A Summary to the Paper "Product Recall Delay and Product Cycle"

Shih-Yang Lin, D07323003

(a) What is the question (of the paper)?

What is the optimal timing for recalling defective products when taking the product cycles into consideration.

(b) Why should we care about it?

1. Product recalls are important decisions to firms. Figuring out the key trade offs involve in such problems could improve decision-makers' judgements for long-term profit maximization over the whole product cyles.
2. Governments can utilize the aforementioned knowledge to design proper mechanism for preventing overdue recalls.
3. In July 2018, Beverage Limited Company of the Atlantic Ocean (大西洋飲料) got 122 complaints about its most popular product, Apple Sidra (蘋果西打). It delayed the recall until November 2018, receiving total 2.2 million NTD fines, whereas the sales during July to September are 2.35 million bottles. This firm's behavior is consistent to the findings in this paper. The margin of Apple Sidra is much higher than the unit penalty, leading to the delay recall decision.

(c) What is your (or the author's) answer?

1. Product recalls at early stages of a product cycle are correlated with lower future sales (higher demand loss) while those at later stages do not have such correlations.
2. If the product margin is high than the unit recall cost, a firm should delay product recalls. And the length of the product recalls depend on the delay penalties.
3. If consumers have partial abilities to learn the product defects before official recalls, the delay durations will be shortened.

(d) How did you (or the author) the there?

1. The authors study car models sold in the U.S. market from Jan. 2012 to Aug. 2015. The data have 27 manufacturers, 49 brands, and 529 car models with 15,361 model-month observations.
2. The author use difference in difference technique to estimate the effects of recalls. The empirical model can be represented as

$$\log(Sales)_{it} = \alpha_0 + \alpha_1 \times TreatPost_{it} + \gamma X_{it} + \varphi_i + \mu_t + \epsilon_{it},$$

where $\log(Sales)_{it}$ is the natural logarithm of sales of model i in month t, $TreatPost_{it}$ is a dummy which indicates whether a recall of model i happened in or before month t, X_{it} is a set of control variables of model i in month t, φ_i and μ_t are model and month fixed effects, respectively. ϵ_{it} is the error term.

The control variables are listed below

Control Variable	Definition
$ProductCycle_{it}$	The product cycle status which is the ratio of the current product age divided by the total sales duration.
$\log(Cum.Cas)_{it}$	The cost of recalls which is the logarithm of realized cumulative number of casualties (deaths and injuries) up to month t.
$MarketShare_{it}$	the market share of model i out of total segment sales in month t.
$CrashFire_{it}$	The number of crashes or fires.
$Injury_{it}$	The number of injuries.
$Death_{it}$	The number of fatalities.
$Complaint_{it}$	The number of complaints.

3. The authors also develop a model to theorize the profit-maximization behavior of the firms. The following table are the notation used in the theoretical model

Notation	Definition
V_{it}	The utility of consumer i who is born in time t to purchase the model of car.
T_m	The pre-determined product mature time.
$\gamma(t)$	A time-variant preference function in a consumer's utility function.
v_i	Consumer i's valuation of acquiring the model of car.
p	Payment for the car.
R	Disutility due to a recall.
k_t	A dummy variable indicates the the timing of recall.