

MS-E2177 - Seminar on Case Studies in Operations Research

Assessing Concentration Risk in a Bank's Corporate Deposit Base

Project Plan

Case Group SEB

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1 Background

In the 2023 banking crisis, the American bank "Silicon Valley Bank" (SVB) went bankrupt. SVB had large amounts of money invested in U.S. treasuries and mortgage-backed securities. These assets fall in value, when the interest rates rose in 2022, and therefore the bank could not sell them without a loss. Additionally, the vast majority of the depositors of SVB were from the technology sector, serving as a source of concentration risk. Under these market conditions, the risk was eventually realized. [1, 3]

To avoid a similar fate as the Silicon Valley Bank, our client SEB is now interested in a best-practice approach for measuring concentration risk within their corporate deposit base. Essentially, concentration risk means the risk arising from concentration to a single sector, country, or other variable within the portfolio [2].

Our project may be applicable outside of the banking industry. Being exposed to concentration risk also has negative consequences for companies in general, not just for banks. For example, if a company supplies everything from a particular country, then the company is exposed to a concentration risk.

2 Objectives

The goal of the project is to conduct a comprehensive analysis on concentration risk in a bank's corporate deposit portfolio, and use mathematical methods to develop an efficient method to quantify concentration risk, all while ensuring the real-world feasibility of the approach. In addition to our own skills and knowledge, inspiration from existing methodologies can be taken from literature, keeping in mind the context at hand.

When assessing the concentration risk, we first need to take a look at the factors that contribute to it, such as the geographic location, industrial sector, suppliers and so forth. After proposing a reasonable method to quantify concentration risk, we need to review existing literature on the topic and assess how our method compares to methodologies that are already in use at other companies or industries to establish the best practice for this case. At the end of the project, the goal is to have a ready-for-use product that SEB would be able to utilize in measuring concentration risk.

3 Tasks

In this section, tasks related to the project are classified under four categories; 3.1 framing the problem, 3.2 formulating the model, 3.3 analysing the results, and 3.4 project deliverables. The tasks described in the corresponding subsections are later shown in a schedule format in Section 4.

3.1 Framing the problem

As the members of our case group all have their background in mathematics and operations research, understanding the problem plays an essential role in order to achieve a successful outcome in a case study that arises from the banking sector. That is, both via comprehensive literature review and discussions with the client our case team aims to achieve a good command of the context of problem as well as an extensive understanding of how concentration risk is currently being measured not only within banking sector but also in the context of other industries. Moreover, discussions with

the client help to verify that the case team is on the right track to meet the project objectives. Understanding the problem properly thus allows our case team to meet the project objectives according to the expectations of the client.

3.2 Formulating the model

One of the ultimate objectives of the project is to provide a methodology for the client to quantify and measure the concentration risk in the bank's corporate deposit base. To actually implement the model, one has to determine what kind of parameters the model will be based on. This is a two-phased task; on the one hand, our team has to discover as many parameters affecting a bank's concentration risk as possible, and on the other hand, invent ways to conclude which of the discovered parameters are most relevant for an efficient model. Put it in other words, dynamics of a more simple model will be easier to interpret than a more complex one, on condition that the simpler model is able to illustrate all the meaningful interactions affecting the concentration risk. In order to identify the key parameters, one possibility for our case team is to apply suitable statistical techniques to assess the importance of different parameters.

Given that the problem is multidimensional, it is justifiable for our team to explore different solution possibilities. This might help our team not only to understand the problem better and possibly reveal new information on the importance of certain parameters, but also pave the road towards the best possible solution. When the case team wants to choose their final model, among other things they may for example consider the accuracy, interpretability, applicability, and robustness of the model.

3.3 Analysing the results

Once the final model has been chosen, our case team validates the results of the model using real life data and collaborating with the client. In case the model and results seems reasonable, our case team further applies scenario analysis techniques to estimate the potential of adverse impacts on the concentration risk. Based on both, the scenario analysis and overall assessment of the concentration risk in SEB's corporate deposit base, our case team proposes a set of recommendations to mitigate this risk. Additionally, ways to integrate the developed model into the current assessment of deposit stickiness will be explored. The developed model will also be benchmarked against best practices reported in the literature.

3.4 Project deliverables

In addition to the objectives from the client's side, there are some common deliverables for everyone taking this course. These deliverables include this project plan, as well as the interim and final reports. These documents help the project team organize their thoughts, balance the workload as evenly as possibly over the time span of the project, proceed from one task to another systematically, recognize the risks of the project at each stage, and reflect on the progress of the project both during and after the project.

4 Schedule

Figure 1 shows the tasks described in Section 3 in a timetable format, in which the unit of measure is week.

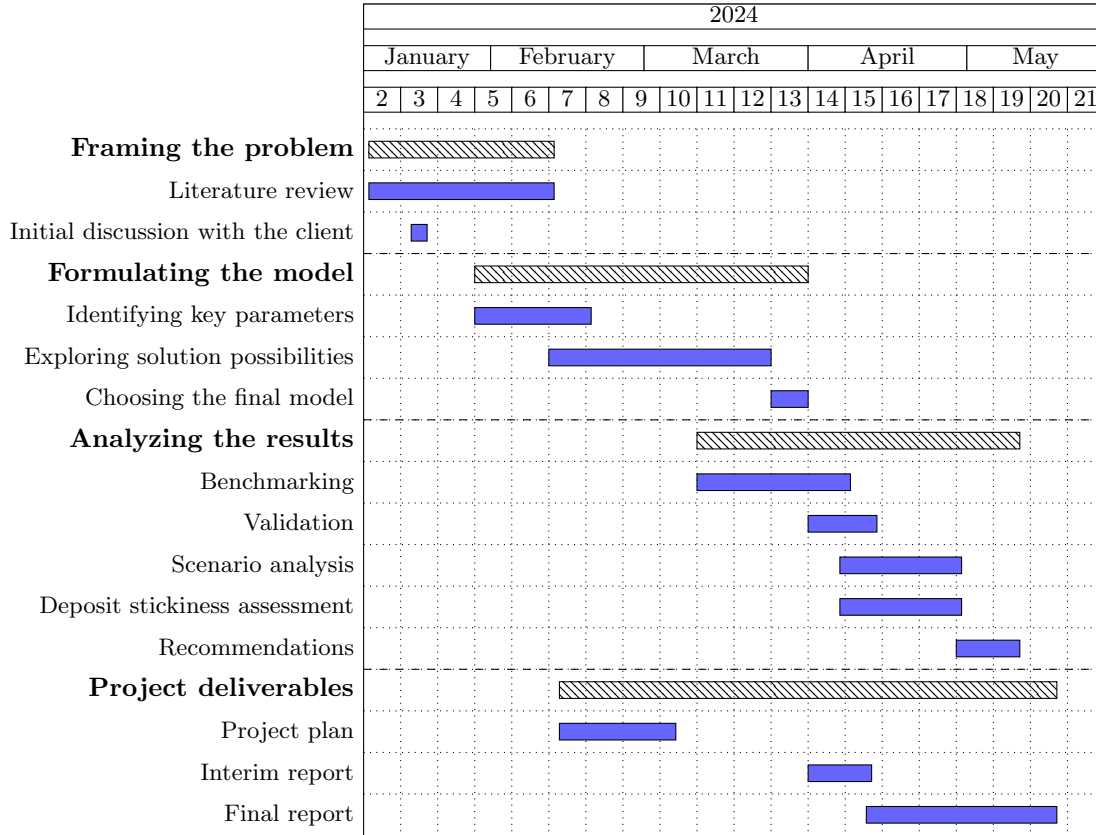


Figure 1: Initial project schedule.

5 Resources

Our resources consist of us students, the literature, the client SEB, and our professor. As students, we provide our skills and viewpoint to the project. All of us have our background in mathematics and operations research.

The literature gives us ideas to conduct the project, such as useful mathematical models currently at use in other companies or industries, as well as theory for potential solutions.

SEB provides us their data, as well as their view and experience in the financial sector. They also provide us feedback that guides us through the project. Our contacts at SEB are Peter Dahlström and Nikita Domin.

Our Professor, Ahti Salo, gives us feedback and guides us through the project and can assist us if we encounter problems. We will have meetings with the client and our professor throughout the project.

6 Risks

Our goal is to successfully deliver a project that meets its objectives (see Section 2) and the deadlines. Despite having a well-designed project plan, unexpected circumstances may arise, making it reasonable to anticipate and prepare for them in advance. Thus, a risk analysis is conducted, and the findings are presented in this section.

The analysis is performed as follows. We identified and listed the most relevant risks that we may encounter. We considered the different risk scenarios from two perspectives: first, by considering potential undesired events and then examining the possible causes, or alternatively, by directly identifying potential causes that can have some unwanted consequences. We limited our analysis to only the most relevant risks, meaning that very unlikely or otherwise irrelevant risks were not covered (such as global catastrophes or MyCourses crashes). After listing the possible risks, we estimated the likelihood of occurrence, potential consequences and possible strategies to prevent or mitigate each risk. The scale [low (unlikely: not expected to occur, but possible), medium (may occur: as likely to happen than not), high (likely to occur)] was used to estimate the likelihood of the risks. Table 1 presents the results of the risk analysis.

Table 1: The results of the risk analysis.

Risk	Likelihood	Consequences	Mitigation
Schedule risk	Medium	Project not delivered on time. Increased stress. Quality suffers.	Realistic plans. Define the project scope clearly. Even workload throughout the course. Monitor and adjust the schedule dynamically. Have some slack before actual DL.
Insufficient (too broad, narrow, misaligned) project scoping	Medium	Objectives are not met. Schedule risk increases.	Discuss with the client regularly. Spend enough time on the first stage (understanding the problem).
Inactive group members / unexpected absences	Medium	Uneven workload. Schedule risk increases.	Flexibility among the members and schedule (e.g. in the case of illness). Members committed. Project manager ensures that all members are active.

Conflicts / contradictions	Low	Problems with progress. Members lose motivation.	Keep common goals in mind. Project manager (and all group members) tries to find common ground. Negotiate or vote.
Coordinating meeting times	Medium	Problems with progress.	Agreed weekly meeting time. The whole group is not necessarily needed in all meetings.
Miscommunication / problems with information flow	Low	Objectives are not met. Problems with progress.	Project manager takes care of the communication between the client and teachers. Group members active on Telegram.
The client is not committed / active	Low	Objectives are not met. Working on the project is demotivating.	Keep the client informed. Make sure the project meets their needs. Contact teachers.
The used models/ methods are not appropriate or reasonable	Medium	Schedule risk increases. Objectives are not met.	Spend enough time on the first stages of the project. Discuss with the client and teachers.
Data: not enough data, poor data quality, data not suitable for the method	Low	Schedule risk increases. Objectives are not met.	Understand and analyse the data, discuss data needs with the client and use reasonable methods.

References

- [1] Shaen Corbet and Charles James Larkin. The implications of the Silicon Valley Bank collapse. *SSRN Electronic Journal*, 2023. doi: <https://dx.doi.org/10.2139/ssrn.4640800>.
- [2] Basel Committee on Banking Supervision. Overview of pillar 2 supervisory review practices and approaches, 2019. URL <https://www.bis.org/bcbs/publ/d465.pdf>. Accessed: 04.03.2024.
- [3] Lai Van Vo and Huong T.T. Le. From hero to zero-the case of Silicon Valley Bank. *SSRN Electronic Journal*, 2023. doi: <https://dx.doi.org/10.2139/ssrn.4394553>.