

# Strategic Marketing Analytics

## Session 9 Causality and Endogeneity

# Marketing analytics



**Analytics** is not only about finding and describing patterns in data

It is also about guiding decisions

# Three types of analytics

- Descriptive
  - This is what's happening
- Predictive
  - This is what will happen if...
- Prescriptive
  - This is what you should do to...

We **observe** correlation



**Correlation** is the measure of the extent to which two variables are related

We **care about** causality



**Causality** is the measure of the extent to which one variable cause the other

# Establishing causality

To establish causality  $X \rightarrow Y$ , you need to establish that:

- 1 There is an actual correlation between  $X$  and  $Y$   
(it did not happen by chance alone)
- 2  $X$  came before  $Y$
- 3 There is nothing else that accounts for  $X \rightarrow Y$

# Endogeneity



**Endogeneity** happens when we establish a false causality, for instance by omitting explanatory variables

Technically, endogeneity refers to the situation where, in  $Y = \beta_0 + \beta_1 X + \varepsilon$ ,  $X$  is correlated with  $\varepsilon$  due to (a) omitted variable, measurement error in  $X$ , or simultaneity

# Direct causation (ideal scenario)

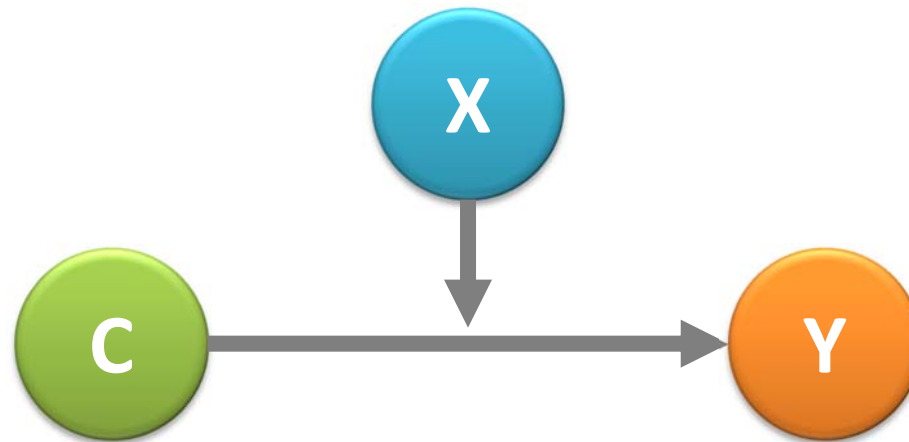




# Mediation



# Moderation



# Reverse causality



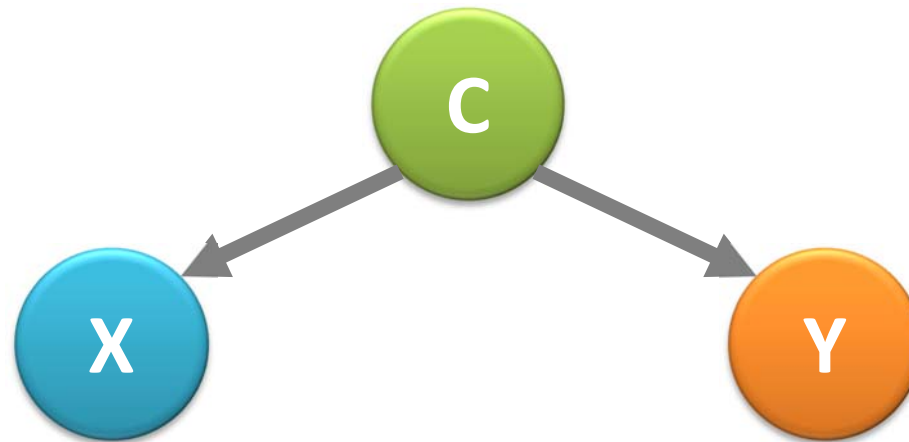
# Delayed effect



# Simultaneity



# Third-party causation





# ILLUSTRATIONS

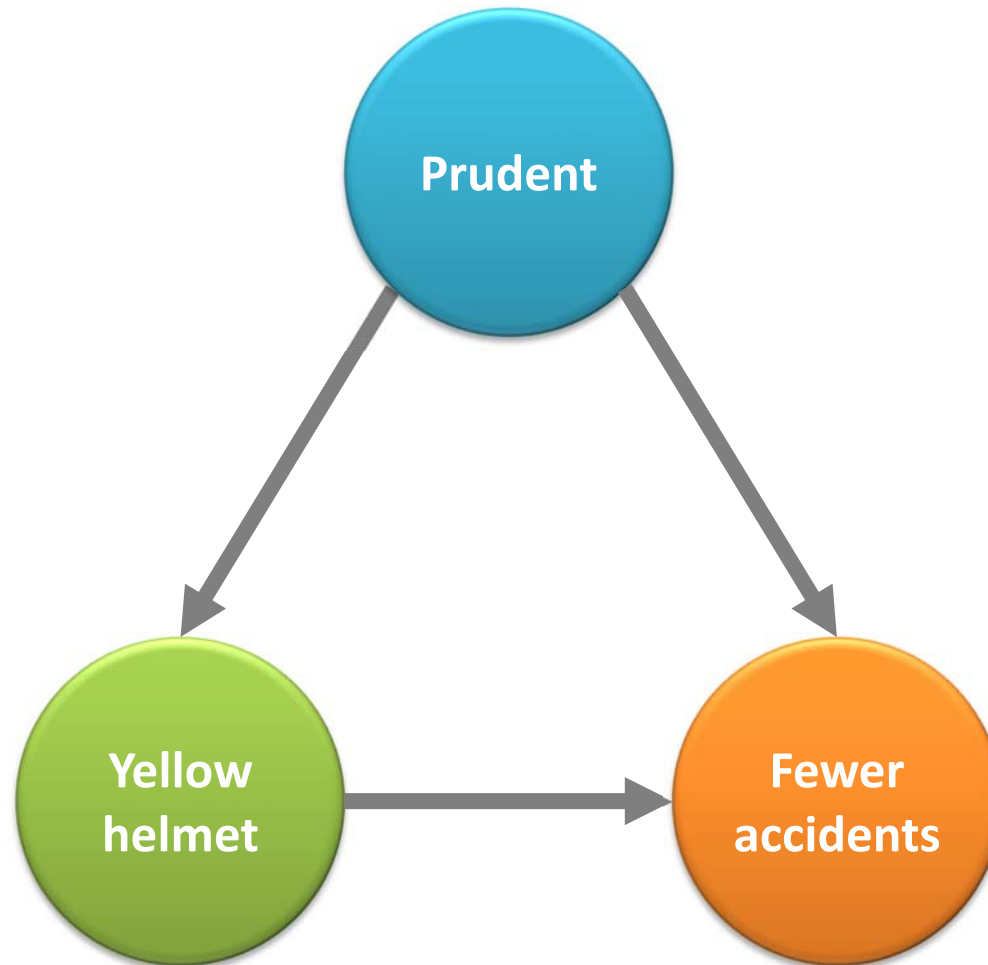
# Yellow helmets



Bikers who wear yellow helmets suffer from -30% accidents



# Yellow helmets



# Loyalty cards



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## Do loyalty programs really enhance behavioral loyalty? An empirical analysis accounting for self-selecting members

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### Abstract

One of the pressing issues in marketing is whether loyalty programs really enhance behavioral loyalty. Loyalty program members may have a much higher share-of-wallet at the firm with the loyalty program than non-members have, but this does not necessarily imply that loyalty programs are effective. Loyal customers may select themselves to become members in order to benefit from the program. Since this implies that program membership is endogenous, we estimate models for both the membership decision (using instrumental variables) and for the effect of membership on share-of-wallet, our measure of behavioral loyalty. We use panel data from a representative sample of Dutch households who report their loyalty program memberships for all seven loyalty programs in grocery retailing as well as their expenditures at each of the 20 major supermarket chains. We find a small positive yet significant effect of loyalty program membership on share-of-wallet. This effect is seven times smaller than is suggested by a naïve model that ignores the endogeneity of program membership. The predictive validity of the proposed model is much better than for the naïve model. Our results show that creating loyalty program membership is a crucial step to enhance share-of-wallet, and we provide guidelines on how to achieve this.

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**Keywords:** Loyalty programs; Grocery retailing; Endogeneity; Tobit-II model; Attraction models

### 1. Introduction

The effect of loyalty programs on loyalty is a topic of debate. Most loyalty programs do not turn all disloyal customers into loyal or make customers exclusively loyal. This does not mean that a loyalty program cannot be a useful tool. As expressed by Koslowsky (1999): “While none of these programs result in a perfect world, each can generate that little extra that can provide the retail marketer with potential

additional shopping trip to your store” (Cioletti, 2001). Hence, it is important to correctly quantify that ‘little extra’ that a loyalty program can offer to a retailer.

Recently, many retail companies have introduced loyalty programs to enhance customer loyalty (Kumar & Reinartz, 2005). Loyalty programs are currently available in many industries, such as supermarkets, gasoline stations, and clothing stores (Leenheer & Bijmolt, 2003; Lewis, 1997). Loyalty programs provide members with benefits such as discounts and saving rewards.

# Gas station fires



80% of gas station fires involve women



# Blockbusters and advertising



# Hydroxichloroquine

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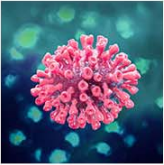
**RETRACTED: Hydroxychloroquine or chloroquine with or without a macrolide for treatment of COVID-19: a multinational registry analysis**

Prof Mandeep R Mehra, MD ✉ • Sapan S Desai, MD • Prof Frank Ruschitzka, MD • Amit N Patel, MD

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## Summary

### Background

Hydroxychloroquine or chloroquine, often in combination with a second-generation macrolide, are being widely used for treatment of COVID-19, despite no conclusive evidence of their benefit. Although generally safe when used for approved indications such as autoimmune disease or malaria, the safety and benefit of these treatment regimens are poorly evaluated in COVID-19.

### Methods

We did a multinational registry analysis of the use of hydroxychloroquine or chloroquine with or without a macrolide for treatment of COVID-19. The registry comprised data from 671 hospitals in six continents. We included patients hospitalised between Dec 20, 2019, and April 14, 2020, with a positive laboratory finding for SARS-CoV-2. Patients who received one of the treatments of interest within 48 h of diagnosis were included in one of four treatment groups (chloroquine alone, chloroquine with a macrolide, hydroxychloroquine alone, or hydroxychloroquine with a macrolide), and patients who received none of these treatments formed the control group. Patients for whom one of the treatments of interest was initiated more than 48 h after diagnosis or while they were on mechanical ventilation, as well as patients who received remdesivir, were excluded. The main outcomes of interest were in-hospital mortality and the occurrence of de-novo ventricular arrhythmias (non-sustained or sustained ventricular tachycardia or ventricular fibrillation).

Hydroxichloroquine is associated with higher death rate<sup>21</sup>

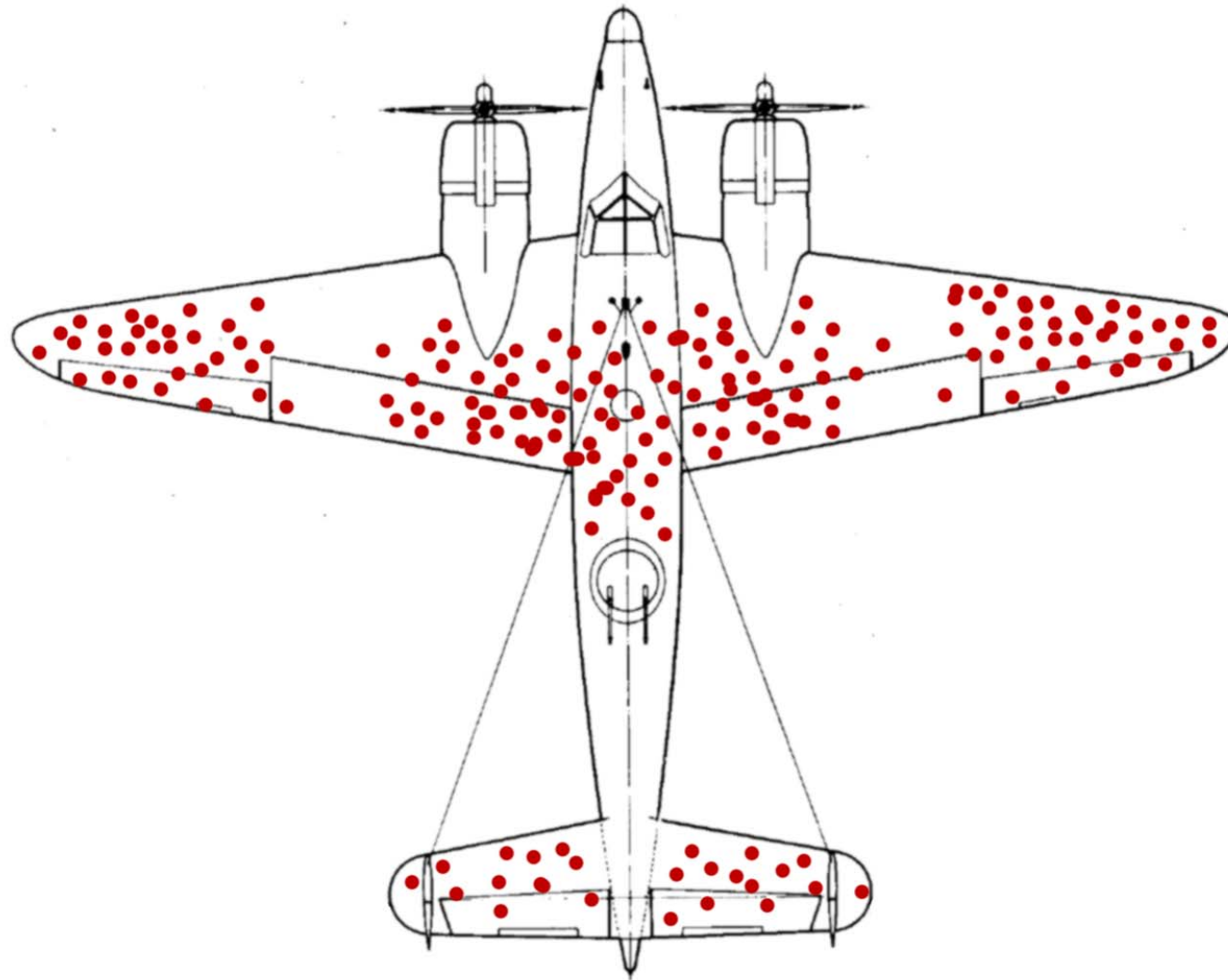
# Direct marketing



## 40% of fundraising revenues happen in December



# Abraham Wald (1902-1950)



# That's all folks!