2024.05.05.

## Task 1

In the first part of the homework we had to do LSQ estimation on the data given in data.xlsx. For this I have plotted the results which are shown on *Figure 1*. The parameters were 0.9362 and 1.0107 for equation 1 in order, 0.8685 for equation 2 and 0.5494, 0.0806 and 0.2660 for equation 3.

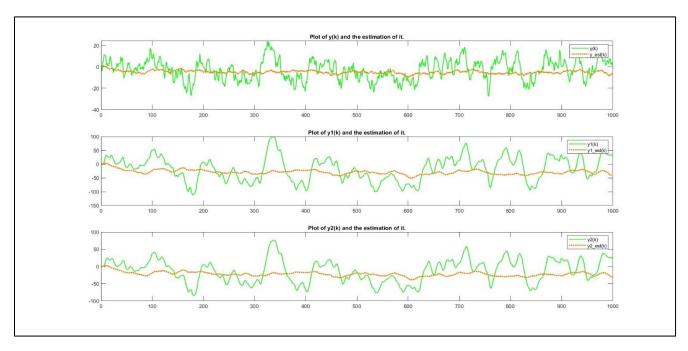


Figure 1

It is apparent that the estimation of the parameters can not replicate the system in its entirety.

For the IV method, I tried to implement it in a way it was written as [Ref 1]:

Z = I chose it to be y\_est the previous estimation of y.

Than the estimated parameter B<sub>2SLS</sub> (two-stage least squares) would be the following form:

 $B_{2SLS} = inv(X'*Pz*X)X'*Pz*Y$ , where Pz = Z\*inv(Z'\*Z)\*Z'. This would equal  $B_{IV.}$  This was the last step of my process shown on Figure 2.

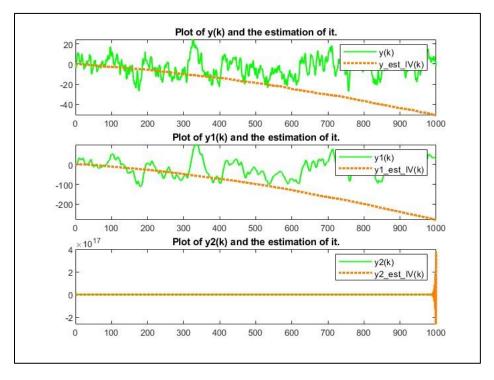


Figure 2

## Reference:

- https://en.wikipedia.org/wiki/Instrumental\_variables\_estimation