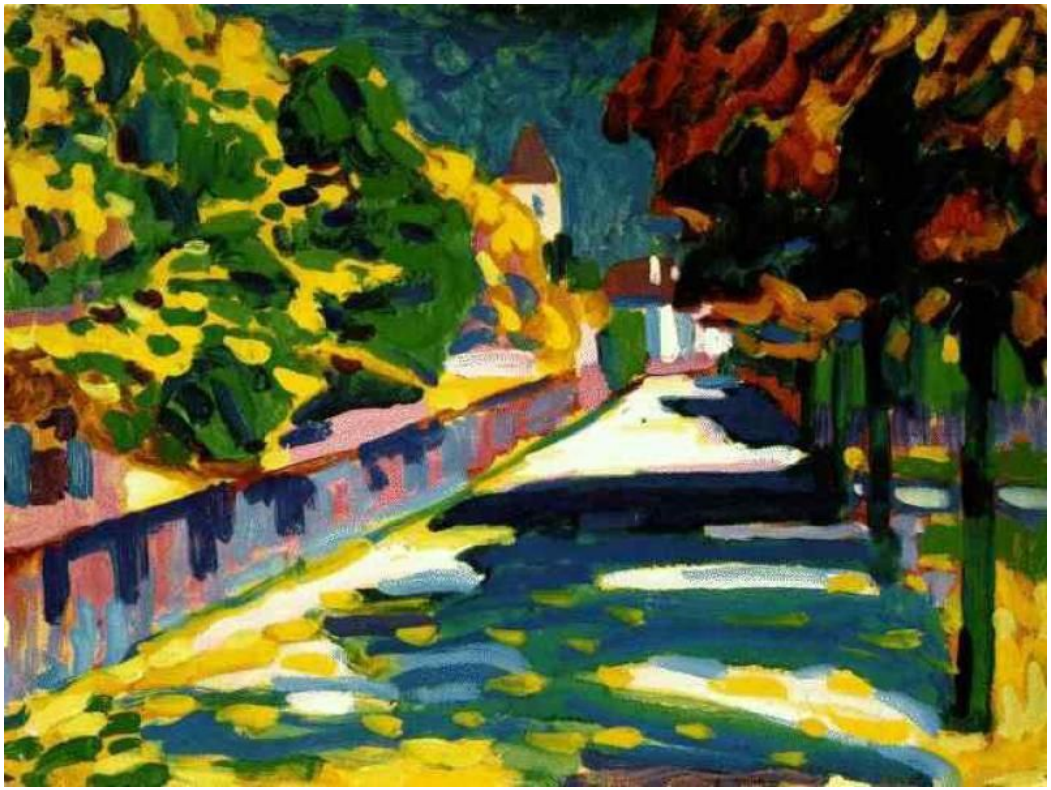

MOSCOW EXCHANGE

Moscow University
Risk Management

Class #1 – Intro: Risk Management

Lecturer: Luis A. B. G. Vicente
September/2015

Class #1 – Risk Management

1	Course Objectives, Program and Dynamics
2	Risk, Uncertainty and Complexity
3	Financial Institutions – Key Risk Dimensions
4	The Increasing Importance of Financial Risk Management
5	Annex

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Course Objectives, Program and Dynamics

- Objectives
  - Understand what financial risk management is all about
    - Risk management – *lato sensu* – as a discipline
    - Main risk dimensions in financial institutions
    - Focus on market risk and, to a lesser extent, credit and liquidity risks
    - Quantitative models and financial risk
  - Acquire the basic knowledge that will serve as the foundation for further development

Course Objectives, Program and Dynamics

- Format
  - 14 classes during 3 ½ months
  - Handouts, bibliography, exercises
    - We will cover a lot of information during a very short period of time
    - Self study plays a major role
  - Individual assessment
    - Individual written exam on 23.12, weight 40%
    - Individual project to be delivered by 23.12, weight 60%
    - Grades from 0 to 5, ≥3 pass, <3 fail

Course Objectives, Program and Dynamics

Class	Date	Topic	Subject	Description
1	24.09 (LV)	Prelude	Intro: Risk Management	– Introduction and course dynamics; – Risk, uncertainty and complexity; – Main sources of risk in financial institutions: market risk, credit risk, liquidity risk, legal risk, compliance risk, reputational risk, strategic risk; – The increasing importance of risk management activity in financial institutions.
2	30.09 (LV)	Finance	Financial Markets and Financial Instruments	– Fixed income instruments: government bonds, corporate bonds, fixed and floating; – Equities: Listing, IPOs, secondary market; – FX: main currencies, currency pairs; – Derivatives: forwards, futures, swaps and options; – Exchange vs. OTC markets.
3	07.10 (DA)	Finance	Interest Rate Theory I	– The time value of money; – Principal and interest; – NPV and IRR calculation; – The yield curve: yield, spot and forward rates.
4	14.10 (DA)	Finance	Interest Rate Theory II	– Bootstrapping the yield curve; – Pricing fixed income instruments; – Duration and Convexity; – Immunization.

Course Objectives, Program and Dynamics

Class	Date	Topic	Subject	Description
5	21.10 (LV)	Finance	Mean-Variance Portfolio Theory and CAPM	– Random returns: mean, variance and covariance; – Portfolio mean and variance; – Diversification effect; – The Markowitz Model; – The Capital Market Line; – The Capital Asset Pricing Model (CAPM).
6	28.10 (LV)	Finance	Basic Derivatives Pricing I	– Non-arbitrage arguments and derivatives pricing; – Pricing linear derivatives – forward, futures and swaps; – Options and the put/call parity.
7	04.11 (LV)	Finance	Basic Derivatives Pricing II	– Price dynamics and risk neutral pricing; – Pricing options using the binomial model; – Pricing options using Monte Carlo simulations; – Pricing options using the Black-Scholes model.
8	11.11 (LV)	Market Risk	Linear Risks – Identification and Sensitivity Analysis	– Definition of risk factors and risk exposures; – Linear decomposition of financial instruments into risk factors; – Calculating risk exposures; – Sensitivity analysis: single instruments and portfolios.

Course Objectives, Program and Dynamics

Class	Date	Topic	Subject	Description
9	18.11 (DA)	Market Risk	Value at Risk (VaR) – Definition and Parametric Estimation	– Value at risk definition; – Parametric VaR estimation for a single instrument using linear risk exposures; – Using the variance-covariance matrix to calculate parametric VaR estimates for a portfolio of financial instruments.
10	25.11 (DA)	Market Risk	Non-Linear Risks and Other VaR Estimation Techniques	– Limitations of the parametric approach; – Full valuation techniques; – VaR using historical simulations; – VaR using Monte Carlo simulations.
11	02.12 (DA)	Market Risk	Extreme Market Events	– Fat tails, crisis and black swans; – Stress testing; – EVT estimates; – Expected shortfall.
12	09.12 (DA)	Credit and Liquidity Risk	Credit and Liquidity Risk Management	– Default risk and loss given default; – Ratings, yield spreads and the price of private debt; – Credit transition models and credit risk estimation; – Market liquidity risk, market depth, bid-ask spreads and liquidity risk adjustments; – Funding, liquidity mismatch, gap analysis.

Course Objectives, Program and Dynamics

Class	Date	Topic	Subject	Description
13	16.12 (LV)	Epilogue	Current Issues in Risk Management	– The complexity spiral; – Limitations in financial modelling; – Lessons from recent financial crises and bank failures; – Global regulation of financial markets.
14	23.12 (LV & DA)	Final Exam	Final Exam	– Final exam.

Course Objectives, Program and Dynamics

Becoming a professional risk manager

Study → Practice → Study → Practice → Study → Practice → Study → Practice ↓

Study → Practice → Study → Practice → Study → Practice ↓

Study → Practice → Study → Practice → Study → Practice

…

Financial risk management is a relatively new discipline

- Financial innovation
- Changes in prudential regulation
- Advances in risk modeling

Models provide only approximations – need for real world experience

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Risk, Uncertainty and Complexity

Classical definition of risk and uncertainty

Frank Knight, 1921

Risk — Known outcomes, known probabilities

Tossing an unbiased coin
- Outcomes: Head or tails
- Probabilities: 50%, 50%

Uncertainty — Known outcomes, unknown probabilities

Getting caught cheating on your girlfriend/boyfriend
- Outcomes: Forgiven or not forgiven
- Probabilities: Unknown*

(*) Very low, anyway

Risk, Uncertainty and Complexity

Another interpretation – Two-tailed and lower-tail risks

Two-tailed — Uncertainty about future outcomes

- Tossing an unbiased coin — Outcomes
  - Head — You win 1M RUB
  - Tails — You win 0.5M RUB

Lower-tail — Uncertainty about future adverse outcomes

- Tossing an unbiased coin paying 1M RUB — Outcomes
  - Head — You win 1M RUB
  - Tails — You win 0.5M RUB

Lower-tail risk is also known as “downside risk"

In risk management, more often than not
- Models consider all possible outcomes
- Yet the main objective is to estimate downside risks
- This is reflected in standard definitions of financial market risks

Risk, Uncertainty and Complexity

Complexity makes matters even worse

- Non-linear financial instruments
- Contingent claims
- Highly coupled markets
- High frequency trading
- Incomplete markets

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Financial Institutions – Key Risk Dimensions

Key Risk Dimensions

Market Risk	• Risk of losses due to adverse market movements.
Credit Risk	• Risk of losses given the default of a borrower or; • Risk of losses given a (negative) change in a borrower's credit outlook (decrease in market value).
Liquidity Risk	• Risk of losses because market prices are too size sensitive (shallow markets) or; • Risk of not having resources on a timely fashion (funding risk).
Operational Risk	• Risk of losses due to IT failures, human error, fraud, insufficient contingency planning, etc.
Legal Risk	• Risk of losses due to violation of laws and/or regulations or; • Risk of losses due to defective contracts.
Image/Reputational Risk	• Risk of losses due to events that would damage the company's reputation.
Strategic Risk	• Risk of losses due to poorly implemented business strategies.

Financial Institutions – Key Risk Dimensions

Financial Risks

Market Risk

- Treasury activity (proprietary trading);
- Investment banking (structured transactions).

Credit Risk

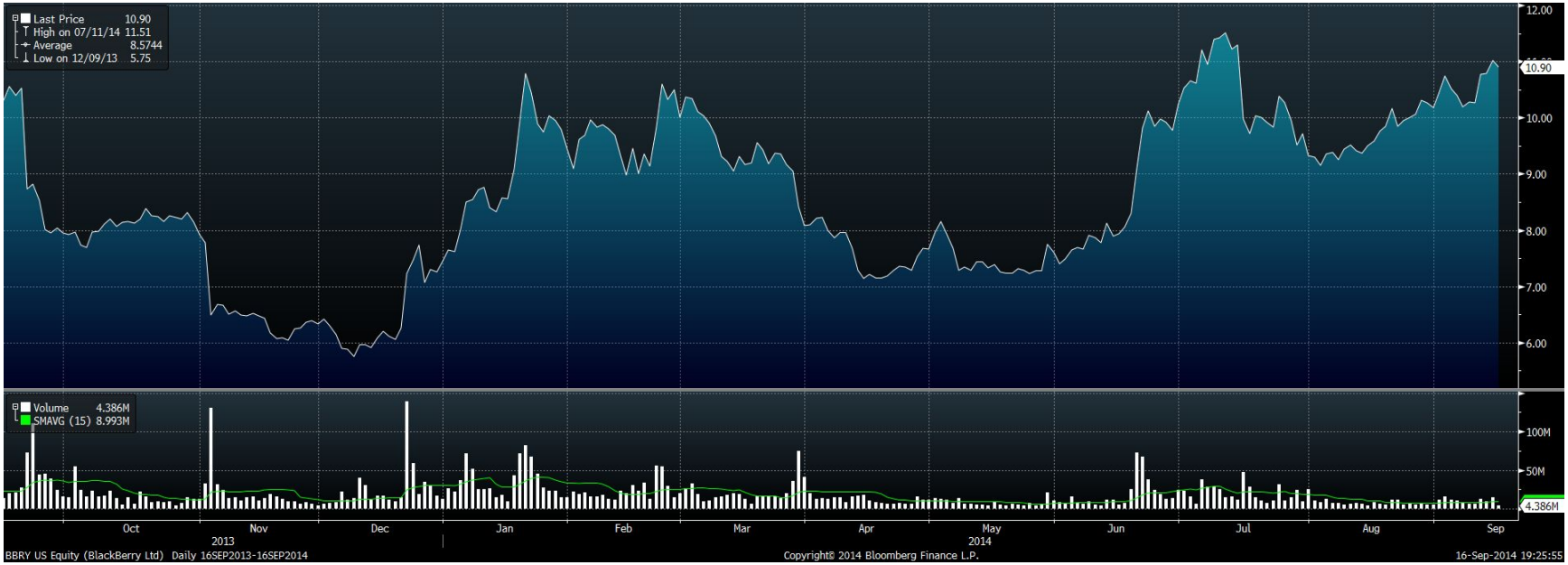
- Treasury activity (proprietary trading);
- Investment banking (structured transactions);
- Lending (retail/corporate).

Liquidity Risk

- Treasury activity (proprietary trading);
- Investment banking (structured transactions);
- Lending (retail/corporate).

Financial Institutions – Key Risk Dimensions

Market and Liquidity Risk - Blackberry

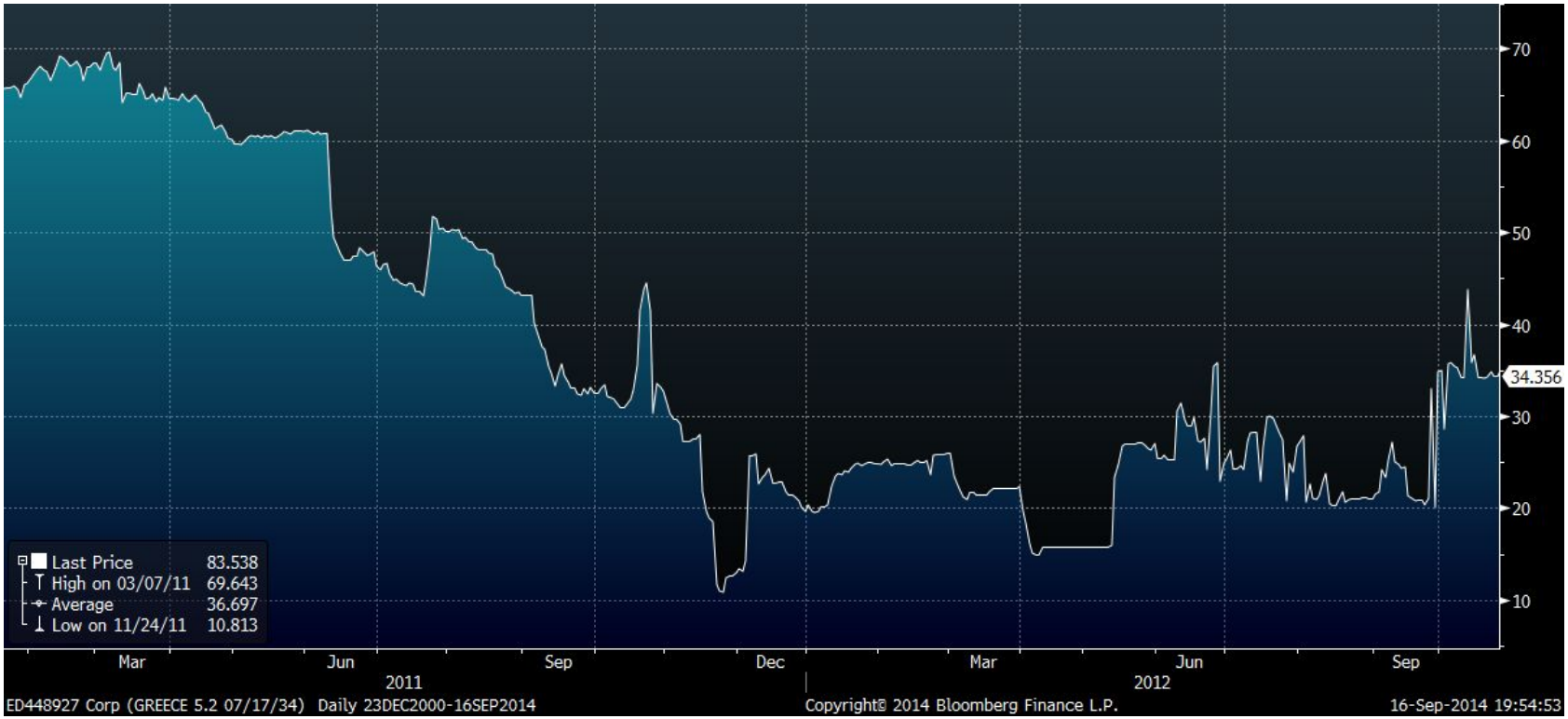


Financial Institutions – Key Risk Dimensions

Market and Liquidity Risk - Sberbank

Financial Institutions – Key Risk Dimensions

Credit Risk - Greece

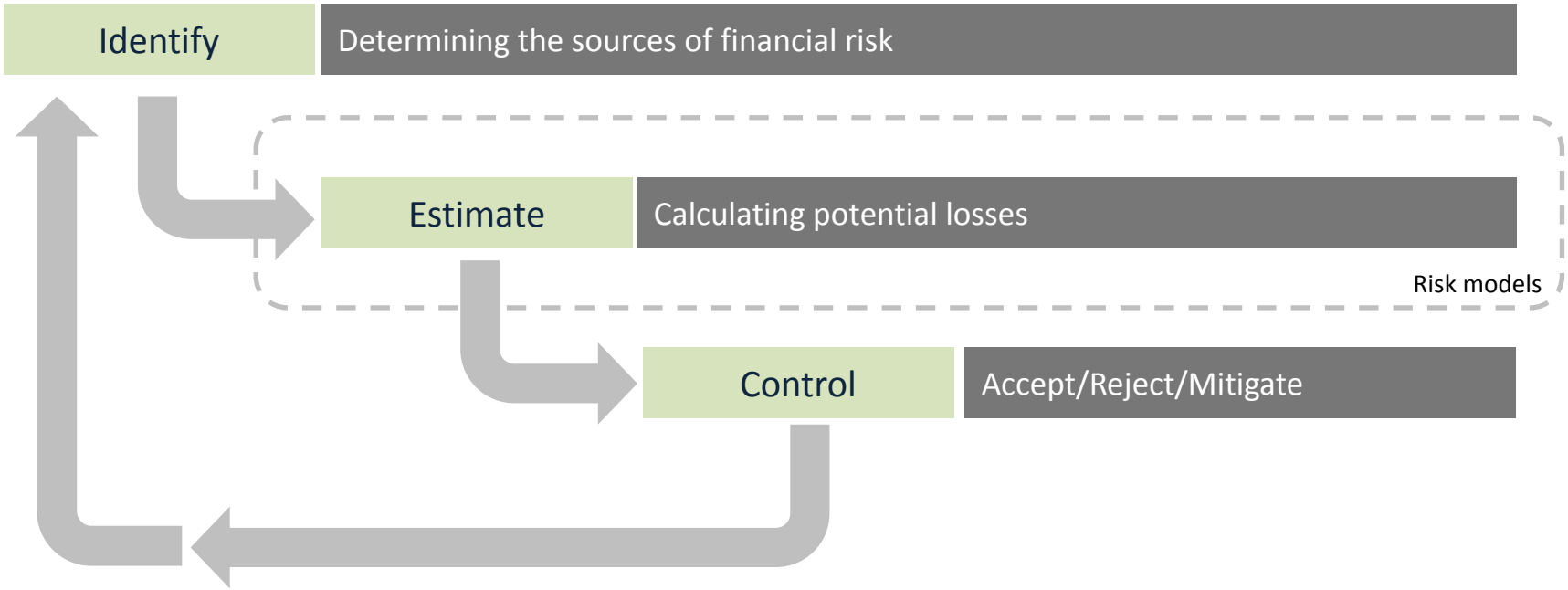


Financial Institutions – Key Risk Dimensions

Credit Risk - Portugal

Financial Institutions – Key Risk Dimensions

Financial Risks – Identification, Estimation and Control



Model Risk — An ongoing hot topic throughout the course

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The Increasing Importance of Financial Risk Management

From the financial sector perspective

- Financial innovation creates new risks – non-linear derivatives, securitization, credit derivatives…
- More often than not financial institutions cannot afford the costs of avoiding some markets and/or products
  - Clients demands for “one-stop-shop” platforms
  - Race for profitability – comparison with competitors and investor attraction
- Better risk management means more adequate allocation of resources and improved capital protection
  - Shareholders push for profitability but at the same time want investment protection

From the regulators perspective

- Individual bank failures entail huge social costs
- Possibility of contagion and systemic failure
- Adequate risk management fosters financial stability

The Increasing Importance of Financial Risk Management

Financial Innovation

- Is there a real social benefit in financial innovation?
- This is actually a much debated topic
- Essentially, financial innovation created the means for:
  - Enhanced hedging/insurance opportunities, lowering overall costs
  - Cheaper access to financing for companies and individuals
- Yet, there is a strong argument for limiting the use over-complex, over-leveraged instruments

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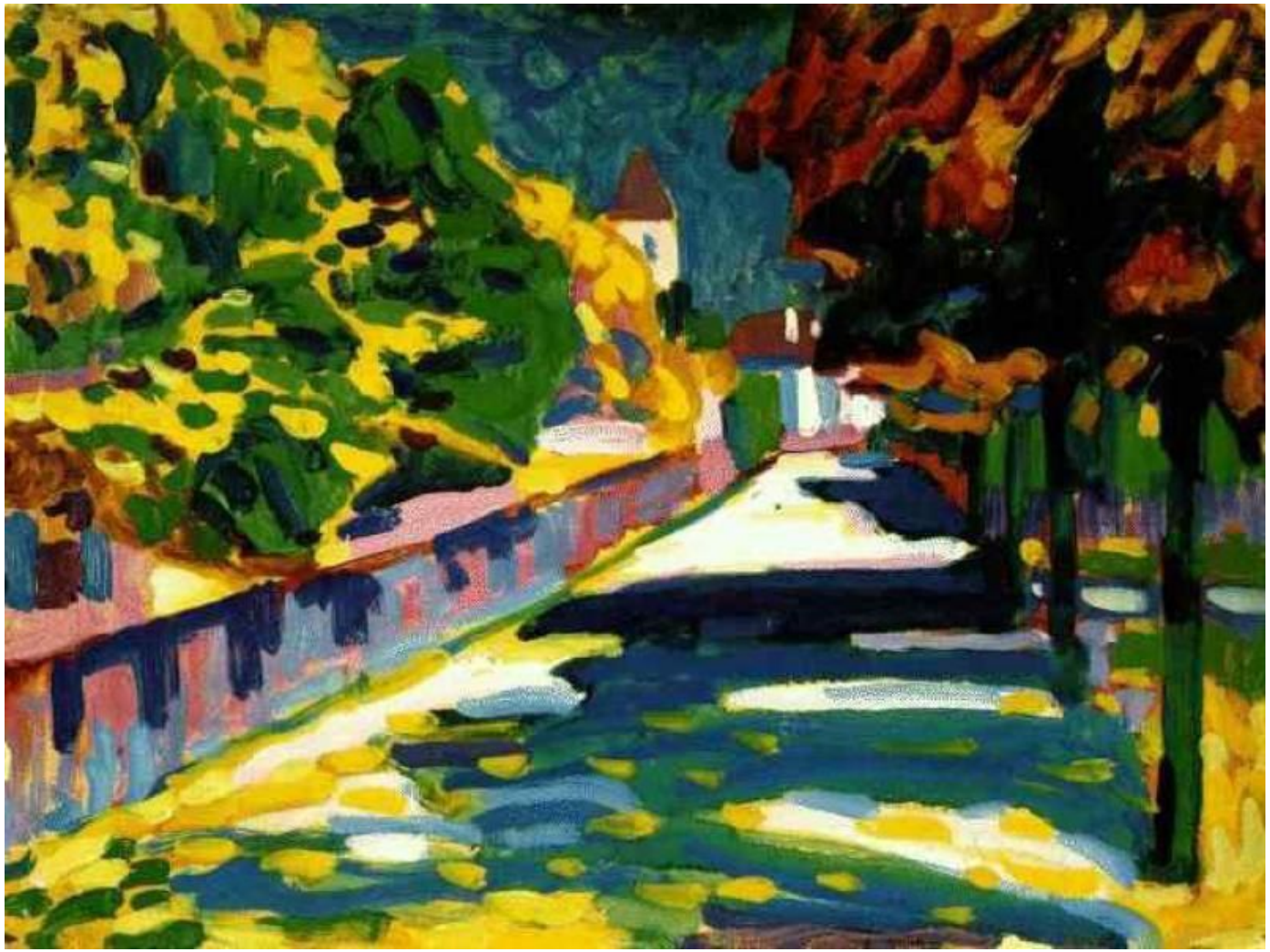
Annex

Useful References

- Risk Management and Financial Institutions, John Hull, (2012);
- Value at Risk: The New Benchmark for Managing Financial Risk, Philippe Jorion (2006);
- A Demon of Our Own Design: Markets, Hedge Funds, and the Perils of Financial Innovation; Richard Bookstaber (2007);
- The Present and the Future of Financial Risk Management, Carol Alexander (2005), http://www.carolalexander.org/publish/download/JournalArticles/PDFs/JFEc_3_1_3-25.pdf
- Q&A: Emanuel Derman on Model Risks, Why Quantitative Finance is not a Theory, and Bailout Ethics, Risk and Emanuel Derman (2011), http://www.risk.net/risk-magazine/interview/2108323/-emanuel-derman-model-risks-quantitative-finance-theory-bailout-ethics



Vassily Vassilyevich Kandinsky, *Autumn in Bavaria*, 1908