

# Basis Point Global Solutions

## Founders' Selected Projects and Experience

### Arvind Rajan, Cofounder

#### Executive Leadership

- Founded **Basis Point Global Solutions**, a financial consulting and analytics firm with the mission of improving investing outcomes through knowledge, analytics and automation (<https://www.basispointglobal.com>) (2020)
- Served as International Chief Investment Officer and Head of Global and Macro of PGIM Fixed Income<sup>1</sup>, an \$800+B global fixed income asset management business and one of the largest asset managers in the world (2011-2019)
- Led portfolio management team with \$80+B AUM, \$150+mm revenue (2011-2019)
  - Grew Emerging Markets Debt business with \$45+B in AUM and \$110+mm annual revenue (tripled in less than 8 yrs) (2011-2019)
  - Built Global Multi-Sector business from one fund of <150mm to a business with 30 clients, five products, with \$20+B in AUM and \$45+mm annual revenue (2011-2019)
  - Ran the FX team, overseeing approximately \$1T in annual transaction volumes, while fully automating the investment process (2011-2019)
  - Built and led the firm's global Economics and Strategy teams (2011-2019)
- Served on firm's Investment Committee, Trade Management Oversight Committee, Pricing Committee, Risk Operating Committee, Product Development Council, and other key governing bodies (2008-2019)
- Led the firm's portfolio risk management during and after the 2008 Global Financial Crisis, covering hundreds of fixed income portfolios and clients, a \$22 Billion legacy subprime book and two hedge funds (Jan 2008-Nov 2011)
- Co-headed Citigroup's 55-person fixed income strategy team in the USA including rates, mortgage, ABS, Credit, and EM strategy (2003-2005)
- Built and headed global 30-person structured credit research team, as a key business partner in building a top-ranked \$500mm (annual revenue) global structured credit franchise (2003-2005)
- Built and led 10-member emerging market quantitative strategy team, as a key partner in building \$300mm (annual revenue) global EM business (1997-2003)

#### Mortgages, Structured Finance, and Structured Credit

- Led portfolio management of over \$10 Billion of mortgage and asset-backed securities in global multi-sector portfolios (2011-2019)
- Led modeling and risk management of \$22 Billion (peak) mortgage credit in Prudential Financial and third party portfolios (January 2008- November 2011) during the peak of the Global Financial Crisis
  - Modeling and scenario analysis of subprime risk
  - Hedging of subprime exposure

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<sup>1</sup> PGIM is the asset management arm of Prudential Financial, Inc.

- Advised on risk management of \$40 Billion in Structured Credit (Subprime, ABS CDO and CLO) exposure at Citigroup during 2007
- Head of Structured Credit Research and Strategy, Citigroup Global Markets (2003-2005)
  - Built and headed global 30-person structured credit research team
  - Led research and modeling on ABS CDOs (Subprime/Alt-A), CLOs, Tranches
  - Responsible for modeling all structured credit derivatives, including a multi-billion dollar options and correlation book
  - Lead author of a [book on Structured Credit](#) aimed at practitioners, 2007
  - Co-authored mathematical model on CDO valuation ([Journal of Finance](#), 2007)
- Led Salomon Brothers' mortgage prepayment and default modeling for mortgages (1994-1997), used by thousands of customers through Yieldbook software and the mortgage trading desk.
  - Agency mortgages
  - Alt-A, Jumbo mortgages
- Built one of the industry's first loan-level default and prepayment models for home equity loans and manufactured housing

### Global Macro Thought Leadership and Track Record

- Led team to generate a ***top decile alpha track record*** in Emerging Markets hard currency and Global Multi-Sector core plus strategies over eight years<sup>2</sup> (2011-2019)
- Built and led world class Macroeconomics and Investment Strategy teams for the firm. Recruited preeminent economist Nathan Sheets to run global macroeconomics team (2010-2019)
- Published a series of white papers with prescient calls on interest rates remaining low for long and views on credit and emerging markets; these have been vindicated by market moves and by the alpha generated in the portfolios (2011-2019)
- Recognized for outstanding investment performance with the following awards and honors:
  - **Lipper Award (2016, 2018):** #1 Global Income Fund. For the No. 1 performing fund over 10 years out of 76 mutual funds in the global income category
  - **Euro Stars (2019):** The top European fund managers: Top global bond managers (based on performance)
  - **Professional Pensions Investment Awards (2018):** Global Fixed Income Manager of the Year, 2018
  - **Asian Investor (2018):** Asset management award for Global Core Fixed Income (Unhedged)
  - **Citywire (2018):** Global Fund Manager to Watch, AAA rated fund manager
  - **Institutional Investor (2016):** Top US Manager Award, Emerging Markets Fixed Income
  - **Pensions Expert (2018):** Pensions and Investment Provider Awards, Winner for Emerging Market Debt
  - **European Pensions Award (2017):** Emerging Markets Manager of the Year
  - **Asian Investor (2017,2018):** Asset management award for Emerging Markets Debt

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<sup>2</sup> Details available upon request

## Investment Process

- Introduced five new Global/EM products and grew Emerging Markets hedge fund to >\$300M AUM, proposed and launched Global Macro hedge fund (2011-2019)
- Tripled the size of the EM portfolio and support team (10 → 30) (2011-2019)
- Built a global multi-sector portfolio team from scratch (2011-2019)
- Led and scaled up FX trading team, process and platforms to handle about \$1T and 200k trades per year (2011-2019)

## Emerging Markets (EM)

- Veteran in Emerging Markets with 23 years experience in portfolio management, trading, and research (1996-2019)
- Expertise in capital markets, macroeconomics, debt management, central banks, reserve management, sovereign wealth management, asset liability management, sovereign crises, restructuring, and related areas
- Managed hard currency (dollar debt), local currency debt, EM currency trading, and an EM hedge fund totaling over \$69 billion in AUM (2011-2019)
- Built EM FX and Credit volatility trading team, capability, relative value process, analytics, and risk capabilities for currency options and integrated the team with the FX trading team, generating information ratios >1 (2015-2019)
- Built and headed 10-member emerging market quantitative strategy team. Key partner in building \$300mm (annual revenue) global EM business (1997-2003)
- Pioneered many quantitative research methodologies in emerging markets, building a complete relative value framework for EM Debt across countries, currencies and assets. Was twice ranked first and once second in the All-American Fixed Income Research poll conducted annually by Institutional Investor (1997-2003)
- Built models for sovereign defaults and restructurings, as part of Citigroup team that analyzed and advised on Russia, Argentina, and Ecuador debt restructuring (1997-2003)

## Quantitative Modeling and Risk Management Models

Over 32 years of experience in mathematical modeling and 25 years experience in building, testing, and deploying quantitative models in finance.

Chief Risk Officer and head of 55-person team responsible for all risk management, quantitative modeling, portfolio analysis, and technology for PGIM Fixed Income, a global public fixed income asset manager with \$300+B AUM (2008-2011)

Built and led a global quant team which included David Li (inventor of the Gaussian Copula Model) and L. Shankar to build all of Citigroup's credit derivative models, for single name, index, and portfolio tranches, CDOs (Collateralized Debt Obligations) and Credit options, used by the trading business for pricing and risk management (2003-2005)

Specific experience in building or leading teams that built the following categories:

- Market risk management models for portfolios
- Tail risk modeling

- Interest rate models
- Mortgage backed models for prepayment and option adjusted spread models
- Models for options embedded in structured products
- Default models for credit
- Sovereign Debt Restructuring models
- Structured finance models for products with cash flow waterfalls
- Credit tranche models for index tranches and bespoke tranches
- Single name credit derivative models
- FX and Credit Volatility trading models
- Emerging market debt relative value models
- AI and ML applications to alpha generation and risk management
- Applying NLP (Natural Language Processing) to investment alpha generation

Very experienced in evaluating the **shortfalls** of models, in particular:

- Stress testing
- How models failed during prior financial crises
- How to make investment firms and portfolios less vulnerable to model risks
- Fragility in risk modeling assumptions
- Fragility in alpha generation models, and good trading practices
- Back testing and over-fitting of data
- The perils of alternative data
- Vulnerabilities of AI/ML techniques when applied to investing

### Financial Derivatives and Structured Products

Deep knowledge of financial derivatives, as applied in markets and portfolios for hedging, relative value extraction, financing, cash flow structuring, and other applications. Expertise in products and processes including:

- Swaps, Futures, and Forwards on interest rates and currencies
- Options in equities, currencies, rates and credit
- Credit Indexes
- CDOs
- Tranches, credit options, and other structured credit derivatives
- ETFs
- Structured finance derivatives and waterfalls
- Margins, cleared products, and collateral management
- Leverage, repo, encumbered capital, and prime brokerage

### Disruption through Automation, Big Data and AI/ML

Led PGIM's AI/ML Taskforce from 2017-2019. Championed and built product and process innovation and automation, quantitative and alpha generation capabilities including use of derivatives, volatility, and systematic strategies (2011-2018):

- Built quantitative alpha team, process and portfolio capabilities for fixed income. Built dollar-and duration-neutral quantitative fx and rates alpha generation models, applied to \$90Billion in portfolio AUMs (risk equivalent to a \$2 Billion hedge fund) and achieving information ratios of 0.7 (2010-2019)
- Completely automated FX trading and order management and scaled active FX trading and FX hedging 10x with only a 3x increase in resources (2011-2016)
- Created and led PGIM's Artificial Intelligence/Machine Learning team in our Technology Initiative (2017-2019)
- Built and successfully tested beta and "alpha" substitution/replication methodologies in fixed income (2016-2019)
- Evaluated dozens of firms' offerings of alternative data, data aggregation, algorithm platforms, and alpha signals. (2018-2019)
- Oversaw trials and four use cases involving AI/ML for investment front office applications (2017-2019)

## Mani Sabapathi, Cofounder

Seasoned investment executive, with a strong quantitative background and risk mindset, achieving superior investment results across an array of asset classes. An engineer and actuary by training, a 27 year career at Prudential resulted in a rich portfolio of expertise, from using VaR to assess insurance risk to managing a subprime mortgage portfolio through the Great Financial Crisis and managing Global Bond Funds and Volatility Strategies. As the cofounder of a Fintech/Asset Management startup, I now seek to help asset owners increase awareness of their portfolio's risk and return characteristics and optimize their investment outcomes.

### Investment Expertise

Over 25 years of investing experience across a variety of asset classes, highlighted by an innovative approach to analyzing investment opportunities. Strong analytical and modeling skills combined with passion for investing and developing creative solutions has led to superior performance throughout career. Key expertise includes:

- Analyzing and modeling complex securities and structures
- Risk measurement and management across assets and portfolios
- Understanding and modeling key drivers of interest rates, credit returns, fx, and volatility
- Marrying quantitative and qualitative approaches to investment risk-reward analysis
- Constructing portfolios that blend attractive characteristics effectively
- Assessing and incorporating derivative products across asset classes to optimize risk-adjusted returns

## Leadership in Finance and Asset Management

- Senior Portfolio Manager for Global Bond Funds, responsible for asset allocation and risk-taking based on market outlook (2015-2020)
- Led development of volatility strategies across asset classes, with successful incorporation of volatility as an independent source of alpha across numerous mandates (representing over \$100billion in AUM) (2014-2020)
- Senior Global Strategist responsible for identifying macro themes and top-down portfolio overlays across PGIM's Fixed Income Portfolios (2012-2015)
- Led PGIM Fixed Income initiative to evaluate use of AI / ML techniques for generating alpha (2018- 2020).
- Headed mortgage credit research team, overseeing investments of over \$20 billion in non-agency mortgage credit products (2001-2012) through the Great Financial Crisis.
- Served on the Board of Directors of the American Securitization Forum (2006-2012)
- Finalist for Investor of the Year Award from Total Securitization, a division of Institutional Investor (2008)

## Structured Products Experience and Track Record

- Led Prudential Fixed Income's mortgage credit team through the 2008 sub-prime crisis. Despite being at the center of the financial crisis, was able to generate positive alpha contribution to the firm from subprime holdings (with peak investment of approximately \$22 billion in sub-prime bonds in 2008).
- Developed cutting edge analytical platform, which along with well-defined views towards originators and collateral expectations, resulted in superior performance. Key innovations include:
  - Roll-rate transition matrix-based model to project defaults and cash flows as early as 1998.
  - Built one of the earliest stochastic models for subprime mortgages incorporating credit and prepayments based on home prices and unemployment rates in 2000
  - Built collateral stratification-based default model by 2003, and incorporated the impact of non-linear aggregation of risks on defaults.
  - Sophisticated originator / servicer evaluation model based on performance after controlling for stated collateral characteristics;
  - Post crisis default behavior model based on mortgage payment versus rental alternatives, extent of negative equity, and payment history
- Was early to identify underwriting issues in non-agency mortgages through rigorous collateral and performance analysis, scanning of real estate investment blogs and regular meetings with originators and servicers. Key trades that resulted in outperformance were:

- Shorting subordinate tranches in non-agency transactions; investing in only AA and above rated securities from 2005; and focusing on seasoned transactions issued before 2004
- Recognized as a leader amongst investors and sought out as subject matter expert by policy makers and regulators (NAIC, SEC, US Treasury, Federal Reserve, FDIC, and FASB), to present insights and suggestions on a variety of topics, including shortcomings in “originate to distribute” model, servicing issues, appropriate modification protocols, proper trust oversight mechanisms, appropriate capital requirements and the value of reporting and transparency.

### Volatility Strategies Experience and Track Record

- Developed a new alpha stream for PGIM Fixed Income in volatility as an asset class
  - Spearheaded development of models and analytics to invest in volatility at institutional level across asset classes (FX, credit and rates)
    - Developed back testing models, relative value tools, and scenario models that project performance using both statistical distributions and deterministic scenarios.
    - Developed infrastructure and team to manage volatility strategy including optimal hedging of delta exposures, including assessment of autocorrelations.
  - FX volatility strategy was successfully deployed in Global and Emerging Markets Hedge Funds and numerous Fixed Income mandates.
    - Developed strong risk and exposure analytics platform to effectively manage and grow portfolio. Worked closely with risk management to develop appropriate risk framework to monitor exposures and set appropriate limits.
    - Broad adoption of strategy across mandates resulted in average trade sizes growing from under \$10mm notional per trade in 2015 to over \$200mm notional per trade in 2020.
    - Strategy averaged over 80 bps of alpha per year with over 1.7 info ratio over 5 year period (for hedge fund mandates)

### Portfolio Management Experience and Track Record

As Senior Portfolio Manager for Global Bonds, was tasked with sector asset allocation, risk exposure desired, developing portfolio analytics and top-down overlays.

- Developed and deployed numerous alpha-generating opportunities using innovative approaches:
  - Developed quantitative approaches to optimize positioning across tenors and in usage of credit derivative swaps in sovereign credit
  - Developed approaches to efficiently deploy portfolio hedges using credit options, credit derivative tranches and strategies utilizing credit derivative swaps

- Relative value models to determine cross sector and regional determinations of optimal risk reward opportunities (between local and hard currency rates, credit and FX exposures)
- Developed portfolio analytic tools to improve portfolio construction:
  - Developed and presented optimal benchmarks and portfolio allocations based on clients' objectives. For sovereign clients, this included incorporation of country specific sensitivities.
  - Model to determine optimal usage of treasuries in a credit portfolio to improve efficient frontier
  - Built relative value models to identify opportunities in emerging market rates, FX and credit, including development of sovereign scores, principal components analysis and correlations over time.
  - Developed scenario-based approach to determine optimal portfolios based on a range of deterministic scenarios to augment statistical-distribution-based asset allocation tools
- Detailed analysis of demographic trends across the world, including a white paper on impact of US housing trends and demographics on economic growth.

## Education

### University of Pennsylvania

1989–1993

#### Jerome Fisher Program in Management and Technology

#### School of Engineering and Applied Sciences

Master of Science in Engineering (M.S.E.) in Computer and Information Science, specialization in Artificial Intelligence; sub specialization in Natural Language Processing

Bachelor of Science (B.S.) in Systems Engineering; Specialization in Robotics

### Wharton School

Bachelor of Science (B.S.) in Economics with concentrations in Finance and Actuarial Science

Minors in Mathematics and South Asian Regional Studies

- Completed 3 degrees in 4 years
- Graduated Magna Cum Laude
- Chartered Financial Analyst, 1998
- Runner-up for Wharton Dean's Award for Outstanding Student in Graduating Class
- Fellow of the Society of Actuaries, 1997