Economic Forecasting
Exercise Sheet 7 Solutions

Richard G. Pierse

1. (a) Figure 1 shows forecast residuals for consumption from three different solutions: single equation, static system solution and dynamic system solution. As expected, the single equation solution residuals are the

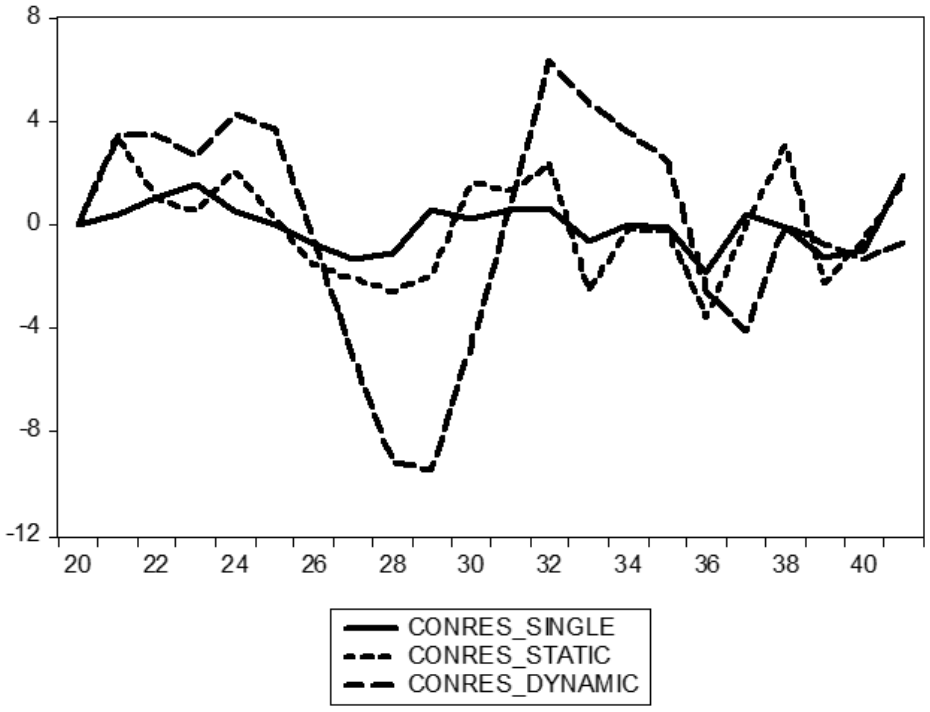

Figure 1: Consumption: single equation, static and dynamic system residuals

smallest since they show only the errors in forecasting consumption in isolation, assuming that all other model variables are forecast perfectly.

The static system solution residuals are larger because they also include the errors made in forecasting the other variables that affect consumption (in this model current and lagged corporate profits and current wages). However, because these are one-step ahead forecasts, errors do not cumulate dynamically and lagged profits are assumed to be their true values rather than determined by earlier forecasts. The dynamic system residuals are the largest since forecast errors in earlier periods (in this case for lagged corporate profits) will tend to cumulate over time. Note however, that these dynamic errors can sometimes cancel each other out as appears to happen at the end of the solution period.

(b) Figure 2 shows percentage changes from base for production from the government expenditure simulation. Production initially increases rel-

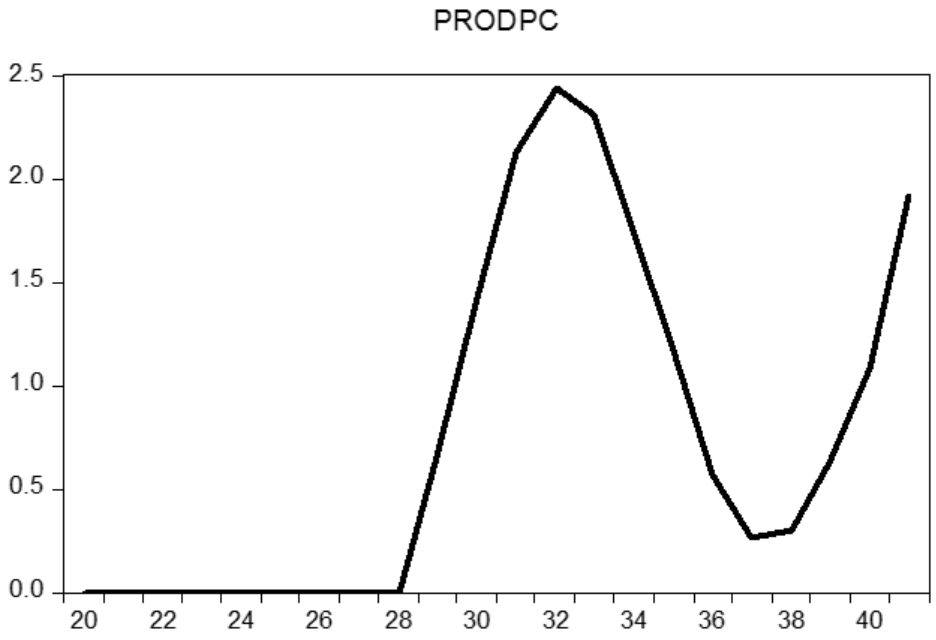

Figure 2: Government expenditure simulation: percent changes in production

ative to base by about 0.7% in 1929, rising to 2.4% in 1932 but then starts to fall back down to 0.27% in 1937 before rising again to 1.9% by 1941. This cyclical effect is due to model dynamics. The increase in govenment expenditure increases production but also wages which has an off-setting effect on profits. Investment responds negatively to cur-

rent profits but positively to lagged profits and it is this that generates the cyclical effect on production.

(c) Figure 3 graphs the path of control variable *gov_expenditure* that achieves the 5% growth target for production, compared with historical levels. For the first few years, the control path actually lies below the historical

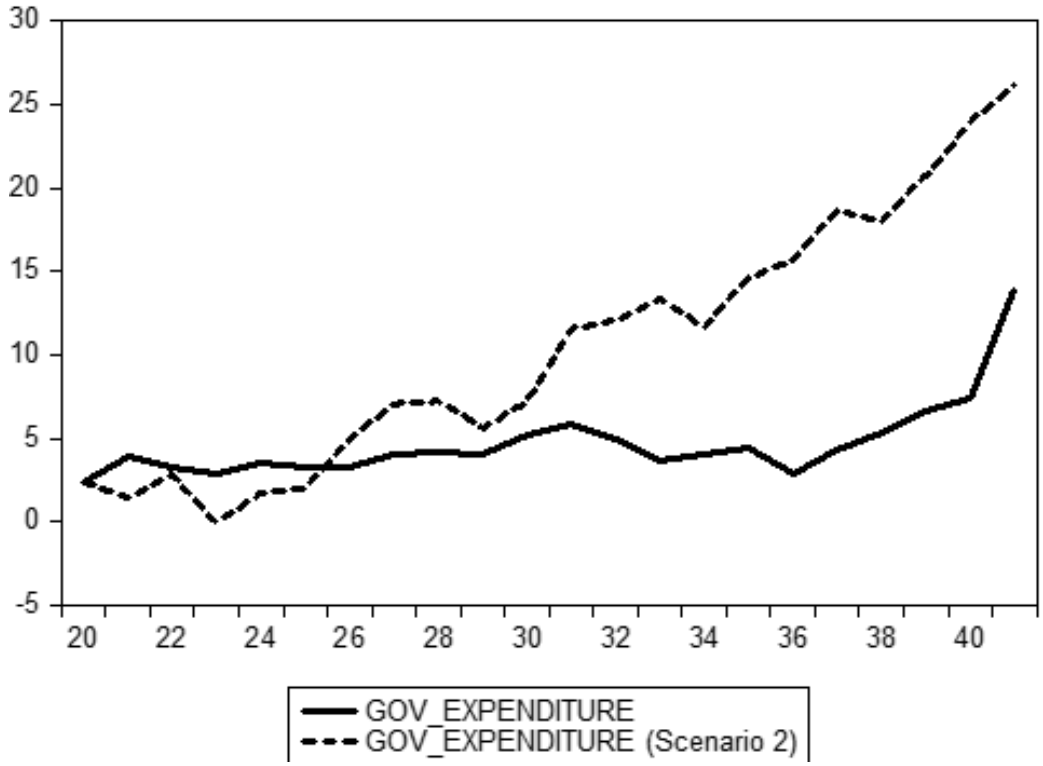

Figure 3: Path of *gov_expenditure* needed to achieve production growth target

time path. This is because in those years, production was growing historically faster than the 5% target rate. However, from 1926 onwards, the level of government expenditure needed to achieve the production growth target is above its historical level, rising to approximately twice historical levels by 1941.

(d) Figure 4 graphs the mean and upper and lower quantile bounds of the distribution of *production* from a stochastic simulation of Klein's model 1. Because this model is linear, the quantile bounds are symmetric around the simulation mean (which is itself identical with the deterministic model solution). However, if the model were non-linear, then the bounds would not necessarily be symmetric and the simulation mean

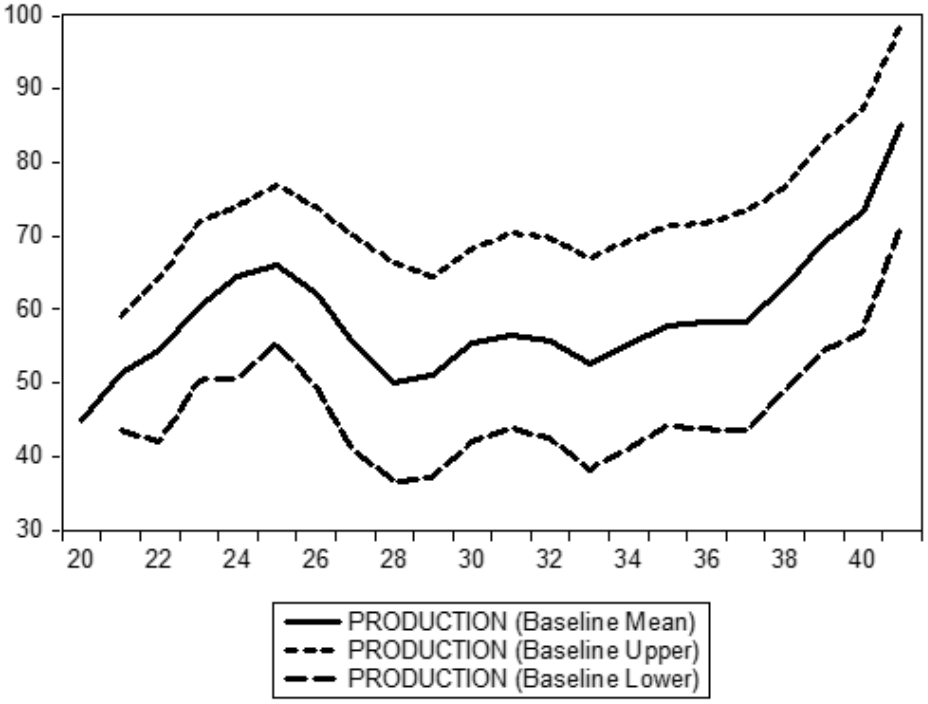

Figure 4: Production: stochastic simulation mean and upper and lower bands

might be different from a deterministic model solution since the latter would then *not* be an unbiased estimate of the forecast mean.