Economics 312 — Spring 2020
Daily Problem #26 — Revised Date: April Fool's Day

Note: The data are weekly data on advertising and sales for a Midwest department store. The advertising variable in this dataset was also used as x *in your first Monte Carlo exercise.*

The following table gives an OLS regression of the model $sales_t = \alpha + \beta_0 adv_t + \beta_1 adv_{t-1} + \gamma sales_{t-1} + u_t$.

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. reg sales l.sales l(0/1)adv

      Source |       SS       df       MS              Number of obs =     156
-------------+------------------------------           F(  3,   152) =   48.99
       Model |  209.251815     3   69.750605           Prob > F      =  0.0000
    Residual |  216.413032   152  1.42376995           R-squared     =  0.4916
-------------+------------------------------           Adj R-squared =  0.4816
       Total |  425.664847   155  2.74622482           Root MSE      =  1.1932

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       sales |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       sales |
         L1. |   .1430939   .0733045     1.95   0.053    -.0017333    .2879211
             |
         adv |
         --. |   2.818347   .8228803     3.42   0.001     1.192588    4.444107
         L1. |   3.540486   .9384818     3.77   0.000     1.686333    5.394638
             |
       _cons |   17.52318   1.731551    10.12   0.000     14.10217    20.94419
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1. Give an assessment of this regression. Do the signs and magnitudes of the coefficients seem reasonable? What additional information would you like to have to determine whether it accurately captures the dynamic relationship between advertising and sales?

2. Use the estimated coefficients to get a point estimate of the "impact effect" $\frac{\partial sales_t}{\partial adv_t}$.

3. Calculate the first 2 "*dynamic marginal effects*" $\frac{\partial sales_t}{\partial adv_{t-s}}$ and the corresponding "cumulative effects" $\sum_{\tau=0}^{s} \frac{\partial sales_t}{\partial adv_{t-\tau}}$. Is the pattern what you would expect?

4. Calculate the "long-run effect" $\sum_{\tau=0}^{\infty} \frac{\partial sales_t}{\partial adv_{t-\tau}} = \lim_{s\to\infty} \sum_{\tau=0}^{s} \frac{\partial sales_t}{\partial adv_{t-\tau}}$.