Rational Investing

Cash Flow Valuation and Duration Risk
Global ETF and Portfolio Modeling

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Our Process: Standardized Data + Cash Flow Projection + CAPM + Yield Curve
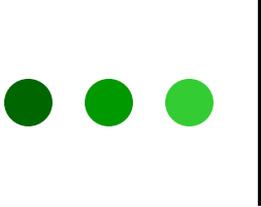
CAPM Discounts Cash Flow Projection => NPV

Fama French +++   Yield Curve + Leverage

Revenue Projection and Terminal Cost Structure

Corporate Events and Volatility Dampening

Data Standardization and Scrubbing

A.I. in Corporate Finance

- Rational Investing applies Artificial Intelligence to Corporate Finance to process a large set of potential valuation drivers

- We extrapolate cash flow defensible through the business cycle, as well as the capital needed to generate incremental revenue

- Over a hundred decision trees form a neural network to estimate cash flow growth from a **limited number of line items and macro data**

- Corporate finance data is particularly well suited to iterative, parallel logic

- We run a 'clean room': **No guidance, consensus estimates**, or tea leaves

- We inject carefully defined human participation plus event processing.

- The result is an intuitive, standardized DCF valuation

US Equity Feed Market Neutral
## 8 Years Entire Universe of Coverage – 1,200 stocks
### Point in time valuation history, simulated track record, gross returns

Year Ending	Unlevered Return	Long / Short Positions	S&P500 Return
Dec-13	7.3%	355 / 424	29.6%
Dec-14	6.3%	305 / 523	11.4%
Dec-15	11.4%	375 / 383	-0.7%
Dec-16	8.1%	296 / 446	9.5%
Dec-17	9.1%	299 / 308	19.4%
Dec-18	8.5%	342 / 302	-6.2%
Dec-19	8.5%	271 / 458	28.9%
Dec-20	10.8%	341 / 370	16.3%
Cumulative	**95.5%**		**163.4%**

Average Annual Return   8.74%

SD Annualized   3.30%

Sharpe Ratio   2.43

RI Track Record

S&P 500
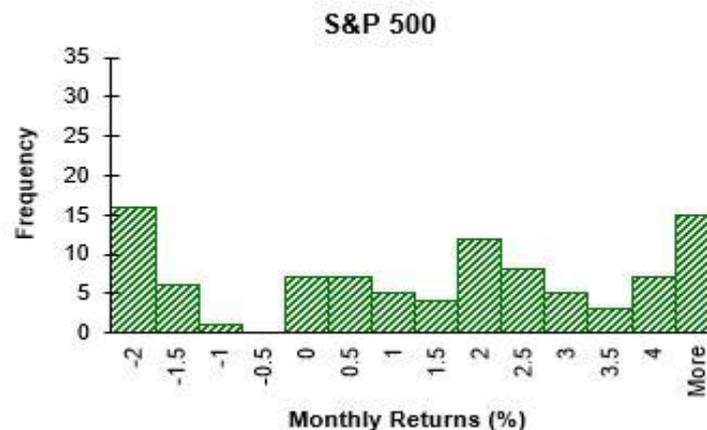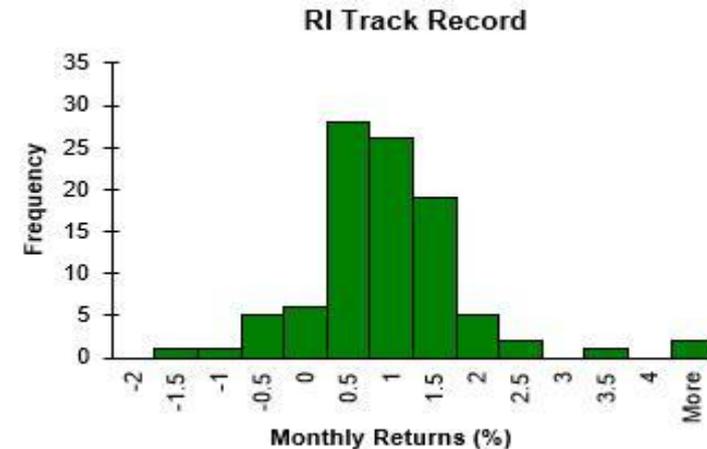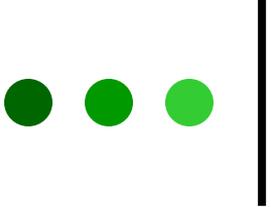
Recent Developments

- Valuation template upgraded to embed relationship between R&D, viral revenue growth, and discount rate

- Quantified impact of shift to subscriber revenue and scalable underlying cloud implementation for growth tech

- Improved relationship between yield curve shifts and impact on operating margins and inventory of cyclical firms

- Improved handling of external shocks and event processing i.e. social event (pandemic) impact vs. stress of credit cycle
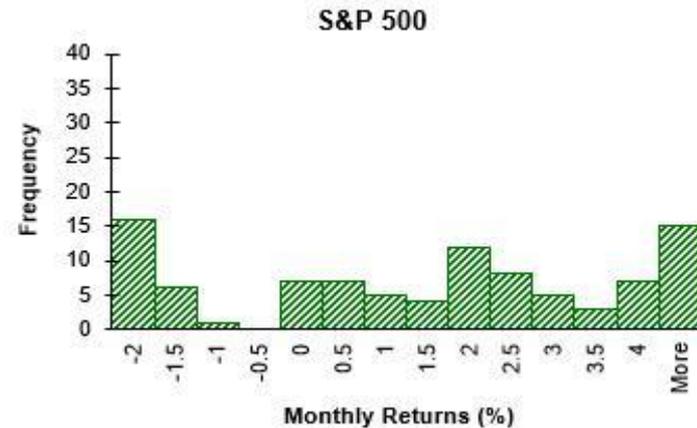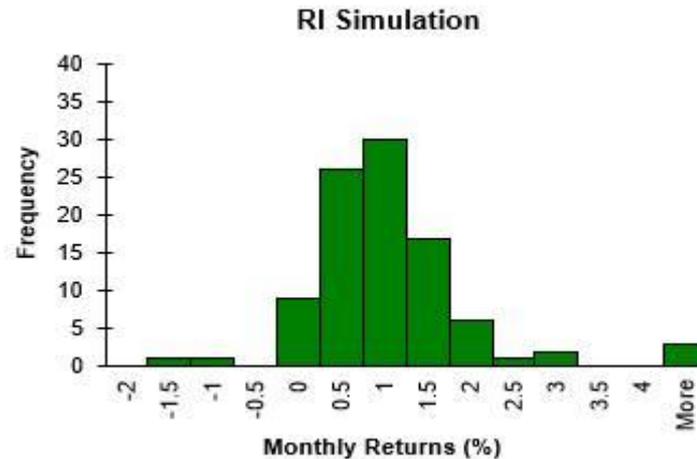- Improved handling of data across top 20 developed markets

US Simulation
8 Years, using current model, gross returns

Year Ending	Unlevered Return	Long / Short Positions	S&P500 Return
Dec-13	6.3%	577 / 618	29.6%
Dec-14	6.7%	524 / 659	11.4%
Dec-15	12.6%	543 / 611	-0.7%
Dec-16	8.8%	488 / 618	9.5%
Dec-17	12.6%	366 / 704	19.4%
Dec-18	14.4%	358 / 673	-6.2%
Dec-19	9.7%	495 / 460	28.9%
Dec-20	13.4%	544 / 354	16.3%
Cumulative	**122.4%**		**163.4%**

Average Annual Return	10.51%
SD Annualized	3.69%
Sharpe Ratio	2.65

RI Simulation

Frequency vs Monthly Returns (%)

S&P 500

Frequency vs Monthly Returns (%)

Excluding financials and utilities. Exposure is aggregate of individual buy/sell decisions by Rational Investing model, 5% per sector net limit, 7.5% stop loss, monthly rebalancing, 25% mis-pricing threshold for investment, 10% for exit .

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Global ETF Simulations 4 years

	CAC40	AEX	FTSE TWSE	ASX50	FTSE 100	HSI	QQQ	KOSPI	TSX60	XOP	XLE	XLY	FTSE MIB
Tickers #	37	23	49	45	84	46	97	42	48	34	25	54	37
Returns													
Dec-17	7.7%	9.0%	9.9%	0.6%	3.4%	21.7%	12.2%	1.1%	7.8%	0.5%	4.5%	11.7%	10.3%
Dec-18	0.9%	8.5%	7.0%	16.6%	4.2%	2.3%	7.8%	8.5%	4.6%	11.3%	11.4%	2.4%	5.3%
Dec-19	11.0%	14.7%	2.5%	5.9%	3.9%	5.4%	14.0%	6.8%	5.1%	1.9%	1.0%	11.7%	11.1%
Dec-20	11.3%	-1.9%	11.6%	9.4%	7.0%	3.5%	4.1%	9.6%	7.7%	72.4%	73.9%	14.5%	3.5%
Annualized	**7.7%**	**7.4%**	**7.7%**	**8.0%**	**7.8%**	**8.0%**	**9.5%**	**6.4%**	**6.3%**	**18.4%**	**19.6%**	**10.0%**	**7.5%**

- We have modeled the top global ETF portfolios and filled out the valuation history of their holdings

- This allows us to compare valuations across markets with relative ease

- The valuation driven results are in line with broader sector and geography simulations

- Understanding of capital efficiency allows us to reinforce these returns

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RI Global Equity Feed 150/75

Point in time valuation history, simulated track record, gross of divs, borrow and fees

Year Ending	RI Global Feed	Long/Short Positions Avg	MSCI World Net
Dec-17	28.1%	619 / 407	22.4%
Dec-18	8.4%	596 / 447	-8.7%
Dec-19	35.5%	518 / 659	27.7%
Dec-20	30.6%	581 / 619	15.9%
Cumulative	145.7%		65.3%

Average Annual Return	25.2%
SD Annualized	13.9%
Sharpe Ratio	1.72
Beta	0. 64

MSCI World Index Allocations

66.08%	US
7.80%	Japan
4.33%	UK
3.42%	France
3.23%	Switzerland
3.11%	Canada
2.90%	Germany
2.11%	Australia
1.35%	Netherlands
5.67%	Others

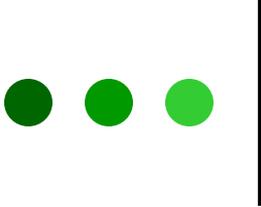| 92.22%	RI Coverage

RI Track Record GLOBAL
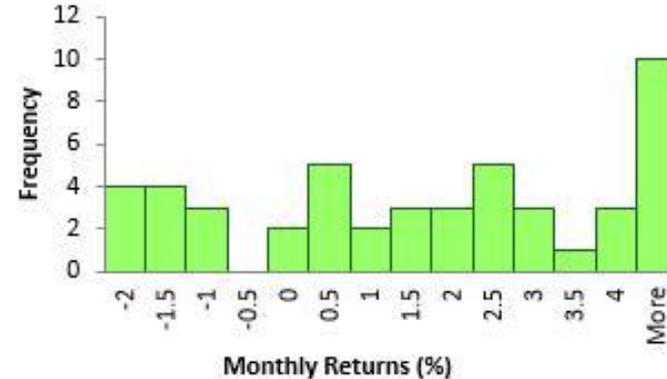
MSCI World (net)
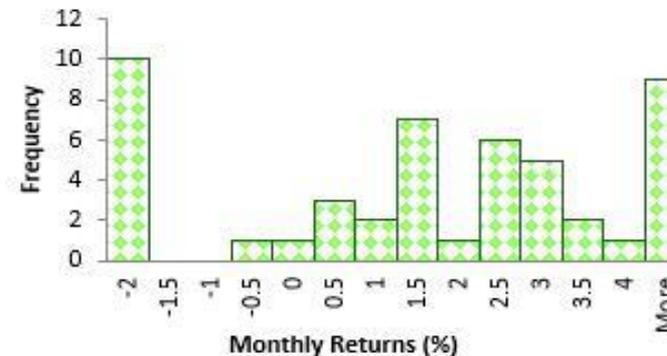
The Perfect Blend of Man and Machine

- A. I. is an iterative industrial interaction between users and systems

- **We have spent two decades pushing the frontier of what machines do well in assembling valuations vs. human capability**

- Decision trees resolve complex, contingent, path dependent logic

- The greatest challenge, and source of alpha, proved to be normalization of financial statement trend lines of recurring revenues and costs

- Resulting standardized Risk Adjusted DCF works across sectors

- Human participation is highly formatted: the analyst supports the system

- Observation backed by intuition i.e. we are always able to answer 'Why?'

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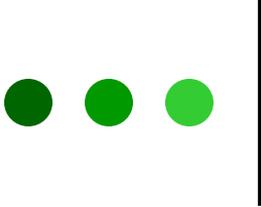
Coverage and Redundancy

- We process 1,250 companies a month across global markets

- Parameters set by humans must work **consistently** across time and cross-sectionally, and results should be **replicable** across geography

- Even with intelligent interpolation, maybe 50% of material information in company filings can currently be absorbed in an automated fashion

- A team of 15 analysts supports DCF models for 2,500 stocks worldwide, limiting their participation to what is most relevant and hard to automate

- A second team of senior analysts and principals reviews the largest mis-pricings; the result represents a unique reduction in noise and uncertainty

- A high level of clarity on risk in the midst of post pandemic uncertainty

Pattern Recognition for Corporate Finance Harnesses Data to Standardize DCF

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- **Why is Unassisted Machine Learning still a Challenge?**

  - The model is built around ex-ante expectations that are never visible and may not be what eventually drove historical returns, but do drive valuations at any given time

- **Every business cycle is different** in drivers of growth on the way up and assets which become economically stranded on the way down

- The system parses a large set of distributed decision trees, needs human tuning for

  - Corporate events and structural change in business conditions

  - A volatile industry masking the underlying strength of technology or brand

- **A.I.'s consistency generates alpha; setting parameters still requires human risk mapping as competitive conditions evolve**

Systems and Data: A New Suez Canal to Global Information
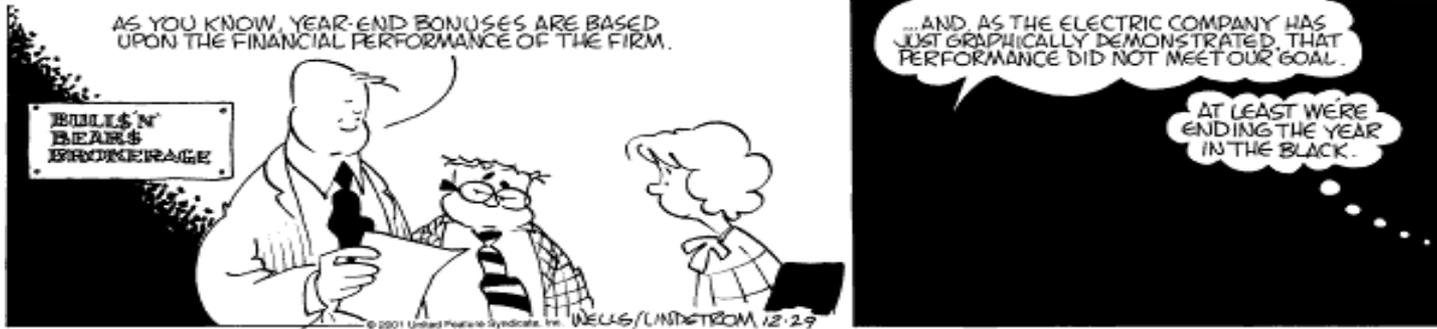
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- **Positive feedback loop**: The modeling process highlights issues in data; correcting relevant data offers insight into systematic improvement

- The result is highly consistent line item normalization across 2,750 global stocks

- Over twenty years, a massive, tuned, distributed decision tree combined with a trained team have built up a durable competitive advantage

- Our process for gathering global public data and cross-checking it, and reading nuances of management behavior from it, is without peer

- Market neutral returns have a Sharpe Ratio > 2 through the business cycle

- This result represents a disruptive level of capability
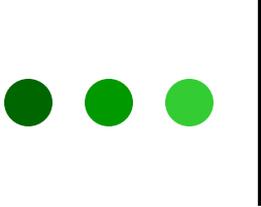
Biography

Manish Aurora, Managing Principal - Methodology and Product Architecture

- Co-founded Rational Investing LLC and built its first valuations starting in 1998. The firm is now 20 professionals modeling the G7 and MSCI World markets

- Designed and developed the FX trading platform of FXCM www.fxcm.com, at a time the world's largest specialized FX dealer

- Converted Merrill's European FX derivatives exposure at NYC, London, Singapore offices to the Euro

- Reprogrammed JP Morgan's global swaps pricing and counterparty credit risk calculation using Massively Parallel Supercomputing technology

- Designed the Value at Risk calculator for the merger of Chase and Chemical, then the biggest bank merger ever, under a tight deadline from the Federal Reserve

- Designed and constructed the first CMBS and Corporate Bond credit risk models at BlackRock

- Sell-side analyst at Nomura Securities covering real estate equity, debt, CMBS

- Built the first commercial paper direct issuance and investment management and reporting system for GE Capital, ITT, Ford at Financial Sciences

- MBA from University of Chicago; BS in computer science, University of Scranton