

# **Incrementality and Testing for Statistical Significance among Binomial Outcomes**

```
DATA PROJECT.MATCH;
```

```
  SET WORK.INPUT;
```

```
  RECORDS = 1;
```

```
  IF MAIL_FLAG = 'C' THEN GROUP = 'CG  ';
```

```
  IF MAIL_FLAG = 'M' THEN GROUP = 'TG  ';
```

```
  SALE_FLAG = 'N';
```

```
  IF (MAKE IN ('F', 'L', 'M'))
```

```
    AND (SALE_DATE GE MDY(1,1,2004))
```

```
    AND (SALE_DATE LE MDY(6,30,2004))
```

```
  THEN SALE_FLAG = 'Y';
```

```
RUN;
```

```
PROC SORT DATA=PROJECT.MATCH;
```

```
  BY GROUP;
```

```
RUN;
```

```
PROC SUMMARY DATA=PROJECT.MATCH;  
  VAR RECORDS;  
  CLASS GROUP;  
  OUTPUT OUT=WORK.SUM_GROUP (DROP=_FREQ_ _TYPE_) SUM=;  
RUN;
```

```
DATA WORK.TEMP_TARGET;  
  SET WORK.SUM_GROUP;  
  IF SUBSTR(GROUP,1,2) = 'TG';  
  RENAME RECORDS = TARGET_SIZE;  
  MATCH = 1;  
RUN;
```

```
DATA WORK.TEMP_CONTROL;  
  SET WORK.SUM_GROUP;  
  IF SUBSTR(GROUP,1,2) = 'CG';  
  RENAME RECORDS = CONTROL_SIZE;  
  MATCH = 1;  
  DROP GROUP;  
RUN;
```

```
DATA WORK.SUM_GROUP;  
    MERGE WORK.TEMP_TARGET WORK.TEMP_CONTROL;  
    BY MATCH;  
    TOTAL_SIZE = TARGET_SIZE + CONTROL_SIZE;  
    DROP MATCH;  
RUN;
```

```
PROC SUMMARY DATA=PROJECT.MATCH;  
  VAR RECORDS;  
  CLASS GROUP;  
  WHERE MAKE = 'F' AND SALE_FLAG = 'Y';  
  OUTPUT OUT=WORK.SUM_FORD (DROP=_FREQ_ _TYPE_) SUM=;  
RUN;
```

```
DATA WORK.SUM_FORD;  
  SET WORK.SUM_FORD;  
  IF GROUP NOT = ' ';  
  POPULATION = "FORD DIV SALES    " ;  
  REPORT = 2;  
  LINE = 1;  
RUN;
```

GROUP	RECORDS	POPULATION	REPORT	LINE	CONTROL	TARGET_SIZE	CONTROL_SIZE	TOTAL_SIZE
TG	246	FORD CAR SALES	1	1	28	139964	15000	154964
TG	66	FORD CAR RETAIL	1	2	9	139964	15000	154964
TG	48	FORD CAR LEASE	1	3	4	139964	15000	154964
TG	898	FORD TRUCK SALES	2	1	83	139964	15000	154964
TG	328	FORD TRUCK RETAIL	2	2	29	139964	15000	154964
TG	98	FORD TRUCK LEASE	2	3	9	139964	15000	154964
TG	95	MERCURY SALES	3	1	11	139964	15000	154964
TG	48	MERCURY RETAIL	3	2	6	139964	15000	154964
TG	13	MERCURY LEASE	3	3	1	139964	15000	154964
TG	131	LINCOLN SALES	4	1	14	139964	15000	154964
TG	65	LINCOLN RETAIL	4	2	9	139964	15000	154964
TG	33	LINCOLN LEASE	4	3	4	139964	15000	154964

**%MACRO** RATE(ADJFACTOR,OUTPUT);

DATA PROJECT.SUMMARY1;

SET WORK.SUMMARY;

BY REPORT GROUP LINE;

ADJ\_TARGET = RECORDS \* &ADJFACTOR.;

ADJ\_CONTROL = CONTROL \* &ADJFACTOR.;

TARGET\_RATE = (ADJ\_TARGET / TARGET\_SIZE);

CONTROL\_RATE = (ADJ\_CONTROL / CONTROL\_SIZE);

INC\_RATE = TARGET\_RATE - CONTROL\_RATE;

INC\_SALES = INC\_RATE \* TARGET\_SIZE;

BUY\_RATE\_PER\_1000 = TARGET\_RATE \* **1000**;

INC\_RATE\_PER\_1000 = INC\_RATE \* **1000**;

TARGET\_MIN95 = TARGET\_RATE - (TARGET\_VARIANCE \* **1.960**);

TARGET\_MAX95 = TARGET\_RATE + (TARGET\_VARIANCE \* **1.960**);

TARGET\_MIN90 = TARGET\_RATE - (TARGET\_VARIANCE \* **1.645**);

TARGET\_MAX90 = TARGET\_RATE + (TARGET\_VARIANCE \* **1.645**);

TARGET\_MIN80 = TARGET\_RATE - (TARGET\_VARIANCE \* **1.282**);

TARGET\_MAX80 = TARGET\_RATE + (TARGET\_VARIANCE \* **1.282**);

```
CONTROL_MIN95 = CONTROL_RATE - (CONTROL_VARIANCE * 1.960);
CONTROL_MAX95 = CONTROL_RATE + (CONTROL_VARIANCE * 1.960);
CONTROL_MIN90 = CONTROL_RATE - (CONTROL_VARIANCE * 1.645);
CONTROL_MAX90 = CONTROL_RATE + (CONTROL_VARIANCE * 1.645);
CONTROL_MIN80 = CONTROL_RATE - (CONTROL_VARIANCE * 1.282);
CONTROL_MAX80 = CONTROL_RATE + (CONTROL_VARIANCE * 1.282);
```

```
SIGNIFICANCE = ' ';
IF (INC_RATE > 0) AND (TARGET_MIN95 > CONTROL_MAX95) THEN SIGNIFICANCE = '95%';
ELSE IF (INC_RATE < 0) AND (TARGET_MAX95 < CONTROL_MIN95) THEN SIGNIFICANCE = '95%';
ELSE IF (INC_RATE > 0) AND (TARGET_MIN90 > CONTROL_MAX90) THEN SIGNIFICANCE = '90%';
ELSE IF (INC_RATE < 0) AND (TARGET_MAX90 < CONTROL_MIN90) THEN SIGNIFICANCE = '90%';
ELSE IF (INC_RATE > 0) AND (TARGET_MIN80 > CONTROL_MAX80) THEN SIGNIFICANCE = '80%';
ELSE IF (INC_RATE < 0) AND (TARGET_MAX80 < CONTROL_MIN80) THEN SIGNIFICANCE = '80%';
```

```
RUN;
```

```
DATA PROJECT.FINAL1;
  SET PROJECT.SUMMARY1;
  BY REPORT GROUP LINE;
  KEEP GROUP POPULATION TARGET_SIZE CONTROL_SIZE
  ADJ_TARGET ADJ_CONTROL
  BUY_RATE_PER_1000 INC_SALES INC_RATE_PER_1000
SIGNIFICANCE;
RUN;
```

```
PROC PRINT DATA=PROJECT.FINAL1;
```

```
DATA PROJECT.FINAL1;  
  SET PROJECT.SUMMARY1;  
  BY REPORT GROUP LINE;  
  KEEP GROUP POPULATION TARGET_SIZE CONTROL_SIZE  
      ADJ_TARGET ADJ_CONTROL BUY_RATE_PER_1000  
      INC_SALES INC_RATE_PER_1000 SIGNIFICANCE;  
RUN;
```

```
PROC PRINT DATA=PROJECT.FINAL1;  
RUN;
```

```
PROC EXPORT DATA= PROJECT.FINAL1  
  OUTFILE=  
  "C:\FMCC\TRIGGER\Final&OUTPUT..xls"  
  DBMS=EXCEL2000 REPLACE;  
RUN;
```

```
%MEND RATE;
```

```
%RATE(1.0,1);
```

GROUP	POPULATION	TARGET_SIZE	CONTROL_SIZE	ADJ_TARGET	ADJ_CONTROL	INC_SALES	BUY_RATE_PER_1000	INC_RATE_PER_1000	SIGNIFICANCE
TG	F / L / M SALES	139964	15000	305.2	42	-86.6992	2.180560716	-0.619439284	80%
TG	F / L / M RETAIL	139964	15000	119	18.2	-50.82298667	0.850218628	-0.363114706	
TG	F / L / M LEASE	139964	15000	37.8	4.2	-1.38992	0.270069446	-0.009930554	
TG	FORD DIV SALES	139964	15000	257.6	36.4	-82.04597333	1.840473265	-0.586193402	80%
TG	FORD DIV RETAIL	139964	15000	93.8	15.4	-49.89637333	0.67017233	-0.356494337	80%
TG	FORD DIV LEASE	139964	15000	29.4	2.8	3.273386667	0.210054014	0.023387347	
TG	L / M / SALES	139964	15000	47.6	5.6	-4.653226667	0.340087451	-0.033245882	
TG	L / M / RETAIL	139964	15000	25.2	2.8	-0.926613333	0.180046298	-0.006620369	
TG	L / M / LEASE	139964	15000	8.4	1.4	-4.663306667	0.060015433	-0.033317901	