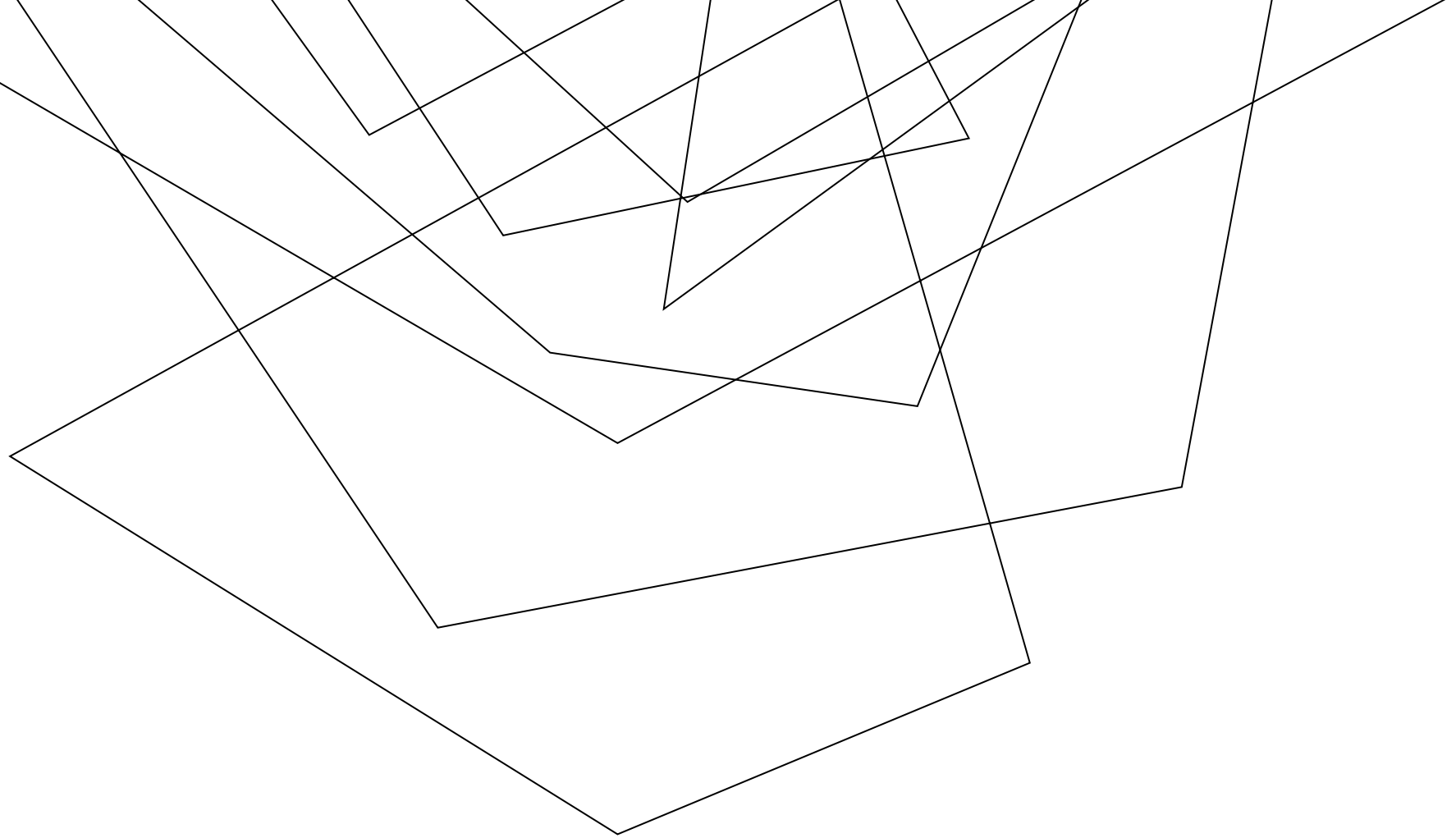


FACTOR INVESTING

Theoretical Background

AGENDA

Introduction

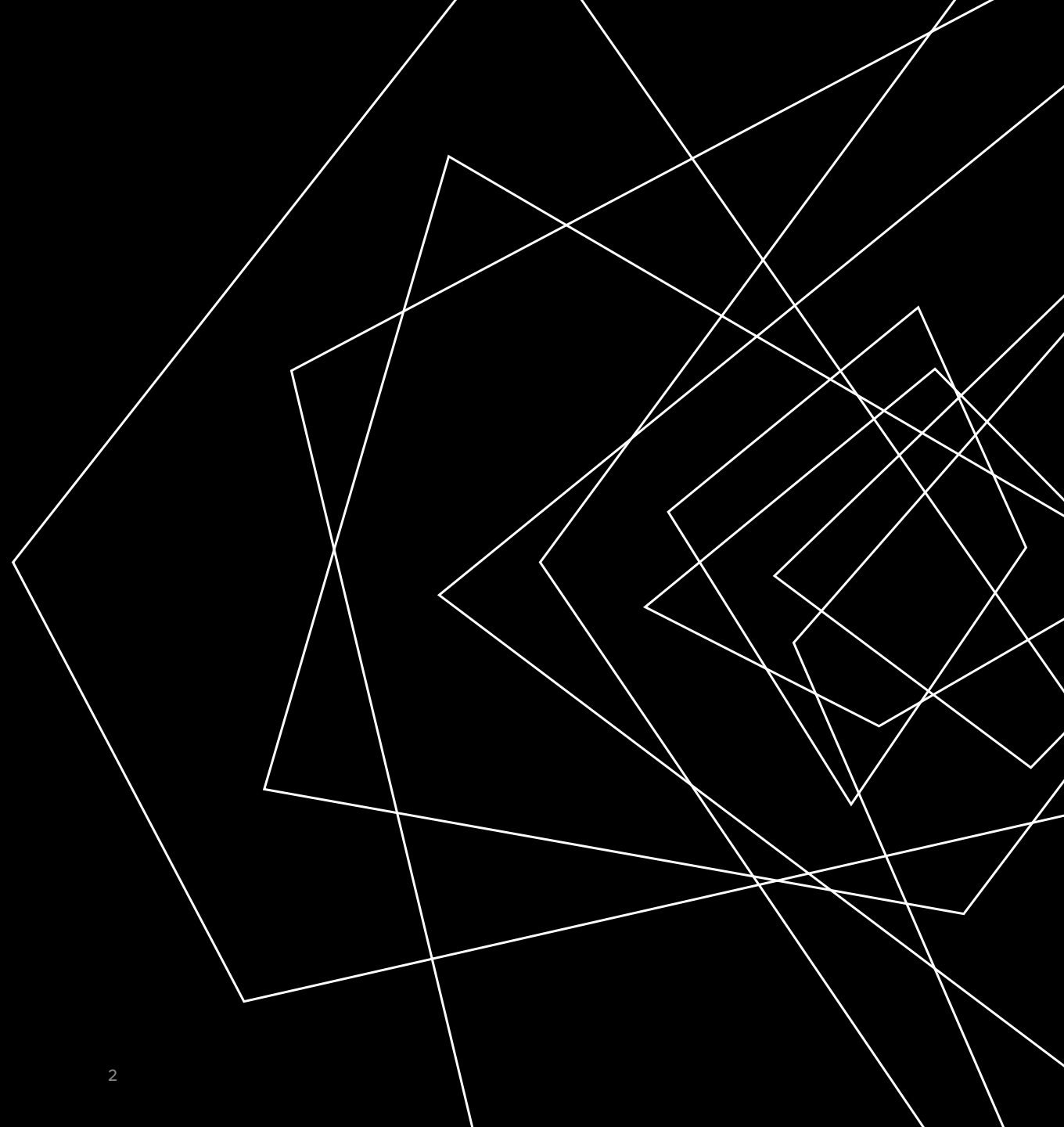
Capital Asset Pricing Model (Beta)

Fama-French 3 Factor Model (Value & Small Size)

Carhart 4 Factor Model (Momentum)

AQR 5 Factor Model (Carry & Defensive)

Our Project

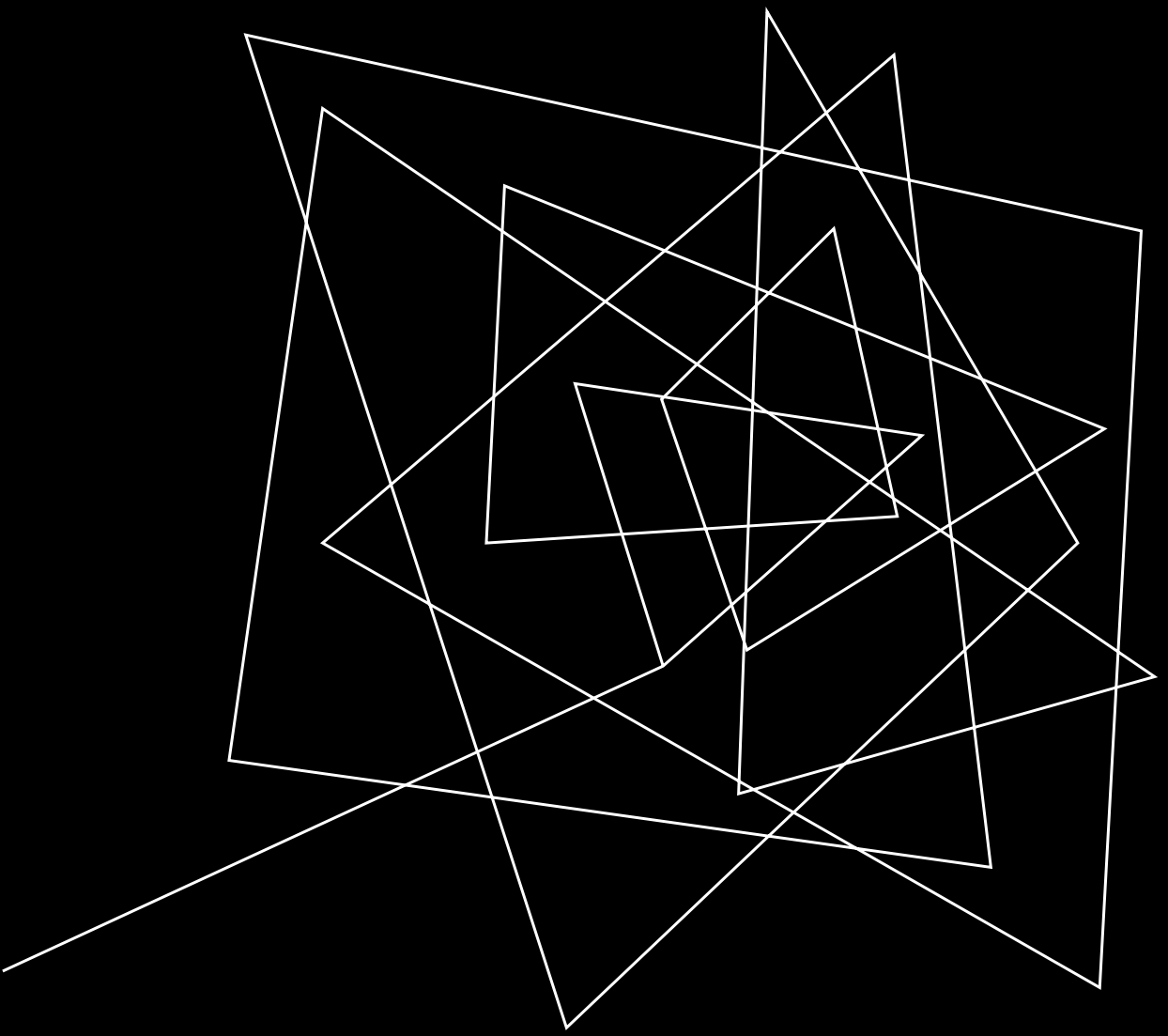


INTRODUCTION

Why does one stock or security in general outperform another?

For example, why did the Tesla stock so much better than the Volkswagen stock?

Financial economists of the 20th century asked themselves this question and tried to find general non-case-specific factors that can explain these differences in returns.



CAPITAL ASSET PRICING MODEL

The Beta Factor

CAPITAL ASSET PRICING MODEL: THE BETA FACTOR

$$stock\ return = \alpha + \beta * market\ return + \varepsilon$$

β is the security's dependence on the overall market.

The higher β, the riskier the security. And for more risk, investors should get more return.

So, if a security is outperforming, its beta should be higher, which means it should be riskier.

Example

Tesla‘s β = 2

Volkswagen’s β = 1

Market Return = 10%

$\alpha = \varepsilon = 0$

Tesla’s return = $2 * 10\% = 20\%$

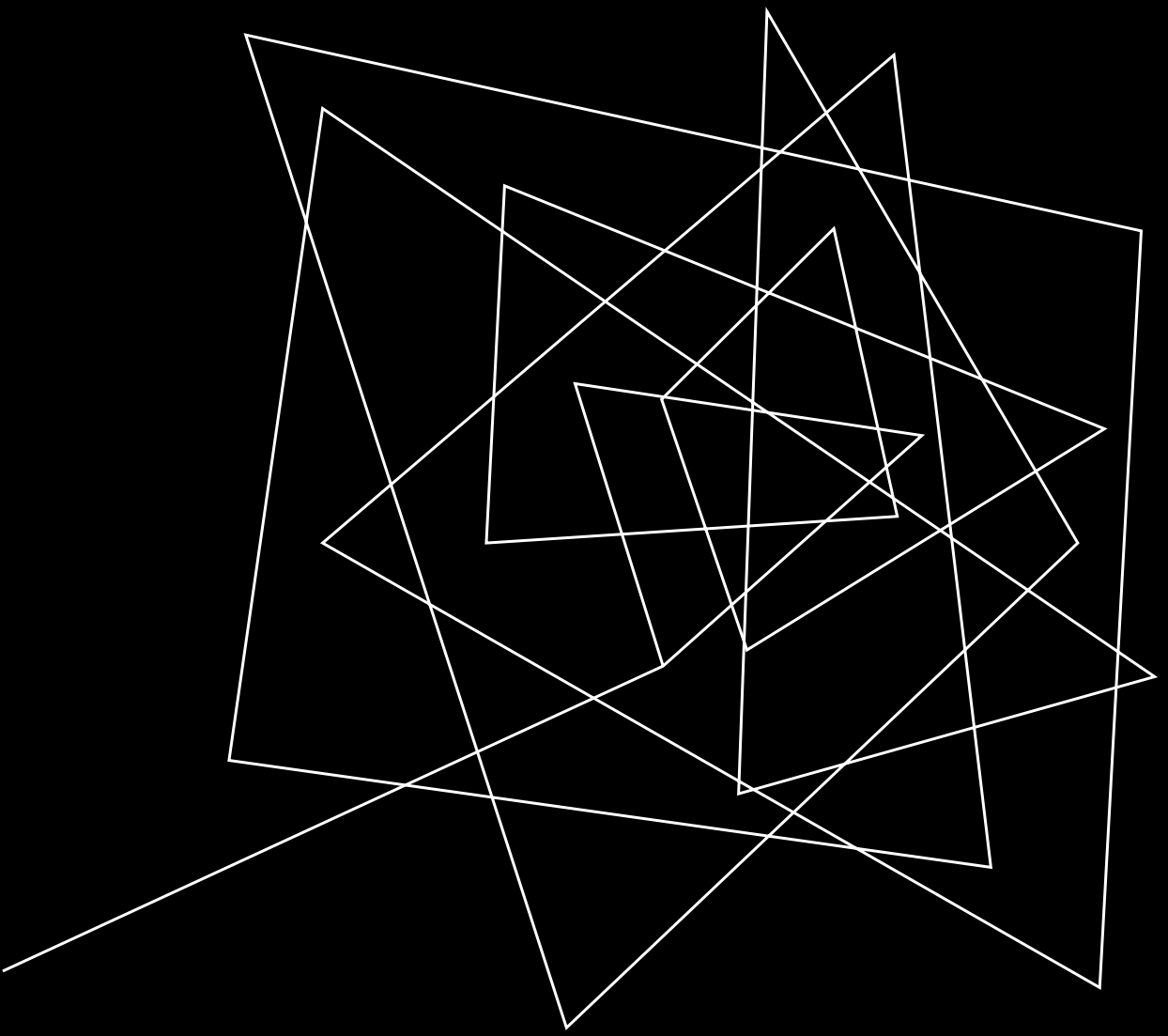
Volkswagen’s return = $1 * 10\% = 10\%$

THE PROBLEM WITH THE CAPM

It explained only 70% of the return differences.

Very low beta securities outperform very high beta securities.

So, it's not universal, and there must be some other factors that explain the differences in returns.



FAMA-FRENCH 3 FACTOR MODEL

The Beta, Value and Small Size Factor

FAMA-FRENCH 3 FACTOR MODELS: THE BETA, VALUE AND SMALL SIZE FACTOR

$$stock\ return = \alpha + \beta * market\ return + b_V * value + b_S * small\ size + \varepsilon$$

Two economists, Fama & French, found two things:

Cheap securities outperform expensive ones.

Stocks of small companies outperform those of large ones.

Value

= Return of cheap securities – return of expensive securities

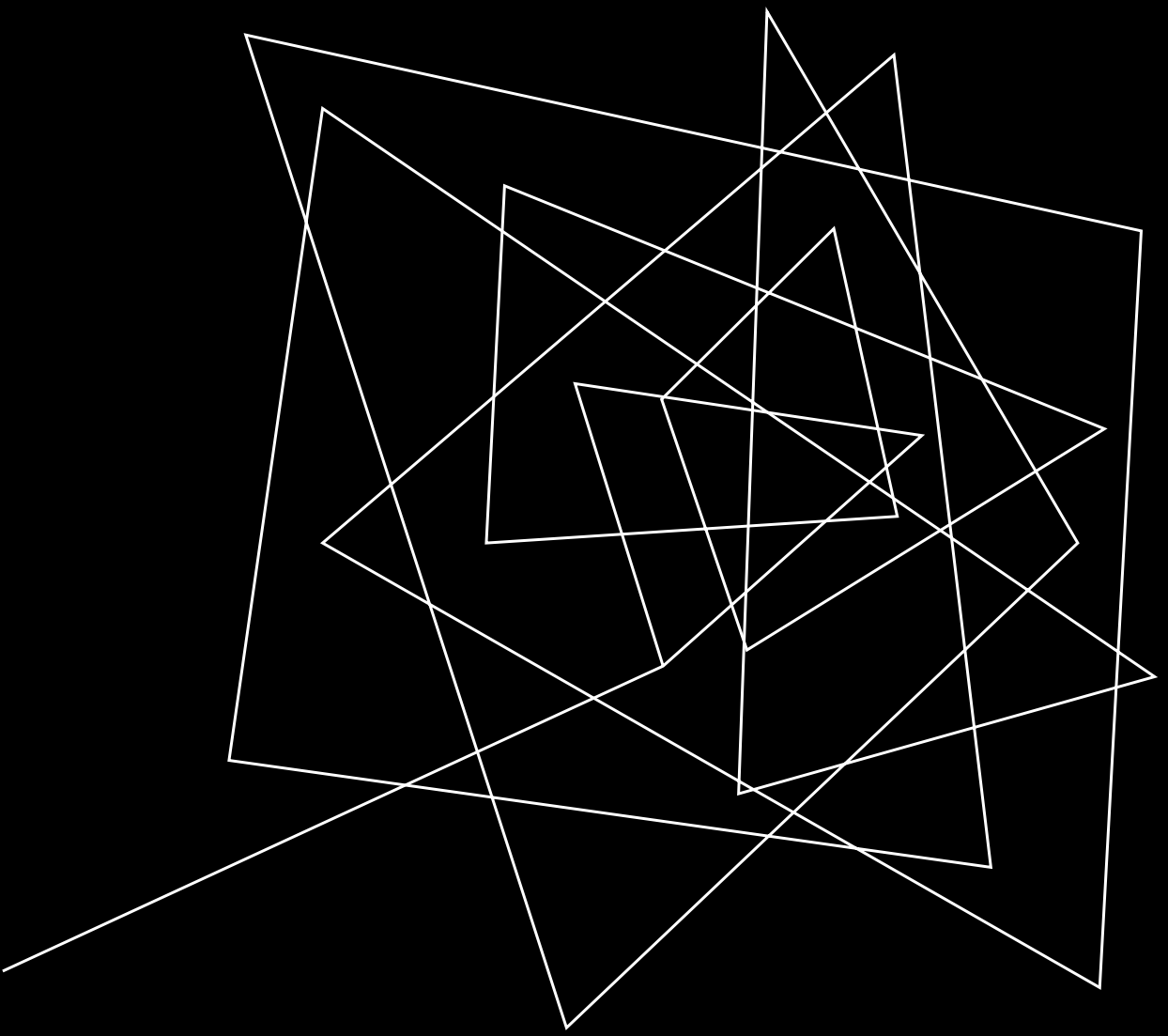
Small Size

= Return of small stocks – return of large stocks

THE PROBLEM WITH THE FF3M

Still, it explains too less of the difference in returns.

There must be more.



CARHART 4 FACTOR MODEL

The Beta, Value, Small Size, and Momentum Factor

CARHART 4 FACTOR MODEL: THE BETA, VALUE, SMALL SIZE AND MOMENTUM FACTOR

$$stock\ return = \alpha + \beta * market\ return + b_V * value + b_S * small\ size + b_M * momentum + \varepsilon$$

The economist Carhart included the so-called momentum factor.

It has been studied that securities that have outperformed recently will continue to do so due to herding, FOMO, etc. The same is true vice versa.

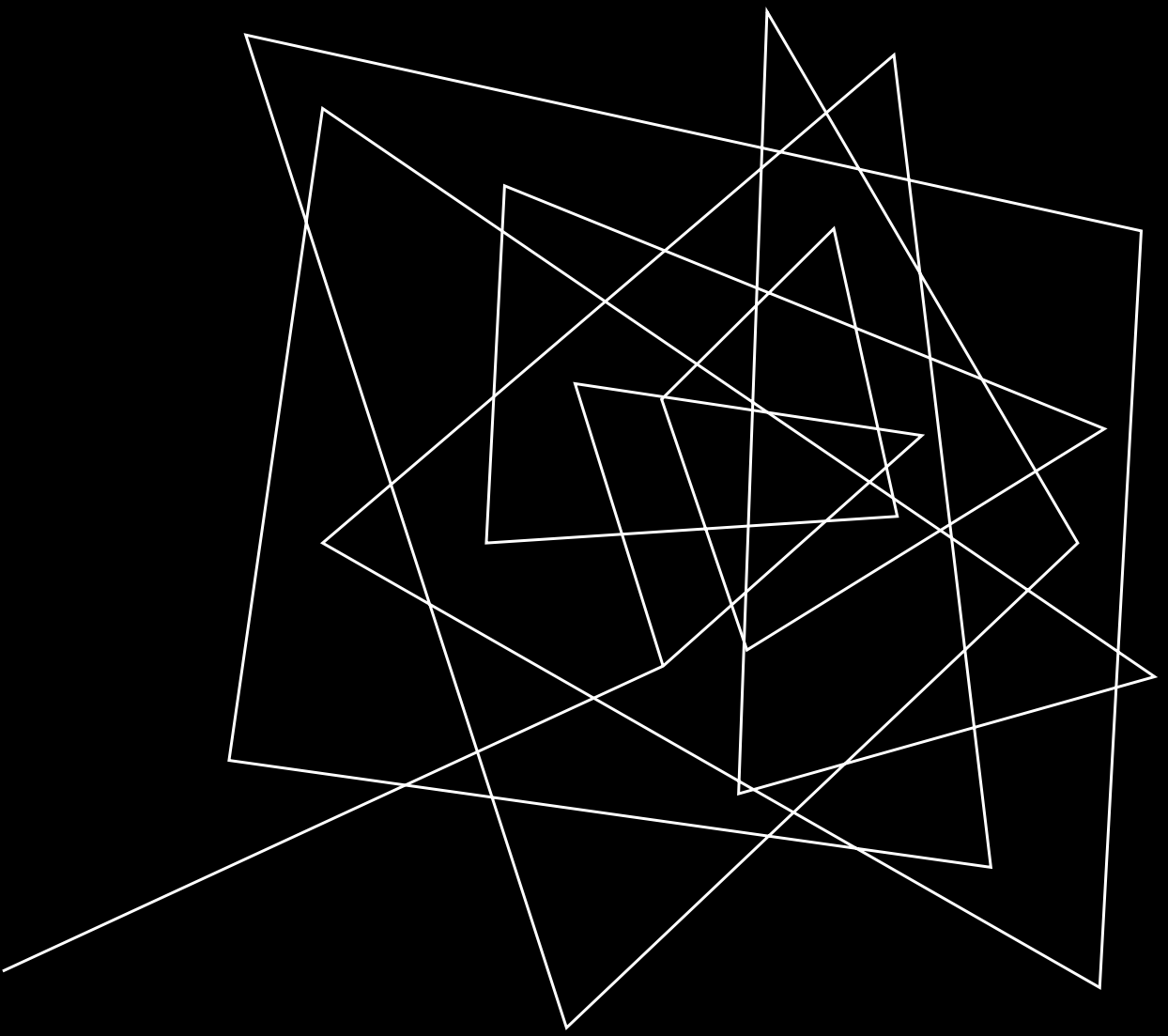
Momentum

= Return of outperforming securities – return of underperforming securities

THE PROBLEM WITH THE C4M

It turned out, that the Small Size factor is not real and due to erroneous data (illiquidity effects).

There is still the phenomenon, that very low Beta stocks outperform very high Beta stocks



AQR 5 FACTOR MODEL

The Beta, Value, Momentum, Carry, and Defensive Factor

AQR 5 FACTOR MODEL: THE BETA, VALUE, MOMENTUM, CARRY AND DEFENSIVE FACTOR

$$stock\ return = \alpha + \beta * market\ return + b_V * value + b_S * momentum + b_C * carry + b_D * defensive + \varepsilon$$

AQR, an Asset Manager with strong academic roots,

dropped the Small Size Factor, since the outperformance of small sized stocks can be explained by a higher beta.

Added the Carry Factor. Higher yielding assets outperform lower yielding securities

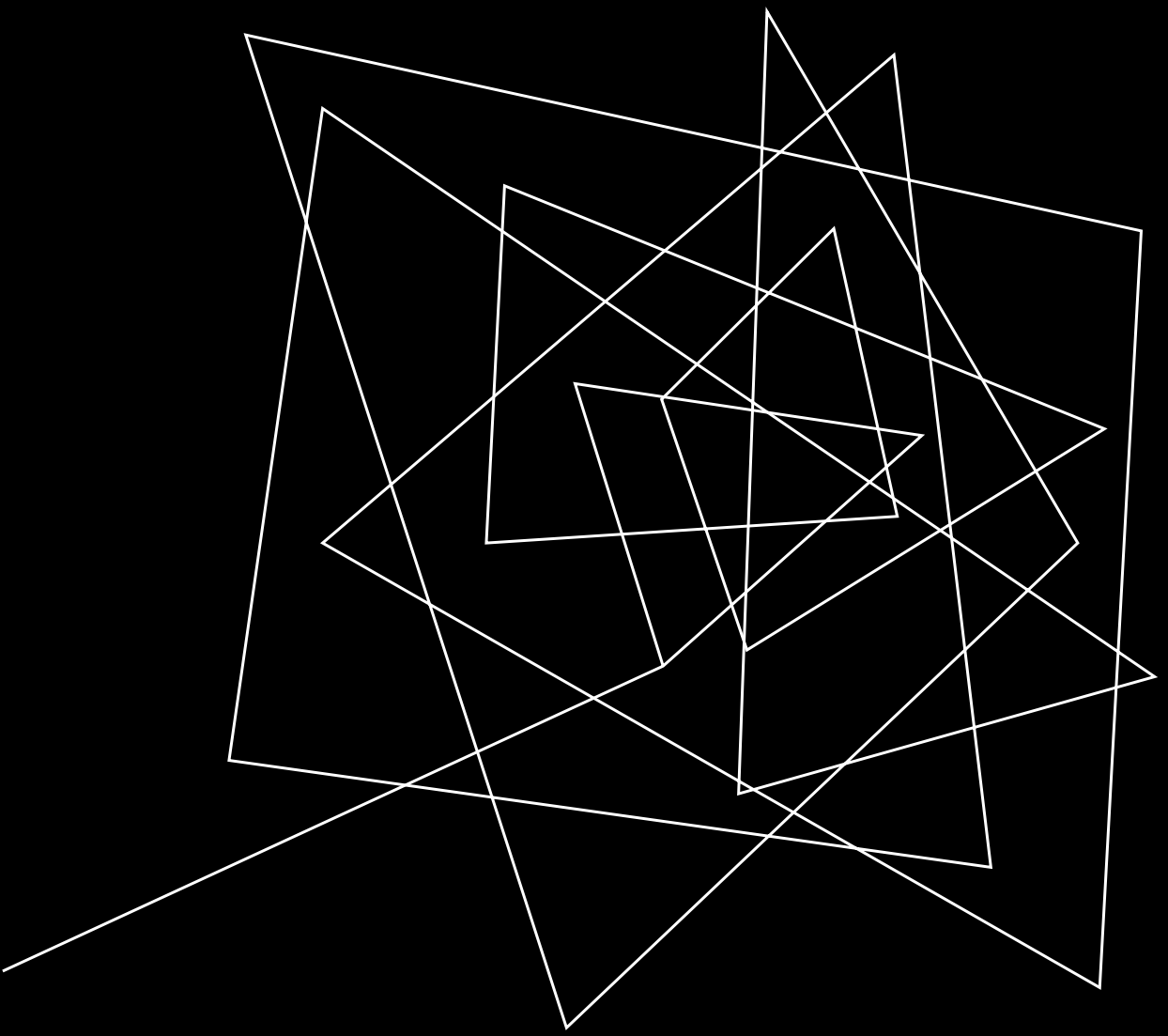
And added the Defensive factor to incorporate this weird low Beta anomaly.

Carry

= return of high yielding securities– return of low yielding securities

Defensive

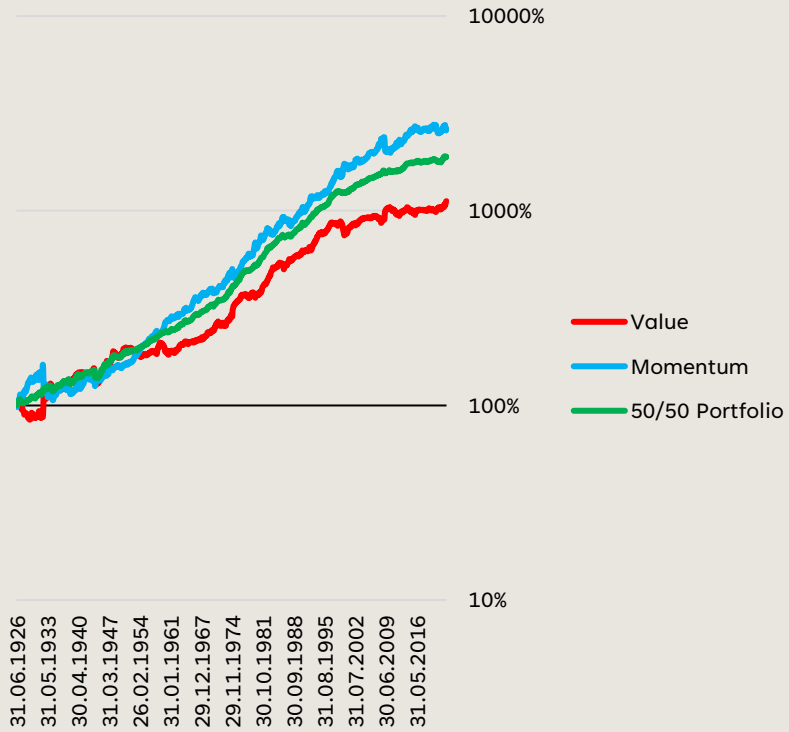
= Return of high quality & low beta securities – return of low quality & high beta securities



OUR PROJECT

Can we predict which factor will perform better?

VALUE VS. MOMENTUM



Value

Long cheap & short expensive stocks

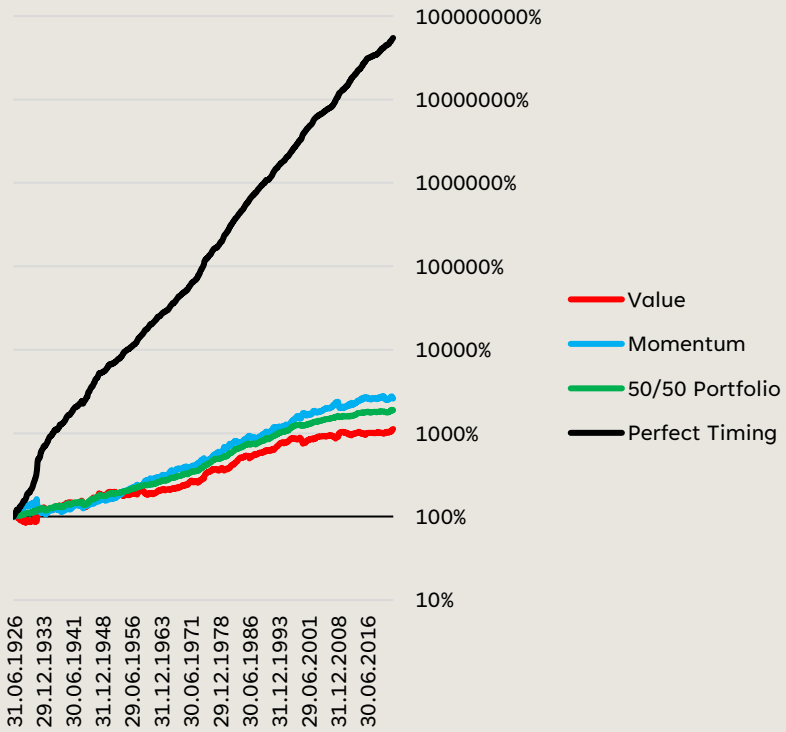
Momentum

Long up-trending & short down-trending stocks

Both are the most important & prominent factor-based strategies.

But they have long periods, up to 10 years, where one performs very poorly.

VALUE VS. MOMENTUM



Can we predict which of the two strategies will perform better?

Perfect prediction would result in the performance shown by the black line.

Of course, this is overly optimistic, but even a little edge would be really useful compared to a simple 50/50 diversification.

This is our project:

Predicting, which strategy will perform better, i.e. classifying, whether we are in a Value- or Momentum-Regime

THANK YOU

Will be lit