



**UNIVERSITÀ  
DI PARMA**

# **Data Envelopment Analysis and Italian Mutual Funds**

**MASTER'S DEGREE IN FINANCE AND RISK MANAGEMENT**

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# Overview

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# Objective

**Is there a better method than traditional indices to evaluate the efficiency of mutual funds?**

## Traditional Indices

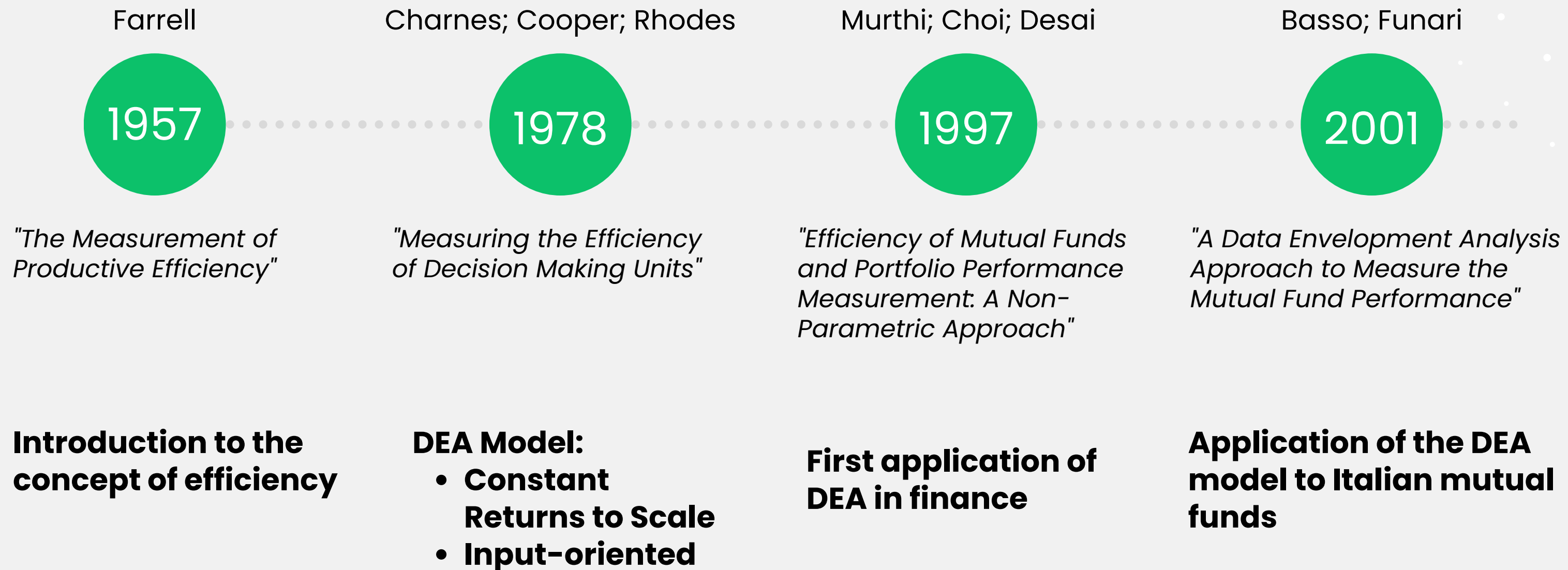
- Indice di Sharpe
- Indice di Treynor
- Alpha di Jensen



## Data Envelopment Analysis

# Literature Review

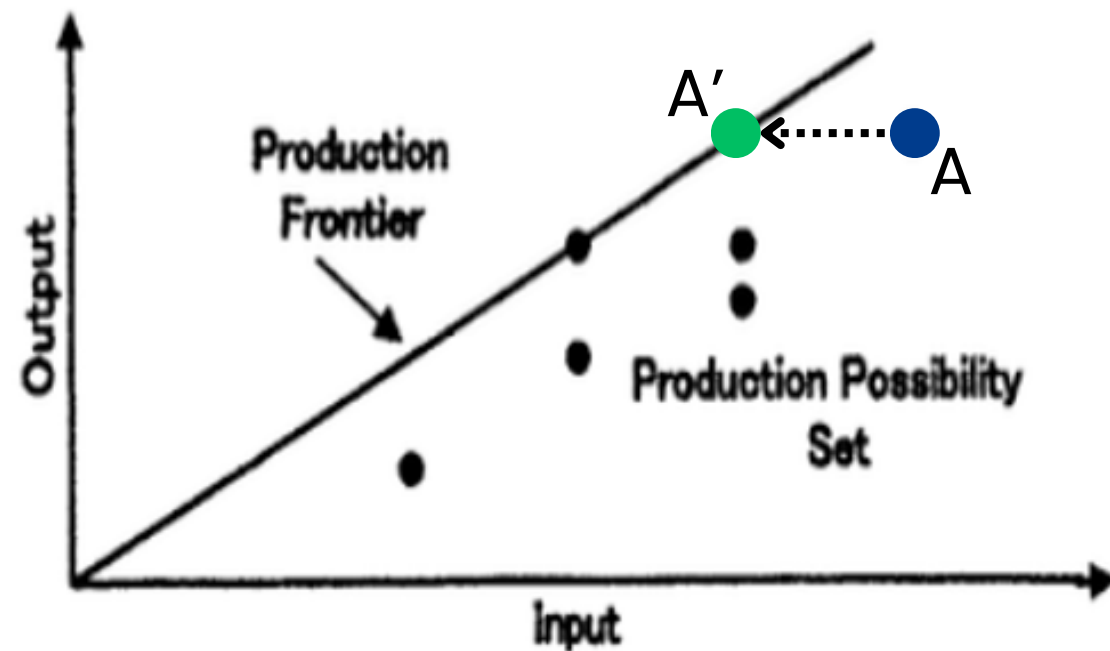
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# Methodology

## Phases of Data Envelopment Analysis

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● — ○ **Definition of Inputs and Outputs**

● — ○ **Calculation of fund efficiency**

● — ○ **Identification of optimal weights**

● — ○ **Calculation of efficient combinations**

# Dataset

Period: 01/01/2019 – 30/06/2021

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## 3 Fund Categories

- Italian Equity Funds(22)
- Euro Government Bond Funds(15)
- Euro Moderate Balanced Funds(15)

## 3 Input

- Standard Deviation
- Beta
- Entry Fee

## 1 Output

- Expected Return

# Results

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Average Efficiency Index by Category



Italian Equity Funds



Euro Government  
Bond Funds

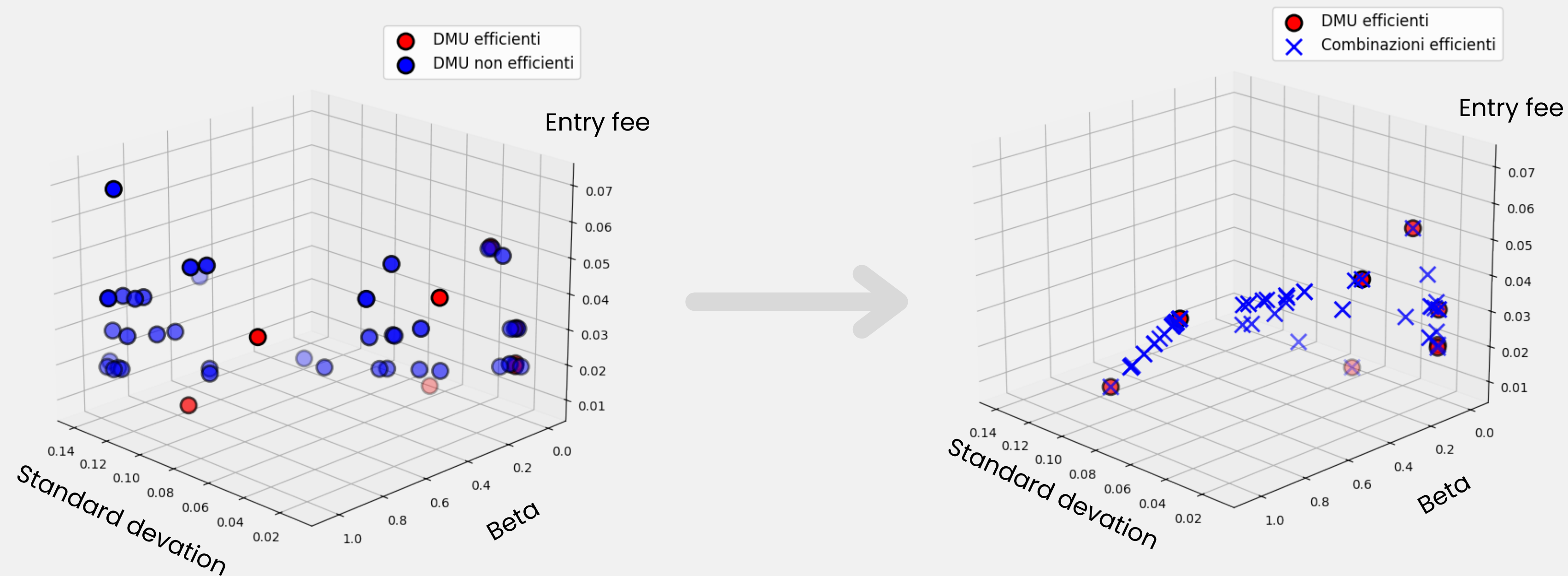


Euro Moderate  
Balanced Funds

# Results

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From Decision Making Units to Efficient Combinations



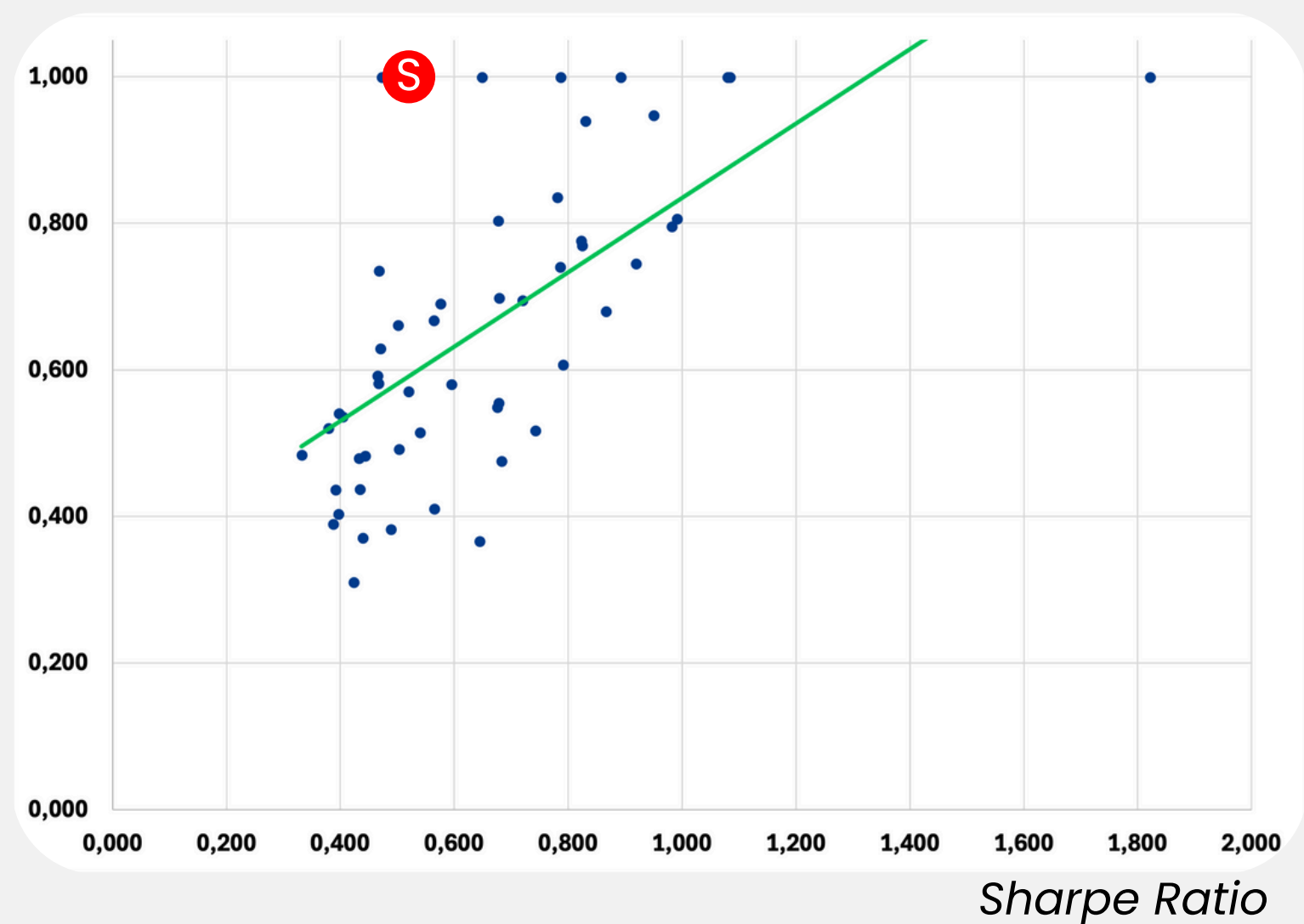


# Results

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## DEA vs. Traditional Indices

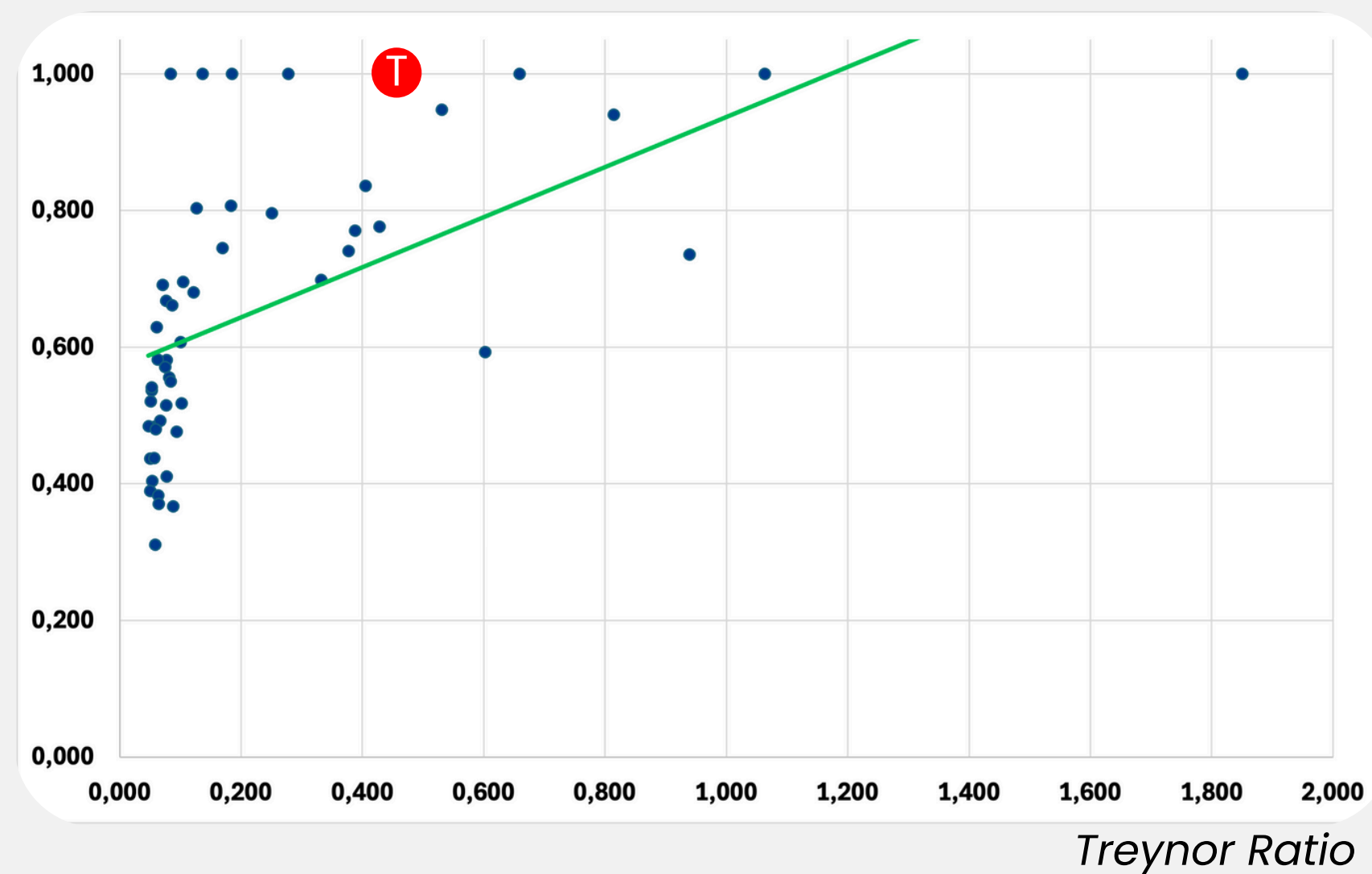
DEA Index



**Linear Correlation:** 0.639

**S** Pictet-EUR Government Bonds I  
Beta: 0.01 vs. 0.50 average

DEA Index



**Linear Correlation:** 0.585

**T** Epsilon Fund – Euro Bond Class Unit R Eur Accumulation  
Entry Fee: 1.50% vs. 3.00% average

# Further Analysis

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Efficiency Index for Passive Funds – ETFs



0.00%

**Entry Fees**



Xtrackers II Eurozone  
Government Bond UCITS ETF 1C



iShares FTSE MIB UCITS ETF

# Further Analysis

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Efficiency Index for ESG Funds

**33** Non-ESG Mutual Funds

**19** ESG Mutual Funds



Non-ESG Mutual  
Funds



ESG Mutual Funds

# Historical Comparison

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Period	Equity Efficiency*	Bond Efficiency*	Balanced Efficiency*	DEA-Sharpe Correlation	DEA-Treynor Correlation
01/01/1997 - 30/06/1999**	0.907	0.439	0.900	0.727	0.624
01/01/2019 - 30/06/2021	0.595	0.863	0.687	0.639	0.585

\*Intra-category efficiency measurement

\*\*Basso, A., & Funari, S. (2001). *A data envelopment analysis approach to measure the mutual fund performance*

# Why DEA?

Advantages Over Traditional Indices

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**Multi-input and  
multi-output analysis**



**Inclusion of entry  
costs**



**Measurement of relative  
efficiency and  
customized benchmarks**

# Thank you

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