

The Hedging Challenge Solved Using MCDM Tool- AHP

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Abstract:

There has been dilemma among decision makers while encountering their decision to hedge their exposure. The study aims finding the influencers of hedging decision. Among these influencers which contribute more for the effective decision is analysed using Analytic Hierarchy Process (AHP) - multi-criteria decision making tool (MCDM). Snowball Sampling was used for the analyses. The respondents were financial decision makers of the firm. The analysis shows that Exposure coverage (Components of exposure to cover) as the most important influencer followed by policy framework with regards to hedging decision. It is recommended that the decision makers concentrate on exposure coverage and policy framework in their decision on hedging.

Keywords: Hedging, Exposure, AHP, decision making, MCDM, Exposure coverage, Policy framework.

I. INTRODUCTION

Hedging Techniques are prominently used for minimising the risk and in the maximization of firm value. There are key factors to be considered while attempting a decision to hedge. The prime factors are Ratio to hedge, Exposure coverage, tenure of hedge, policy decision, Instruments to be used for hedging, number of currencies to be involved and its impact on the financial performance (Hiren Maniar, 2016). The percentage ratio of exposure for the firm to hedge are explained in hedging ratio. The exposure coverage variable are classified as the coverage of revenues from long term projects, debts in foreign currency, future committed investments, revenues and exposure in the balance sheet. Tenure explains the period or the duration to opt the hedge. Every firm has its unique policy framing decisions for hedging. Instruments choice is a major influential

factor for hedging. Also, the number of currency choice to hedge has to be accounted.

There exists a challenge for the hedging decision makers across the firms. The hedging decision varies based on firm's activities as exporters, importers and a mix of both. The important factors on decision making in hedging has been puzzling and differs on each person's perspective. Decisions on hedging should be quick and based on a significant strategy (Akhilesh Tripathi, 2018). To resolve this challenge we use Multi-criteria decision making Tool. Using the measurement process of Analytic Hierarchy Modelling (Satty, 1980) we determine the relative importance the factors towards decision making for hedging.

II. Literature Review

Analytical Hierarchical Process

Lee Younghwa, 2006 investigated the website quality effects on its e-business. The various

influential factors of quality of website was proposed. Wu, Cheng et al 2009, evaluates an optimal choice of energy fund by using AHP-TOPSIS method. AHP helps to determine the optimal weights for the evaluating variable while TOPSIS helps to select the optimal solution. Ahmet, Calik 2019, proposed a methodology for the FDI investors to select the sectors to invest in an inflammatory economy like Turkey. The author used AHP method for selecting the criteria weights for the factor by adding opinion weights from the decision making groups. Later proposed the Technique for Order of Preference by Similarity to Ideal Solution to rank the highest ranked sectors for FDI investments for the investors based on the evaluation criteria. Singh, Rohit Kumar, 2018 used AHP method for vendor rating model for a start-up firm. Their criteria's were prioritized based on the firm product development. Anand, M.B et al, 2018 ranks the additive manufacturing process on microfabrication. There exist a list of manufacturing process for microfabrication. The evaluation of the best process and ranking of it based on its preferences are evaluated using AHP-TOPSIS method. Yatsalo, Boris et al 2016 handles a high uncertainty decision making using MCDM tools. From the expert of stakeholders multi-criteria analysis is done. The most popularity of MCDA and TOPSIS has been analysed. Chakraborty Shankar et al 2017 used multi-criteria decision making tool for selecting the appropriate fibre for manufacture of yarn to achieve an optimal mix. Parung, Gary Alexander et al 2018 has done a study with Indonesia for identification of major barriers and strategies and experts were involved to weigh. The major five category of barriers were identified. Nazam, Muhammad used fuzzy AHP-TOPSIS method for risk management of green supply chain management and enhance the success rate of the industries. Evaluation of the potential risk is done using criterion method and adding weights to the strategies based on the expert's advice.

Chin-Nung Liao 2011, decision makers were allowed to set aspiration level of different choice. Multi-criteria goal programming model and multi-criteria decision making models were integrated to solve the challenges in supplier selection. Ji, W 2013, employees AHP-TOPSIS method to identify the best practices and to understand the complex relationship of student satisfaction factors. Saaty and Wind 1980, serves as the father to illustrate the process of applying AHP in solving various deterministic problems for the firms in different context. This research lends this process to prioritize the factors for a hedging decision. There has been several research framework model developed for risk modelling and hedging.

III. Factors Influencing The Hedging Decision

The main concern for a decision maker while executing currency hedging are considered as estimation of exposure from the operations, knowledge on currency hedging, concerns about legal and tax issues, stabilizing the firms market value and trading for profit (Raghavendra R.H, 2014). Danijela Milo Sprcic 2012, estimates the determinants of hedging decisions are the financial distress cost, agency cost, costly external financing, taxes, and managerial utility and hedging substitutes. The decision to hedge is more inclined towards the investment and growth opportunities of the firm. Yadav and Rastogi 2009, seventy five percent of the surveyed firms were focussed on cost-center approach and are risk averse towards risk management. Aman Chugh et al 2017, indicates the there is still a paucity in focusing on the determinants of foreign risk hedging strategies and the preference in various instruments used for forex risk hedging. There is observed a lack of understanding in the regulatory and legal framework in management of derivative market in India. Also, there is a lack of understanding in pricing and valuation models of derivatives (Ruchika Gahlot). The hedging Approach adopted by the Indian Companies were mainly classified as Hedging

coverage, Policy decision, Tenure of hedging, Instruments used, Number of Currencies used for hedging(Hiren Maniar).

IV. Objectives

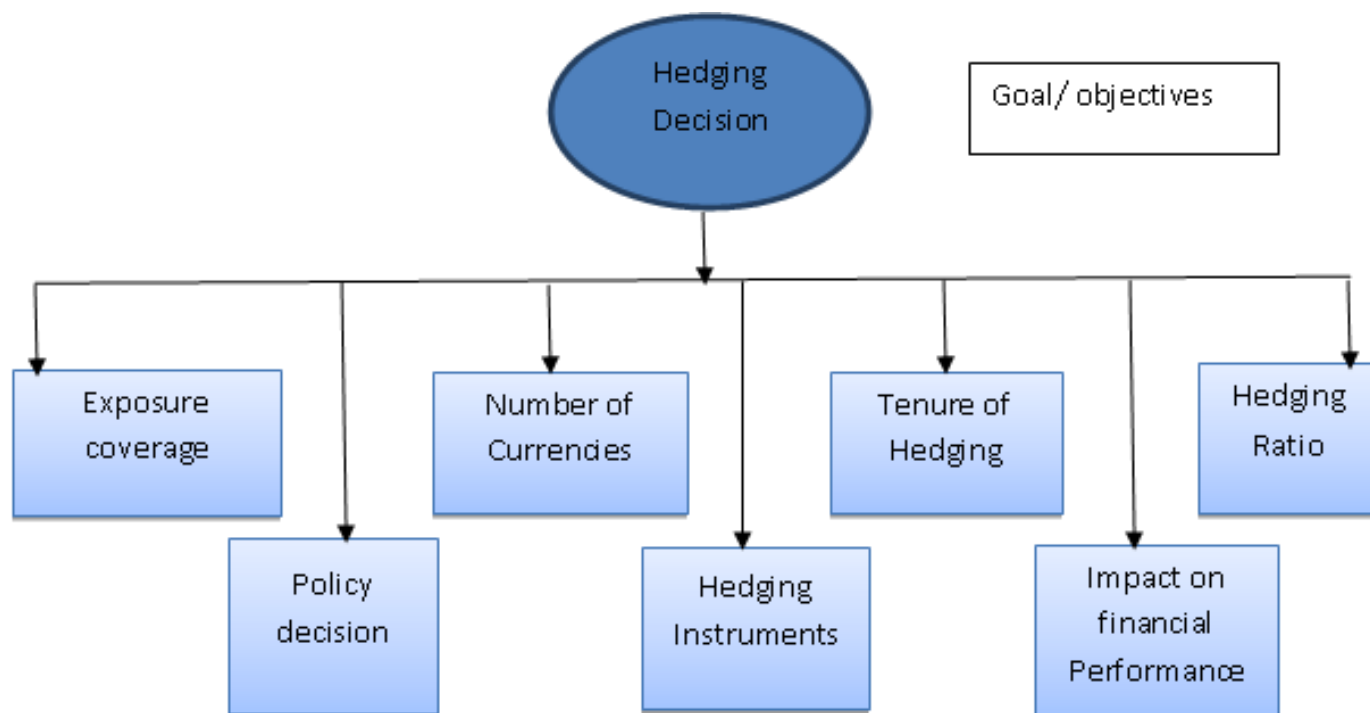
1. To identify the key factors for hedging which influences the decision.
2. To propose a generic model for prioritizing the factors while taking an hedging decision.

V. Methodology

This research proposes a methodology for effective hedging decision making using Fuzzy AHP. Data collection was done through snowball sampling technique from 30 respondents. Primary data were collected using structured questionnaire survey. The respondents were Chief Financial Officer or Finance Manager who primary deal with hedging decision for the company. The respondents belong the import and export of various manufacturing sectors. The manufacturing sectors includes textiles, chemicals, automobile, engineering tools and leathers. Excel 2016 was used for the analysis.

The key parameters for hedging decision are identified from the literature as shown in the above table. Exposure coverage includes the decision of exposures to be covered using hedging like the revenue and balance sheets (receivables), long term projects etc. Hedging instruments generally represents the currency derivative instruments like the forwards, futures, options, Swaps and Forward Rate Agreement. The number of currencies to be hedged depends on the firms transactions and highly significant for hedging. Policy decision of the companies acts as a key player in many exporting firms. The hedging decisions are mostly worked on the policy framework. Some firms work on the hedging impact on their financial performance. Also, hedging ratio of what proportion of the exposure should be hedged depends on the attributes to the decision maker or based on the firms policy framework.

Hierarchal Structure:



The analytic hierarchy process is a MCDM (Multi-Criteria Decision Making) method which allows the decision maker to model their complex problem in a hierarchical structure. It integrates both importance criteria and the alternatives into a single score for decision alternatives. There are seven major factors pondered for an effective hedging strategy. Among these the most influencers of hedging decision considered by the decision makers are to be investigated.

Using the relative importance scale, the expert's opinion are mapped into the judgment vector. Further pairwise comparison matrix is used to determine the criterion weights. Extended analysis methods of Chang's has been used for determining the weights for pairwise comparison. The random consistency index for seven criteria RI is 1.35 (Nazem et al).

Scale of Relative importance

Intensity of importance	Degree of Importance
1	Equal importance
3	Moderate importance of one over the other
5	Essential or Strong importance
7	Very Strong importance

9	Extremely important.
2,4,6,8	Are the intermediate values between the two adjacent judgements

The detailed comparative analysis is done using the AHP matrices and the respective weights for each criterion is calculated. The length of the criteria matrix involves the number of criteria into consideration. Normalized pairwise matrices is obtained by dividing all the elements of columns divided by the sum of the respective columns and we get the criteria weights by calculating the average of the rows. After we obtain the criteria weight we shall calculate the consistency to validate our finding.

The consistency index (C.I) is calculated using the formula $(\lambda_{\max} - n)/(n-1)$ is 0.1183

Further we calculate the Consistency Ratio,

Consistency Ratio = Consistency Index (C.I)/Random Index (R.I)

Where R.I for n =7 is 1.32

Consistency Ratio is 0.0876, which is less than 0.10 (standard), hence our matrix is consistent, and we may progress our decision making using AHP based on the criteria weights for the variables.

Pairwise Comparisons of evaluation criteria								
	Exposure	Policy Decision	Tenure of Hedging	Instruments used	Impact on Financial Performance	Number of Currencies used	Hedging Ratio	Criteria Weightage
Exposure	1	2	3	3.1	2	3	2	0.27
Policy Decision	1/2	1	3	2	3	3	2	0.21
Tenure of Hedging	1/3	1/3	1	2	2	3	3	0.15
Instruments used	1/3.1	1/2	1/2	1	2	2.3	3	0.12
Impact on Financial Performance	1/2	1/3	1/2	1/2	1	2	2.6	0.11
Number of Currencies used	1/3	1/3	1/3	1/2.3	1/2	1	2.7	0.07
Hedging Ratio	1/2	1/2	1/3	1/3	1/2.6	1/2.7	1	0.06

Source: Primary

VI. Discussion

Analytic Hierarchy Process applied to this objective was found consistent. The criterion weight was maximum for features of exposure coverage at 0.27. The next high priority for decision makers on hedging strategy considered are the policy decision of the respective firms at 0.21. Third on the priority should the time period of the hedging contract 0.15 and followed by the choice of instruments used for hedging 0.12. Further the hedging strategies impact on the firm's financial performance is considered 0.11. Number of currencies used and the hedging ratio of how much of the exposure should be hedged are at least priority in the process of decision among the experts at 0.07 and 0.06 criterion weights.

Policy decision has been an important criterion in analysis following expert opinion. But, they also agree that the policy decision has not been mandate by most of the manufactures. The exposure coverage decision are vitally played by the head office or the financial experts at the timely advice from the authorities. The analysis recommends the essentially of "policy for decision "when there are near exposure (both short and long term).

VII. Conclusion

The Analytic Hierarchy process is formulated for effective decision making during a hedging decision for the importing and exporting firms. The framework was found to be consistent for decision making tool. Exposure coverage scored the highest criterion weight, followed by policy decision of the firm to hedge. Following these prioritizes are the duration of hedging, instruments used, hedging impact on the financial performance, number of currencies used for hedging and the ratio of exposure to be hedged. The components exposure coverage for the firm and the Policy framework for hedging decision are the key criterion on decision maker on hedging.

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