



CHOOSING A CREDIT CARD

SYST 573-Decision and Risk Analysis Group Project Report

Reddivari Sai Saran – G01142501

Akshay Godugu – G01061970

Vikas Marupadiga – G01147479

Table of Contents

1. Background and Description of the problem.....	3
1.1 Decision Context:	3
1.2 Problem Definition:.....	3
1.3 Project Roadmap:.....	3
2. The Value Hierarchy Process.....	3
2.1 Affinity Process:	3
2.2 Value Hierarchy:.....	4
2.3 Fundamental Objectives:	5
2.4 Mean Objectives:	5
2.5 Measures:.....	6
2.6 Alternatives:	7
2.7 Measure Value for Each Bank:	7
3. Swing Weights and Utility Scores.....	8
3.1 Swing Weights - Fundamental Objectives:	8
3.2 Mean Objectives:	8
3.2.1 Swing Weights – Credit History:.....	8
3.2.2 Swing Weights – Financial:.....	9
3.2.3 Swing Weights – Rewards:	9
3.2.4 Swing Weights – Bank:	10
3.3 Utility Scores:	10
4. Results	11
4.1 Logical Decision for Windows (LDW) Model:.....	11
4.2 Why AMEX is the best choice?.....	12
4.3 Sensitivity Analysis	13
4.4 Tornado Diagram	16
5. Conclusion	17
6. References	17

1. Background and Description of the problem

1.1 Decision Context:

Nowadays every individual in this world has a bank account either in their own country or in the other country. Each person who holds a bank account has a debit or the credit card. There exist various banks in the world such as Bank of America, American Express, Axis Bank, Discover, Chase, Capital One, etc. Each bank provides different offers to every individual based on the information provided. Credit cards are used by individuals to make the necessary payments. In our project, we select different banks to choose a credit card depending on various measures.

1.2 Problem Definition:

The credit card involves a third-party who pays the merchant as credit and charges the amount on the card from the respected individual as a credit statement. The bank provides its customers with a varied kind of card types such as gold, silver, and platinum. For instance, let us consider Bank of America that offers a cash reward credit card which offers a \$150 cashback when a credit of \$500 is spent within 90 days grace period and an additional 3% cash back on every single purchase. The individual is provided with different offers and he is given a choice to choose his/her credit card based on his needs and requirements. The main goal of the project is to choose the credit card based on various kind of measures.

1.3 Project Roadmap:

We came across a few factors for choosing the right credit card, we have taken different measures like APR, Interest Rate, Cash Bonus, Transaction fees, etc. After considering a few measures we came across the four banks (Bank of America, Discover, Chase, American Express) which would meet the requirements. With the help of these measures, we designed a value hierarchy that leads to the fulfillment of the measures which helps us to choose the right credit card. Swing weights procedure is to be used to compose a model that emphasizes the subjective judgment. These Swing weights are to be calculated using the LDW (Logical Decisions). With the help of these swing weights and values, the Utility of all the alternatives is to be calculated which depends on the measures. In LDW, the highest utility is to be taken to choose the credit card. Finally, after finding the appropriate credit card, we then performed a sensitivity analysis to check how the outcome variable could change.

2. The Value Hierarchy Process

2.1 Affinity Process:

As of choosing a credit card, the scenario was based on the past incidents which were faced by one of my teammates. So, we are the decision makers for choosing the credit card. For this process, each individual member of the group got several ideas including the measures such as Online Capabilities, Blueprint, Foreign Transaction Fee, Rewards, Credit Limit, APR, Minimal Payment, Sign-up Bonus, and many other factors. Later we then came to a conclusion of taking the measures which would meet the required criteria of choosing the credit card. After choosing the measures we then used the list to create the value hierarchy which is displayed below in section 2.2.

From the various options we had, we chose the best alternatives mentioned below:

1. Bank of America.
2. Chase.
3. American Express.
4. Discover.

2.2 Value Hierarchy:

After completing the affinity diagram and gathering the measures, as a team, we worked together to create the value hierarchy. The value hierarchy is displayed below by using the measures which we considered.

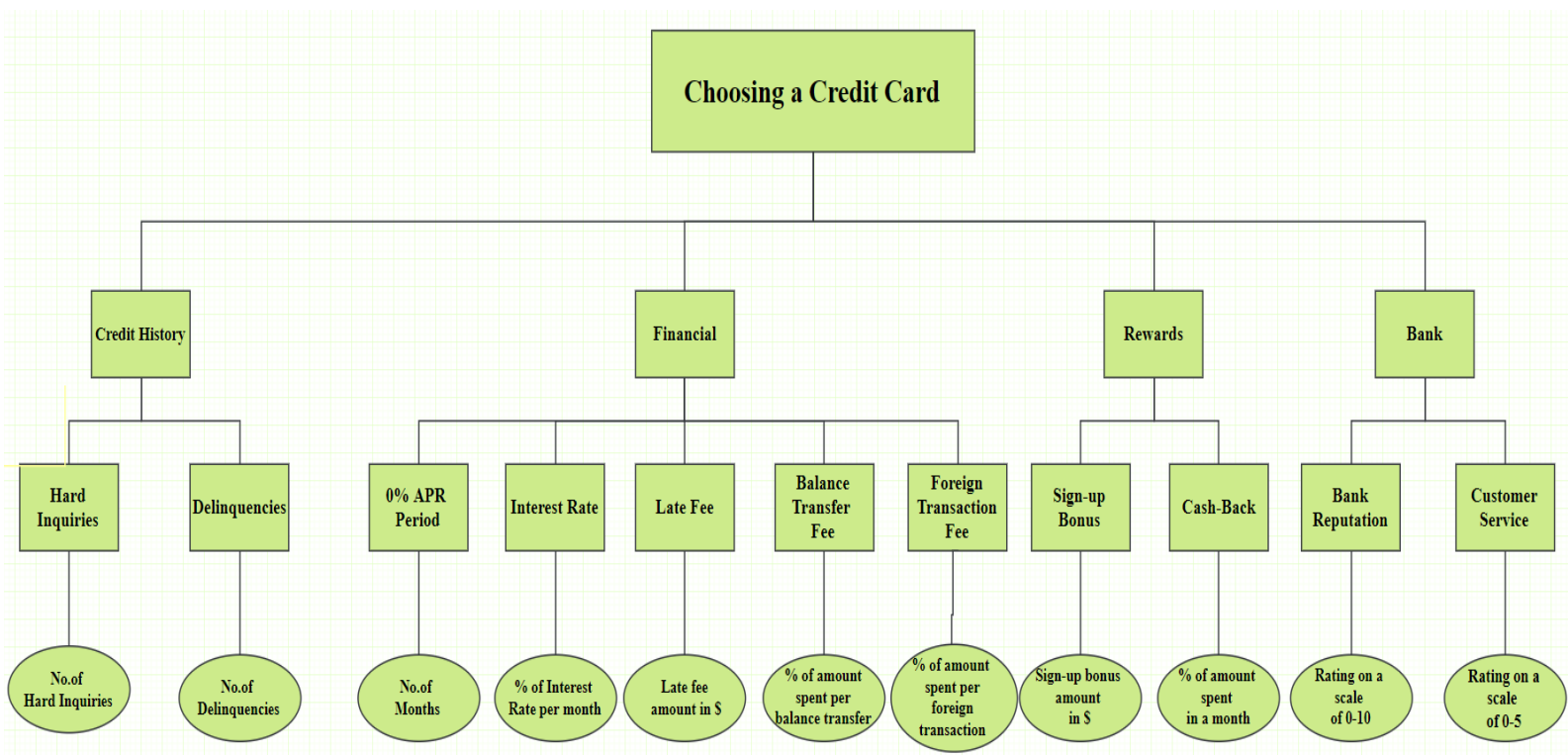


Figure (i): Value hierarchy

2.3 Fundamental Objectives:

Together, we have come across many essential objectives and finally decided to put up four of the objectives. The fundamental objectives are listed below in the table.

Fundamental Objective	Relationship
Credit History	Credit history will have a greater impact on the credit card. Credit history tells whether you're a proved creditworthy or not.
Financial	Financial tells about the interest rate, transaction fees, Annual rates, and other customer charges.
Rewards	Credit card always carries an incentive for the customer which typically includes cash-back, sign-up bonus, and merchant discounts.
Bank	The bank which provides transaction, loans, and services to the customers.

Table (i): Fundamental Objectives

2.4 Mean Objectives:

From the above fundamental objective observations, we derived a few mean objectives that lead to the fulfillment of the fundamental objectives.

Credit History - Means Objectives	Relationship
Hard Inquiries	The issuer does a background check before the approval of the credit card.
Delinquencies	For approving a credit card, the number of delinquent accounts is considered before the approval.
Financial - Mean Objectives	Relationship
0% APR	0% APR defines an annual interest rate which the bank provides to its individuals excluding the interest rate for a period of time.
Interest Rate	Interest Rate is the amount of interest that is charged by the bank to the customer.
Late Fee	Late fee is the penalty charged by the bank to its customer for the late payment. It varies from bank to bank.
Foreign Transaction Fee	A foreign Transaction fee is the charge which the bank charges its individual for transactions which the individual does in the other countries.
Balance Transfer Fee	The fee which is charged when an amount is transferred from one bank to another bank.
Rewards – Mean Objectives	Relationship

Sign-up Bonus	The sign-up bonus is provided by the bank which means that a certain amount is provided as an incentive for the new customers for taking the credit card in their bank.
Cash Back	For a credit card, the bank provides a certain percentage of money on each purchase the customer makes.
Bank – Mean Objectives	Relationship
Bank Reputation	Bank Reputation means the overall status or its ranking based on various parameters.
Customer Service	Customer Service means making sure that the customer's requirements are met by the bank.

Table (ii): Mean Objectives

2.5 Measures:

Several measures are taken into consideration to choose the best credit card which best fits the customer needs. Being the decision makers of the problem, we chose the measures which would favor the students while choosing the credit card. Therefore, the objectives which are obtained are mentioned below.

Objective	Measures
Hard Inquiries	A number of Hard Inquiries present in the credit history of the customer.
Delinquencies	Number of Delinquencies present in the credit history of the customer.
0% APR Period	A number of months provided by the bank with no APR.
Interest Rate	% of interest rate per month.
Late Fee	Late fee amount in \$
Foreign Transaction Fee	% of the amount spent per foreign transaction.
Balance Transfer Fee	% of the amount spent per balance transfer.
Sign-Up Bonus	Sign-up amount in \$
Cash-Back	% of the amount spent in a month by the customer.
Bank Reputation	Rating on a scale of 0-10.
Customer Service	Rating on a scale of 0-5.

Table (iii): Measures

2.6 Alternatives:

There are approximately more than 100 banks around the world. We selected four banks out of so many alternatives. They are Bank of America, Chase, American Express, Discover. We have taken these banks as it would fulfill the students' needs.

1. Bank of America – Bank of America is an American international investment bank. Its headquarters are located at Charlotte, North Carolina. Bank of America stands in the second position among all the banks in united states by total assets.
2. Chase – JPMorgan Chase Bank is a US Multinational bank. Its headquarters are located at Manhattan, New York. It is one of the oldest banks which is about 200 years old.
3. American Express - American Express is mainly known as Amex. Its headquarters are located in New York City. This bank was founded in 1850.
4. Discover – It is a credit card bank which was introduced by Sears in 1985. When this bank was launched, they attracted customers by not charging an annual fee. Discover Bank is the third largest credit card bank in the USA.

2.7 Measure Value for Each Bank:

Below are the measures we have taken and the values for each alternative (Bank).

Measures	Value			
	Bank of America	Chase	American Express	Discover
No. of Hard Inquiries	1	1	0	2
No. of Delinquencies	2	1	0	2
No. of Months for 0% APR	12	15	15	6
% of Interest Rate per month	26.24%	25.99%	20.49%	24.24%
Late fee amount in \$	\$39	\$39	\$38	\$39
% of amount spent per foreign transaction	3%	3%	0%	0%
% of amount spent per balance transaction	3%	3%	0%	5%
Sign-up Bonus amount in \$	\$200	\$150	\$250	\$150
% of amount spent in a month for getting a Cash-Back	3%	1.5%	5%	5%
Bank Reputation	9.0	9.6	9.2	8.9
Customer Service	4.3	4.5	4.7	4.4

Table (iv): Measure Values for each alternative.

3. Swing Weights and Utility Scores

3.1 Swing Weights - Fundamental Objectives:

To calculate the weights of the fundamental objectives, we considered Financial goal as the first preference, rewards goal as the second preference, credit history as the third preference and bank goal as the least preference. We ranked financial goal as highly important because most of the students prefer it. We then rated as rewards are 90% as important as financial, credit history goal is 30% important as a financial goal and bank goal is 40% important as a financial goal. After the financial, most of the students prefer rewards so it is given as rank 2. At present, as we are being the students the credit history is not much preferred. So, the bank goal is the third important as it is much preferred when compared to credit history.

	(Least Preferred Level, Most Preferred Level)	Rank	Rate	Weight
Financial Goal	(0,1)	1	100	0.385
Rewards Goal	(0,1)	2	90	0.346
Credit History Goal	(0,1)	4	30	0.115
Bank Goal	(0,1)	3	40	0.154

Table (v): Fundamental Objectives - Swing Weights

3.2 Mean Objectives:

3.2.1 Swing Weights – Credit History:

To calculate the weights of Credit History, we considered Hard Inquiries as to the most preferred and delinquencies as the least preferred. We considered delinquencies as 70% of the hard inquiries measure. Hard inquiries are given the first preference for the approval on any credit card when compared to the number of delinquencies.

	(Least Preferred Level, Most Preferred Level)	Rank	Rate	Weight
Hard Inquiries Measure	(2,0)	1	100	0.558
Delinquencies Measure	(2,0)	2	70	0.412

Table (vi): Credit History – swing weights

3.2.2 Swing Weights – Financial:

To calculate the weights of financial, we considered 0% APR period as most preferred because the customers who take a credit card look for a maximum period of 0% APR. A foreign Transaction fee is given the second preference because most of the customers use the credit card for foreign transactions, a balance transfer is given the third preference as the customers might transfer the balance from one to another, the interest rate is given the fourth preference, and the least preferred is the late fee. We believe that the foreign transaction fee is 60% as important as of 0% APR. Also, we have given that interest rate is 30%, the balance transfer fee is 40%, Late fee is 20% importance of the 0% APR measure.

	(Least Preferred Level, Most Preferred Level)	Rank	Rate	Weight
0% APR Period Measure	(6,15)	1	100	0.40
Foreign Transaction Fee Measure	(3,0)	2	60	0.24
Balance Transfer Fee Measure	(5,0)	3	40	0.16
Interest Rate Measure	(26.24,20.29)	4	30	0.12
Late Fee Measure	(39,38)	5	20	0.08

Table (vii): Financial – Swing Weights

3.2.3 Swing Weights – Rewards:

To calculate the weights of the rewards, we considered Cash-Back measure as the most important, and the delinquencies measure as the least important. We rated Delinquencies measure as 80% important of Cash-Back Bonus. Cash-Back is the amount which the customer gets back on every single purchase at grocery stores or gas stations on a few credit cards and is most preferred when compared to delinquencies measure.

	(Least Preferred Level, Most Preferred Level)	Rank	Rate	Weight
Cash-Back Measure	(1.5,5)	1	100	0.556
Delinquencies Measure	(150,250)	2	80	0.444

Table (viii): Rewards – Swing Weights

3.2.4 Swing Weights – Bank:

To calculate the swing weights of the bank, customer service is considered as an important factor and bank reputation is given 70% importance of the customer service. We believe that customer service provided by the bank is much preferable when compared to the bank reputation.

	(Least Preferred Level, Most Preferred Level)	Rank	Rate	Weight
Customer Service Measure	(4.3,4.7)	1	100	0.558
Bank Reputation Measure	(8.9,9.6)	2	70	0.412

Table (ix): Bank – Swing Weights

3.3 Utility Scores:

The table below shows the utility score which is calculated using the most and least preferences of the attributes. We believe that a single dimension value function method is the most appropriate method for the data which we have. And the scores are in a range of 0-1.

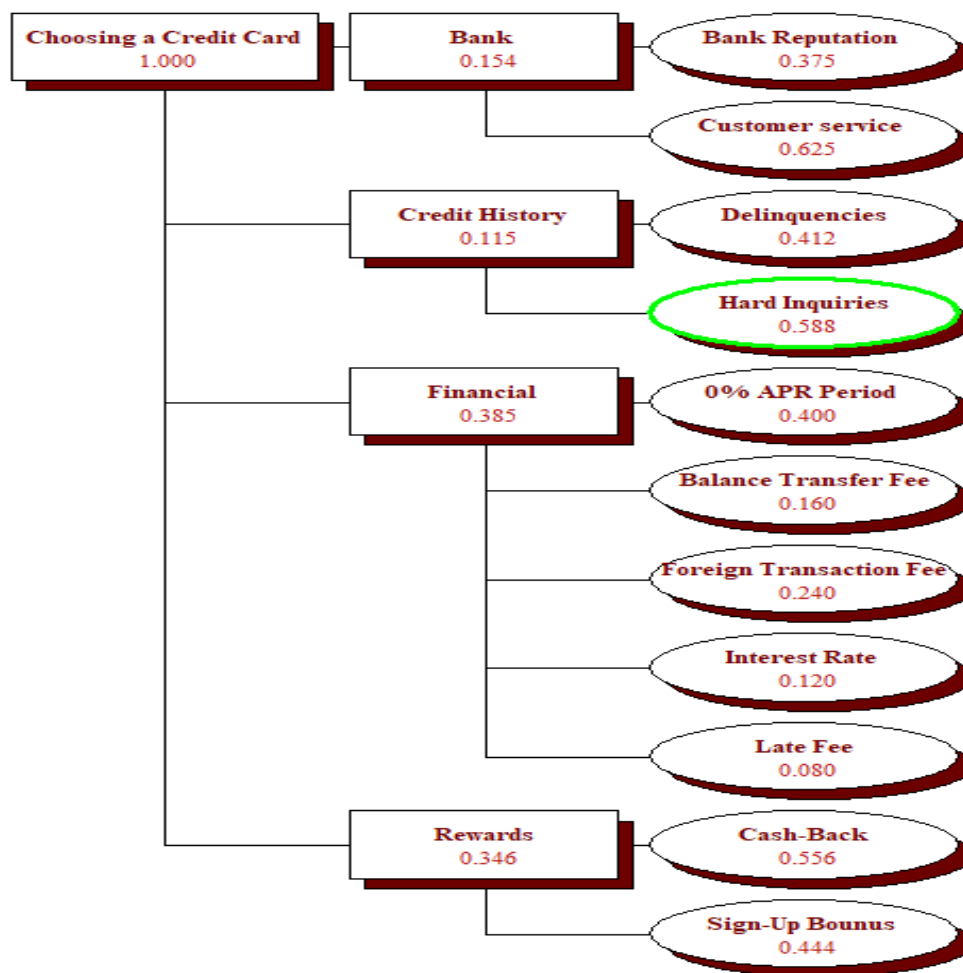
Measures	Utility Score			
	Bank of America	Chase	American Express	Discover
No. of Hard Inquiries	0.5	0.5	1	0
No. of Delinquencies	0	0.5	1	0
No. of Months for 0% APR	0.6667	1	1	0
% of Interest Rate per month	0	0.0434782609	1	0.347826087
Late fee amount in \$	0	0	1	0
% of amount spent per foreign transaction	0	0	1	1
% of amount spent per balance transaction	0.4	0.4	1	0
Sign-up Bonus amount in \$	0.5	0	1	0
% of the amount spent in a month for getting a Cash-Back	0.4285714	0	1	1
Bank Reputation	0.142857143	1	0.428571429	0
Customer Service	0	0.5	1	0.25

Table (x): Utility Scores

4. Results

4.1 Logical Decision for Windows (LDW) Model:

To find the results of choosing the credit card, Logical Decision for Windows model is used. The process of choosing the preferred credit card is obtained from this LDW model based on our measures and objectives. Here, American Express is obtained as the result to choose the credit card from the remaining banks. We assigned our model into Logical Decision to know how the final result is American Express and also how the result might change depending upon the change in the preferences.



Preference Set = NEW PREF. SET

Figure (ii): LDW Value Hierarchy with Local weights

4.2 Why AMEX is the best choice?

Ranking for Choosing a Credit Card Goal

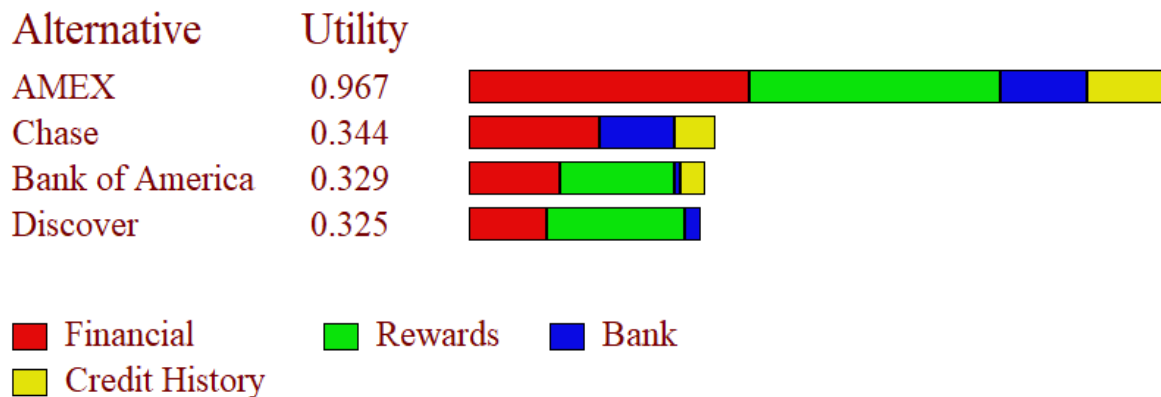


Figure (iii): Rank Alternative graph in LDW

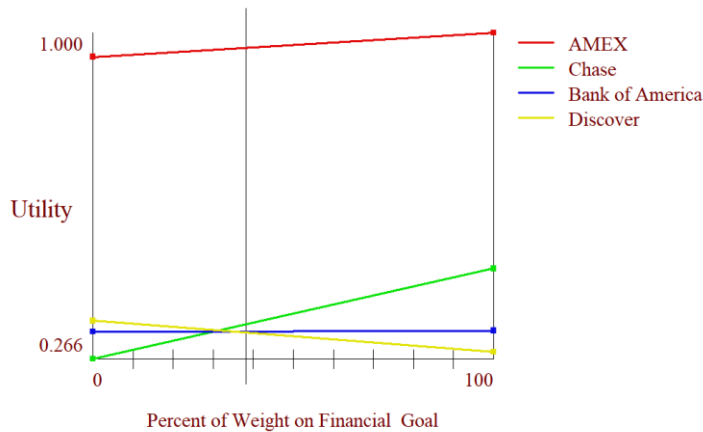
In Logical Decision, we obtained American Express as the best choice when Rank alternative graph is produced. We consider this as a sensible result because when we look at the ranking order of the fundamental objectives, Financial is the most preferred objective for the customers. Whereas Discover has the lowest ranking for the financial when compared with American Express.

When Rewards is taken into consideration, American Express has the highest utility score when compared with Chase. As Chase does not have cash-back bonus or Sign-up Bonus. American Express also has the highest utility value when compared with other alternatives in the Rank alternative graph for Financial.

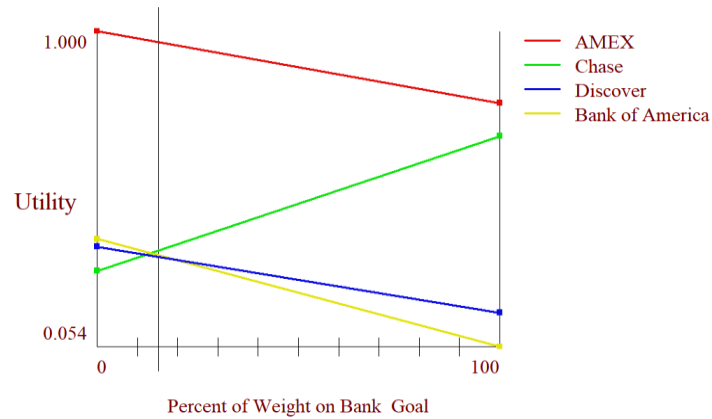
If we take measures like Customer Service and Bank Reputation, we obtained American Express as the highest utility value because Discover is less preferred in Bank Reputation when compared with American Express. And the utility value of American Express alternative has the highest when compared with Bank of America. In ranking for Credit History objective, it shows that American Express has the highest utility value.

Taking into consideration of all the utility values of each objective and measure, American Express has the highest Utility score overall.

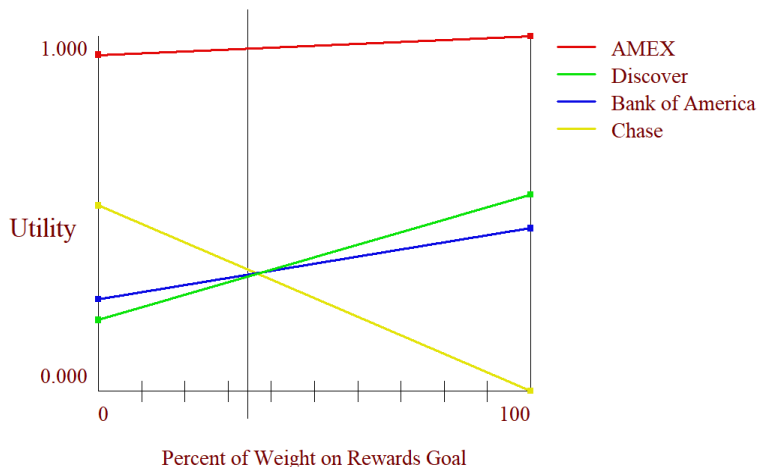
4.3 Sensitivity Analysis



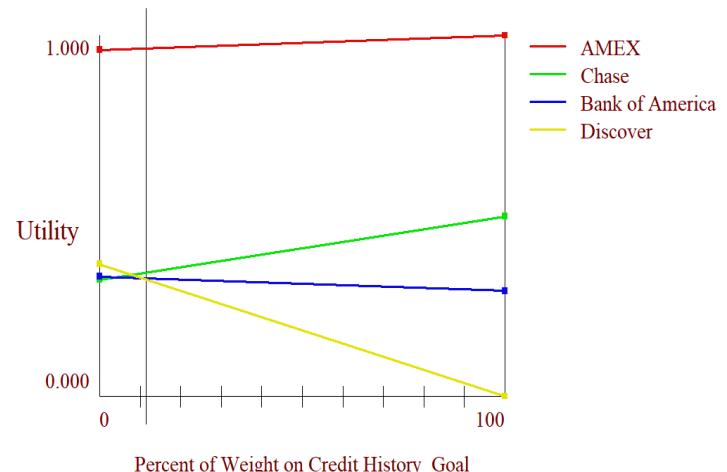
Figure(iv): Sensitivity Analysis for Financial



Figure(v): Sensitivity Analysis for Bank



Figure(vi): Sensitivity Analysis for Rewards



Figure(vii): Sensitivity Analysis for Credit history

The graphs above are produced from LDW which is obtained by doing the sensitivity analysis of the result.

The sensitivity analysis graph (Figure (iv)) for financial indicates that the American Express has the highest weight because of the mean objectives present in financial being the highest. The vertical bar represents the weight, AMEX stands top when compared to other alternatives. Even though the weight of Chase has increased but could not reach the weight of American Express.

The sensitivity analysis graph (Figure (v)) for Bank indicates that American Express has the highest weight because of the bank reputation and customer service is the highest. In this graph

even though the value of AMEX got decreased later, it stands as the highest utility weight in this fundamental objective.

The sensitivity analysis graph (Figure (vi)) for Rewards indicated that American Express has the highest weight when we look at the vertical bar. The graph of Amex increases from left to right which means that there is no decrease in the weight. Although chase stands second on the vertical bar, later the weight got decreased and becomes the least when taken all the measures into consideration.

The sensitivity analysis graph (Figure (vii)) for Credit History shows that American Express has the highest weight. When compared with other alternatives the weight of AMEX didn't fluctuate in the graph. As mentioned earlier Discover has the least utility score for both the measures hard inquiries and delinquencies.

Ranking for Choosing a Credit Card Goal

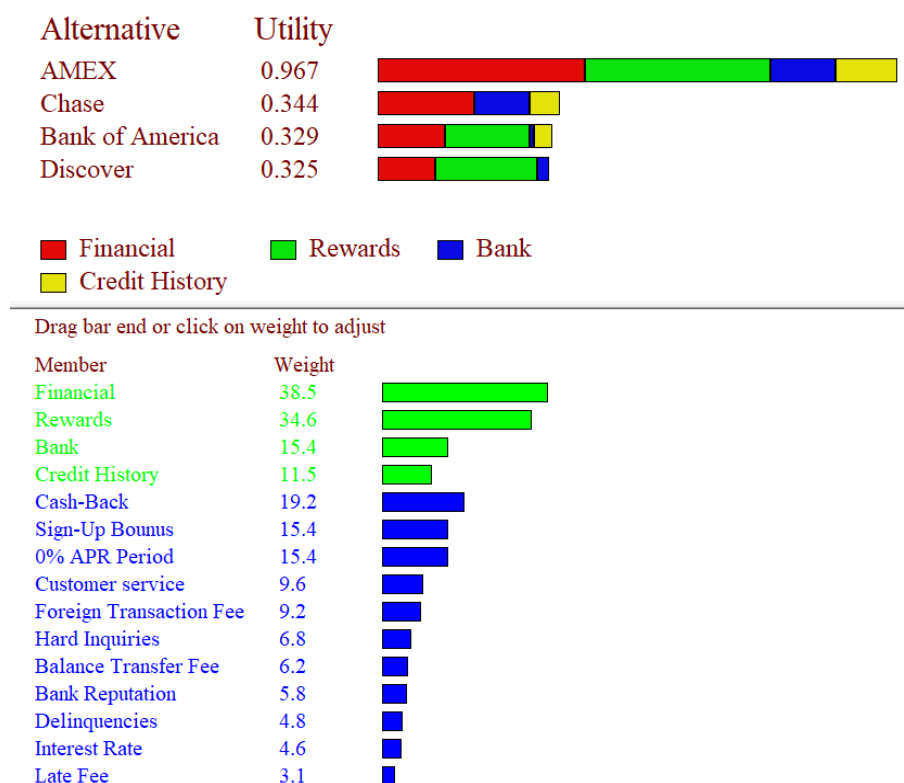


Figure (viii): LDW goal with weights

Interpretation: The figure above shows the actual swing weights, the weights of Financial and Rewards are almost the same whereas credit history and bank are very low. But the weights of Credit History and Bank are almost the same. Discover has the least utility score.

Ranking for Choosing a Credit Card Goal

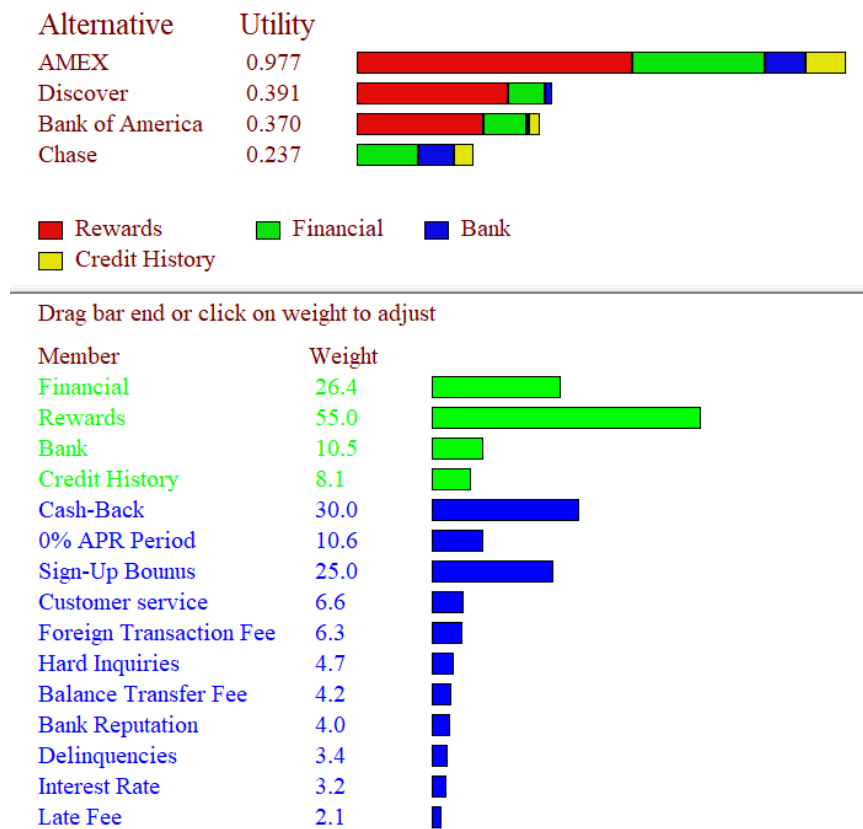


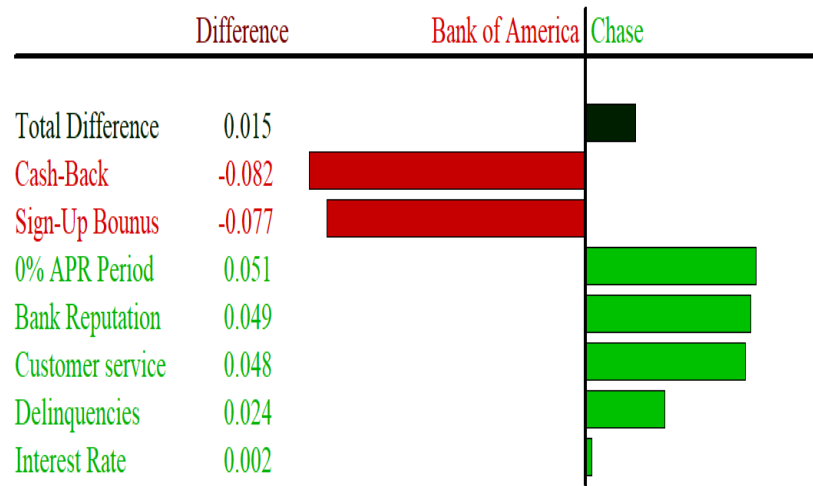
Figure (ix): LDW goal with modified weights

Interpretation: When the weights of Sign-up Bonus and Cash-Back are increased to 25% and 30% respectively, rewards has the highest weight when compared to the other three weights. The weight has a drastic change from 34.6 to 55. Also, the financial weight has decreased from 38.5 to 26.4. Now Discover has the second highest utility score.

4.4 Tornado Diagram

Choosing a Credit Card Goal Utility for

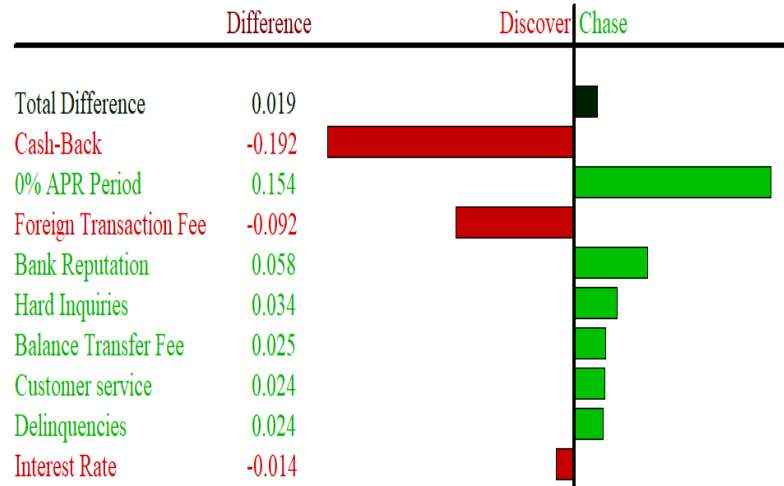
Chase	0.344
Bank of America	0.329
Total Difference	0.015



Figure(x): Tornado Diagram of Chase and BOFA

Choosing a Credit Card Goal Utility for

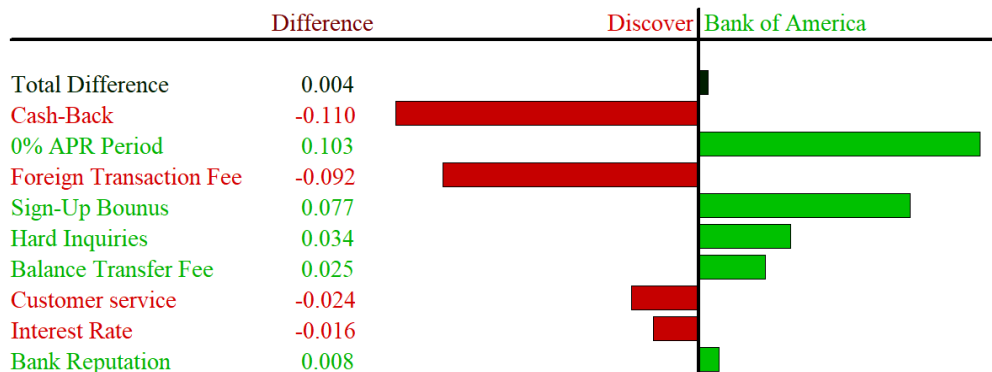
Chase	0.344
Discover	0.325
Total Difference	0.019



Figure(xi): Tornado Diagram of Discover and Chase

Choosing a Credit Card Goal Utility for

Bank of America	0.329
Discover	0.325
Total Difference	0.004



Figure(xii): Tornado Diagram of Discover and BOFA

Interpretation:

Figure(x) shows the relation between Chase and BOFA, the difference is 0.015. Cash-back and Sign-up bonus affects BOFA, whereas 0% APR, Bank Reputation, Customer Service affects Chase a lot.

Figure(xi) shows the relation between Discover and chase, the difference is 0.019. Cash-back affects Discover a lot, whereas 0% APR affects Chase a lot.

Figure(xii) shows the relation between Discover and BOFA, the difference is 0.004. Cash-back and Foreign Transaction fee affects Discover, whereas 0% APR affects BOFA a lot.

5. Conclusion

From the project, and after the analysis of Financial and Bank objectives we conclude that AMEX might be the right choice for any individual when choosing a credit card. The result might differ accordingly as the weights differ as shown in the sensitivity analysis. As students, working on this project greatly enhanced our skills in making the right decision of what business credit card has to be chosen in the near future.

6. References

- [1] B. o. America, "Bank of America Cash Rewards Credit Card," Bank of America, [Online]. Available: <https://secure.bankofamerica.com/applynow/welcome.go>.
- [2] A. Express, "Amex Everyday Credit Card," American Express, [Online]. Available: <https://www.americanexpress.com/us/credit-cards/card-application/apply/prospect/terms/amex-everyday-credit-card/36503-10-0/?pznOfferCode=SIWR-7MR8RS-4GFF-SKL#FeeTable>.
- [3] Chase, "Chase Freedom Unlimited Credit Card," Chase, [Online]. Available: https://applynow.chase.com/FlexAppWeb/pricing.do?card=FY9N&page_type=appterm.
- [4] Discover, "Discover it Student Cash Back," Discover, [Online]. Available: https://www.discover.com/credit-cards/student/it-card.html?ICMPGN=PUB_HNAV_CARDS_STUD_IT.
- [5] CreditKarma, "Credit card approval: What factors matter?," CreditKarma , [Online]. Available: <https://www.creditkarma.com/credit-cards/i/credit-card-approval/>.
- [6] M. Crashers, "How to Choose a Credit Card That's Right for You," Money Crashers, [Online]. Available: <https://www.moneycrashers.com/how-to-choose-credit-card/>.
- [7] CreditCards+com, "6 things to consider before choosing a credit card," CreditCards+com, [Online]. Available: <https://www.creditcards.com/credit-card-news/help/6-consider-before-choosing-picking-credit-card-6000.php>.