Investigation of influence of events to TV sales

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The aim of this work is to examine how shipment numbers of televisions (TV) in Japan are influenced by large events. The motivation for this is that many marketers at electronics companies and many clerks at electrical stores say, or believe, that more TV are sold when world-class sporting events (Olympic summer games or FIFA world cup soccer games) are held. Furthermore, a general manager at a TV maker strongly said in April 2008 that there is no year where more TV have not been sold in the past when there were Olympic summer games. However, this expectation and sentiment are by no means free from doubts because their basis is not clear. For example, as electrical stores have a sale on TV before sports events, more TV are sold thanks to the sale. However, as it is only in the short-term, it seems inappropriate to state flatly that more TV are sold. Hence, the expectation and sentiment might be under the mere impression, conjecture and assumption many marketers and clerks have, and there are some possibilities that many marketers and clerks simply quote these conveniently to kick-start sales. In this work we investigate the authenticity of these claims.

The data we use is monthly TV shipment numbers in Japan from January 1992 to December 2007, which has been published by Japan Electronics and Information Technology Industries Association (JEITA). Figure 1(a) shows the data. This figure shows that a similar behaviour is repeated every year (we call this the seasonal component) and they seem to be modulated by long-term trends. Hence, it will be convenient for treating the data and further analysis if the data can be decomposed into the seasonal components and long-term trends. To achieve this we apply the state space model [1]. Broadly speaking, the state space model is a method where some states (mechanisms) are assumed to be unobservable variables, a model taking in the state is built, and the variables are estimated based on the model. After decomposing the data, we collect the seasonal components in 1993, 1995, 1999, 2003, 2005 and 2007, where there was no large event[1]. Using these data we estimate the mean and the standard deviation (SD) at each month, and we treat it as the standard behaviour. See Figure 1.

To investigate the influence of large events on TV shipment numbers in a year, we add the trends in the year to the standard behaviour. If the shipment numbers at some months fall within the SD of the standard behaviour, it indicates that these shipment numbers are almost average. If the shipment numbers at some months fall outside, it indicates that there is some influence to these shipment numbers. Also, we can obtain the mean and SD of the total shipment number of the year using the standard behaviour. If the total shipment number of the year falls within the SD, this implies that the influence of the event is not so large that the total shipment number does not deviate significantly from the standard behaviour.

Using the above procedure we investigate the influence of large events to TV shipment

[1]Although there is no large sports event in 1997 and 2001, there were large political events, hike in the consumption tax in 1997 and introduction of the home appliance recycling law in 2001. Hence, we do not use them.

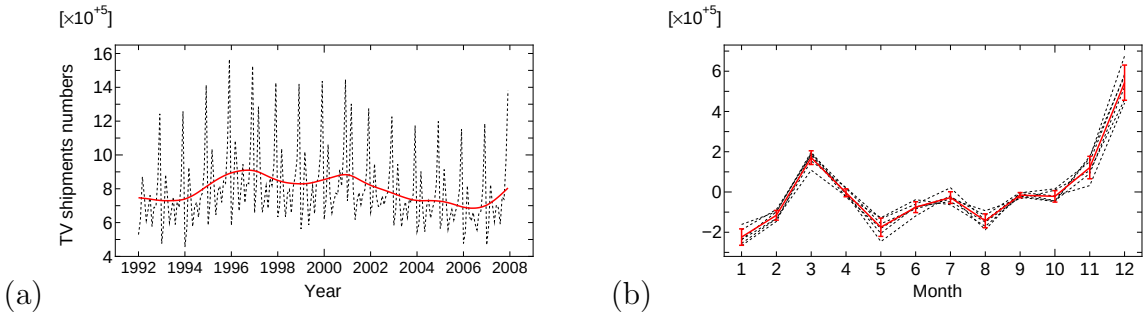

Figure 1: Monthly TV shipment numbers in Japan from January 1992 to December 2007 and the decomposed data. (a) the dotted line is monthly TV shipment numbers and the solid line is the estimated trend, and (b) collection of the seasonal components where the dotted lines are seasonal components of each year, the solid line is the mean and the error bar is standard deviation (the solid line and error bar is treated as the standard behaviour).

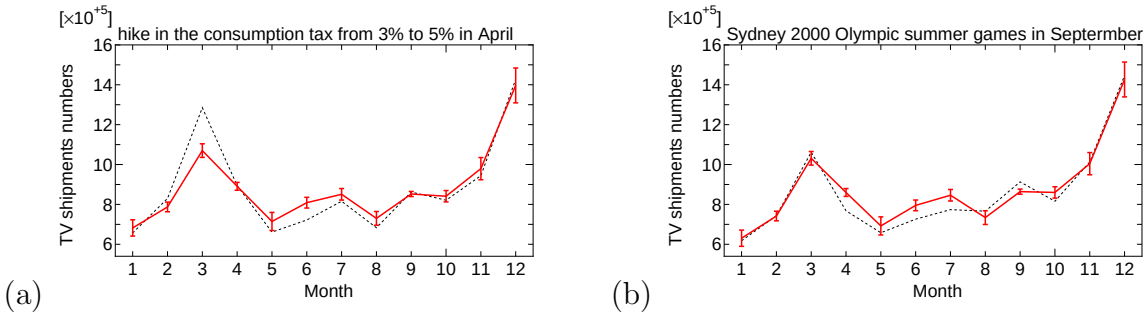

Figure 2: Monthly TV shipment numbers and the standard behaviours. (a) and (b) correspond to the data in 1997 and 2000, respectively, where the dotted lines are monthly TV shipment numbers, and the solid line is the standard behaviour.

numbers. Although we show the result of 1997 and 2000 as the typical result, the result of other years is essentially the same. In April 1997 the consumption tax was raised from 3% to 5%. Figure 2(a) shows that more TV were shipped in March. From 13 September to 1 October in 2000 Olympic summer games was held in Sydney. Figure 2(b) shows that more TV were shipped in August and September. This is because more people go to stores to buy TV since electrical stores have a sale on TV before large events. However, both the Figures 2(a) and 2(b) show that there were months where less TV were shipped before and after the events. This indicates that there were buying restraints before and after the sales promotions and the effect of sales promotion is limited. We now compare the total shipment numbers. The total shipment numbers in 1997 and 2000 were around 10.602 million and 10.303 million, respectively. The estimated total shipment numbers and confidence interval using the SD of the standard behaviour of these years is around 10.604 million and between 10.165 and 11.043 million in 1997, and 10.486 million and between 10.047 and 10.925 million in 2000. This indicates that the total shipment number is almost average even if there are large events.

Keywords
TV shipment numbers, Olympic summer games, FIFA world cup soccer games

References

[1] G. Kitagawa and W. Gersch, *Smoothness Priors Analysis of Time Series*, Lecture Notes in Statistics No. 116, (Springer-Verlag, New York, 1996).