## Introduction

The world of investing has seen a significant shift with the inclusion of unconventional assets like LEGO or Pokémon cards. Originating in the late 1990s, Pokémon cards have evolved from a children’s collectible to a potential investment opportunity. This study seeks to compare the investment performance of Pokémon cards with traditional stock investments. It attempts to address the questions about the performance of Pokémon cards relative to stocks and the relationship of price trends between both groups.

In the first part, a brief literature review is provided. Then, the data used for the analysis are described. In the third part the hypotheses and methodology of the analysis are presented; and lastly the results along with the conclusion are highlighted.

## Literature review

Pokémon cards have emerged as a lucrative investment opportunity, especially since the COVID-19 pandemic, which brought back interest in this collectible. Moreover, card collectibles experts predict the Pokémon cards value to be rising in the near future. This is backed by the observations of a spike in demand of other cards, like sports cards and all other categories of collectibles after 25 years, since those items typically reach its ‘full nostalgia factor‘ (USA Today, 2023).

The value of Pokémon cards today is driven by factors like rarity, condition, and grading. Cards from the first editions and shadowless variants in the mint condition are highly valued. The most iconic example is the 1st Edition Shadowless Holographic Charizard card, with its value reaching even more than 400 thousand dollars (Forbes, 2022; Collectibles Insurance Services, 2021; Money Under 30, 2021)

The grading of Pokémon cards, conducted by companies like PSA and CGC, plays an important role in their valuation. A card graded as Gem Mint 10 can be priced significantly higher than the same card ungraded or in a lower-grade condition. (33rd Square, 2023)

Other factors contributing to the value of Pokémon cards include age, with cards from the 1996-2000 era being more valuable in general, and aesthetic aspects of the cards like holographic designs, adding rarity and thus value (MoneyMade, 2023).

Moreover, alongside Pokémon cards, other unconventional assets like LEGO sets have also gained recognition as viable alternative investments. A study analysing the financial returns of LEGO sets found that these toys, with their decreasing supply over time, generate high returns on the secondary market. In fact, LEGO investments outperformed large stocks, bonds, gold, and other alternative investments, yielding an average return of at least 11% (8% in real terms) over the period from 1987 to 2015. This study also highlighted that LEGO returns are not exposed to market, value, and volatility risk factors, making them a possibly attractive option for investors seeking diversification (Dobrynskaya - Kishilova, 2018).

On the other hand, compared to the Pokémon cards value determinants, stock market investments are typically assessed over long periods and are influenced by broader economic trends. The stock market performance and its driving factors are well-documented and have been analyzed in many studies (e.g., Siegel J., 2008). However, direct comparisons between the specific investment performances of Pokémon cards and stocks are scarce in existing literature.

Therefore, this study aims to fill this gap by analysing and comparing the returns, risks, and market behaviour of Pokémon cards and stocks as two distinct forms of investment.

## Data

The data on Pokémon prices were collected using a web scraping method utilising Python and its libraries including BeautifulSoup, requests, and selenium. The data were retrieved from the website Pokemonprices.com and processed into the format suitable for data analysis.

The data on stocks were retrieved from Yahoo Finance using an API. The corresponding data retrieval and data processing code along with the datasets can be accessed under the link in the Appendix. The key processing steps are described further.

First, the Pokémon prices data were grouped by the card and set name the card belongs to. Since there were several thousands of unique cards, it was decided to select only the cards with the most frequent observations. This resulted in ten separate datasets of unique cards, of which four were released in 1999, three in 2016, one in 2019, and two in 2020. This means not only vintage cards are frequently traded, but this also holds for the cards from more recent Pokémon cards sets. Those datasets, however, needed to be adjusted further, since each of them was comprised of irregular observations of prices across time. Furthermore, each card had different number of sales for different grades. For example, the older cards were traded across a broad range of grades, whereas the more recent cards were heavily traded only for the best grades. Therefore, it was decided to create a mean of the card’s sales observations per month due to their irregularity, and to select observations only for grades that had observations for more than half the months included in each of the card’s datasets.

The missing values were filled-in using the so-called forward fill, i.e. the missing values were filled forward with the preceding non-missing observation. In the case when there was no non-missing preceding observation (i.e. at the beginning of each dataset) the so-called backward fill was used. This resulted in monthly prices data for the different Pokémon cards, with most datasets starting in 2016, and all ending in the year 2023. Each dataset has its unique timeframe, and each dataset contains its unique most frequently traded grades. Additionally, each grade in each of the datasets have a different number of artificially filled-in monthly prices values. In the analysis part, it is always stated how 'heavily' the given grade observations were filled in, suggesting the preciseness of the results for each of the grades. In the end the stocks S&P500 prices and riskless bonds monthly data were merged with each of the card’s datasets on the date (i.e. month and year), resulting in the final datasets used for the analysis.

The key variables included in each of the datasets are:

*gradeXprice*; for X being a number in a range from 1 to 10. – represents the price for given grade (X) in each month.

*adjclosestock* – represents the closing price of an S&P500 in a given month.

*adjclosebond* - represents the closing price of a riskless bond in a given month.

## Hypotheses

H1: The Pokémon cards have generally higher returns than stock returns over the period 2017–2023.

H2: The Pokémon cards prices are negatively related to the stock prices during the period 2017-2023.

H1 – motivated by that cards carry more risk – thus higher returns.

H2 – motivated by that during economic downturns (fall of stock prices) investors turn to alternative investments (rise in pokemon prices).

## Methodology

~~Panel data methods on monthly data aggregated from the data with higher frequency, in the case of both cards and stocks. This ensures the time consistency between the two. Panel data chosen since we have a cross-sectional set of cards/sets and stocks altogether, observed during the time-frame of 2017-2023. Pooled OLS, Fixed Effects, Random Effects.~~

Now, we have a time series data for 10 (7) different cards, of which 4 are from the year 1999 and 3 from the year 2016.

*H+M: 1page*

## Results

R: 3 pages

## Conclusion

*C: 0.5 page*

## References:

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