Economics 311 — Fall 2017
Daily Problem #20 — November 10

This problem continues the analysis of the VAR with U.S. GDP growth (usgr) and Canadian GDP growth (cgr) using quarterly data over the period 1975:2 – 2011:4. The two VAR regressions are below:

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
usgr						
usgr						
L1.	.2512771	.0898504	2.80	0.005	.0751735	.4273807
cgr						
L1.	.2341061	.0975328	2.40	0.016	.0429453	.4252668
_cons	1.494612	.3354005	4.46	0.000	.8372394	2.151985
cgr						
usgr						
L1.	.3759117	.0726571	5.17	0.000	.2335065	.5183169
cgr						
L1.	.2859551	.0788694	3.63	0.000	.1313739	.4405362
_cons	.8755421	.2712199	3.23	0.001	.3439609	1.407123

Suppose that there is no correlation between *current* U.S. growth and *current* Canadian growth. (This is, of course, not true.) In that case we can unambiguously treat the error terms in these VAR equations as *structural shocks*—shocks to the dependent variable that do not affect the right-hand variable at all. (If this assumption is false, we have to make an "identifying assumption" in order to analyze the effects of shocks. We will not get into this.)

Suppose that there is a 1-unit (one percentage point) positive shock (error term) to U.S. growth in 2018 (and no shock to Canada—the Canadian error term is zero). In other words, $\varepsilon^{US}_{2018} = 1$ and $\varepsilon^{C}_{2018} = 0$.

a. By how much will U.S. growth change in 2018 as a result of this shock? (Canadian growth does not change, by assumption.)

b. Assuming that there are no further shocks (all error terms are zero after 2018), how much will U.S. growth change (relative to the baseline case of no shocks) in 2019 (through the lagged *usgr* variable, which is $usgr_{2018}$ whose change you examined in part a)? By how much will Canadian growth change in 2019 (again, through the lagged *usgr* variable)?

c. Again assuming that there are no further shocks, how much will U.S. growth change in 2020 due to the shock in 2018? [Hint: Both *usgr* and *cgr* have changed for 2019 as per part b, so changes in both lagged terms will affect the value of *usgr* (and *cgr*) in 2020.]

d. Could we continue this process indefinitely into the future, calculating the expected effect of a 2018 shock to U.S. growth on the entire future path of U.S. and Canadian growth? (Doing this would create an "impulse-response function.")