

# Risk and Return on Investment

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## ABSTRACT

Current practice largely follows restrictive approaches to market risk measurement, such as historical simulation or Risk Metrics. In contrast, we propose flexible methods that exploit recent developments in financial econometrics and are likely to produce more accurate risk assessments, treating both portfolio level and asset-level analysis. Asset-level analysis is particularly challenging because the demands of real-world risk management in financial institutions – in particular, real-time risk tracking in very high-dimensional situations – impose strict limits on model complexity. Hence we stress powerful yet parsimonious models that are easily estimated. In addition, we emphasize the need for deeper understanding of the links between market risk and macroeconomic fundamentals, focusing primarily on links among equity return volatilities, real growth, and real growth volatilities. Throughout, we strive not only to deepen our scientific understanding of market risk, but also cross-fertilize the academic and practitioner communities, promoting improved market risk measurement technologies that draw on the best of both. This paper examines the rationale, nature and financial consequences of two alternative approaches to portfolio regulations for the long-term institutional investor sectors life insurance and pension funds. These approaches are, respectively, prudent person rules and quantitative portfolio restrictions. The argument draws on the financial-economics of investment, the differing characteristics of institutions' liabilities, and the overall case for regulation of financial institutions. Among the conclusions are regulation of life insurance and pensions need not be identical prudent person rules are superior to quantitative restrictions for pension funds except in certain specific circumstances (which may arise notably in emerging market economies), and although in general restrictions may be less damaging for life insurance than for pension funds, prudent person rules may nevertheless be desirable in certain cases also for this sector, particularly in competitive life sectors in advanced countries, and for pension contracts offered by life insurance companies. These results have implications inter alia for an appropriate strategy of liberalisation

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## INTRODUCTION:

Financial risk management is a huge field with diverse and evolving components, as evidenced by both its historical development (e.g., Diebold (2012)) and current best practice (e.g., Stulz (2002)). One such component probably the key component is risk measurement, in particular the measurement of "financial asset return volatilities and correlations (henceforth "volatilities"). Crucially, asset-return volatilities are time-varying, with persistent dynamics. This is true across assets, asset classes, time periods, and countries, as vividly brought to the fore during numerous crisis events, most recently and prominently the 2007-2008 "financial crisis and its long lasting Aftermath. The field of financial econometrics devotes considerable attention to time-varying volatility and associated tools for its measurement, modeling and forecasting. In this chapter we suggest practical applications of the new volatility econometrics" to the measurement and management of market risk, stressing parsimonious models that are easily estimated. Our ultimate goal is to stimulate dialog between the academic and practitioner communities, advancing best-practice market. Risk measurement and management technologies by drawing upon the best of both.

### Investment Definition:

Investment has different meanings in finance and economics. Finance investment is putting money into something with the expectation of gain that upon thorough analysis has a high degree of security for the principal amount, as well as security of return, within an expected period of time. In contrast putting money into something with an expectation of gain without thorough analysis, without security of principal, and without security of return is speculation or gaming. Investment is related to saving or deferring consumption. Investment is involved in many areas of the economy, such as business management and finance whether for households, firms, or governments.

### Meaning of Investment:

Investing is a parting with one's fund, to be used by another party, user of fund, for productive activity. It means giving an advance or loan or contributing to the equity or debt capital of a corporate or non-corporate business unit. Generalized, investment means conversion of cash or money into a monetary asset or a claim on future money for a return

In finance, the purchase of a financial product or other item of value with an expectation of favorable future returns. In general terms, investment means the use of money in the hope of making more money.

- "Investment is the employment of funds an assets with the aim of earning income in capital appreciation."
- "An activity that commits funds in any financial/physical form in the present with an expectation of receiving additional return in the future."
- According to an individual point of view "investment refers to money commitment of some sort. For example, a commitment of money to buy a new car is certainly an investment"

### Investment Constraints

- Liquidity
- Age
- Need For Regular Income
- Time Horizon
- Risk Tolerance
- Tax Liability

### Characteristics of Investment:-

- ❖ Rate of return
- ❖ Risk
- ❖ Marketability
- ❖ Tax shelter
- ❖ Convenience
- **1.Return:**-sales price form dividend or interest from investment.
- **2. Risk:**-higher the risk and higher the return.
- **3. Safety:**-certainty of return of capital without loss of money or time

### Objectives of Investment:-

- ❖ Maximize current income
- ❖ Preservation of capital
- ❖ Reasonable current income with moderate capital growth
- ❖ Long term capital growth
- ❖ Aggressive capital growth
- ❖ Tax advantaged investments

### Types of Risks:

1. Systematic risk.
2. Unsystematic risk.

The meaning of systematic and unsystematic risk in finance:

1. Systematic risk is uncontrollable by an organization and macro in nature.
2. Unsystematic risk is controllable by an organization and micro in nature.

#### A. Systematic Risk

Systematic risk is due to the influence of external factors on an organization. Such factors Are normally uncontrollable from an organization's point of view.

1. Interest rate risk,
2. Market risk and

3. Purchasing power or inflationary risk.

### 1. Interest Rate Risk

Interest-rate risk arises due to variability in the interest rates from time to time. It Are normally uncontrollable from an organization's point of view.

Particularly affects debt securities as they carry the fixed rate of interest.

1. Price risk and
2. Reinvestment rate risk.

The meaning of price and reinvestment rate risk is as follows:

1. Price risk arises due to the possibility that the price of the shares, commodity, Investment, etc. may decline or fall in the future.
2. Reinvestment rate risk results from fact that the interest or dividend earned from an Investment can't be reinvested with the same rate of return as it was acquiring earlier

### 2. Market Risk

Market risk is associated with consistent fluctuations seen in the trading price of any Particular shares or securities. That is, it arises due to rise or fall in the trading price of Listed shares or securities in the stock market.

1. Absolute risk,
2. Relative risk,
3. Directional risk,
4. Non-directional risk,
5. Basis risk and
6. Volatility risk.

1. Absolute risk is without any content.

e.g., if a coin is tossed, there is fifty percentage Chance of getting a head and vice-versa.

2. Relative risk is the assessment or evaluation of risk at different levels of business Functions

e.g. a relative-risk from a foreign exchange fluctuation may be higher if the Maximum sales accounted by an organization are of export sales.

3. Directional risks are those risks where the loss arises from an exposure to the particular Assets of a market.

e.g. an investor holding some shares experience a loss when the Market price of those shares falls down.

4. Non-Directional risk arises where the method of trading is not consistently followed by The trader.

e.g. the dealer will buy and sell the share simultaneously to mitigate the Risk

5. Basis risk is due to the possibility of loss arising from imperfectly matched risks.

e.g.the risks which are in offsetting positions in two related but non-identical markets.

6. Volatility risk is of a change in the price of securities as a result of changes in the Volatility of a risk-factor.

e.g. it applies to the portfolios of derivative instruments, Where the volatility of its underlying is a major influence of prices. He risks which are in offsetting positions in two related but non-identical markets.

### 3. Purchasing Power or Inflationary Risk

Purchasing power risk is also known as inflation risk. It is so, since it emanates (originates) From the fact that it affects a purchasing power adversely. It is not desirable to invest in Securities during an inflationary period.

1. Demand inflation risk and
2. Cost inflation risk.

The meaning of demand and cost inflation risk is as follows:

1. Demand inflation risk arises due to increase in price, which result from an excess of Demand over supply. It occurs when supply fails to cope with the demand and hence Cannot expand anymore. In other words, demand inflation occurs when production Factors are under maximum utilization.

2. Cost inflation risk arises due to sustained increase in the prices of goods and services. It Is actually caused by higher production cost. A high cost of production inflates the final Price of finished goods consumed by people.

## 2. Unsystematic Risk

Unsystematic risk is due to the influence of internal factors prevailing within an Organization. Such factors are normally controllable from an organization's point of view. It Is a micro in nature as it affects only a particular organization? It can be planned, so that Necessary actions can be taken by the organization to mitigate (reduce the effect of) theRisk.

1. Business or liquidity risk,
2. Financial or credit risk and
3. Operational risk.

### 1. Business or Liquidity Risk

Business risk is also known as liquidity risk. It is so, since it emanates (originates) from the Sale and purchase of securities affected by business cycles, technological changes, etc.

1. Asset liquidity risk and
2. Funding liquidity risk.

**1. Asset liquidity risk** is due to losses arising from an inability to sell or pledge assets at, e.g. assets sold at a lesser value than their Book value

**2. Funding liquidity risk** exists for not having an access to the sufficient-funds to make a Payment on time. e.g. when commitments made to customers are not fulfilled as Discussed in the SLA (service level agreements).

## 2. FINANCIAL OR CREDIT RISK

Financial risk is also known as credit risk. It arises due to change in the capital structure of The organization. The capital structure mainly comprises of three ways by which funds are Sourced for the projects. These are as follows:

1. Owned funds. For e.g. share capital.
  2. Borrowed funds. For e.g. loan funds.
  3. Retained earnings. For e.g. reserve and surplus.
1. Exchange rate risk,
  2. Recovery rate risk,
  3. Credit event risk,
  4. Non-Directional risk,
  5. Sovereign risk and
  6. Settlement risk.

The meaning of types of financial or credit risk is as follows:

1. Exchange rate risk is also called as exposure rate risk. It is a form of financial risk that Arises from a potential change seen in the exchange rate of one country's currency in Relation to another country's currency and vice-versa e.g. investors or businesses

2. Recovery rate risk is an often neglected aspect of a credit-risk analysis. The recovery rate Is normally needed to be evaluated

e.g. the expected recovery rate of the funds Tendered (given) as a loan to the customers by banks, non-banking financial companies

3. Sovereign risk is associated with the government. Here, a government is unable to meet Its loan obligations, renegeing (to break a promise) on loans it guarantees, etc.

4. Settlement risk exists when counterparty does not deliver a security or its value in cash As per the agreement of trade or business.

### 1. Operational Risk

Operational risks are the business process risks failing due to human errors. This risk will Change from industry to industry. It occurs due to breakdowns in the internal procedures, People, policies and systems.

1. Model risk,
2. People risk,
3. Legal risk and
4. Political risk.

1. Model risk is involved in using various models to value financial securities. It is due to Probability of loss resulting from the weaknesses in the financial-model used in assessing And managing a risk.

2. People risk arises when people do not follow the organization's procedures, practices And/or rules. That is, they deviate from their expected behavior.

3. Legal risk arises when parties are not lawfully competent to enter an agreement among Themselves. Furthermore, this relates to the regulatory-risk, where a transaction could Conflict with a government policy or particular legislation (law) might be amended in the Future with retrospective effect.

4. Political risk occurs due to changes in government policies. Such changes may have an Unfavorable impact on an investor. It is especially prevalent in the third-world countries

1. Every organization must properly group the types of risk under two main broad Categories viz.

- a. Systematic risk and
- b. Unsystematic risk.

2. Systematic risk is uncontrollable, and the organization has to suffer from the same. However, an organization can reduce its impact, to a certain extent, by properly planning The risk attached to the project.

3. Unsystematic risk is controllable, and the organization shall try to mitigate the adverse Consequences of the same by proper and prompt planning.

### LIQUIDITY:

Liquidity position of the firms leads to easy payments of dividend. If the firms have high Liquidity, the firms can provide cash dividend otherwise, they have to pay stock dividend. Mutual fund investment is one of the highly liquidity based investments Which can be recapitalized at any time or sold the mutual fund units at any time.

### CONVENIENCE:

Mutual fund investment is one of the most convenient investments For those who want to invest or get back their investment through selling of The units of mutual fund.

### FLEXIBILITY:

Mutual fund can be transferred from one scheme to the other scheme On the basis of present market condition

### MATURITY:

If a company wants to factor its receivables it submits a list of customers, their credit Rating, amount involved in maturity and other terms.

When the units are sold and redeemed at any time on-going basis at the price determined By the fund's Net Assets Value (NAV) is called as open ended mutual fund. These mutual Fund has no fixed maturity periods.

Closed ended mutual funds have fixed maturity period ranging from two to 15 years. The Units of closed ended mutual funds are not repurchased or redeemed by mutual funds Before the maturity period. The investors cannot buy units directly from the fund after The closing period

**1. CALL MONEY MARKET:** It is the market for very short-term funds repayable on Demand and with the maturity period is less than 15 days. Call money market Is mainly located in major industrial and commercial areas like Delhi, Mumbai, Kolkata, Chennai and Ahmadabad.

**2. TREASURY BILL MARKET:** Treasury bills are also one of the short-term financial Instruments, which deal in money market. Treasury bill is a kind of finance bill Or promissory note issued by the government to raise short-term funds. Treasury Bills duration vary from 14 days to 364 days.

#### **SAFETY:**

Invest in stock and bond investments to meet income needs (from bond income and stock dividends) And to provide for real growth (from equities). Fixed-income securities should comprise 55–65 percent of the total portfolio; of this, 5–15 percent should be invested in short-term securities For extra liquidity and safety. The remaining 35–45 percent of the portfolio should be invested In high-quality stocks whose risk is similar to the S&P 500 index. More detailed analyses for our 25-year-old and our 65-year-old would make more specific Assumptions about the risk tolerance of each, as well as clearly enumerate their investment goals, Return objectives, the funds they have to invest at the present, and the funds they expect to invest over Time, and the benchmark portfolio that will be used to evaluate performance.

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Heirs can then sell the assets and not pay capital gains tax. Capital gains taxes are paid on **realized Capital gains**. Beginning in 2001, gains on assets purchased after January 1, 2001, and held For at least five years will be only 18 percent. For taxpayers in the 15 percent income tax bracket, The capital gains tax rate fell to 8 percent on assets held longer than five years. Sometimes it is necessary to make a trade-off between taxes and diversification needs. If Entrepreneurs concentrate much of their wealth in equity holdings of their firm, or if employees Purchase substantial amounts of their employer's stock through payroll deduction plans during Their working life, their portfolios may contain a large amount of unrealized capital gains. In Addition, the risk position of such a portfolio may be quite high because it is concentrated in a Single company. The decision to sell some of the company stock in order to diversify the portfolios Risk by reinvesting the proceeds in other assets must be balanced against the resulting tax Liability. To attain the prudent diversification, one should consider making the change over time. Some find the difference between average and marginal income tax rates confusing. The **Marginal tax rate** is the part of each additional dollar in income that is paid as tax. Thus, a married Person, filing jointly, with an income of \$50,000 will have a marginal tax rate of 28 percent. The 28 percent marginal tax rate should be used to determine after-tax returns on investments.

#### **INFLATION:**

Expected Rate of Inflation Previously, it was noted that if investors expected the price Level to increase during the investment period, they would require the rate of return to include Compensation for the expected rate of inflation. Assume that you require a 4 percent real rate of Return on a risk-free investment but you expect prices to increase by 3 percent during the investment period. In this case, you should increase your required rate of return by this expected rate of inflation to about 7 percent  $[(1.04 \times 1.03) - 1]$ . If you do not increase your required return, The \$104 you receive at the end of the year will represent a real return of about 1 percent, not 4 percent. Because prices have increased by 3 percent during the year, what previously cost \$100 Now costs \$103, so you can consume only about 1 percent more at the end of the year  $[(\$104/103) - 1]$ . If you had required a 7.12 percent nominal return, your real consumption could Have increased by 4 percent  $[(\$107.12/103) - 1]$ . Therefore, an investor's nominal required rate Of return on a risk-free investment should be

$$NRFR = (1 + RFR) \times (1 + \text{Expected Rate of Inflation}) - 1$$

Rearranging the formula, you can calculate the RFR of return on an investment as follows:

To see how this works, assume that the nominal return on U.S. government T-bills was 9 percent During a given year, when the rate of inflation was 5 percent. In this instance, the RFR of return on these T-bills was 3.8 percent, as follows:

$$\begin{aligned} RFR &= [(1 + 0.09)/(1 + 0.05)] - 1 \\ &= 1.038 - 1 \\ &= 0.038 = 3.8\% \end{aligned}$$

This discussion makes it clear that the nominal rate of interest on a risk-free investment is not a good estimate of the RFR, because the nominal rate can change dramatically in the short run in reaction to temporary ease or tightness in the capital market or because of changes in the Expected rate of inflation. As indicated by the data in Exhibit 1.6, the significant changes in the Average yield on T-bills typically were caused by large changes in the rates of inflation.

### EXPECTED RETURNS AND REALIZED RETURNS

When you are evaluating alternative investments for inclusion in your portfolio, you will often be Comparing investments with widely different prices or lives. As an example, you might want to Compare a \$10 stock that pays no dividends to a stock selling for \$150 that pays dividends of \$5 a year. To properly evaluate these two investments, you must accurately compare their historical Rates of returns. A proper measurement of the rates of return is the purpose of this section.

When we invest, we defer current consumption in order to add to our wealth so that we can Consume more in the future. Therefore, when we talk about a return on an investment, we are Concerned with the change in wealth resulting from this investment. This change in wealth can Be either due to cash inflows, such as interest or dividends, or caused by a change in the price of The asset (positive or negative).If you commit \$200 to an investment at the beginning of the year and you get back \$220 at The end of the year, what is your return for the period? The period during which you own an Investment is called its holding period, and the return for that period is the **holding period Return (HPR)**. In this example, the HPR,

HPR that was annualized, we assumed that the return is compounded for the whole year.That is, we assumed that the rate of return earned during the first part of the year is likewise earned On the value at the end of the first six months. The 12 percent rate of return for the initial six months Compounds to 25.44 percent for the full year.<sup>2</sup> Because of the uncertainty of being able to earn the Same return in the future six months, institutions will typically not compound partial year results. Remember one final point: The ending value of the investment can be the result of a positive Or negative change in price for the investment alone (for example, a stock going from \$20 a share To \$22 a share), income from the investment alone, or a combination of price change and income.Ending value includes the value of everything related to the investment.

### EXPECTED RETURN: E(R)

The expected return from investing in a security over some future holding period is an estimate of the future outcome of this security.

- Although the **Expected Return** is an estimate of an investor's expectations of the future, it can be estimated using either **ex ante** (forward looking) or **ex post** (historical) data.
- If the expected return is equal to or greater than the required return, purchase the security.
- Regardless of how the individual returns are calculated, the **Expected Return of a Portfolio** is the weighted sum of the individual returns from the securities making up the portfolio:

$$E(R)_p = \sum_{n=1}^N w_n E(R)_n$$

**EX ANTE EXPECTED RETURN:** calculations are based on probabilities of the future states of nature and the expected return in each state of nature. Sum over all states of nature, the product of the probability of a state of nature and the return projected in that state.

$$E(R) = \sum_{s=1}^S P_s R_s$$

**Ex post expected return** calculations are based on historical data. Add the historical returns and then divide by the number of observations.

$$E(R) = \left( \sum_{t=1}^T R_t \right) \div T$$

**VARIANCE (STANDARD DEVIATION):  $\Sigma^2$  ( $\Sigma$ )**

Variance is a measure of the dispersion in outcomes around the expected value. It is used as an indication of the risk inherent in the security. Standard deviation is the square root of variance.

**EXTANTE VARIANCE CALCULATION:**

1. The expected return is subtracted from the return within each state of nature; this difference is then squared.
2. Each squared difference is multiplied by the probability of the state of nature.
3. These weighted squared terms are then summed together.

$\sigma^2 = \sum_{s=1}^s [R_s - E(R)]^2 P_s$ <p>Variance</p>	$SD = \sigma = \sqrt{\sigma^2}$
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**RISK RETURNS TRADE –OFF:**

In the preceding section we saw that, under the CAPM theory, beta is the proper measure of a stock’s relevant risk. However, we need to quantify how risk affects required returns: For a given level of risk as measured by beta, what rate of return do investors require to compensate them for bearing that risk? To begin, The expected rate of return and the variance or standard deviation provide investor with information about the nature of the probability distribution associated with a single asset. However all these numbers are only the characteristics of return and risk of the particular asset. But how does one asset having some specific trade-off between return and risk influence the other one with the different characteristics of return and risk in the same portfolio? And what could be the influence of this relationship to the investor’s portfolio? The answers to these questions are of great importance for the investor when forming his/ her diversified portfolio. The statistics that can provide the investor with the information to answer these questions are covariance and correlation coefficient. Covariance and correlation are related and they generally measure the same phenomenon – the relationship between two variables. Both concepts are best understood by looking at the math behind them

let us define the following terms.

$r^{\wedge}$

$i$ = Expected rate of return on Stock  $i$ .

$r_i$ = Required rate of return on Stock  $i$ . This is the minimum expected return that is required to induce an average investor to purchase the stock.

$r$ – = Realized, after-the-fact return.

$r_{RF}$ = Risk-free rate of return. In this context,  $r_{RF}$  is generally measured by the expected return on long-term U.S. Treasury bonds.

$b_i$ = Beta coefficient of Stock  $i$ .

$r_M$ = Required rate of return on a portfolio consisting of all stocks, which is called the market portfolio.

RPM = Risk premium on “the market.”  $RPM = (r_M - r_{RF})$  is the additional return over the risk-free rate required to induce an average investor to invest in the market portfolio.

**RPI= RISK PREMIUM**

On Stock  $i$ :  $RPI_i = (RPM)b_i$ .

The market risk premium, RPM, is the premium that investors require for bearing the Risk of an average stock, and it depends on the degree of risk aversion that investors on average Have. Assume that Treasury bonds yield  $r_{RF} = 6\%$  and that the stock market has a required Return of  $r_M = 11\%$ . Under these conditions, the market risk premium, RPM, is 5%:

$$RPM = r_M - r_{RF} = 11\% - 6\% = 5\%$$

$$\text{Risk premium for Stock } i = RPI_i = (RPM)b_i \quad (6-13)$$

For example, if  $b_i = 0.5$  and  $RPM = 5\%$ , then  $RPI_i$  is 2.5%:

$$RPI_i = \frac{1}{2} \cdot 5\% = 2.5\%$$

$$\frac{1}{2} \cdot 5\%$$

The required return for any investment can be expressed in general terms as Required return = Risk-free return + Premium for risk Here the risk-free return includes a premium for expected inflation, and we assume That the assets under

consideration have similar maturities and liquidity. Under these Conditions, the relationship between risk and required returns can be found as specified In the Security Market Line (SML):

## RISK AVERSION

Financial plans and investment needs are as different as each individual. Investment needs Change over a person's life cycle. How individuals structure their financial plan should be related To their age, financial status, future plans, risk aversion characteristics, and needs.

Before embarking on an investment program, we need to make sure other needs are satisfied. No Serious investment plan should be started until a potential investor has adequate income to cover Living expenses and has a safety net should the unexpected occur.

Insurance Life insurance should be a component of any financial plan. Life insurance protects Loved ones against financial hardship should death occur before our financial goals are met.

The death benefit paid by the insurance company can help pay medical bills and funeral expenses And provide cash that family members can use to maintain their lifestyle, retire debt, or invest for Future needs (for example, children's education, and spouse retirement). Therefore, one of the first Steps in developing a financial plan is to purchase adequate life insurance coverage. Insurance can also serve more immediate purposes, including being a means to meet long-term Goals, such as retirement planning. On reaching retirement age, you can receive the cash or Surrender value of your life insurance policy and use the proceeds to supplement your retirement Lifestyle or for estate planning purposes.

## CONCLUDING REMARKS

We have attempted to demonstrate the power and potential of dynamic \_financial econometric methods forpractical\_finnancial risk measurement and management. Wehave surveyed the large literature on high-frequency volatility modeling, interpreting and unifying the most important and intriguing results of practical relevance.<sup>92</sup> Our discussion has many implications for practical \_Financial risk management; some point toward desirable extensions of existing approaches, and some suggest new directions.

### Key points include:

#### 1. Standard \model-free" methods, such as historical simulation, rely on false

org/research-and-data/real-time-center/business-conditions-index.For background and references, see Diebold and Rudebusch (2012).We hasten to add that this chapter is a complement, not a substitute, for the more general and technical survey of volatility and covariance forecasting of Andersen et al. (2006a). In addition, space constraints and other considerations have invariably limited our choice of included topics.For instance, we have largely neglected stochastic volatility and other parameter-driven approachesto volatility modeling, as well as option-implied volatility.

2. Successful risk measurement may be achieved through the use of univariate density models directly for portfolio returns. volatility models o\_eraconvenient and parsimonious framework for modeling key dynamic features of such portfolio returns, including volatility mean-reversion, long-memory, and asymmetries.

3. Successful risk management, in contrast, requires a fully-speci\_ed multivariate density model. In that regard, standard multivariate models are too heavily parameterized to be useful in realistic medium- and large-scale \_financial market contexts. In medium-scale \_nancial contexts, recently-developed multivariate

GARCH models are likely to be useful. In very large-scale \_financial contexts, more structure must be imposed, such as decoupling variance and correlation dynamics.

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