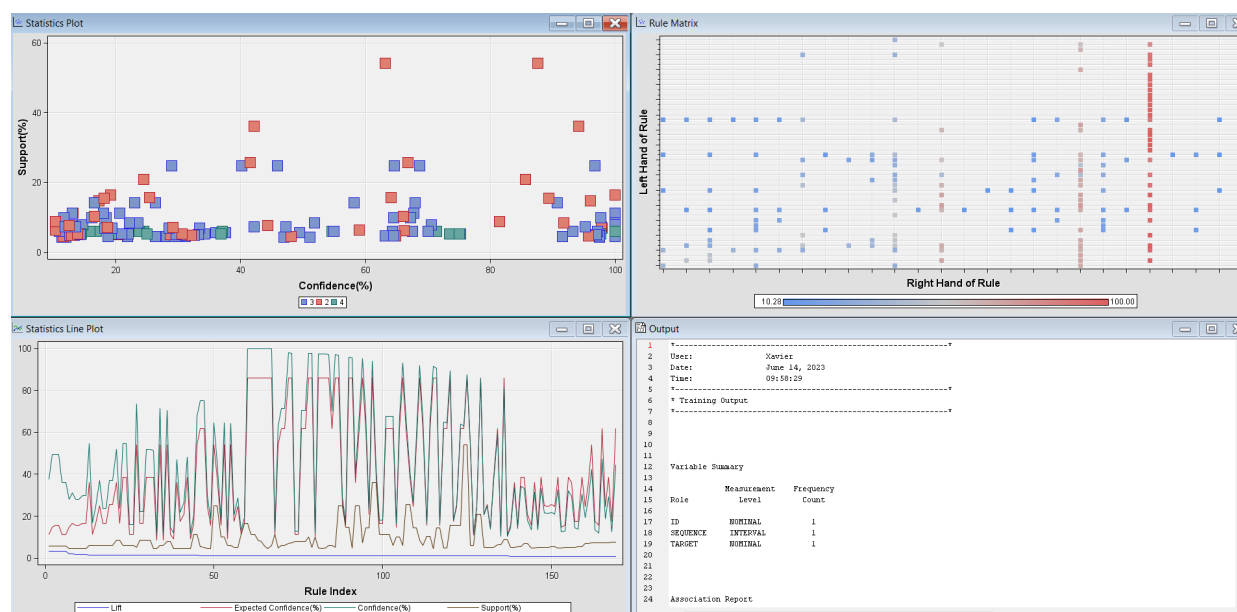
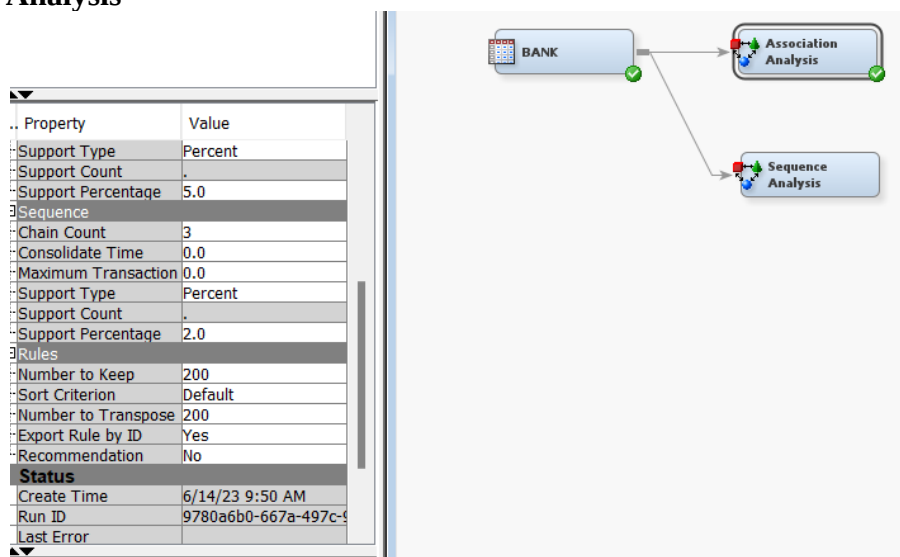
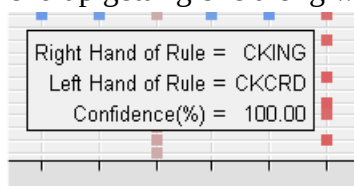


## SAS Association Rule Mining

### Market Basket Analysis



Checking as the right hand rule is strongly associated with a variety of different banking products as seen by the tall populated red column in the top right graph. Most customers either go to the bank specifically for a checking account or end up getting one along with other services.



For instance, note 100% confidence where check card (left hand rule) implies checking account (right hand rule). A check card has many uses, but one of its main functions is to act as an ATM access card to allow customer to deposit or withdraw money from ATM. In addition, various other banking services

(online or offline) can also be accessed in a convenient manner by showing or scanning one's check card and it can be used to pay for goods and services as a debit card.

Highest Lift involves checking account:

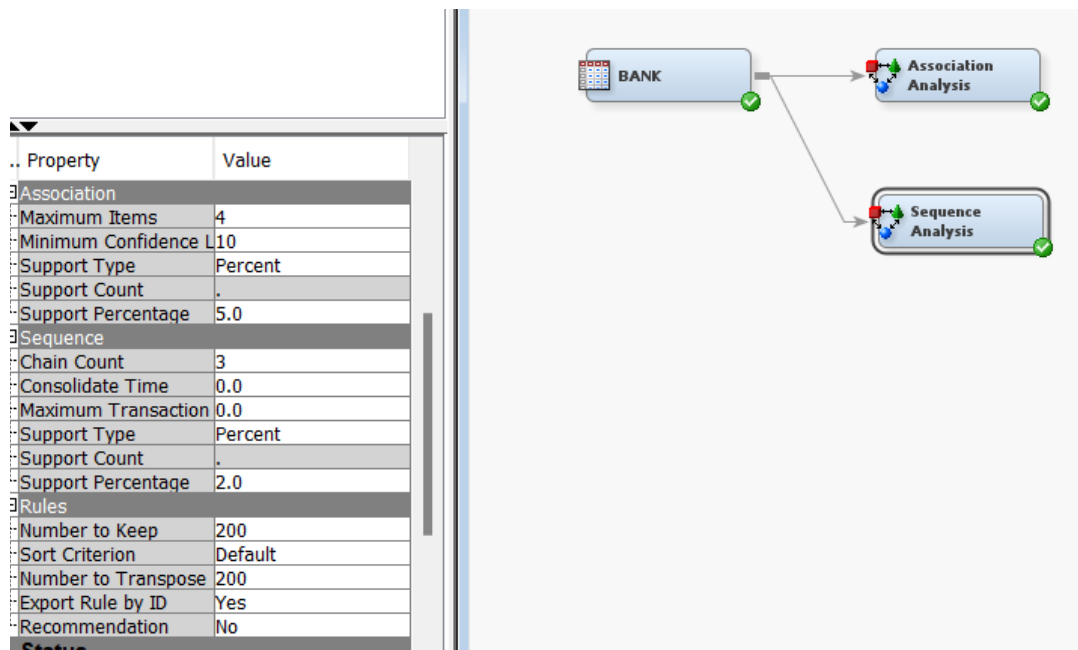
RULE1 CKING & CCRD ==> CKCRD

RULE2 CKCRD ==> CKING & CCRD

Rules 1 and 2 are inverse of each other and have the same lift of 3.33, which is calculated as confidence of the rule divided by the expected confidence. Checking accounts are also a commonly used method to pay for credit card balances at the end of statement periods. However, note that Rule 1 has a support of 5.58%, Confidence of 37.57%, Expected Confidence of 11.30%. Confidence, while still high above our threshold, drops significantly with introduction of credit card to check card and checking account. Because while check card and checking account must be tied together with a given bank, a customer can pay for credit card from one bank with their checking account from another bank. In addition, it's possible to pay for the credit card balance directly from the checking account without using a debit card.

One way to attract more customers into getting more credit cards and checking cards along with their checking accounts is to run promotional offers during months in which new checking account openings are highest. The standard signup bonus (SUB) for credit cards could be increased or various fees associated with card usage like overdraft and cash advance could be waived for a period of time.

## Sequence Analysis



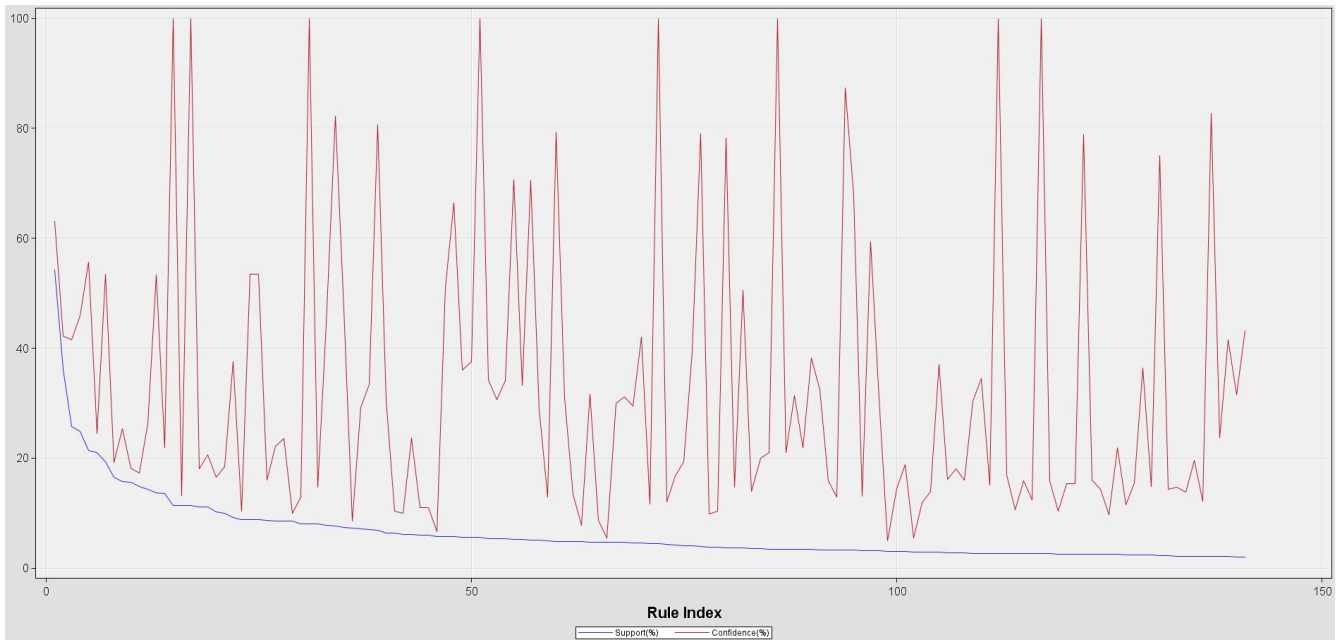
Results - Node: Sequence Analysis Diagram: Association Analysis

File Edit View Window



Rule Description

Map	Rule
RULE1	CKING ==> SVG
RULE2	CKING ==> ATM
RULE3	SVG ==> ATM
RULE4	CKING ==> SVG ==> ATM
RULE5	ATM ==> ATM
RULE6	CKING ==> CD
RULE7	CKING ==> ATM ==> ATM
RULE8	CKING ==> HMEQLC
RULE9	SVG ==> CD
RULE10	CKING ==> MMDA
RULE11	CKING ==> CCRD
RULE12	CKING ==> SVG ==> CD
RULE13	SVG ==> ATM ==> ATM
RULE14	SVG ==> SVG
RULE15	CKCRD ==> CKCRD
RULE16	CKING ==> CKCRD
RULE17	CKING ==> CKCRD ==> CKC...
RULE18	SVG ==> HMEQLC
RULE19	CKING ==> SVG ==> HMEQLC
RULE20	SVG ==> CCRD
RULE21	CKING ==> SVG ==> CCRD
RULE22	CD ==> CD
RULE23	CKING ==> IRA
RULE24	HMEQLC ==> HMEQLC
RULE25	CKING ==> HMEQLC ==> HM...
RULE26	CKING ==> SVG ==> SVG
RULE27	ATM ==> HMEQLC
RULE28	CKING ==> ATM ==> HMEQLC
RULE29	CKING ==> AUTO
RULE30	SVG ==> CKCRD



Sequence analysis show that a checking account is the common point of entry for many customers interacting with this bank with over half of the top 30 rules being initiated with a checking account. Sequence analysis show that checking account => ATM card is one of the highest rules (rule 2), while checking account => check card is rule 16. This is interesting as one might assume the check card would be more popular since it can act as an ATM card with more benefits. However, it's important for businesses to take into consideration consumer preferences. Many people might want to easily access their checking accounts and not desire additional services immediately, so an ATM card would surface. In addition, while a debit card has more functionalities, they have fewer financial safeguards and are more vulnerable to fraud like card skimming and BIN attacks. Indeed, a common piece of consumer advice is for customers to lock their debit card when not in use.

Instead of aggressively upselling new customers, the bank may choose to meet the customer where they are at and offer convenient services at first. For example, offer the customer the option of just getting an ATM card instead of offering a debit card by default when they open their account. This convenience may be appreciated and help keep the customer even if they don't seek additional services. Then overtime, the bank can segmentize the customer based on their usage of their checking account and upsell targeted offers for auto loans, personal loans, mortgage, credit cards etc.