



Enterprise Risk Management (ERM) Exam

Spring 2016 Edition

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How to Study for the Exam

The SOA FSA exams are different from the preliminary SOA exams. They require a large amount of self study as well as a deeper understanding of the study material.

How much time is needed?

A typical student can expect to spend between 300-400 hours studying for the 4 hour ERM exam. The amount of time spent studying is completely dependent on the individual student.

The study schedule that comes with the product is a sample study schedule and it should be adapted to suit the individual student as needed.

Study Strategy

Phase 1: Read the source materials

Start off by reading though all the source material. This is a daunting task as the amount of material on the FSA exams is much more than anything seen on the preliminary exams.

The best strategy is to read the source material in conjunction with the XP Actuarial Digital Study Manual. By doing this you will refresh what has just been read and you can add notes/highlight anything that pops out to you as important (note the XP Actuarial Digital Study Manual already contains helpful memorization boxes for important parts of the reading saving you time!).

Reading large amounts of text in one sitting can drain you pretty quickly, so I suggest splitting up your reading into smaller blocks throughout the day. Read for 30 minutes in the morning before work, read for 30 minutes during lunch at work and then spend another 1 hour to 1.5 hours after work reading. On the weekends split your study sessions into 1 hour long "mini-sessions". Go ahead take a break in between and clear your mind.

By splitting up the reading throughout the day you will be less likely to "drift into other thoughts" or "not remember what you just read". Reading the source material alongside the study manual will also aid in remembering what was just read.

It is important to make sure you add your own notes to the study manual and highlight all important formulas. Quality time spent here will save you time later during the memorization and practice phase.

Phase 2: Review the Study Manual

In this phase you should re-read the entire study manual. You should also spend time in this phase ensuring that you have added all notes that you need to the study manual and clarify the concepts that you do not fully understand (email support is included with the study manual, premium and basic packages). Use the Phase 2 Study Schedule to track your progress through the study manual readings.

Phase 3: Memorization and Practice

Phase 3 is all about drilling the concepts into your brain. You will eat, sleep and dream about the concepts and problems on this exam. Utilize the XP Actuarial Study Manual and XP Actuarial Digital Cue Cards to aid you in memorizing the important concepts. Practice makes perfect! In this phase, it is important to do all the practice questions, look at the past SOA exam questions and simulate writing the exam. I suggest attempting 2 practice exams towards the end of this phase.

The Digital Cue Cards are categorized by topic which will allow you to focus on specific areas of interest. Spend time memorizing the advantages/disadvantages, definitions, lists, formulas, etc. on the exam. The best part is you can do this at any time due to the ability to have the cue cards stored on your smartphone or tablet. This will allow you to have an edge on the competition because you can memorize at all times. Whether you are on your way to work on the subway, waiting for a meeting to start, or walking home from the gym, you can use that time to get closer to passing this exam!

During this phase it is important to become more familiar with the case study. The accompanying XP Actuarial Case Study Summary, which is included with the XP Actuarial eXamPrep Package, will give you insights into how the case study relates to the source material. Spend some time here thinking about what type of questions the exam writers could ask. The case study is a big component of the exam and being very familiar with it will save you time come exam day!

Phase 4: Crunch Time

The last two weeks are crunch time. In this phase it is important to keep all the concepts fresh. The best method I found to memorize the material and keep it fresh (as well as condition your hand for the exam date) is to write things out over and over again (when you become an FSA it might be good to plant a couple trees for the paper you will use during your FSA exams).

During this phase you should also simulate an actual exam each day. If you have time off of work, your schedule would look something like this:

Spend 1-2 hours going over all the material from the cue cards, study guide and your own handmade notes. Then spend 30 minutes reviewing the case study.

After the morning review session, setup a "mock exam" situation and work through one of the practice exams included with the product. Attempt the exam exactly as the exam day. This means not looking up answers in between questions or flipping to the solutions right away. The goal here is to get you used to writing the exam and attempt to lessen the "exam jitters" on the actual exam date. If you can write a 5 hour simulated exam at home, why can't you do it at the exam center?

Spend the evening going over what you could not answer on the practice exam and again reviewing the memorization guide, digital cue cards and your own notes. Feel free to add to your own notes with the material that you did not know that day. This allows you to know it the next day when you attempt the next practice exam. Repeat this process each day until the final day before the exam.

Phase 5: Day before the Exam

The final day before the exam should be spent keeping things fresh in your mind. Some people say that you should just take the day to relax. Relaxation is important to calm the nerves but nothing is worse than not remembering a formula or definition the next day even though you are completely relaxed. I suggest splitting the day into mini review sessions of about 1 hour in length. After each session, spend an hour on something that takes your mind off of the exam. This gives you the best of both worlds.

Finally, make sure to go to bed early the night before the exam. This is not a university exam or preliminary exam, it is a grueling 5 hour long exam and your body needs to be rested. Also make sure to set your alarm and while you are at it why not set at least 10 alarms on 3 different devices. Being prepared to pass and then showing up late to the exam is not something you want to happen.

Products Offered

XP Actuarial Premium Package

XP Actuarial Basic Package

XP Actuarial Study Manual

XP Actuarial Video Lessons

XP Actuarial Digital Cue Cards

XP Actuarial eXamPrep Package

Check out www.xpactuarial.com for full product descriptions and a listing of all products offered.

Where to Buy?

You can purchase XP Actuarial products from [Actuarial Bookstore](#), [SlideRuleBooks](#), [Actex](#) or directly from [XP Actuarial](#).

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Please do not hesitate to contact our instructor at info@xpactuarial.com or visit www.xpactuarial.com

Financial Enterprise Risk Management, Paul Sweeting

Chapter 7: Definitions of Risk

7.1 Introduction

- Important to be aware of the risks that an institution might face
- Risks will differ from firm to firm and over time risks may change

7.2 Market and Economic Risk

- **Market Risk:** risk from exposure to capital markets, includes both asset side (equities, bonds, etc.) and liability side (long-term interest rates and the effect they have on life insurance, pension liabilities)
- **Economic Risks:** closely related to market risk, includes price and salary inflation, etc.
- Market risk affects the asset side of the balance sheet
- Financial risk affects the liability side of the balance sheet
- Banks face market risk in two main areas:
 - Risk of the marketable securities held by a bank, relatively straightforward models for this
 - Market risk, relating to positions in various complex instruments which many banks are counter-parties of
 - Want to account for all positions but also any offsetting positions that the bank has
- Non-Life Insurance: relates to the portfolio of marketable assets held, also includes the assumptions about inflation
- Life Insurance/Pension Firms: market risk includes the various assumptions related to the valuation of the liabilities, rate of interest used to discount future claims

7.3 Interest Rate Risk

- Risk arising from the unanticipated changes in the interest rate at various terms
- Includes:
 - Changes in overall level of interest rates, the shape of the yield curve
- Affects the value of long-term financial liabilities and the value of fixed interest investments
- Expected returns are linked to the term structure of interest rates

7.4 Foreign Exchange Risk

- Reflects the risk of having to exchange cash flows in one currency to another currency

7.5 Credit Risk

- Refers to default risk, often the largest risk for banks (large number of loans to customers)
- Counterparty risk for derivative trades is another source of credit risk for banks (risk that the other party in a derivative transaction cannot make his/her payments, resulting in a loss)

- Banks model credit risk for credit-based structured products (CDO's, etc.)
- Need complex credit models to accurately model the risk in these products and to correctly divide tranches
- Market risk and economic risk are linked to credit risk, economic downturn increases the risk of default
- Important to consider the interactions of credit risk and market risk together
- Life/Non-Life: main credit risk is the default of a reinsurer
- Banks/Insurers also exposed to the credit risk from their bondholders
- Pension Schemes: risk of sponsor insolvency, also the financial strength of buyout firms
- Credit risk is similar to non-life insurance risk as there is both incidence (probability of default) and intensity (the recovery rate)

7.6 Liquidity Risk

- Examples include: high trading costs, a necessity to accept a substantially reduced price for a quick sale, inability to sell at all in a short time scale
- **Market Liquidity Risk:** risk that a firm cannot easily trade due to a lack of a market depth or due to market disruption
- **Funding Liquidity Risk:** risk that a firm cannot meet expected or unexpected current and future cash flow and collateral needs
- Key requirements are the timing and amount of the payments as well as the uncertainty relating to the payments
- Some illiquidity can be desirable – institutions can charge a premium for that illiquidity
- Some illiquid assets have other costs such as higher transaction costs or greater heterogeneity (real estate and private equity for example)
- Illiquid assets less likely to be eligible to count towards the regulatory capital of a bank or insurance company
- Assets provide liquidity in 3 ways:
 - Through sale for cash
 - Through use as collateral
 - Through maturity or periodic payments (dividends or coupons)
- In some cases, it is attractive to lend long term and fund using short term (especially if long term rates are higher than short term rates)
- If the short term money markets close, then the organization will have insufficient reserves and will be faced with liquidity risk
- Life insurance companies have longer term liabilities and greater cash flow predictability, so higher illiquidity is appropriate
- Non-life insurance companies fall somewhere between banks and life insurers
- Pension schemes are generally long-term institutions, but a scheme which is cash flow positive (benefits are still being accrued at a higher rate than they are being paid out) can afford to invest a higher proportion in illiquid assets, a cash flow negative scheme will need to invest in more liquid investments as the payments going out exceed those coming in

7.7 Systemic Risk

- Risk of failure of the financial system, occurs when many firms are similarly affected by a particular external event (directly or indirectly)
- Risk is higher when firms follow similar strategies
- Contagion risk: the extent that systemic risk is driven by the relationships between different parties, risk that a failure in one firm, sector or market will result in further failures
- Four Types of Systemic Risk:
 - Financial infrastructure
 - Liquidity
 - Common market positions
 - Exposure to a common counterparty

7.7.1 Financial Infrastructure

- Risk relating to financial infrastructure arises if a commonly used system fails
- Particularly true if it relates to payment or settlement of financial transactions

7.7.2 Liquidity Risk

- Liquidity risk become a systemic risk if a run on the bank occurs or if short-term money markets become less liquid
- This results in a reduced ability for banks to raise the capital they need to remain solvent
- This is known as funding liquidity risk
- The global financial crisis in 2007 resulted from this

7.7.3 Common Market Positions

- Exposure to common investment positions can affect the investments or whole sectors or markets
- Resulting risk is also known as feedback risk, risk that the change in price will result in further changes in the same direction
- Sometimes these are better characterized as behavioural risks that cause stocks either individually or as a group to tend upwards (bubble) or downwards (crash)
- Downward risks of forced sales – a fall in price of a risky asset can reduce the solvency of an investor, forcing the investor to sell the asset and buy a risk-free alternative to protect a statutory solvency position
- This forced sale causes a further fall in price, resulting in further solvency problems and even more sales
- This risk lead to the demise of Long Term Capital Management (LTCM)

7.7.4 Exposure to a Common Counterparty

- Risk requires a relatively small failure to escalate through several layers of investors
- Ultimate effect must be one that damages the stability of an entire financial system

- Could result from losses that stem from a direct financial relationship between firms or more simply from a loss of confidence in firms carrying out similar businesses as a failed firm

7.8 Demographic Risk

- Covers a wide range of risks
- Includes proportions married or with partners, age differences of partners, number of children, lapses or withdrawals, pension scheme new entrant and retirement patterns, mortality and longevity
- Mortality Risk: risk that mortality is higher than expected
- Longevity Risk: risk that mortality is lighter than expected
- Both mortality risk and longevity risk are key risks for life insurance companies
- Pension schemes exposed to longevity risk
- Four Types of Mortality/Longevity Risk
 - Level
 - Volatility
 - Catastrophe
 - Trend
- **Level Risk:** risk that the underlying mortality of a particular population differs from that assumed
- **Volatility Risk:** risk that the mortality experience will differ from that assumed due to there being a finite number of lives in the population considered
- **Catastrophe Risk:** risk of large losses due to some significant event increasing mortality rates beyond some random volatility (natural disasters, floods, earthquakes, pandemics, etc.)
- **Trend Risk:** risk that mortality rates will improve over time at a rate different than assumed
- Lapses/Withdrawals/Pension Scheme new entrants and early retirements: they are not necessarily independent from each other or from market and economic variables
- Should consider some demographic variables together with market and economic risks

7.9 Non-life Insurance Risk

- Shorter time horizon for most non-life insurers results in market/economic risks being less relevant
- Non-life insurance risk is the key factor when determining the premium rate for the business to be written and for setting the correct reserves
- Need to consider the following:
 - Incidence of claims
 - Intensity of claims (size of claims)
- Intensity of claims is not the same from one claim to another, the maximum might be known or may be unlimited
- A variety of approaches are needed to model the intensity of claims correctly
- Four types of risk:
 - Underwriting
 - Volatility
 - Catastrophe
 - Trend

- **Underwriting Risk:** similar to the level risk for life insurers, it is the risk that the average level of claims in the portfolio as measured by incidence and intensity is different than that assumed
- **Volatility Risk:** risk that remains even if risks are correctly underwritten, and reflects uncertainty in the incidence and intensity of claims resulting from the fact that only a finite number of policies exist
- **Catastrophes:** occur when high-intensity low-probability events occur, can also occur as a combination of a smaller event combined with a high concentration of claims by frequency
- **Trend risk:** the risk of unexpected changes from current levels in the incidence and intensity of claims
- Reserving risk includes volatility risk, catastrophe risk and trend risk
- Considering claim levels with economic/market variables seems to be sensible as well

7.10 Operational Risks

- Group of risks which impact the way in which a firm carries on business
- Include a wide number of different risks that often overlap each other to a significant degree
- These risks can be the biggest risks faced by any organization
- Poor control of operational risks allows other types of risk (market or credit) to be excessive
- Can also result in mistakes and inefficiencies that result in fines or lost business
- Can also result in shareholder value destruction

7.10.1 Business Continuity Risk

- The risk that an external event will affect the physical ability of a firm to carry on business at its normal place of work
- Also need to consider the effect to which suppliers and business partners might also be affected by such risks

7.10.2 Regulatory Risk

- The risk that an organisation will be negatively impacted by a change in legislation or regulation
- Or may fall foul of legislation or regulation already in place
- Such changes might result in additional compliance costs, existing activities being prohibited or sales of business units being required
- Can bring fines or expensive litigation or loss of business due to a failure to comply

7.10.3 Technology Risk

- The risk of a failure in technology, including unintended loss or disclosure of confidential information, data corruption, or computer system failure
- Overlap between technology risk and crime risk
- Risk that there are undiscovered errors in software used in an organization, resulting in losses due to mis-pricing, or incorrect payments being made
- Risk increases exponentially with the number of systems used by an organization

7.10.4 Crime Risk

- Results from the dishonest behaviour of individuals in relation to a firm
- Includes: theft of money or intellectual property by an employee (fraud) and the unauthorised access of systems by an outside party with the same aims (hacking)
- Crime risk includes aspects of moral hazard or adverse selection (if there is deliberate non-disclosure in obtaining insurance or loans)
- Include risks such as arson, which disrupt a firm's business

7.10.5 People Risk

- People risk is the non-criminal actions that can adversely affect an enterprise

Employment-Related Risks

- Risks that the wrong people are employed, people employed need to have the skills an organisation needs to run its business
- Need to promote the right employees and retain the right employees
- Recruitment is expensive, every time a new recruit is taken on, there is the risk that the employee is not the right person for the role
- Absenteeism is another risk
- Legal implications of dismissing employees needs to be considered as well

Adverse Selection

- Relates to underwriting risk in both life and non-life insurance
- Risk that the demand for insurance is positively correlated with the risk of loss
- Arises as a result of asymmetry of information and the inability to differentiate between different risks when pricing

Moral Hazard

- The risk that behaviour will depend on the level of their exposure to a particular risk
- If there is insurance in place, the incentive to avoid risk is reduced

Agency Risk

- The risk that one party appointed to act on behalf of another will instead act on its own behalf
- Example is a company's managers acting in their best interest as opposed to the company's shareholders best interest
- Two main sources for agency costs:
 - Loss associated with the action of the agents
 - The cost of any action taken to modify the behaviour of agents

7.10.6 Bias

- Can be deliberate or subconscious

- A project could be given too optimistic of an appraisal as approval will result in greater rewards for a proponent
- Insurance/Pension reserves might be understated in order to increase apparent profits or to improve the standing of the professional or advisor
- Bias can arise if key risks are intentionally omitted or downplayed, or their consequences misrepresented
- Links between risks might be understated
- Might be deliberate optimism around positive outcomes (growth of future new business or asset returns)
- Overconfidence is the greatest for difficult tasks with low predictability
- **Illusion of Knowledge:** the belief that more information improves the forecast accuracy
- **Illusion of Control:** the belief that greater control improves results
- **Anchoring:** occurs when decisions are made relative to an existing position rather than based solely on the relevant facts
- **Representativeness:** making the assumption that things with similar properties are alike
- **Heuristic Simplification:** using rules of thumb

7.10.7 Legal Risk

- Used to describe the risk arising from poorly drafted legal documents within an organization
- Extends to policy documents between firms and policyholders

7.10.8 Process Risk

- Risk inherent in the processes used by firms
- Examples: credit checks on bank loan and mortgage applications, bank payment clearing, bank collateral management, bank trading and settlement, dividend and coupon payments, employee remuneration, policy underwriting, claim handling, benefit payment, premium and contribution collection, external investment manager monitoring, risk management
- Inefficient processes can damage the competitiveness of an organisation

7.10.9 Model Risk

- The risk that financial models used to assess risk, to determine trades or otherwise to help make financial decisions are flawed
- Flaws can be in the structure of the model, choice of parameters, or the incorrect translation of a model from theory into code
- Occurs if models are put to uses other than those for which they were intended

7.10.10 Data Risk

- The risk of using poor data, data can be entered incorrectly, data could be inconsistent or repeat, which can skew the analysis

7.10.11 Reputational Risk

- The risk that arises from other operational risks

- The loss of data can result in a loss of confidence in an organization
- Repeated delays in claim payments by an insurer can result in loss of confidence

7.10.12 Project Risk

- Umbrella term covering all of the various operational risks in the context of a particular project
- Operational risks occur not just in the day-to-day operation of a business but also in the approach to each project that is carried out

7.10.13 Strategic Risk

- Includes many of the operational risks covered previously, it covers a more fundamental area, the achievement of the organization's core objectives
- Important that a business has a strategy and important to understand how it intends to implement it

7.11 Residual Risks

- Those risks that remain once any action has been taken to treat the risks
- Once risks are dealt with, any risks that remain are recognized and correctly allowed for
- Examples: credit risk, basis risk (the risk arising from an imperfect hedge)