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The Past, Present and Future of Investing

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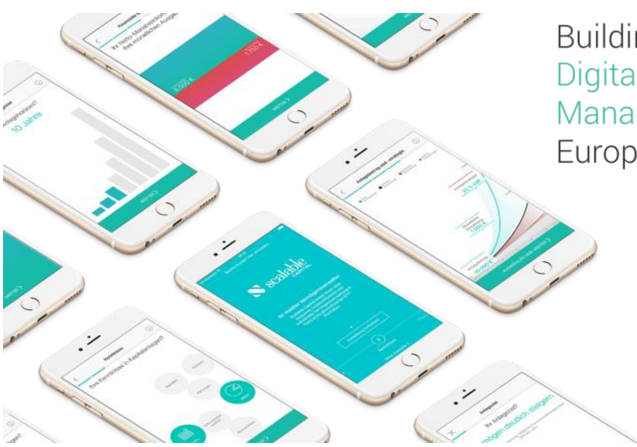
CEO, Scalable Capital

August 28, 2017

Scalable Capital



Building the leading Digital Wealth Management Platform in Europe and Asia.

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Scalable Capital's Solution

We offer fiduciary investment services

- at lower cost (for both the client and the financial institution)
- of higher quality (a robust, quantitative investment approach)
- with more personalisation (individual managed accounts)
- in a more convenient service (online only)
- to a greater audience (lower thresholds)

through the use of technology.

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We Have Seen Rapid Growth So Far

Typical Client Profile

- 45 years old
- £35,000 average investment
- 50% with monthly savings plan of £400 on average
- Average Income: £100,000
- Liquid net worth: £200k-1million
- Investment experience

Current AUM growth per week: £5-7m

Our Funding

- Backed by leading European venture capital firms since 2015.
- New strategic investor for 2017: BlackRock

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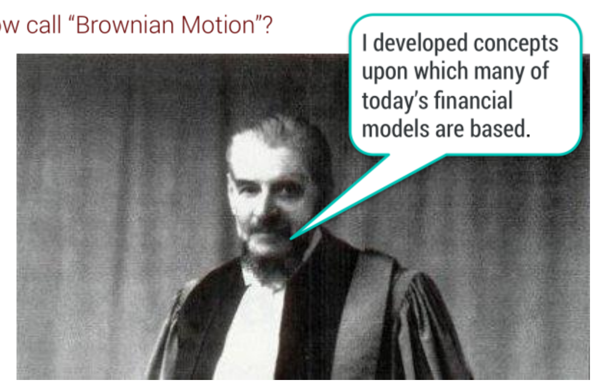
The Founder of Modern Mathematical Finance.

Who is considered to be the Founder of Modern Mathematical Finance and a pioneer in the subject we now call "Brownian Motion"?

a) Pythagoras
b) Isaac Newton
c) John Nash
d) Louis Bachelier



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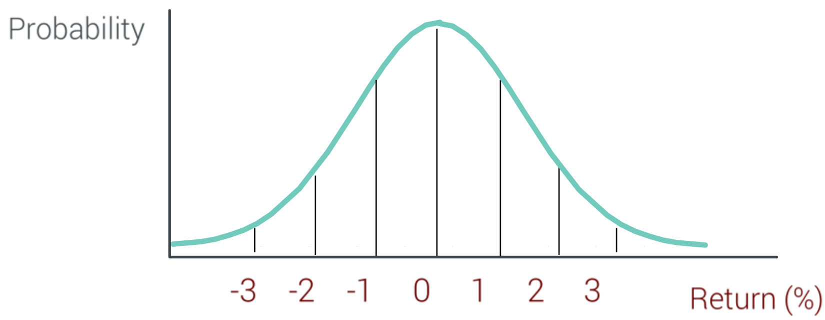
Assumption 1: Normal Distribution

Returns follow normal bell-shaped curve, specified by mean μ and standard deviation (volatility) σ.



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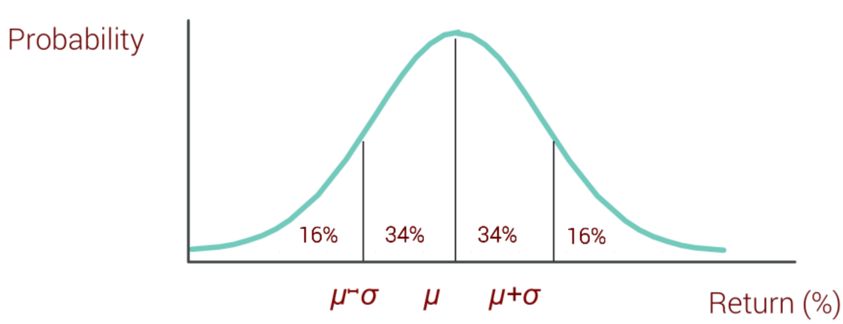
Assumption 2: Volatility as Risk Measure

Volatility σ ("average deviation" of returns from mean μ) describes risk.



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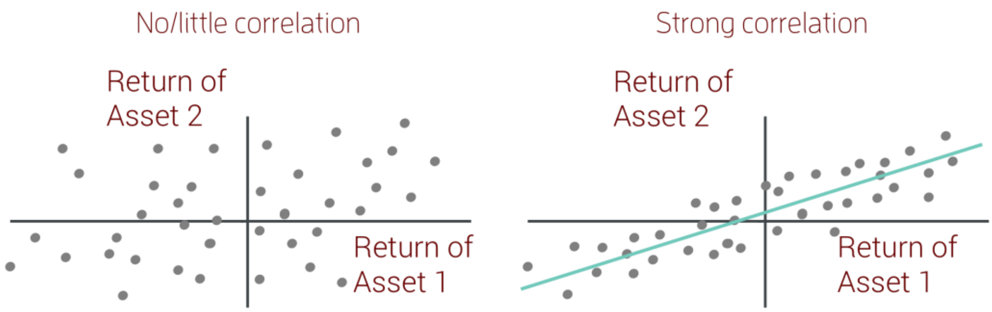
Assumption 3: Correlation Shows Dependence

Correlation as a linear measure of dependence captures the relationship between different assets.



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MPT Ignores Empirical Facts

1. Returns have fat tails, i.e., more extremes than normal assumption predicts ➔ omnipresence of Black Swans.
2. Losses are more extreme than gains, but volatility is a symmetric risk measure.
3. Correlation ignores that assets tend to move much more in sync during stress periods.
4. Volatility "clusters" over time. We observe periods of high and low volatility, i.e., strong dynamics.

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1 Severe Underestimation of Large Losses

Dow Jones Daily Losses	Empirical Frequencies (Feb 1885-July 2015)	Normally Predicted Frequencies
>2%	7 weeks	7 weeks
>3%	4 months	21 months
>4%	10 months	50 years
>5%	2 years	3,500 years
>10%	36 years	79,414,856,920,319,476,000 years

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Source: Center for Quantitative Risk Analysis

2 Losses and Gains Are Asymmetric

Volatilty ignores that returns are mostly skewed towards larger losses.

Asset Class	Index	5% Worst-Case Cut-Off	5% Best-Case Cut-Off
Equities	MSCI World	-12.2%	6.4%
	MSCI Brazil	-27.7%	14.4%
	MSCI Russia	-29.2%	13.6%
	MSCI India	-23.9%	13.7%
	MSCI China	-19.0%	17.6%
Commodities	DJ-UBSCI	-16.6%	8.7%
Real Estate	REITs	-17.2%	9.8%
German Government Bonds	REXP	-2.1%	2.3%

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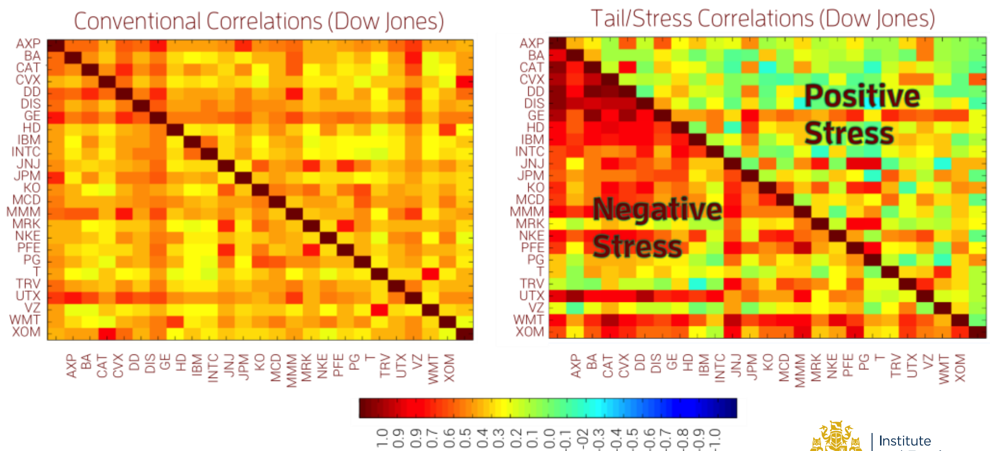
Source: Center for Quantitative Risk Analysis

3 Correlations Is a Poor Dependence Measure

Diversification fails when needed most.



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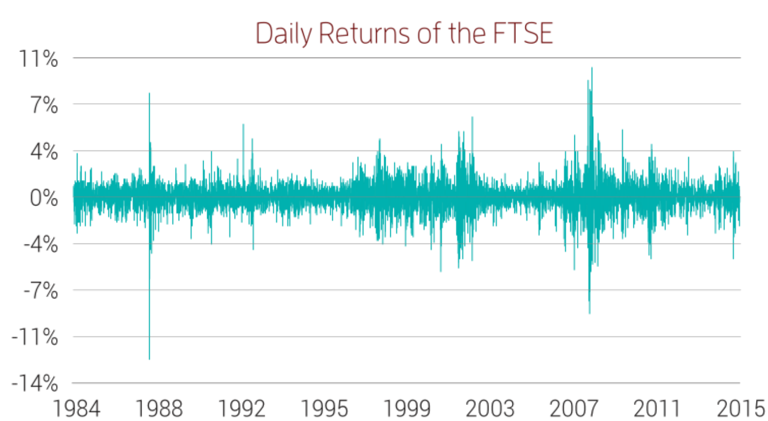
Source: Center for Quantitative Risk Analysis

4 Volatility Forms "Clusters" Over Time

Strong, statistically relevant risk dynamics.



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Use Realistic Assumptions – Moving From Elegance To Relevance

- MPT's unrealistic assumptions are necessary for deriving its elegant mathematical solution.
- Move away from "elegant mathematics" to "relevant econometrics".
- Use of computer-driven simulation techniques to derive forward-looking, risk-based asset allocation.
- More realistic risk assessment due to more realistic assumptions.

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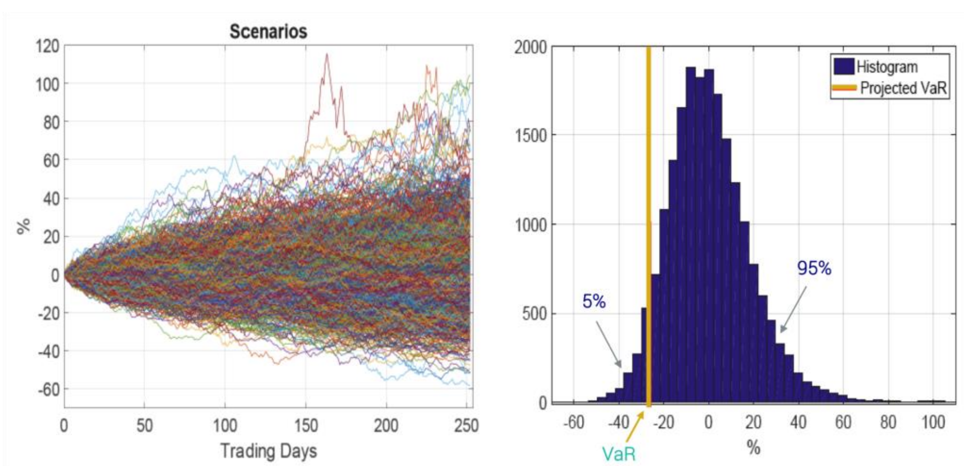
A Data-Driven Investment Model



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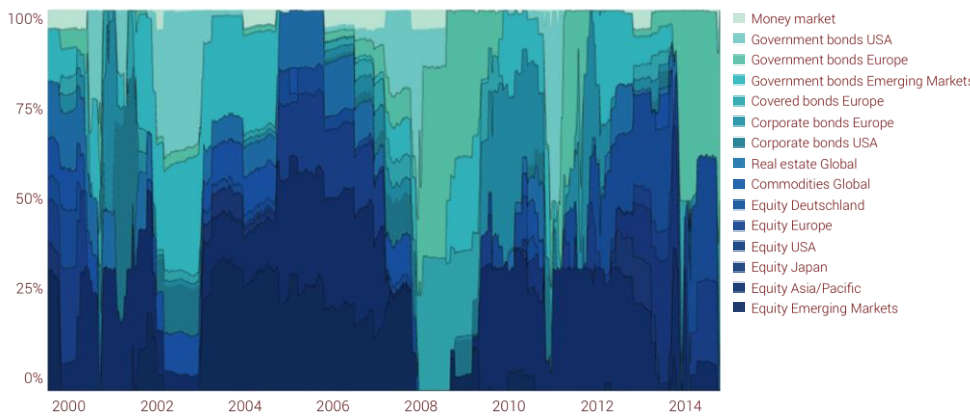
Outcome: Dynamic Risk Management

Portfolio Allocation for a 20% Value-at-Risk Portfolio



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Risk-based Strategies Lead to Better Returns

Recent research refutes the naïve idea: "high risk = high return"

Example: Yale University Study (2016) shows that a risk-based approach outperforms a buy & hold approach:

- Better risk-adjusted returns
- Outperformance since 1926, circa 2% p.a.

Performance Comparison Buy & Hold vs. Risk-based Approach (Logarithmic Scale)

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Source: Moreira and Muir (Yale University, 2016)

Key Client Benefits

Better understanding of risks

Better risk-adjusted returns

Less stress – Better behaviour

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Modular Platform.

Scalable Capital API
- Allows for integration into third party platform
- All core functionalities available (e.g. transactions, account balance, inventory)

Scalable Capital Front-End
- Cross platform (Responsive Web, iOS, Android)
- Branding capability (Scalable Capital, co-branded, white-label)

Suitability Assessment
- Fully regulatory compliant electronic suitability assessment and risk scoring
- Stand-alone or add-on to partner's KYC process
- Regular and ad-hoc reviews

Onboarding
- Smooth customer experience through maximum of prepopulated information
- Validation of IBANs, TINs, etc.
- Address auto-completion
- Email verification
- Provision of pre-contractual documents

Checkout
- Fully electronic contract closing, no wet signatures required
- Both custodian and investment manager contracts closed in one go
- 24h cool-down period
- Electronic provision of legal documents

Identification / KYC
- Deep integration with PostIdent / Onfido
- Electronic provision of XML data/copies of ID
- PEP status

Fund Screening
- Ongoing screening process
- Variety of quantitative and qualitative criteria
- Customizable filters

Portfolio Management
- Multiple models supported: risk managed, model portfolios, static weights
- Add-on features: Smart rebalancing, TLH

Order Management
- Fully automated
- Dynamic, risk-based limits
- Order routing: Bloomberg, Redi, FIX, email, phone
- Order aggregation across clients and/or time

Reporting
- Regulatory reporting: Semi-annual/quarterly, Loss-threshold reporting
- Additional real-time reporting: Asset allocation, List of transactions, Performance, Fees, Taxes
- Look-through

Electronic Mailbox
- Secure and encrypted
- Email notifications
- Third party integration possible (consolidated mailbox for both custodian and investment manager)

Tax
- Tax-awareness for real-time rebalancing
- Tax-smart rebalancing: Consideration of allowances and tax credits
- Tax-loss harvesting: Monitoring of gains and losses as well as active switching

Billing
- Fee models: All-In Fee, Split Fee, Variable
- Invoices: Customizable, white-label, E-delivery
- Discounts/rewards supported

Internationalisation
- Multi-language, -country and -currency
- Multi-regulatory, -tax
- Multi-broker, -custodian

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Collaboration: Siemens

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> “Technology is transitioning from a competitive advantage to a competitive requirement. Those that do not invest in technology will not be able to meet their clients' long-term needs.”

Larry Fink, Founder & CEO of BlackRock

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Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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