations reveal contextual or methodological constraints that might affect the reliability of the findings. Including this aspect helps to identify the research gap or improve the thesis's structure by addressing or avoiding similar problems.

Table 1.

Review of previous empirical studies

Source	Scope	Key findings	Limitations
O'Connor et al. (2015)	Focuses on global markets, especially during crises; data covers international markets, using events from 2000–2015.	Gold acts as a hedge against downturns, inflation, and currency devaluation. It has low/negative correlations with other assets, especially during crisis periods. Emphasizes gold's role in diversification.	Relies mainly on qualitative analysis and does not address practical challenges for retail investors.
Demidova-Menzel and Heidorn (2007)	Analyzes retail investors in developed markets based on data from European markets between 1990–2005.	Concludes that physical gold investments often carry higher storage and transaction costs compared to ETFs and futures, which can reduce net returns for retail investors despite gold's perceived stability.	Focuses specifically on retail investors, limiting its applicability to institutional investment strategies.
Ciner, Gurdgiev, & Lucey (2013)	Studies gold's behavior in extreme financial crises, focuses on international data from major financial crises between 1997–2009.	Uses econometric models to demonstrate gold's safe haven role during extreme market conditions.	Mostly focuses on short-term market crisis cases and not reflect long-term investment behavior.

Source: compiled by the author based on the sources presented in the table

According to Table 1, O'Connor et al. (2015) provided a survey exploring the financial economics of gold. This work highlighted gold's role as a hedge against market downturns, inflation, and currency devaluation while emphasizing its utility in portfolio diversification. O'Connor et al. (2015) empirical findings show that gold's correlation with other asset classes is either low or negative, particularly during times of financial stress, making it a crucial tool for managing portfolio risk. Moreover, the study provides a well-

structured and deep analysis of historical price movements and their relationship with macroeconomic factors. O'Connor et al. (2015) survey is important for understanding gold's strategic role in modern investment portfolios. While O'Connor et al. (2015) mostly rely on the qualitative approach, other scholars stick to the quantitative approach, analyzing historical price data to establish statistical analysis. These methodologies support the case for gold's benefits, offering theoretical and empirical foundations.

Demidova-Menzel and Heidorn (2007) focused on the practical aspects of integrating gold into investment portfolios. Their analysis delved into the costs and benefits associated with physical gold investments, including transaction fees, storage costs, and liquidity considerations. They also explored the differences between physical gold and derivative-based investments like exchange-traded funds (ETFs) and futures, highlighting the differences in terms of risk, return, and accessibility for retail investors. A key contribution of this research is how it highlights retail investors' choices when deciding between physical gold and gold-related investments, offering a strong theoretical foundation for the thesis's focus on the perspective of Estonian retail investors.

Ciner, Gurdgiev, and Lucey (2013) studied the behavior of gold prices during major and unlikely events. Their paper emphasized gold's role as a safe haven, particularly during extreme market conditions, and provided empirical findings of gold's effectiveness as a hedge against financial crises. By introducing various econometric approaches, this study offers a methodological perspective that supports the findings of O'Connor et al. (2015) and Demidova-Menzel and Heidorn (2007), providing an understanding of gold's value in diverse market conditions.

Together, these studies provide a solid foundation for understanding gold-based investments. O'Connor et al. (2015) highlight gold's macroeconomic role and its benefits for investment portfolio diversification, Demidova-Menzel and Heidorn (2007) focus on practical cost considerations, and Ciner et al. (2013) bring a methodological approach to analyzing gold's behavior under stress. This thesis builds on these works by incorporating updated data and focusing on the practical side of owning and investing in physical gold, particularly from the perspective of private investors.

The appeal of gold to investors during periods of panic or extreme market stress is widely recognized and frequently highlighted in financial media (Sanderson, 2015). Gold is a hedge, which is defined as "an asset that is uncorrelated or negatively correlated with other asset classes or portfolio on average" (O'Connor et al., 2015 p. 220), as well as may act as a

safe haven against the currencies other than those seen as a safe haven themselves, such as the US Dollar and the Swiss Franc (Joy, 2011).

To better illustrate gold's performance compared to other equities, the following Figure 2 tracks the price development of gold spot price and S&P 500 index, both denominated in euros, over a 25-year period.

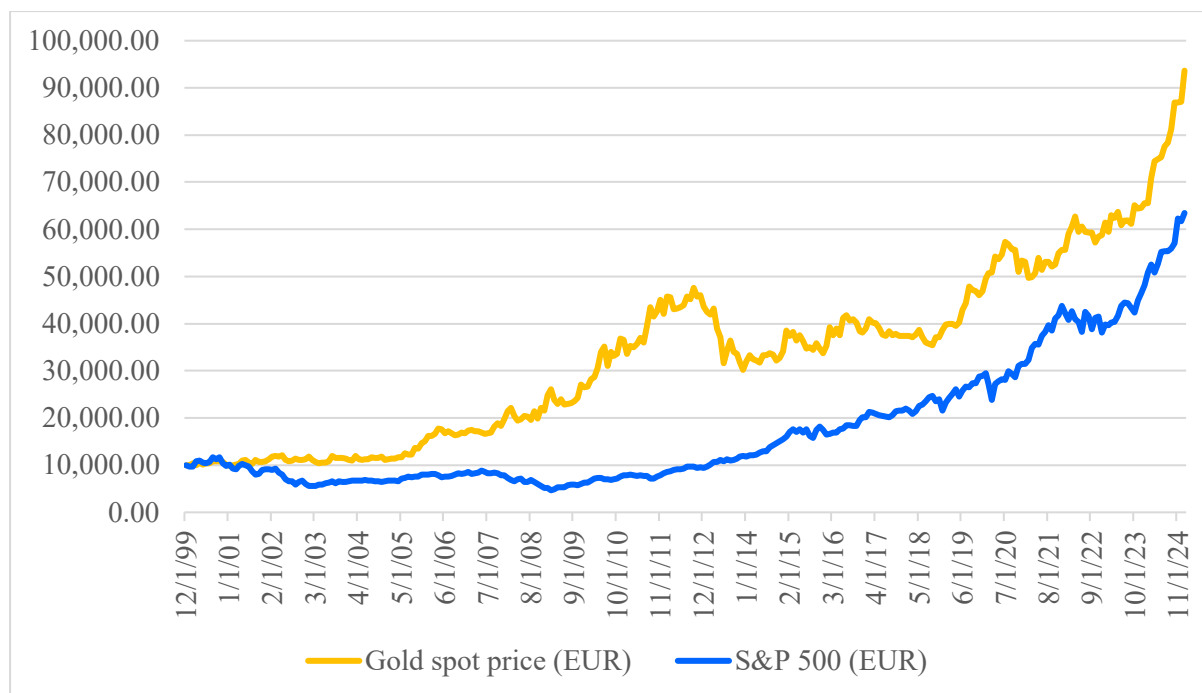


Figure 2. Comparative performance of gold spot price and S&P 500 in EUR (1999–2024)

Source: compiled by the author based on the data from Curvo

Figure 2 compares the gold spot price and the S&P 500 index (both in EUR) from December 1999 to November 2024, highlighting how these two assets behave under different market conditions. The initial value is 10,000€, making both performances directly comparable. Gold is generally seen as a safe-haven asset that frequently outperforms during times of market volatility and economic uncertainty, while the S&P 500 reflects the performance of the entire stock market, which is influenced by investor sentiment, company profitability, and economic growth (O'Connor et al., 2015). For instance, as Figure 2 makes clear, gold prices increased drastically during the 2008 financial crisis, as investors sought stability, yet the S&P 500 faced a decrease. Similarly, gold reached a peak during the height of the COVID-19 pandemic in 2020, while the S&P 500 initially weakened before recovering.

According to Ciner, Gurdgiev, and Lucey (2013), combining gold and stocks in a portfolio can enhance diversification, reduce overall risk, and improve long-term stability. The Figure 2 supports this by illustrating that, over the last 25 years, gold has produced better

cumulative returns than the S&P 500, despite higher visual volatility. Specifically, according to the author's calculations, the average annual return for gold over this period was approximately 8.9%, while the S&P 500 achieved about 7.4% in EUR terms.

In addition to individual investments, it is essential to understand the global role of gold, particularly how it is held and perceived by institutional stakeholders such as central banks. Gold ownership is distributed among a diverse group of holders, including central banks, governments, international organizations, private investors, and the jewelry industry. According to the World Gold Council, as of December 2024, the top holders of gold are the United States, Germany, and Italy. The total holdings from all the countries represent a significant portion of the world's total gold reserves, which amount is approximately 35,938.6 metric tons. Global central banks continue to increase their gold reserves as a part of their monetary policies and strategies to reduce dependence on fiat currencies, particularly during economic crises and geopolitical tensions (Aizenman & Inoue, 2013). For instance, the National Bank of Poland and the Central Bank of Hungary have significantly increased the amount of their gold reserves over the last few years in order to diversify their foreign exchange portfolio (World Gold Council, 2024).

Physical gold-based investment products are among the oldest and most tangible forms of investments, offering investors a strong sense of value and hedge against economic uncertainty. There are three main forms of physical gold-based products, that will be also discussed further in the thesis:

1. Gold bars (bullion)
2. Gold coins
3. Gold jewelry

In countries like India and China, gold is viewed not only as an investment but also as a symbol of power and status in society (Kakkar & Chitrao, 2023). Data by the World Gold Council (2023) indicated that China and India accounted for approximately 57% of the world's gold jewelry market in 2023 by tonnes of gold sold. According to Grosheva et al. (2022), its appeal is influenced by economic conditions, particularly during periods of low or negative real interest rates and legislative changes, like adjustments in VAT on gold bullion, which have also driven increased interest in gold jewelry as an alternative investment.

Despite its cultural and aesthetic appeal, gold jewelry ownership comes with significant disadvantages as an investment. Retail shops often mark up prices by 300 percent or more, indicating the cost of gemstones, the design, and craftsmanship, which far exceed the value of the gold itself. Since each piece of jewelry is unique and its value subjective, the

resale value often does not include these additional costs, which can significantly reduce profitability compared to other forms of gold investment like bullion or coin. (Rompas, 2015) In order to maximize returns, investors should seek diversification of their gold holdings with other forms, such as bars or coins, which usually have lower premiums or spot prices, and greater quality (Artigas et al., 2011).

Physical gold, in the form of bars or coins, is one of the most common methods of gold investments. Gold bars, or mostly recognized as bullion, are especially known for their low premiums over the spot price of gold, making them a cost-effective way to purchase gold (Artigas et al., 2011). According to the World Gold Council (2024), these bars are typically sold based on weight, ranging from small sizes, like 1 gram or 10 grams, to larger bars of 1 kilogram or more. To ensure authenticity and standardization, gold bars are often stamped with information about their purity, usually 99,5% or higher, and manufacturers insignia, with many produced by refiners certified by the London Bullion Market Association (LBMA) (London Bullion Market Association, 2024). Gold bars are favored by both individual and institutional investors. According to Demidova-Menzel and Heidorn (2007), smaller bars are perfect for personal investors due to their affordability and flexibility. In contrast, larger bars are often chosen by institutional buyers and central banks for their efficiency in storage and value appreciation. However, owning gold bars also comes with considerations such as secure storage, insurance costs, and the potential for theft. Therefore, investors typically use safety deposit boxes or specialized vaults to protect their assets (Demidova-Menzel & Heidorn, 2007).

Similarly, gold coins offer an accessible and widely recognized alternative for investors. Common examples include the South African Krugerrand, the UK Sovereign, and coins from countries such as Canada, the United States, and Australia. Coins are typically purchased through dealers and carry a small premium over the spot price of gold, reflecting production and distribution costs. Despite these premiums, gold coins are especially valued for their portability, liquidity, and simplicity of resale. They are well-suited for investments ranging from a few hundred to thousands of euros, providing a tangible and flexible option for smaller-scale investors. (Coulson, 2005)

In 2023 global demand for gold bars and coins reached approximately 1,217 tonnes, highlighting their continued relevance as stable and accessible investment vehicles (World Gold Council, 2024). Coins and bars provide investors with a reliable hedge against economic uncertainty and an opportunity to diversify their portfolios. Certain coins, such as Canadian Maple Leaf and UK sovereign, may also gain additional value due to their

historical or collectible value, enhancing investment potential (Coulson, 2005). Together, gold bars and coins offer flexible and practical options for investors who choose investments in the gold market.

In conclusion, the research discussed in this subchapter highlights how gold is a diverse investment. Gold's function as a safe hedge and a tool for portfolio diversification, especially in uncertain financial times, is clarified by O'Connor et al. (2015). By analyzing the expenses and practical difficulties of physical gold investment and comparing them with different investment products, such as exchange-traded funds (ETFs), Demidova-Menzel and Heidorn (2007) offers a practical approach. By studying how gold reacts to extreme market conditions, Ciner, Gurdgiev, and Lucey (2013) provide insight and support gold's role as a safe haven asset. This subchapter also explored a variety of physical gold-based instruments, such as jewelry, coins, and bars, each of which has unique pros and cons. Coins provide more portability and liquidity, whereas gold bars are notable for their affordability. On the other hand, subjective resale pricing and high markups often negatively affect the jewelry. Together, this subchapter provides an extensive understanding of why gold attracts investors, covering everything from gold-based instruments along with their related costs, past performance, and market dynamics to its economic benefits and the practical challenges of ownership.

1.3. Direct and indirect costs of investing in physical gold

Physical gold is considered one of the most appealing investment vehicles to an investor, yet like any other investment instrument, it comes with a range of direct and indirect costs, which should not be underestimated. According to World Gold Council (2024), these costs, which impact the overall profitability, include:

1. Transaction costs
2. Storage fees
3. Insurance expenses
4. Authentication
5. Potential liquidity constraints
6. Taxes

Moreover, many of these costs overlap with those costs associated with traditional financial instruments, as discussed previously in subchapter 1.1, while others are unique to the specifics of physical gold. This subchapter aims to highlight these differences and similarities to provide an extensive understanding of gold investment costs.

Transaction costs are an important consideration in any investment, including gold. Similar to financial instruments, such as stocks or mutual funds, physical gold-based products involve premiums, brokerage fees, and bid-ask spreads (O'Connor et al., 2015), although gold adds specific aspects. Investors usually pay more than the current market price for actual gold, such as coins or bars; fabrication, shipping, brokerage fees, and seigniorage - all included in the premium, the charge by mints to cover manufacturing (Kosares, 2013). Depending on elements, including order size and dealer policies, seigniorage usually falls between 2,5% and 3,5%, with wholesale and retail markups adding an extra 0,5% to 3% (Kosares, 2013). Although smaller denominations frequently have larger per-gram premiums due to similar manufacturing costs regardless of size, standard gold bullion, such as one-gram denominations, typically trade at premiums of 5% or 7% above the spot price (Kosares, 2013).

In addition to these premiums, like in the financial market, the bid-ask spread raises the cost of ownership even further. One important measure of market liquidity is the bid-ask spread, the difference between the purchase and sale prices of an asset (O'Connor et al., 2015). Smaller spreads usually indicate greater liquidity and smaller transaction costs, where the gap is influenced by a number of factors, including dealer inventory levels, market volatility, and transaction size; larger deals mostly benefit from smaller spreads because of economies of scale (O'Connor et al., 2015). Spreads, however, may grow when dealing with smaller denominations or during times of market volatility due to the physical nature of gold (Chen & Wang, 2024). Another significant factor is market impact costs, where large trades affect supply and demand, leading to negative price shifts (Drehmann & Nikolaou, 2013). Moreover, according to Drehmann and Nikolaou (2013), illiquid markets often face execution delays, which can lead to less favorable pricing because it can take longer to find a counterparty or complete a trade.

Furthermore, storage costs are a crucial component of holding physical assets, and according to Stringham (2015), maintaining physical gold involves resource-demanding procedures. Unlike ETFs or mutual funds, where custodians primarily manage records and transactions, physical gold involves secure storage solutions, such as expert vaults, which are essential to protect against theft and deterioration (Stringham, 2015). These expenses, which are sometimes calculated as a proportion of the value of the gold being stored, result from the security and preservation of gold in expert vaults or custodial services, usually between 0.1% and 1% each year (Stringham, 2015). Furthermore, Nair et al. (2021) emphasize that storage costs interact with market pricing mechanisms, and the price dynamics, for instance, of gold

futures are influenced by the costs associated with retaining gold, such as storage fees, insurance, and opportunity costs. Investors must weigh the expenses against possible returns when deciding between riskier at-home solutions or safe professional storage, because high storage prices can reduce the advantages of having physical gold and affect investor preferences (Nair et al., 2021).

Purchasing actual gold involves carefully weighing insurance to protect against loss, damage, and theft. While financial investments rely on regulatory protections and custodial services, gold is frequently only partially covered by standard homeowner's insurance, with compensation limitations that might not equal to the asset's full market value (Nasdaq, 2024). Precious metals-specific insurance provides more thorough coverage, including the entire value of the gold, but it has higher premiums and could call for safe storage options like certified safes or expert vaults (Nasdaq, 2024). Physical gold insurance typically costs between 1% and 2% of its worth each year, depending on variables including safety precautions and storage conditions (Nasdaq, 2024). In contrast, traditional financial investments' custodial or advisory fees indirectly cover asset protection. Additionally, it is crucial to remember that gold kept in bank safe deposit boxes is not automatically insured, so in order to have sufficient security, additional policies are needed (Nasdaq, 2024).

In addition to premiums, storage, and insurance, the authentication of gold ensures its purity and legitimacy, protecting investors from counterfeit risks and preserving resale value (Raudhatusoufwah et al., 2021). Traditional methods, like fire assay, are accurate yet destructive, and expensive, while nondestructive techniques, such as X-ray fluorescence (XRF) and ultrasonic testing, provide reliable and efficient alternatives (Raudhatusoufwah et al., 2021). These advanced methods, often used by companies like the Numismatic Guaranty Company (NGC), typically cost 20€ to 50€ per item, with higher fees for complex pieces. Certification from reputable providers not only confirms authenticity but also enhances market appeal, making it a crucial part of physical gold investment strategies (The Royal Mint, 2024).

Gold's liquidity constraints can occur due to market conditions, transaction costs, and the type of gold being traded. Widely recognized bullion coins and gold bars are more liquid due to their global acceptance, while unique coins or jewelry often face limited demand, reducing liquidity (Coulson, 2005). During market volatility, bid-ask spreads widen, making large transactions more costly and time-consuming (O'Connor et al., 2015). Physical gold also implies logistical challenges, such as secure transport and verification, which can delay liquidation and add expenses (Nair et al., 2021). However, in economic crises, gold's safe-

haven appeal can enhance its liquidity, offering investors protection against market uncertainty (Ferry, 2020).

The overall profitability of physical gold investments is significantly affected by taxes, with variations across jurisdictions influencing investor decisions (Auerbach & Gordon, 2002). Similar to financial instruments, gold investments are subject to capital gains tax. However, tax significantly varies from country to country, and these accrue due to variations in tax laws, classifications of gold as an asset and the intended use of the gold (investment vs. personal use) (Smith & Singleton, 2015). For instance, in the US, gold is considered by the Internal Revenue Service (IRS) as a collectible, so long-term capital gains (kept more than one year) are liable for a tax rate of over 28%, which is higher than the typical rates for other investments (Smith & Singleton, 2015). In contrast, if investment-grade gold satisfies purity and form requirements, it is exempt from Value Added Tax (VAT) in the UK, however, certain coins and bars may be subject to Capital Gains Tax (CGT) at the time of sale (Auerbach & Gordon, 2002). Germany offers another condition: physical gold held for over a year is generally tax-free, while sales within a year fall under income tax (World Gold Council, 2024). Similarly, Estonia excludes gold from taxation if used for private purposes, further reducing tax burdens for long-term holders (World Gold Council, 2024).

Overall, investing in physical gold comes with various direct and indirect costs that significantly influence its overall profitability. These include transaction fees, spreads, storage, insurance, taxes, specific premiums, and liquidity constraints, all of which are influenced by variables such as jurisdiction, transaction size, and market conditions (World Gold Council, 2024). Spreads and premiums reflect the dynamics of production and liquidity, whereas insurance and storage provide security but come with recurring costs (Nair et al., 2021). Investment returns are also impacted by tax laws, which differ widely between regions (Smith & Singleton, 2015). The main goal of this thesis is to identify and analyze these expenses, in particularly bid-ask spreads and taxes, in order to provide a comprehensive framework for assessing investments in physical gold. Previous subchapters provide investors with a theoretical foundation for effectively balancing costs and benefits in the context of physical gold investment.

2. Cost of investing in physical gold-based products in Estonian context

2.1. Data and methodology

2.1.1. Data

The empirical analysis of this thesis focuses on the costs associated with investing in physical gold from the perspective of an Estonian retail investor. A key aspect of this part is

the analysis of bid-ask spreads for investment gold, which reflects the difference between the price a buyer is willing to pay (bid) and the price a seller is willing to accept (ask). These spreads are an essential indicator of market efficiency and transaction costs. The purpose of this study is to explore the stability and variability of bid-ask spreads over time by studying them across several Estonian enterprises.

Data from three key companies that provide investment gold in Estonia was gathered for the analysis (Tavid, Money Express, Tavast). These companies were chosen because of their solid reputation, consistent presence in the Estonian market, and availability of current pricing data for a variety of gold items. The analysis focused on physical gold products only: standardized gold bars and investment-grade gold coins. The data was gathered once per month during December 2024, January 2025, and February 2025. On each collection date, available ask (selling) and bid (buying) prices of all listed gold bars and gold coins were manually entered into Excel spreadsheets. This approach guaranteed consistency and comparability across companies and months. Products without either selling or buying price were excluded from the final analysis. The percentage difference between these prices was used to compute the bid-ask spread. The collected data was then standardized for comparison purposes: all prices were recorded in euros, and each product was described according to its weight, form (bar or coin), and issuing brand (e.g., Valcambi, Krugerrand, Vienna Philharmonic, etc.)

In addition to transaction costs embedded in bid-ask spreads, other relevant expenses associated with physical gold investment were considered. Publicly available price lists of locker rentals from two major Estonian providers, TBB and Hansab, were also considered in the thesis. These companies offer various storage options for private clients, including safe deposit boxes suitable for physical gold. Furthermore, the author contacted local insurance providers (ERGO, If, Seesam) via email to request the availability and pricing of insurance products specifically covering physical gold assets. Even though insurance costs can vary a lot between companies, including them in the calculations helps better understand the long-term costs of the ownership.

The bid-ask spread data was gathered manually monthly during December 2024, January 2025, and February 2025. On each collection date, all available ask (selling) and bid (buying) prices for listed gold bars and coins were recorded into Excel spreadsheets by the author. In total, each working spreadsheet included, on average, around 130 products, meaning that the author personally processed and systematized a considerable amount of data

across the study period. This manual collection ensured consistency and better comparability across companies and months.

Each product in the dataset was classified into one of these groups. The classification enabled the calculation of average, minimum, and maximum bid-ask spreads per weight category, allowing retailer investors to decide whether smaller or larger products are more cost-effective. The Excel dataset consisted of the following key variables:

- Date of data collection
- Company name
- Product name and type (bar or coin)
- Nominal weight (in grams)
- Bid price (buying price)
- Ask price (selling price)
- Bid-ask spread as a percentage

2.1.2. Methodology

To provide a well-structured approach, the methodology was divided into multiple stages, as shown in Figure 3.

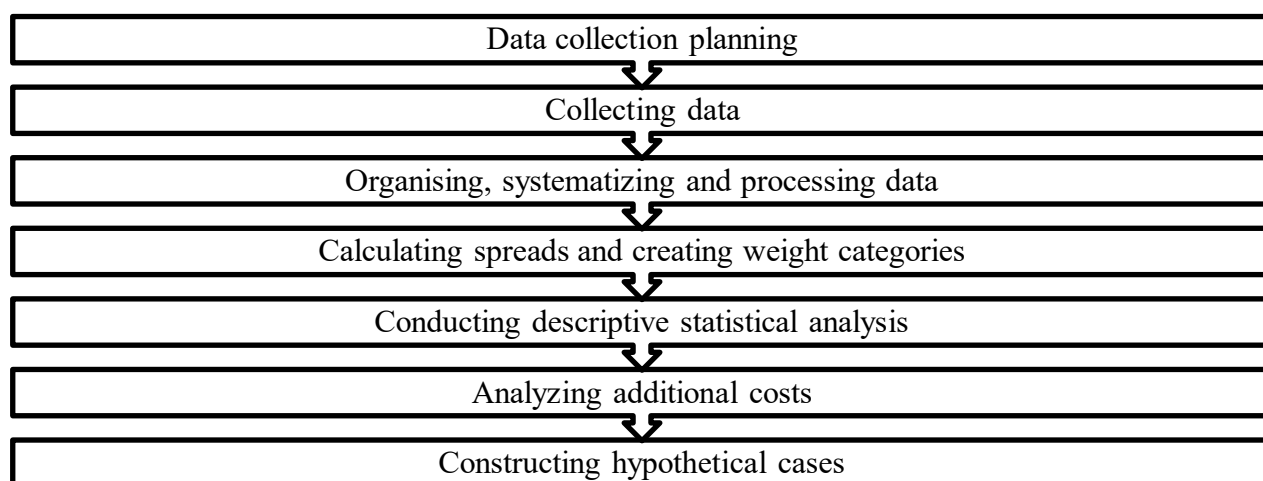


Figure 3. Breakdown of empirical part steps

Source: compiled by the author

The percentage difference between the ask and bid prices was used to compute the bid-ask spread, following the formula:

$$\text{Percentage spread} = ((\text{Ask Price} - \text{Bid Price}) / \text{Ask Price}) \times 100$$

All observed gold items were grouped based on weight categories to enable a detailed analysis of how transaction costs vary across product characteristics. The main idea behind the grouping is that economies of scale can lead to differences in bid-ask spreads, and thus,

relative transaction costs, differ depending on the product's weight and size. Author defined the following five weight-based categories:

1. Very light: <5g
2. Light: 5g – 15g
3. Medium: 15g – 50g
4. Heavy: 50g – 250g
5. Very heavy: >250g

Descriptive statistics were used to assess the variability and distribution of bid-ask spreads across the selected companies and product types. For each weight group, the following indicators were calculated:

- Average spread (mean)
- Minimum spread
- Maximum spread

This statistical approach provides an overview of the typical transaction cost levels and highlights any outliers. Additionally, price dynamics over time were briefly studied by comparing the average spreads per month in order to identify whether market conditions or pricing policies fluctuate within short periods.

Several hypothetical investment scenarios were constructed based on real market data to further enhance the practical relevance of this analysis. These scenarios model the total cost of investing in specific gold products, taking into account:

- Initial purchase price
- Bid-ask spread
- Storage cost (e.g., one year in a basic locker)
- Potential selling price at a later date

These case-based examples provide a concrete perspective on how transaction and maintenance costs accumulate over time and how they differ depending on the size and type of the gold product from the perspective of the Estonian retail investor.

Despite efforts to ensure accuracy and consistency, the analysis relies solely on publicly available online price lists, which may not always reflect in-store offers, negotiated deals, or short-term promotions. Also, only three data collection points were used, restricting the ability to capture high-frequency market dynamics or seasonal fluctuations.

Moreover, the analysis assumes that all gold items are of identical purity and investment quality, although smaller variations between brands may affect the pricing in practice. This

methodological approach helped to identify patterns and differences in the pricing of physical gold in Estonia, contributing valuable insights to the broader discussion on the costs of investing in gold for private investors.

2.2. Results and discussion

This section presents the results of the empirical analysis of the cost of investing in physical gold, using percentage spreads as an indicator of transaction costs. The spreads were calculated for three different dates (December 2024, January 2025, February 2025) based on the data collected from Estonian dealers, such as Tavid, MoneyExpress, and Tavast. The following table below provides a summary and detailed interpretation of the results per month.

Table 2.

Summary of average, minimum, and maximum bid-ask spreads across gold product weight categories, December 2024 – February 2025

Weight-based category of a gold product	Average spread			Minimal spread			Maximal spread		
	Dec 2024	Jan 2025	Feb 2025	Dec 2024	Jan 2025	Feb 2025	Dec 2024	Jan 2025	Feb 2025
Very light: <5g	22.85%	20.75%	24.30%	16.00%	9.56%	9.60%	30.03%	37.83%	46.71%
Light: 5-15g	20.89%	17.32%	16.00%	8.45%	6.60%	6.40%	37.50%	37.50%	37.50%
Medium: 15-50g	10.87%	9.94%	9.40%	5.85%	4.67%	4.21%	27.45%	27.45%	27.41%
Heavy: 50-250g	6.61%	4.27%	6.50%	2.98%	4.70%	3.70%	10.00%	10.45%	10.50%
Very heavy: >250g	6.17%	8.13%	7.00%	3.26%	6.96%	3.30%	8.88%	8.54%	9.81%

Source: compiled by the author

A clear pattern can be noticed throughout the empirical analysis: smaller gold products, particularly in the very light (<5g) and light (5-15g) categories, had the highest percentage spreads, suggesting significantly higher transaction cost for small-sized products. Across the three months, the average spreads for the very light (<5g) category ranged from 20.75% to 24.30%, with maximum values exceeding 46%. Similarly, the light (5-15g) category remained with average spreads between 16% and almost 21%, with a wide variation of spreads between the minimum and maximum spreads.

In contrast, the medium (15-50g), heavy (50-250g), and very heavy (>250g) categories demonstrate significantly lower and more stable spreads, with average values below 11% across all months. Minimal spreads go as low as almost 3%, and maximum spreads rarely exceed 10% in the heaviest categories, highlighting the economies of scale and greater cost efficiency available to investors purchasing larger gold products.

It is important to notice that Table 2 highlights that these patterns continued across different months despite fluctuations in global gold prices. This suggests that the main driver of percentage-based transaction costs in the Estonian retail gold market is not short-term price volatility but product-specific characteristics, particularly weight and associated dealer markups. This study helps retail investors make well-informed decisions regarding the most affordable investment strategies in physical gold by identifying which product categories offer the best price-to-value ratios.

Although transaction spreads reflect the immediate cost of buying or selling actual gold, they only partially cover the total expenses associated with gold ownership. Following purchase, gold needs to be kept secure and regularly insured, which adds to the already high and typically ongoing expenses for individual investors. These practical issues are often ignored in public discussions despite the fact that they can significantly influence total investment outcomes. As highlighted by Demidova-Menzel and Heidorn (2007), these hidden expenses may significantly reduce the profitability of investing in physical products. Their study also reveals that investment products vary in terms of accessibility, liquidity, and continuing operating costs, all of which are crucial when for physical gold ownership, in addition to pricing and returns.

In Estonia, one of the most common options for storing gold is renting a safe deposit box in a bank or private vault provider. While no direct commissions are charged for the storage of gold, a fixed monthly or annual rental fee applies, depending on the size of the box. The availability of such services varies, and so do the costs. For example, *Tallinn Business Bank (TBB)* offers two box sizes:

- Small box (85 mm height): 15€/month or 180€/year
- Large box (285 mm height): 30€/month or 360€/year

A refundable key deposit of 250€ is also required.

Similar rental terms are offered by private secure storage company Hansab, which offers various options for both short-term and long-term storage. On an individual base, these prices might appear low, but over years, they represent a fixed overhead that scales independently of how much gold is stored. Whether storing 1000€ or 10 000€ worth of gold, the rental cost remains the same, making it less cost-effective for small-scale investors. It is also important to note that some storage providers (like SEB) do not publish detailed pricing or fee policies for gold-related services, making cost transparency challenging for new investors.

Insuring physical gold presents further difficulties. According to correspondence with Estonian insurers Seesam and ERGO, the coverage terms differ significantly based on where the gold is stored and its declared value.

- Gold kept at home can be partially insured under standard home insurance, usually up to 4000€.
- Insuring amounts above 4000€ requires stricter security measures, such as a certified safe, an active alarm system connected to a security company, and an official documentation (invoices, valuation certificates)
- Gold stored in bank safe deposit boxes is not covered by standard insurance policies.

Estimated premiums vary depending on location, risk profile, and coverage terms. For instance, Seesam suggested that insuring 10 000€ worth of gold stored at home could cost approximately 60€ - 150€ annually, depending on specific conditions. This creates an uneven risk landscape: gold stored at home may be insurable but less secure, while bank storage is safer but not insurable through traditional policies. As a result, investors must make trade-offs between safety, insurability, and cost, none of which are visible at the time of initial purchase.

This section presents two hypothetical yet representative investment cases to assess the real-world implications of spread levels and ownership costs. These examples help contextualize the percentage-based spread data and emphasize the importance of product weight and ownership costs in determining actual financial outcome of physical gold investment. Table 3 presents a comparison between two hypothetical cases, small and medium-scale investments, to show how losses in spreads and additional costs, such as storage and insurance, affect the overall result. The data indicates that while larger investments are typically more cost-effective, even a small investment may result in a significant loss. This table helps visualize the financial difference based on the selected product types and the amount invested.

Table 3.

Comparison of small and medium investment cases

	Small Investor	Medium Investor
Investment	1000 €	10,000 €
Spread loss	~22%	~7%
Storage/Insurance	60–90€/year	180€/year
Total loss	~31%	~8.8%

Source: compiled by the author

1. Case A: Small-Scale Investor with a 1000€ Budget

A hypothetical investor allocates 1000€ to physical gold in early 2025. Given the limited budget, the investor selects gold products in the *very light* category (i.e., 1 g and 2.5 g units). Based on the empirical results (see Table 2.), the average percentage spread for this category in year 2025 is approximately 22%.

This implies that the investor's holdings have an immediate resale value of:

$$1000\text{€} \times (1 - 0,22) = 780\text{€}$$

The gold is stored at home, which is covered under the standard household insurance policy, which in Estonia typically insures valuables up to 4000€ (ERGO & Seesam, 2025). Enhanced coverage, while optional, could increase annual costs by an estimated 60€ - 90€ depending on provider-specific conditions. Assuming that the investor resells the gold one year later at a stable market price, the total realized loss consists of:

- 220€ from the spread, and
- 60€ - 90€ from insurance, if applicable.

The total financial impact may reach 310€, representing a 31% loss relative to the initial capital.

This case illustrates that while small-scale investments in physical gold are accessible, they are not cost-effective. High spreads followed by optional insurance and the absence of economies of scale lead to an excessively high-cost burden, which is immediately realized upon resale.

2. Mid-Level Investor with a 10 000€ Budget

A second investor enters the market with a 10,000€ capital allocation. The investor chooses larger units, such as 100 g bars or 1 oz (31.1 g) coins, which fall under the *medium* and *heavy* weight categories. According to empirical data (see Table 2. and Table 3.), these categories are associated with an average spread of approximately 7%. Thus, the investor's holdings have a resale value of:

$$10000\text{€} \times (1 - 0.07) = 9300\text{€}$$

To store the gold securely, the investor rents a safe deposit box from Tallinn Business Bank (TBB) for 180€ per year. Additionally, a 250€ refundable key deposit is required (Tallinn Business Bank, 2024). As clarified by Seesam and ERGO, gold stored in bank vaults is not eligible for insurance coverage, which shifts the focus toward physical rather than financial protection.

After one year, assuming the resale takes place at unchanged gold prices, the investor receives 9300€ and deducts 180€ for storage. The total return becomes:

$$9300\text{€} - 180\text{€} = 9120\text{€}$$

This leads to a realized loss of 880€ or 8.8% of the original investment.

This case demonstrates how scale improves cost efficiency. Despite higher absolute costs, the proportional loss is much smaller than in the first case. Although the lack of insurance may still present a risk, the investor benefits from lower spreads and safer storage.

Conclusion

This thesis has explored the costs of investing in physical gold from the perspective of an Estonian retail investor, highlighting both theoretical and empirical findings. By thoroughly analyzing both direct and indirect costs, such as storage, insurance, bid-ask spreads, and taxes, the study has provided a clear framework for understanding the practical challenges and financial consequences of owning physical gold. Additionally, a review of previous empirical researches studied gold's role as a safe haven, inflation hedge, and portfolio diversifier, and it highlighted gaps in addressing practical costs faced by retail investors.

Through the analysis of percentage bid-ask spreads across multiple Estonian dealers and weight categories, the study revealed a consistent and significant pattern: smaller gold products had significantly higher transaction costs, with average spreads in the lighter categories exceeding 20%. On the other hand, greater conditions come with investing into heavier items (>50g), with spreads usually ranging from 6% to 8%. This pattern remained consistent from December 2024 to February 2025, indicating a structural pricing model among local sellers.

The thesis emphasized often underestimated ongoing costs of actual gold ownership, such as storage fees and insurance constraints, after the first purchase. Moreover, standard insurance coverage is limited, and many insurers do not protect gold stored in bank vaults, adding an additional layer of complexity and potential risks. The study also included case-based scenarios that help demonstrating how costs appear in real investment situations. For instance, even with no indication of a decline in the price of gold, a small investor buying 1000€ items may lose more than 30% of their money due to spread and optional insurance only. On the other hand, A 10,000€ investment in heavier gold units, yields a loss of less than 9%, illustrating the significance of scale, unit selection, and long-term strategy.

These practical findings support the theoretical claims of Demidova-Menzel & Heidorn (2007), who emphasize that physical gold has disadvantages in terms of accessibility, liquidity, and operating costs, despite being attractive due to its tangibility and crisis tolerance. This thesis aims to close the gap in the academic literature by focusing on the practical findings rarely considered in traditional portfolio theory.

This research offers valuable insights for Estonian retail investors by highlighting the hidden costs and decision-making dynamics associated with physical gold ownership. The findings indicate that investors should thoroughly assess not only the market potential of gold but also the cumulative effects of spread, storage, insurance, and product selection on their financial outcomes. By understanding these factors, private investors can make more informed, goal-focused decisions in a market that is safe, yet structurally expensive.

Although this thesis provided a practical overview of gold investment costs, future studies could explore several directions. First, gathering more frequent data over a longer period of time would help better capture changes in the seasons, market volatility, and pricing reactions to global events. Second, to further understand how cost structures fluctuate between countries, future studies could include international comparisons or expand the dealer sample. Third, in order to learn more about investor behavior, preferences, and understanding of hidden costs, like storage or insurance, a survey-based study could be conducted. Finally, analyzing other precious metals, such as silver or platinum using a similar cost-based approach, could offer valuable insights for retail investors seeking alternative investments.

References

1. Adkinson, G. A. (2024). Types of costs associated with investing. Retrieved from <https://www.linkedin.com/pulse/types-costs-associated-investing-george-adkinson-asci-ahksi-xgjoc/>
2. Aizenman, J., & Inoue, K. (2013). Central banks and gold puzzles. *Journal of the Japanese and International Economies*, 28, 69–90. <https://doi.org/10.1016/j.jjie.2013.02.001>
3. Aizenman, J., & Marion, N. (2003). On the effect of opportunity cost on international reserve holdings. *The Review of Economics and Statistics*, 85(3), 685–690. <https://doi.org/10.2307/2109666>
4. Alfaro, L., & Chauvin, J. (2017). Foreign Direct Investment, Finance, and Economic Development. *Encyclopedia of International Economics and Global Trade*. https://www.hbs.edu/ris/Publication%20Files/FDICapital_Formatted_20170922_Final_W_c7fcb82c-f318-4632-a589-20118eaeef8.pdf
5. Apanovych, Y., Líšková-Dvořáková, Z., Burghauserová, M., & Kovač, V. (2023). Insights into Gold Investing: Exploring Investor Behavior. *Acta Montanistica Slovaca*, 28(4), 807–818. <https://doi.org/10.46544/ams.v28i4.02>
6. Artigas, J. C. (2010). Rediscovering Gold As An Asset Class. *Journal of Indexes*, 13(6), 26–32. https://www.etf.com/docs/magazine/2/2010_176.pdf
7. Artigas, J., Ong, E., Palmberg, J., Street, L., & Grubb, M. (2011). *Gold: A Commodity Like No Other*, Published by the World Gold Council.
8. Auerbach, Alan J; Gordon, Roger H . (2002). *Taxation of Financial Services under a VAT*. *American Economic Review*, 92(2), 411–416. doi:10.1257/000282802320191714
9. Avery, L. J., & Collins, P. J. (1999). Managing Investment Expenses: Trustee Duty to Avoid Unreasonable or Inappropriate Costs. *ACTEC Notes*, 25(1), 123–136. https://heinonline.org/HOL/Page?collection=journals&handle=hein.journals/actec1j25&id=128&men_tab=srchresults
10. Beck, R. H. (2024). *Gold Price Today*. Retrieved from <https://www.forbes.com/advisor/investing/gold-price/>
11. Becker, B., Jacob, M., & Jacob, M. (2012). Payout taxes and the allocation of investment. *Journal of Financial Economics*, 107(1), 1–24. <https://doi.org/10.1016/j.jfineco.2012.08.003>
12. Bergstresser, D., Chalmers, J. M. R., & Tufano, P. (2009). Assessing the Costs and Benefits of Brokers in the Mutual Fund Industry. *The Review of Financial Studies*, 22(10), 4129–4156. <https://doi.org/10.1093/rfs/hhp022>

13. Bodie, Z., Kane, A., & Marcus, A. J. (2018). *Investments* (11th ed.). McGraw-Hill Education.
14. Bogle, J. C. (2014). The Arithmetic of “All-In” Investment Expenses. *Financial Analysts Journal*, 70(1), 13–21. <https://johncbogle.com/wordpress/wp-content/uploads/2010/04/FAJ-All-In-Investment-Expenses-Jan-Feb-2014.pdf>
15. Business News Daily. (2024). *Direct costs vs. indirect costs: What's the difference?* Retrieved from <https://www.businessnewsdaily.com/5498-direct-costs-indirect-costs.html>
16. Chen, W., & Wang, Y. (2025). Dynamic market making with asymmetric information and market power. *The Review of Financial Studies*, 38(1), 235–293. <https://doi.org/10.1093/rfs/hhae062>
17. Ciner, C., Gurdgiev, C., & Lucey, B. M. (2013). Hedges and safe havens: An examination of stocks, bonds, gold, oil and exchange rates. *International Review of Financial Analysis*, 29, 202–211. <https://doi.org/10.1016/j.irfa.2012.12.001>
18. Coulson, M. (2005). Gold as an investment. *Applied Earth Science Transactions of the Institutions of Mining and Metallurgy Section B*, 114(2), 122–128. <https://doi.org/10.1179/037174505x62802>
19. Curvo. (n.d.). *Compare indexes: Gold bullion vs S&P 500*. Retrieved December 16, 2025, from <https://curvo.eu/backtest/en/compare-indexes/gold-bullion-vs-sp-500?currency=eur#summary>
20. Demidova-Menzel, N., & Heidorn, T. (2007). *Gold in the investment portfolio* (Frankfurt School - Working Paper Series, No. 87). Frankfurt School of Finance & Management. <https://nbn-resolving.de/urn:nbn:de:101:1-2008082921>
21. Dong, X., Feng, S., & Sadka, R. (2019). Liquidity risk and mutual fund performance. *Journal of Finance Research*, 34(2), 123–145. Retrieved from <https://www.jstor.org/stable/10.2307/48760827>
22. Drehmann, M., & Nikolaou, K. (2013). Funding liquidity risk: Definition and measurement. *Journal of Banking & Finance*, 37(7), 2173–2182. <https://doi.org/10.1016/j.jbankfin.2012.01.002>
23. Durrett, D. (2010). *How to invest in gold and silver: A Complete Guide with a Focus on Mining Stocks*. (8th ed.). Ten Books Publishing. <https://investo.bg/wp-content/uploads/2023/06/Don-Durret-Gold-Mines-Valuation.pdf>
24. Eldenburg, L. G., & Wolcott, S. K. (2005). Cost Management: Measuring, Monitoring, and Motivating Performance.

25. ERGO Insurance SE. (2024). Property insurance terms and conditions. Retrieved from <https://www.ergo.ee>
26. Ferry, E. (2020). Speculative substance: ‘physical gold’ in finance. *Economy and Society*, 49(1), 92–115. <https://doi.org/10.1080/03085147.2019.1690254>
27. Fisher, D. (2023). *History Of Gold: Lessons To Learn For Investors*. Retrieved from <https://www.physicalgold.com/insights/history-gold-investment/>
28. Fisher, D. (2023). *What Types of Gold Investment are There?* Retrieved from <https://www.physicalgold.com/insights/what-types-of-gold-investment-are-there/>
29. Froot, K. A., & Wagoner, S. (2011). *BlackRock Solutions* (Harvard Business School Case No. 9-211-082). Harvard Business School Publishing.
30. Galas, M., Brown, D., Bryant, J., Li, L., Phelan, C., Rutkowska, A., & Treleaven, P. (2024). *The structure and impact of fees on investor and manager returns*. SSRN. <https://doi.org/10.2139/ssrn.4785475>
31. Garivaltis, A. (2019). Two resolutions of the margin loan pricing puzzle. *Research in Economics* (73)2, 199–207. <https://doi.org/10.48550/arxiv.1906.01025>
32. Grosheva, N., Grosheva, E., Fan, X., & Boltchenkoy, I. (2022). Инвестиции физических лиц в золото [Investments of individuals in gold]. *Russian Journal of Resources, Conservation and Recycling*, 15(3). <https://doi.org/10.15862/15ECOR122>
33. Habib, M. A., & Johnsen, D. B. (2015). The quality-assuring role of mutual fund advisory fees. *International Review of Law and Economics*, 46, 1–19. <https://doi.org/10.1016/j.irl.2015.11.003>
34. Hansab Group. (2024). Secure storage solutions. Retrieved from <https://www.hansab.ee/en/solutions/secure-storage/>
34. Haslem, J.A. (2004). Are mutual fund expenses too high? A commentary. *Journal of Investing*, 13(2), 8–12.
35. Hayes, A. (2024). *Gold price history: highs and lows*. Retrieved from <https://www.investopedia.com/gold-price-history-highs-and-lows-7375273>
36. Hendershott, T., Jones, C. M., & Menkveld, A. J. (2011). Does algorithmic trading improve liquidity? *Journal of Finance*, 66(1), 1–33.
37. Holmström, B., & Tirole, J. (2000). Liquidity and risk management. *Journal of Money, credit and Banking*, 32(3), 295–319. Retrieved from <https://doi.org/10.2307/2601167>
38. Investopedia. (2023). *What Are Assets Under Management (AUM)?* Retrieved from <https://www.investopedia.com/terms/a/aum.asp>

39. Joel, T. (2024). *Types of Investment Costs*. Retrieved from <https://cowrywise.com/blog/types-of-investment-costs/>
40. Joy, M. (2011). Gold and the US dollar: Hedge or haven? *Finance Research Letters*, 8, 120–131.
41. Kakkar, S., & Chitrao, P. V. (2023). Significance of Gold in Indian culture. *Journal of Contemporary Issues in Business and Government*, 29(02), 78–84.
42. Kirby, C. (2023). Look Out for These 5 Hidden Investment Fees. Retrieved from <https://dreamwork.financial/top-5-hidden-investment-fees/>
43. Kopp, E., Kaffenberger, L., & Wilson, C. (2017). *Cyber risk, market failures, and financial stability*. *IMF Working Papers*, 17(185).
44. Kosares, M. J. (2013). *The ABCs of gold investing: How to protect and build your wealth with gold* (3rd ed.). Newcastle Financial Publishing. Retrieved from <https://archive.org/details/abcsofgoldinvest0000kosa>
45. La Monica, P. R. (2023). *How the market has changed in the 20+ years I've covered it*. Retrieved from <https://edition.cnn.com/2023/03/03/investing/investing-lessons/index.html>
46. Lahoti, J. H. (2017). An analytical study on perception of investors towards gold as an investment option. *Paripex - Indian Journal of Research*, 6(3), 1–6.
47. Leicht, A. (2023). *5 reasons beginners should invest in gold in 2024*. Retrieved from <https://www.cbsnews.com/news/reasons-beginners-should-invest-in-gold-in-2024/>
48. London Bullion Market Association. (2024). *Good delivery standards*. Retrieved from <https://www.lbma.org.uk/market-standards>
49. Ljutova, I.I. (2018). Мировые Запасы и Динамика Добычи Золота [World Reserves and Dynamic of Gold's Supply]. *Messenger of the National Institute of Business*, 35, 118–123.
50. Low, S. (2017). Explaining the expense ratio of international equity funds. *American Journal of Business*, 32(2), 82–92. <https://doi.org/10.1108/ajb-07-2016-0021>
51. Madsen, J. B. (2003). Inflation and Investment. *Scottish Journal of Political Economy*, 50(4), 375–397.
52. MacNeil, I. G. (2012). *An introduction to the Law on Financial Investment*. (2nd ed.). Hart Publishing. https://www.google.ee/books/edition/An_Introduction_to_the_Law_on_Financial/g4t6BAAAQBAJ

53. Nair, J. R., Kumar, B., & Inani, S. (2021). Market backwardation and the theory of storage: An empirical investigation of Indian gold futures markets. *Global Business Review*. <https://doi.org/10.1177/09721509211046337>
54. Martin, R., Malhotra, D.K. and McLeod, W. (2001). A comparative analysis of the expense ratios of domestic and international open-end and closed-end equity funds. *Financial Counseling and Planning*, 12(2), 61–72.
55. Nasdaq. (2024, November 12). *How to insure physical gold*. Retrieved from <https://www.nasdaq.com>
56. Nawaz, N., & R, S. V. (2013). A study on various forms of gold investment. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3525301>
57. NerdWallet. (2023). *Brokerage fees and investment commissions explained*. Retrieved from <https://www.nerdwallet.com/article/investing/brokerage-commissions-fees>
58. Numismatic Guaranty Company. (2024). Services and fees. Retrieved from <https://www.ngccoin.com>
59. O'Connor, F. A., Lucey, B. M., Batten, J. A., & Baur, D. G. (2015). The financial economics of gold — A survey. *International Review of Financial Analysis*, 41, 186–205. <https://doi.org/10.1016/j.irfa.2015.07.005>
60. Panis, C. W. A., & Padmanabhan, K. (2023). *Buy low, sell high: The ability of investors to time purchases and sales of mutual funds*. U.S. Department of Labor, Employee Benefits Security Administration.
61. Parker, R., & Kyj, L. (2006). Vertical information sharing in logistics relationships. *International Journal of Physical Distribution & Logistics Management*, 36(9), 712–730.
62. Rompas, P. L. (2015). A Qualitative Research of Woman Perception of Gold Jewelry as Investment in Manado. *Jurnal Riset Ekonomi, Manajemen, Bisnis dan Akuntansi*, 3(1).
63. Raudhatusoufwah, R., Pok, W. H., Ismail, A. K., Ahmad, A., Manaf, M. S. A., Ahmad, N., Mohammad, E. J., Wahab, Y. A., Zakaria, Z., & San, C. K. (2021). Gold purity determination using ultrasonic wave: A review. *Journal of Nondestructive Testing*, 35(4), 123-134. <https://doi.org/10.1016/j.jnt.2021.02.005>
64. Sanderson, H. (2015). *Gold rises amid expectation of ECB move on E*. Retrieved from <https://www.ft.com/content/6084ae4a-9fce-11e4-9a74-00144feab7de>
65. Seesam Insurance AS. (2024). Home insurance product information. Retrieved from <https://www.seesam.ee>

66. Smirnova, E. (2016). Use of gold in financial risk hedge. *Quarterly Journal of Finance and Accounting*, 54(1/2), 69–91. <https://www.jstor.org/stable/44657338>
67. Smith, S. H., & Singleton, R. (2015). Tax-efficient investing in gold. *Journal of Accountancy*. <https://www.journalofaccountancy.com/issues/2015/jan/investing-in-gold-tax-considerations.html>
68. Stringham, E. P. (2015). *Private governance: Creating order in economic and social life*. Oxford University Press. Retrieved from https://www.academia.edu/107942121/Private_Governance
69. Tallinn Business Bank. (2024). Safe deposit boxes – prices and sizes. Retrieved from <https://www.tbb.ee/en/private/safe-deposit-boxes/>
70. The Royal Mint. (2024). Authentication and valuation services. Retrieved from <https://www.royalmint.com>
71. Torres Kompen, R., Edirisingha, P., & Monguet, J. M. (2009). Using Web 2.0 applications as supporting tools for personal learning environments. In M. D. Lytras, P. Ordóñez de Pablos, E. Damiani, D. Avison, A. Naeve, & D. G. Horner (Eds.), *Best practices for the knowledge society: Knowledge, learning, development and technology for all* (pp. 33–40). Springer. https://doi.org/10.1007/978-3-642-04757-2_4
72. Trivedi, J. C., Patel, P., & Sidhpura, S. (2012). Is Towering Gold an Investment Choice? *The Journal of Innovative Thinkers*, 1(2). <https://ssrn.com/abstract=2223188>
73. U.S. Department of Labor. (2023). *Buy Low, Sell High: The Ability of Investors to Time Purchases and Sales of Mutual Funds*. Retrieved from <https://www.dol.gov/sites/dolgov/files/ebsa/researchers/analysis/retirement/buy-low-sell-high-the-ability-of-investors-to-time-purchases-and-sales-of-mutual-funds.pdf>
74. U.S. Securities and Exchange Commission. (n.d.). *How Fees and Expenses Affect Your Investment Portfolio*. Retrieved from https://www.sec.gov/investor/alerts/ib_fees_expenses.pdf
75. Understanding Investing. (2015). THE COSTS OF INVESTING. [Video recording] Retrieved from <https://www.alfi.lu/en-gb/understandinginvesting/videos/the-costs-of-investing>
76. University of California, Santa Barbara. (2015). *An Introduction to Indirect Costs at UC Santa Barbara*. Retrieved from <https://www.research.ucsb.edu/sites/default/files/SPO/Budget%20Preparation/Introduction%20to%20Indirect%20Costs.pdf>

77. Verma, S., & Sharma, M. (2014). A Study of the Factors Affecting Gold as an Investment Option. *International Journal of Business Insights & Transformation*, 8(1), 18–24.
<https://research.ebsco.com/c/rfupc/search/details/auidpg622f>
78. Waham, A. (2022). *How to identify hidden investment fees in your portfolio*. Retrieved from <https://facet.com/financial-planning/how-to-identify-hidden-costs-in-your-investment-portfolio/>
79. Witherell, M. (2015). *An Introduction to Indirect Costs at UC Santa Barbara*. Retrieved from https://www.research.ucsb.edu/sites/default/files/policies/others/introduction_to_indirect_costs.pdf
80. Wyart, M., Bouchaud, J.-P., Kockelkoren, J., Potters, M., & Vettorazzo, M. (2008). Relation between bid\ask spread, impact and volatility in order-driven markets. *Quantitative Finance*, 8(1), 41–57. <https://doi.org/10.1080/14697680701344515>

Resümee

KULDASSE INVESTEERIMISE KULUD – EESTI ERAINVESTORI VAATENURK

Kristina Kalinina

Bakalaureusetöö eesmärk oli hinnata füüsilisse kulda investeerimise kulusid Eesti jaeinvestori vaatenurgast. Uurimistöö raames analüüsiti nii otseseid kui ka kaudseid kulusid, mis kaasnevad füüsilise kulla omamise ja hoidmisega, sealhulgas tehingukulud, hoiustamistasud, kindlustuskulud, autentimise hinnad ja maksud. Töö teoreetilises osas kaardistati investeerimisega seotud kulude liigid ja võrreldi erinevaid kullapõhiseid investeerimistooteid. Samuti tehti ülevaade varasematest empiirilistest uurimustest, mis käsitlevad kulla rolli kui inflatsioonikaitset, turu turbulentsi ajal kindlat varaklassi ning portfelli mitmekesistajat.

Empiirilises osas koguti andmeid Eesti suurematelt kulla müüjatelt – Tavid, Tavast ja Money Express – ning analüüsiti erinevate kuldtoodete (müntide ja kangide) bid-ask spredide muutumist detsembrist 2024 kuni veebruarini 2025. Tulemused näitasid, et väiksemate kuldtoodete puhul olid tehingukulud (protsentuaalne spread) oluliselt kõrgemad kui suuremate ühikute puhul. Samuti hinnati hoiustamise ja kindlustamise kulusid, kogudes teavet TBB ja Hansabi hoiukapiteenuste kohta ning kontakteerudes kindlustusfirmadega Seesam ja ERGO.

Töö praktilise väärtuse suurendamiseks koostati ka kaks hüpoteetilist investeerimisjuhtumit. Analüüs näitas, et väikeste summade investeerimisel füüsilisse kulda võivad kogukulud ulatuda kuni 31%-ni investeeringust, samas kui suuremate summade puhul on see märgatavalt madalam (~9%). Selline erinevus tuleneb peamiselt skaleerimisefektidest, kus suuremate toodete puhul langevad suhtelised tehingukulud.

Töö tulemused annavad selge ülevaate füüsilisse kulda investeerimise varjatud kuludest ja aitavad Eesti jaeinvestoritel teha informeeritud otsuseid. Tulevikuuuringud võiksid keskenduda kulude võrdlusele rahvusvahelisel tasandil, samuti jaeinvestorite hoiakute ja teadmiste kaardistamisele seoses kulla investeerimisega.

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