Lehman Brothers Risk Management: An Integrated Framework

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Where vision gets built. SM

- Our control environment

- Risk Management Practices: An Integrated Framework
  - Risk Appetite
  - Risk Equity
    - Risk Measurements
  - Limits and the approval process
    - Portfolio level
    - Single transactions
    - Concentration
    - Country

- Conclusion

Our Control Environment

- Risk Management is one of our core competencies.
- It is Multi-tiered and involves many areas of the Firm.
- One key feature which differentiates us from our peers is Market risk and Credit risk are integrated
  - allows us to leverage people, analytics, systems, information flows.
- Risk Management is a partnership with the business
  - we work proactively with the business before a large trade is done to collectively determine the least risky deal structure.
- Risk Management
  - develops risk policies and procedures
  - sets limits
  - tracks actual risk usage against limits

Our Control Environment

- Dick Fuld chairs the weekly Capital Markets meeting
  - composed of the Executive committee, the Heads of the Businesses, the Chief Strategist, the Chief Economist, the Global Head of Risk Management.
  - serves to frame our risk opinions in the context of the global market environment.

- The Risk Committee meets weekly to review exposures and position concentrations (both market and credit)
  - the Firm's Risk Committee consists of the Executive Committee, the Firm's senior risk-takers and the Global Head of Risk Management.

- In addition, there are other risk committees such as the:
  - Investments and Commitments Committees
  - New Products Committee
  - Operating Exposures Committee
  - Country Risk Committee

Risk Management Practices: An Integrated Framework

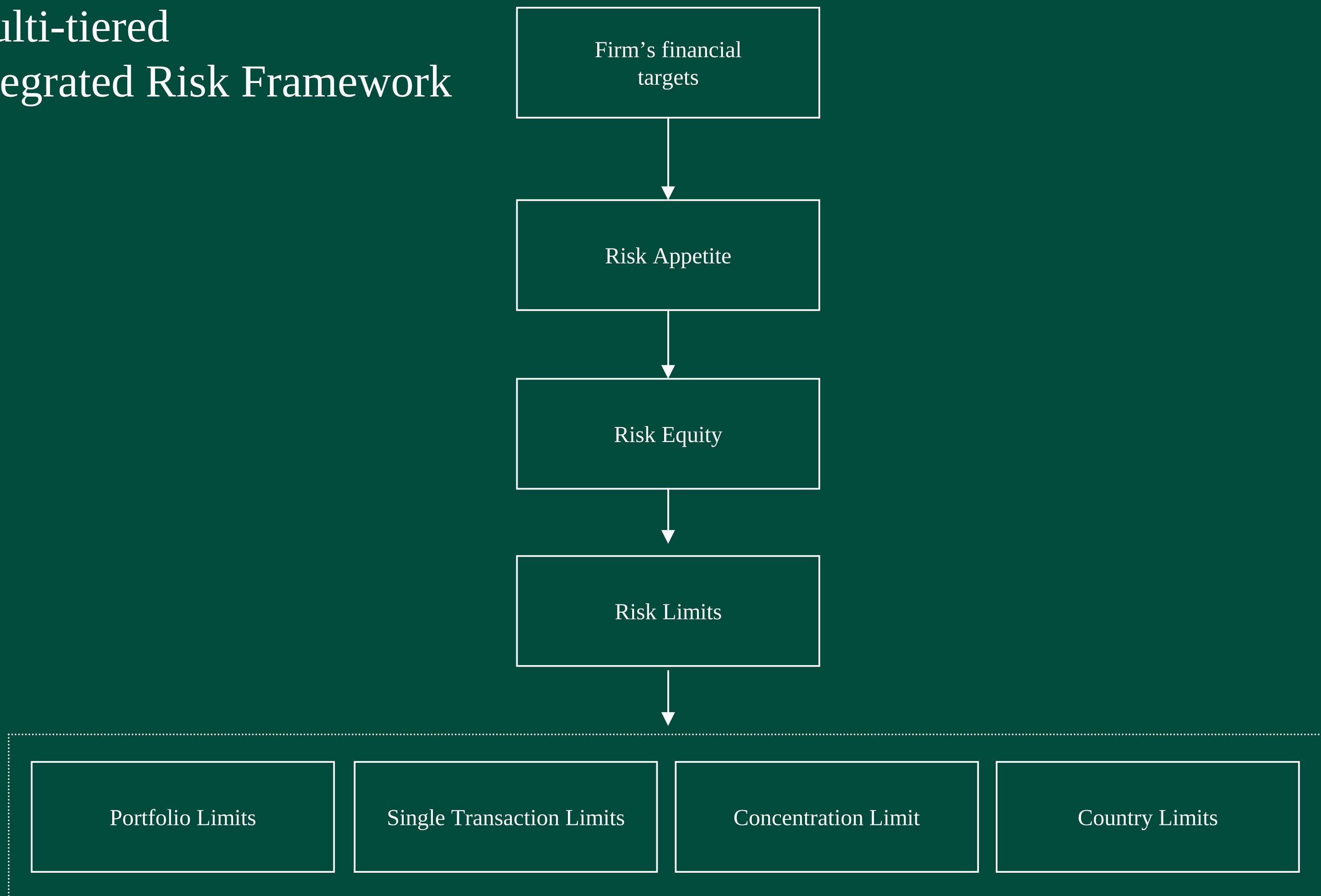
The three core functions of risk management are:

1. Understanding and identifying all risks.
2. Ensuring that appropriate limits are in place for all transactions and products.
3. Protecting the Firm against "catastrophic" loss.

1. Have metrics to measure the risk for all products.
2. Define a "Risk Appetite."
3. Have the ability to measure and monitor "tail risk."

Risk Management Practices: An Integrated Framework

– Multi-tiered
– Integrated Risk Framework



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Risk Management Practices: An Integrated Framework

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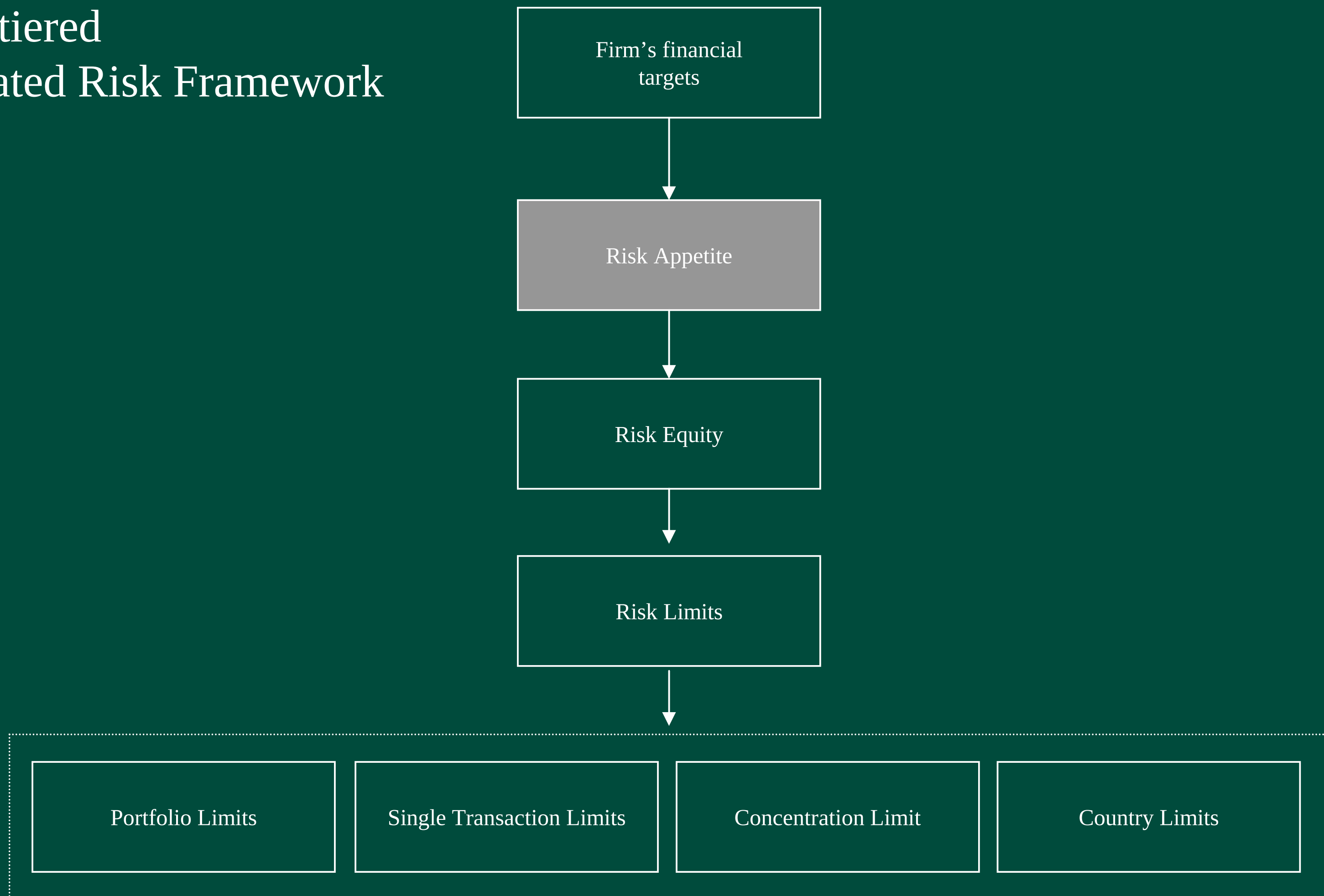

Risk Management Practices: An Integrated Framework

Risk Appetite

- The risk appetite represents the quantity the Firm is "prepared to lose" in a year from market, event and counterparty credit risk.
- The risk appetite framework begins with the Firm's financial targets and is designed to balance risk and return:
  - our aim is to deploy enough risk in our businesses to maximize returns;
  - while limiting risk to ensure we meet our financial targets.
- Significant factors driving risk appetite include:
  - base revenue assumptions
  - an estimate of the loss of revenues from non-risk taking activities
  - a minimum acceptable ROTE
  - compensation adequacy

Risk Management Practices: An Integrated Framework

Risk Appetite

- We start with our financial targets.
- We take into account a potential simultaneous slowdown in customer flow and banking activities (origination/advisory) which would negatively impact our financial targets since revenue shortfalls can also come from non-risk taking activities.
- Then we subject ourselves to two constraints:
  - maintaining a minimally acceptable annual ROTE
  - ensuring compensation adequacy including maintaining sufficient headcount to protect the franchise for the long-term.

Risk Management Practices: An Integrated Framework

Risk Appetite – the center of our approach to risk.

The risk appetite represents the quantity the Firm is "prepared to lose" in a year from market, event and counterparty credit risk. It is defined and measured at a 95 percent level of confidence.

Confidence Interval and Time Horizons

Daily VaR		Risk Appetite		Equity Requirement
95% confidence	←	95% confidence	→	99.5% confidence
One day horizon		One year horizon		1 year or longer horizon depending on the nature of the trade

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– Multi-tiered

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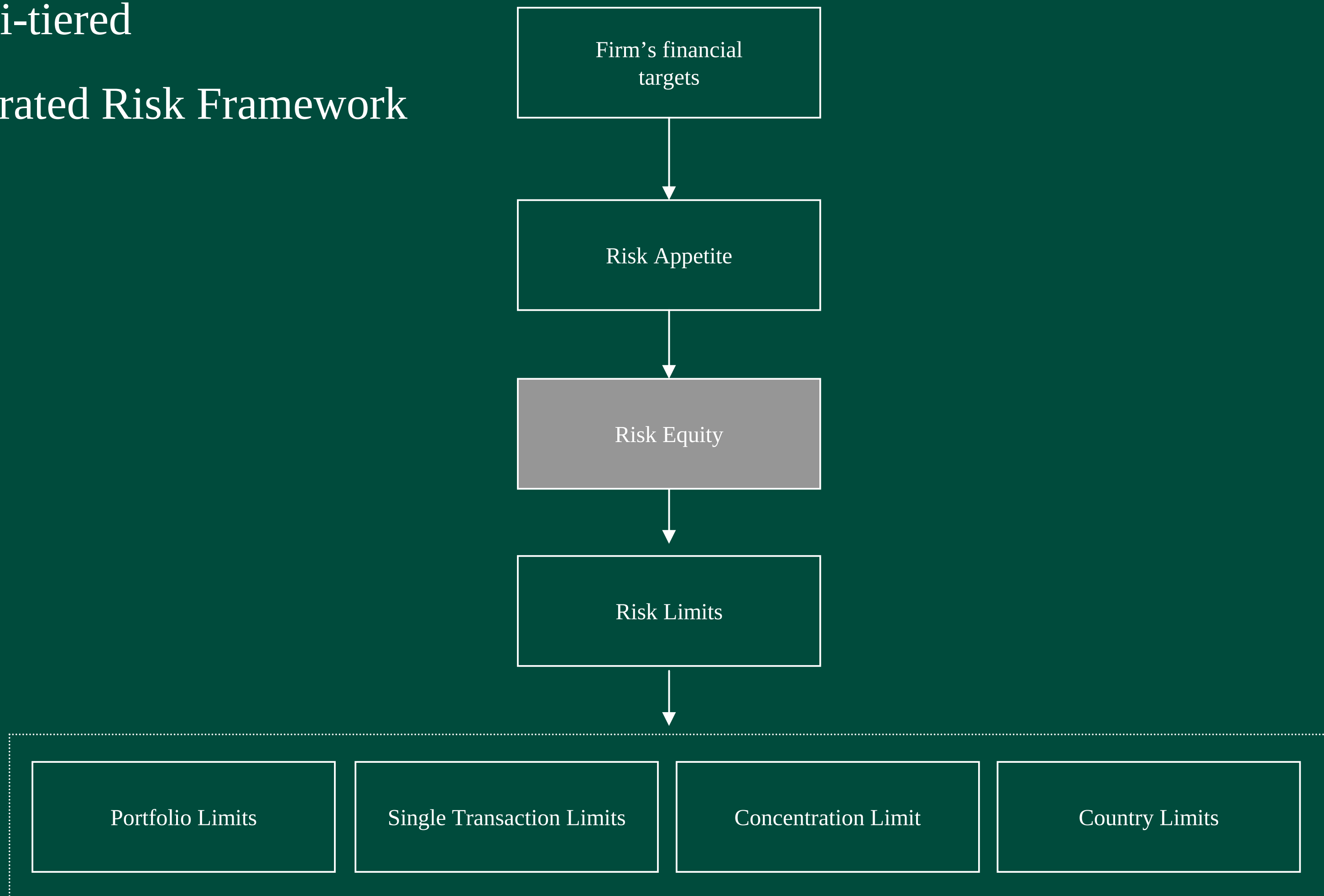

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Risk Management Practices: An Integrated Framework

Risk Equity

The equity capital the Firm requires is the greater of the economic capital required to protect the Firm against market, event, counterparty credit and operating/legal risks or regulatory capital – the capital required by businesses operating in regulated entities.

Equity Capital: Economic Capital and Regulatory Capital

Market Risk

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Event Risk

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Counterparty Credit Risk

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Operating/Legal Risk

Economic Capital | Augmented by | Regulatory Capital | = | Equity Capital

Risk Management Practices: An Integrated Framework

Market Risk Measurement

- Market risk (VaR) measures the potential mark-to-market loss on all positions from adverse moves in all risk factors.
- Market risk is composed of linear and non-linear risk.
- We use the historical simulation approach with full revaluations for all non-linear products.
- Calculated on a daily basis for all businesses
- Calculated at a 95 percent confidence interval over a one-day holding period
- Consolidated globally
- Usage measured and reported daily against risk limits

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Market Risk Measurement

- Backtesting is used to determine the reasonableness of the VaR measures by comparing the actual net trading profits or losses of a portfolio to the VaR generated for the portfolio.
- Stress tests are performed to evaluate the potential impact on a portfolio of abnormal market conditions however unlikely the probability of occurrence may be.
- Re-runs of historical episodes of extreme market moves are performed to evaluate the impact on today's portfolio of a repeat of a time period with extreme market moves.
- Hypothetical scenarios are used to evaluate the potential P&L impact on a portfolio due to shocks that have some probability of occurrence and are driven by macro fundamental shifts:
  - dollar declines due to the current account deficit
  - oil price increases leading to cost-push inflation
  - yield curve steepening due to potential inflationary expectations
  - credit spreads widening due to an increase in the overall level of the curve

Risk Management Practices: An Integrated Framework

Market Risk - Other Measures

- In addition to measuring market risk we also measure event risk.
- Event risk measures the potential losses which go beyond mark-to-market losses. These include:
  - downgrades for high grade loans and securities
  - defaults for high yield loans and securities
  - defaults for sub-prime mortgage loans
  - property value losses on real estate
  - dividend risk for equity derivatives
  - deal break risk for merger arbitrage positions

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Counterparty Credit Risk

- Counterparty credit risk measures the potential loss the Firm can suffer due to forward settlements, financing and derivative transactions with its customers.
- The measurement is a three-step process:
    1) Measure the potential exposure of all transactions over the appropriate time horizon.
    2) Assign each counterparty a probability of default and a recovery rate based on its internal credit rating.
    3) Run these inputs through the model to create a cumulative joint probability distribution from which we cut a tail.
- The result of this process measures the maximum potential loss across the entire counterparty portfolio.

Risk Management Practices: An Integrated Framework

– Multi-tiered

– Integrated Risk Framework

Firm's financial targets

↓

Risk Appetite

↓

Risk Equity

↓

Risk Limits

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Portfolio Limits | Single Transaction Limits | Concentration Limit | Country Limits

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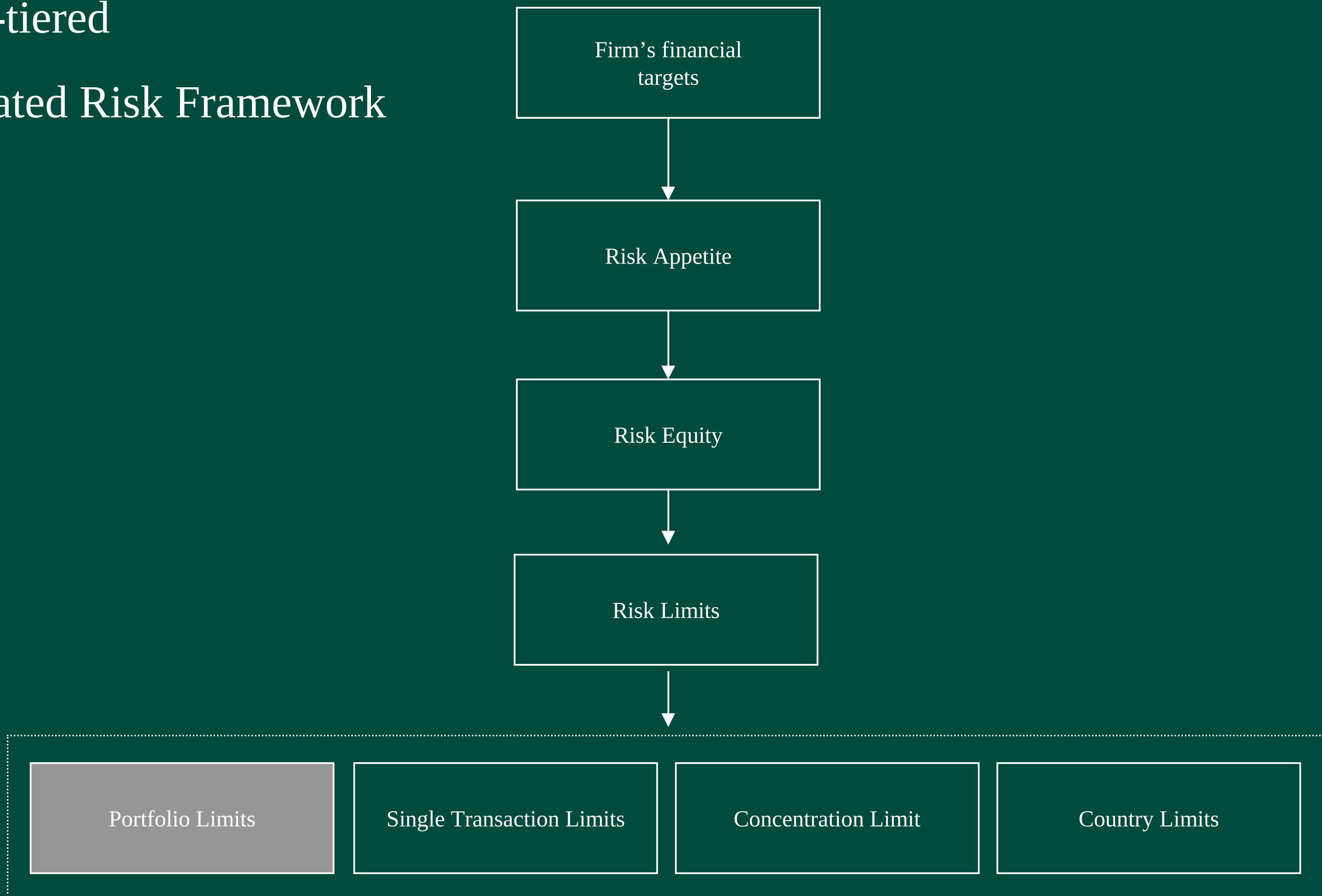

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Risk Limits

- Risk Appetite Limits
  - The overall limit is driven by Risk Appetite which is approved by the Executive Committee.
  - Limits are set by Risk Management in conjunction with the business heads.
  - Limits are cascaded down to the divisions and businesses.
- Credit Limits
  - All counterparties are given internal ratings.
  - Every counterparty has a limit which is subdivided into product limits
    - no diversification benefit is given to any counterparty across products
  - The largest counterparties by industry, region and product are reviewed on a quarterly basis.
  - All counterparties rated below "A" are formally reviewed on an annual basis

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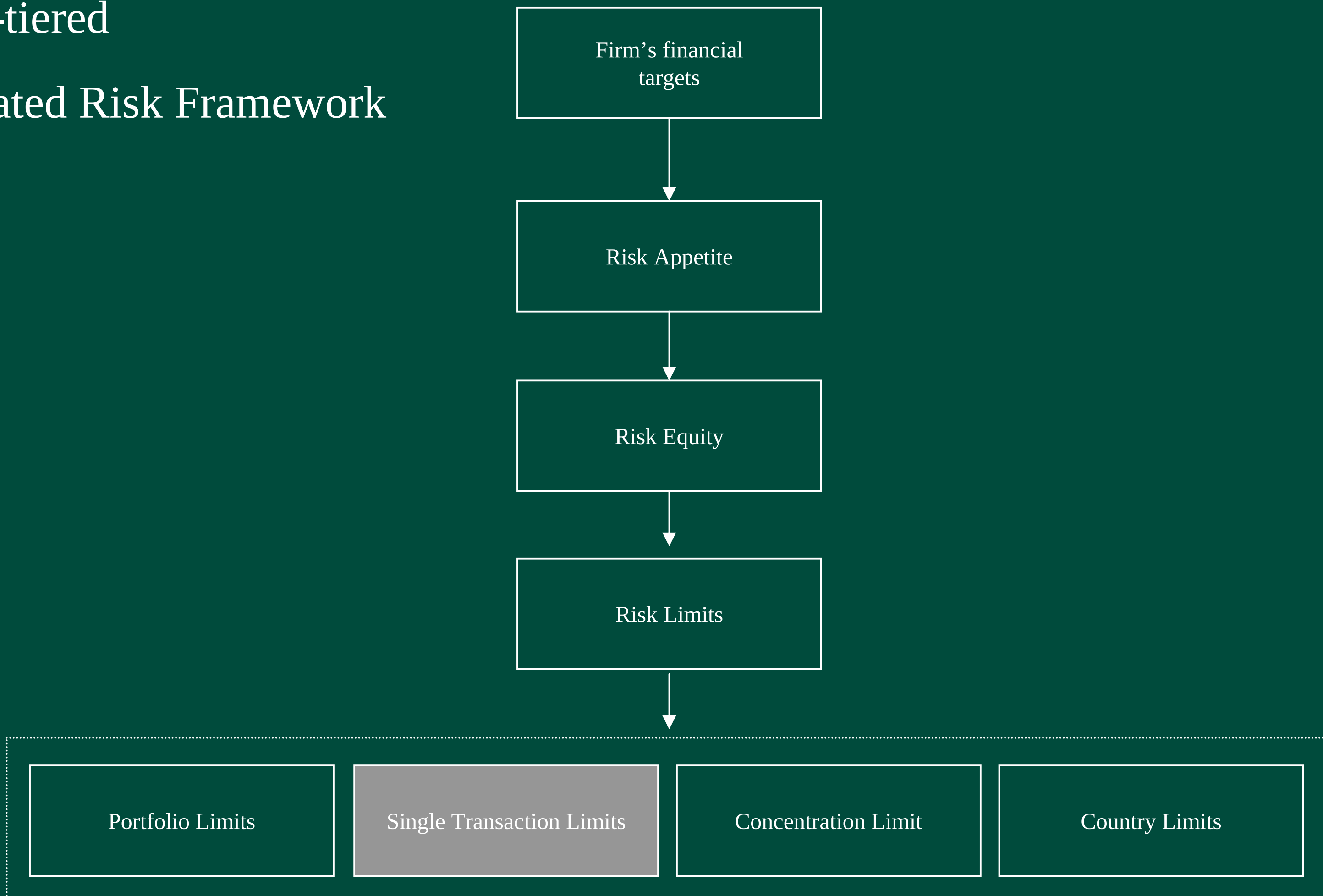

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Single Transaction Limits

Commitment Process – A series of "checks and balances"

Deal Team, Risk & Research Analysts participate in due diligence	Deal Team prepares detailed memorandum	Divisional Commitment Committees	Firmwide Commitment Committee
Investment Banking relationship managers responsible for coordinating the approval process Commitment Committee Credit Review analyst, Credit and Market Risk Management, and Research participate in formal due diligence and risk assessment	Proposal described Results of all due diligence reported Opinions, financial projections and recommendations of Commitment Committee Credit Review analyst, Credit and Market Risk Management, and research reported	Ensures attractive ROE Ensures transaction can be accommodated within – Cash Capital limit – Risk Appetite – Credit limit – Single transaction limit	Ensures that – The transaction fits within our funding and risk frameworks – Even in downside scenarios meets minimum return hurdles – There is proper coordination across the Firm – Due diligence has been thorough – The Firm is comfortable doing business with the client – The Firm is protected from a legal perspective – The syndication strategy is clear, and where appropriate we have pre-syndicated with our "Club"

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Risk Limits

Single Transaction Limits

- The Firm operates under a comprehensive regime of limits for risk which relate to the aggregate portfolio of transactions.
- The Single Transaction Limit framework limits the size of single transactions even if a transaction can be accommodated within these aggregate limits.
- We want to limit the maximum loss we could incur to any one name in order to avoid negative publicity and incur decreased confidence in the Firm’s risk controls.
- The Commitments Committee has the authority to approve transactions within these limits.
- Executive Committee approval is required in rare circumstances where transactions could exceed these limits.

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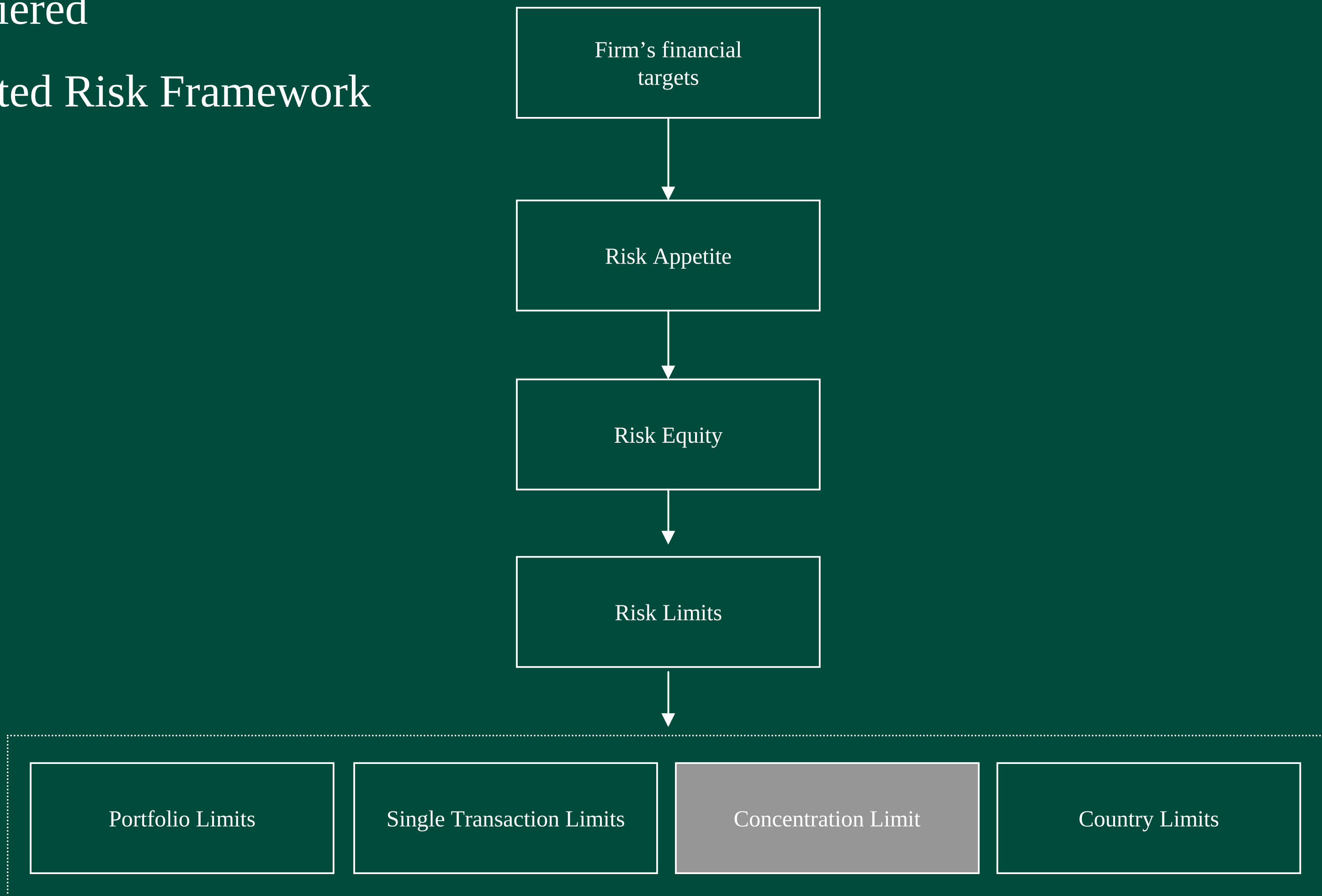

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Risk Limits

Concentration Limits

- While the Single Transaction Limit establishes a framework for limits on the size of an individual transaction we also place limits on groups of positions which have similar characteristics and therefore are correlated.
- Concentration Limits are set on:
  - asset classes
  - industry sector
  - credit sector
  - underlying name

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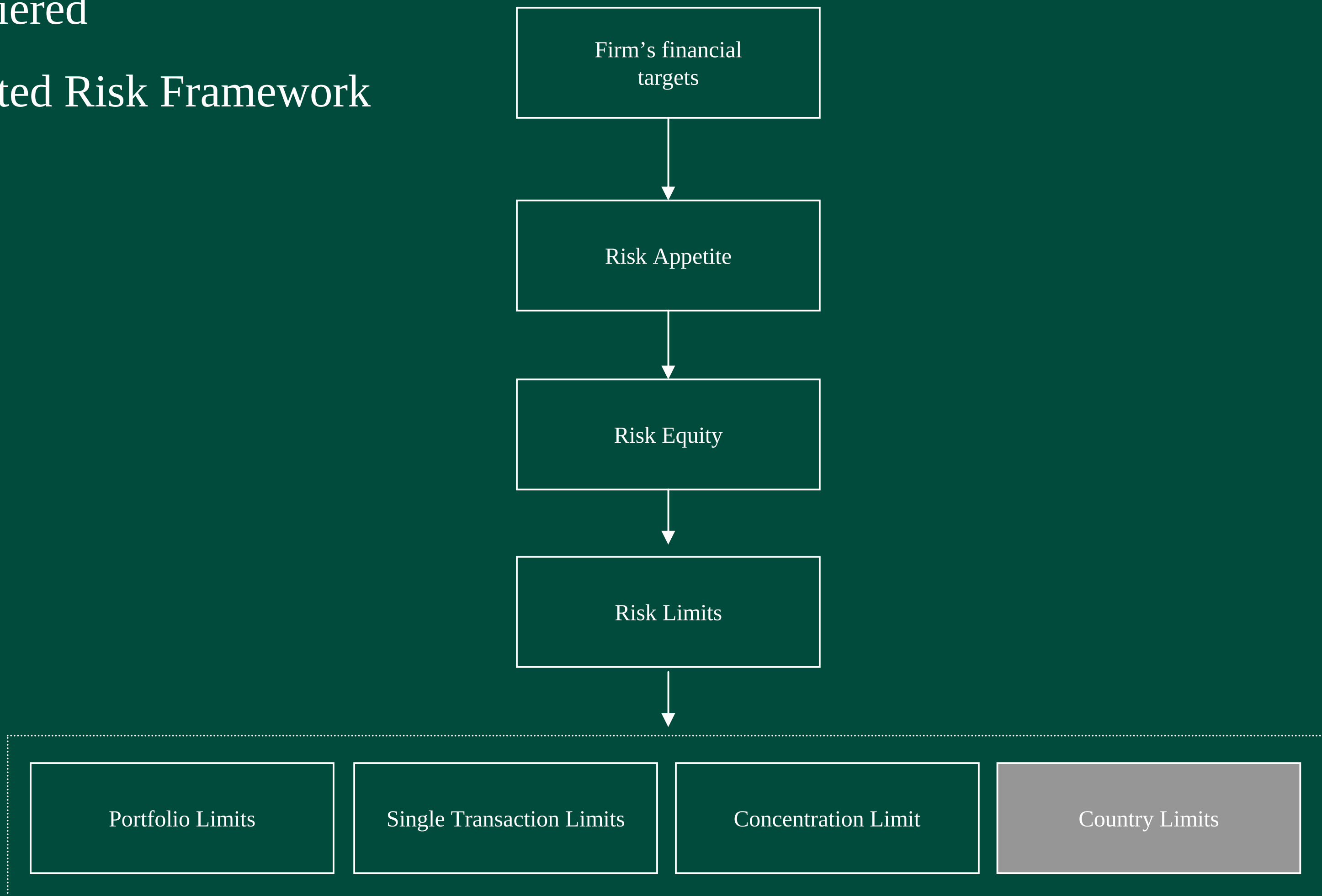

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Risk Limits

Country Limits

- Limits are set on a country basis for non-G10 countries.
- All countries are tiered according to
  - political and social stability
  - macro fundamentals/creditworthiness
  - size and liquidity of markets
- Limits are set on an Estimated Potential loss basis.
- This process limits losses arising from a crisis in a country or a region.
- Encourages prudent risk taking.

Summary and Conclusion

- We have a strong culture of risk management throughout the firm.
- Our franchise is to facilitate customers and clients.
- We are prudent toward our approach to credit risk with particular focus on single credit exposures and industry concentration.
  - We have very low tolerance for delays on receiving collateral, where applicable.
  - We give close scrutiny to the value of customer collateral posted against margin loans.
- Our approach is to mitigate risk through various hedging strategies, and follow a model of credit facilitation where we act as a conduit between our clients and the capital markets, rather than as the ultimate holder of the risk.