**SAS HOMEWORK 6 (Group Homework)**

**Note : This data has been provided for teaching purpose in this course and may not be used in any other research or distributed to anyone else without prior permission.**

**In a hazard model, a negative coefficient means that as X1 increases, the duration to an event will decrease.**

I have provided a dataset of 9000 credit card customers. Of these credit card customers some are inactive (i.e., have never used the card) and the rest are active. We have the following variables.

1. The mode of acquisition (whether they were acquired through direct mail (DM), direct selling (DS), telephone sales (TS) or through internet (NET))
2. Whether they have a Reward card (i.e., a card that gives points for every dollar purchased)
3. Whether they have an affinity card and the type of affinity card they have.
4. The type of card that they were given (that is, whether they have a standard, gold, platinum or quantum card). Note: Quantum > Platinum > Gold > Standard card in terms of credit worthiness.
5. Note that profit = totfc + 1.6%\*TotalTrans (approximately)

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|  | **HID** | ID of the account |
|  | **Active** | Whether the account is active (=1) or not (=0) |
|  | **Rewards** | whether the customer has a reward card (=1) or not (=0) |
|  | **Limit** | credit limit of the customer |
|  | **numcard** | number of cards that the customer has from this bank |
| **Mode of acquisition** | **DM** | whether the customer was acquired though direct mail (1=Yes, 0=No) |
| **DS** | whether the customer was acquired though direct selling (1=Yes, 0=No) |
| **TS** | whether the customer was acquired though telephone selling (1=Yes, 0=No) |
| **NET** | whether the customer was acquired though internet (1=Yes, 0=No) |
| **Type of card** | **Gold** | whether the customer has a GOLD card (1=Yes, 0=No) |
| **Platinum** | whether the customer has a PLATINUM card (1=Yes, 0=No) |
| **Quantum** | whether the customer has a QUANTUM card (1=Yes, 0=No) |
| **Standard** | whether the customer has a STANDARD card (1=Yes, 0=No) |
|  | **Profit** | profit generated by the customer over a 3 year period |
|  | **Totaltrans** | Total transaction amount (money spent) by the customer over a 3 year period |
|  | **Totfc** | Total finance charges paid by the customer over a 3 year period |
|  | **Age** | Age in years |
|  | **Dur** | Duration: Number of months a customer has stayed with the firm |
| **Types of Affinity cards** | **sectorA** | No affinity – card is not associated with affinity to an organization |
| **SectorB** | Affinity card affiliated with Professional organization (e.g. Am. Medical. Assoc) if a customer has an affinity card of this type value =1 else 0. |
| **SectorC** | Affinity card affiliated with Sports |
| **SectorD** | Affinity card affiliated with Financial institution |
| **SectorE** | Affinity card affiliated with University (e.g. UTD card) |
| **SectorF** | Affinity card affiliated with Commercial (e.g. Macy’s card) |

1. Run the following Tobit model (Use PROC QLIM)

Model profit = age, totaltrans, rewards, limit, numcard, modes of acquisition, type of card, types of affinity

Write a summary of the results. Focus on important effects, interpretation, model fit etc.

2. Run a selection model (Use PROC QLIM)

Model active = age, rewards, limit, numcard, modes of acquition, type of card, types of affinity

Model profit = age, totaltrans, rewards, limit, numcard, modes of acquition, type of card, types of affinity

Write a summary of the results. Focus on important effects, interpretation, model fit etc.

3: Survival analysis

1. Delete all customers who are inactive.
2. Run a proportional hazards model (PROC PHREG)

**Duration** = age, totaltrans, rewards, limit, numcard, modes of acquition, type of card, types of affinity

Note that duration is censored if its value is 37 as we have only 37 months of data.

4. Run a model using PROC LIFEREG with Weibull distribution.

Write a summary of the results. Focus on important effects, interpretation, model fit etc.

5. Use PROC LIFETEST to test whether survivor function of affinity groups are significantly different from that of non-affinity groups.

What do you conclude?