Economic Forecasting
Exercise Sheet 1: Solutions

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1. (a) Figure (1) shows the data for male and female participation rates in the USA from 1980 to 2000. Note that male participation has been generally

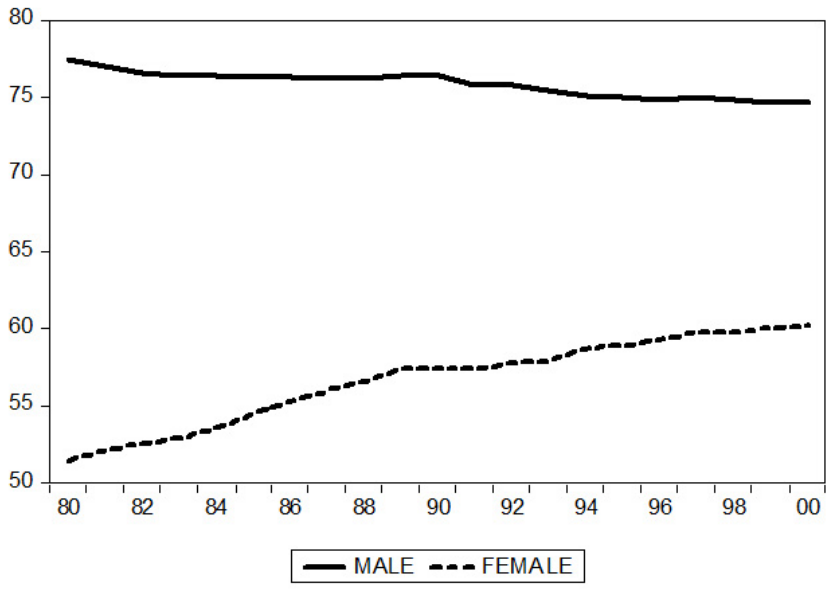

Figure 1: Male participations rates: 1980-2000

falling due to increased years in education and earlier retirement while female participation, while much lower, has been increasing as more women choose to go out to work.

(b) (i) Figures (2) and (3) show a constant level one-step ahead forecasts for male and female participation rates for 1990-2000 generated using the formulae:

```
MCLEV1 = MALE(-1)
FCLEV1 = FEMALE(-1)
```

Note that the forecast is simply the previous year's value so it consistently over-forecasts in periods when the actual is falling and under-forecasts in periods when the actual is rising.

(ii) Figures (4) and (5) show a constant change one-step ahead forecasts for male and female participation rates for 1990-2000 generated using the formulae:

```
MCCH1 = MALE(-1) * 2 - MALE(-2)
FCCH1 = FEMALE(-1) * 2 - FEMALE(-2)
```

Note that the forecast projects the previous year's change so it will forecast turning points with a lag of one period as is seen for male participation in 1997 and female participation in 1991 and 1993.

(iii) Figures (6) and (7) show a constant growth one-step ahead forecasts for male and female participation rates for 1990-2000 generated using the formulae:

```
MCGR1 = MALE(-1) * MALE(-1) / MALE(-2)
FCGR1 = FEMALE(-1) * FEMALE(-1) / FEMALE(-2)
```

The forecast projects the previous year's growth rate and so, like the constant change forecast, it will forecast turning points with a lag of one period. In fact, since the constant growth rate forecast is simply a constant change forecast in the logarithm of the variable, it will have the same pattern and exactly the same turning points as the constant change forecast as can be seen by comparing Figures (6) and (7) with Figures (4) and (5).

(c) It is not clear which of the three one-step ahead forecasts is the best. The constant levels forecasts more consistently over-forecast male participation (because it is consistently falling) and under-forecast female participation (because it is consistently rising). The constant change and constant growth forecasts are very similar and do not consistently over-forecast or under-forecast but they fail to capture turning points and appear less smooth than the original variables.

(d) Multi-step forecasts can be generated for male and female participation using the recursive formulae:

```
MCLEVH = MCLEVH(-1)
MCCHH = MCCHH(-1) * 2 - MCCHH(-2)
MCGRH = MCGRH(-1) * MCGRH(-1) / MCGRH(-2)
FCLEVH = FCLEVH(-1)
FCCHH =FCCHH (-1) * 2 - FCCHH(-2)
```

```
FCGRH =FCGRH(-1) * FCGRH(-1) / FCGRH(-2)
```

and are plotted together in Figures (8) and (9). It is immediately obvious that forecasting many steps ahead using any of these naïve forecasting rules leads to awful forecasts. The constant level simply projects the 1989 value forwards while the constant change or growth project the 1989 change or growth rate forwards. In each case the forecast errors tend to get larger as the forecast period is extended.

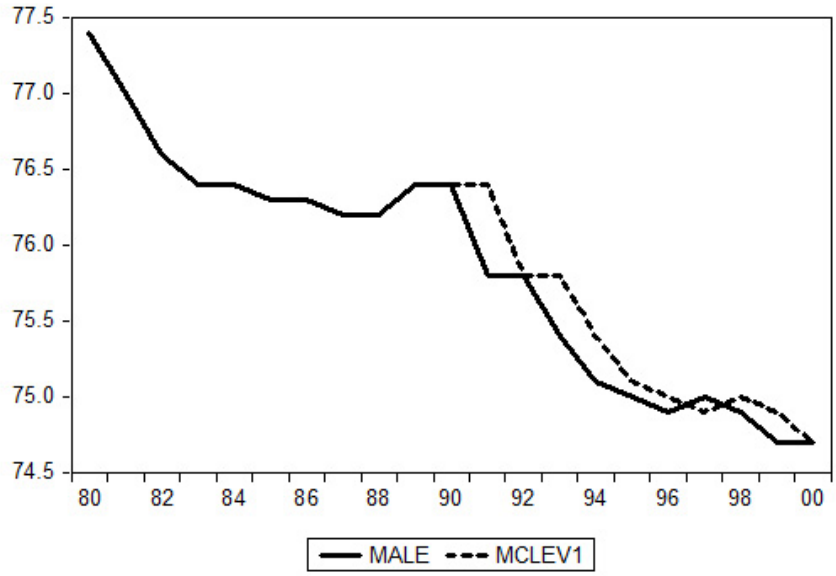

Figure 2: Male participation: constant level one-step forecasts: 1990-2000

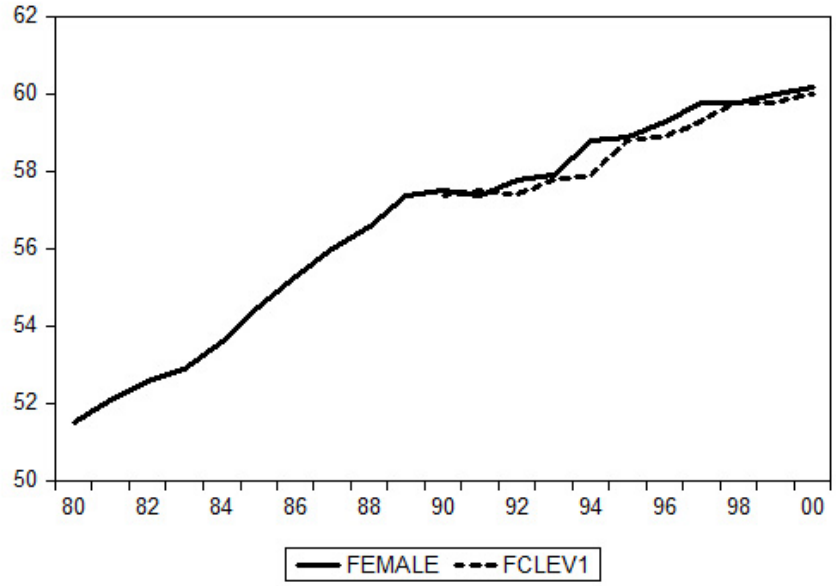

Figure 3: Female participation: constant level one-step forecasts: 1990-2000

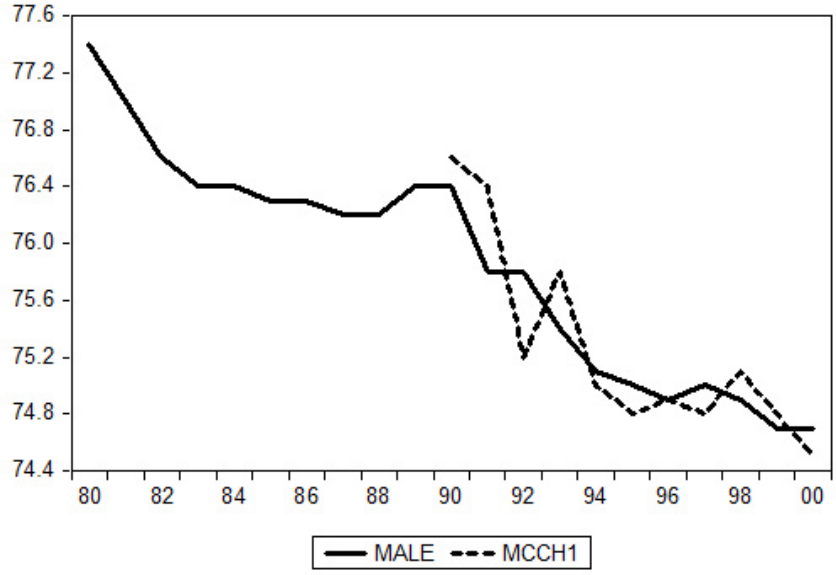

Figure 4: Male participation: constant change one-step forecasts: 1990-2000

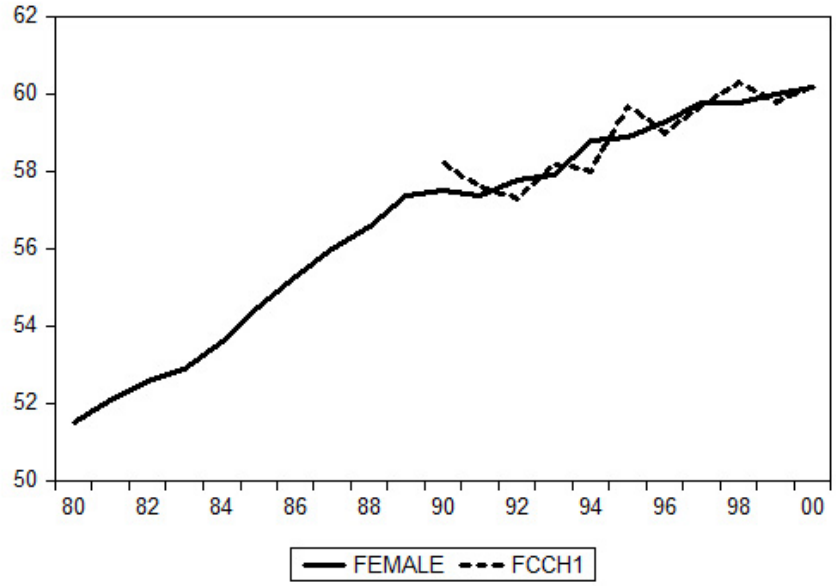

Figure 5: Female participation: constant change one-step forecasts: 1990-2000

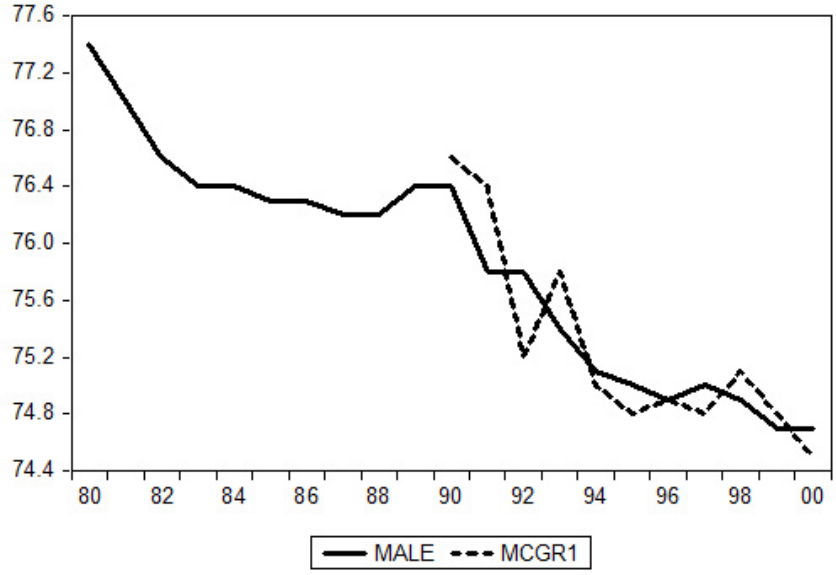

Figure 6: Male participation: constant growth one-step forecasts: 1990-2000

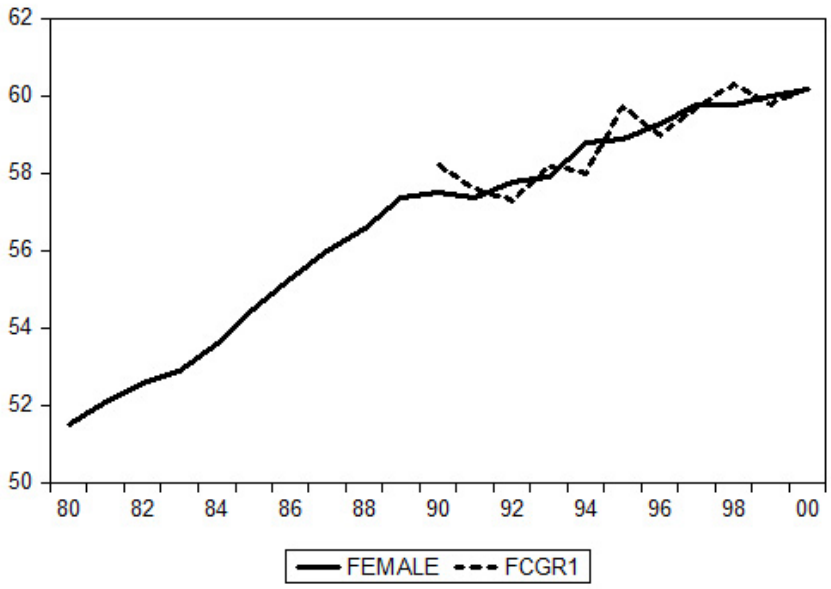

Figure 7: Female participation: constant growth one-step forecasts: 1990-2000

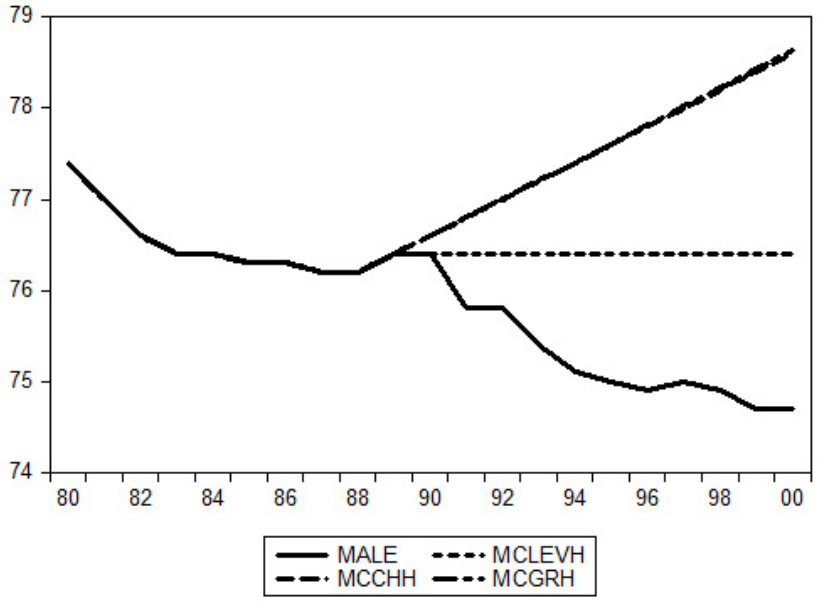

Figure 8: Male participation: multi-step forecasts: 1990-2000

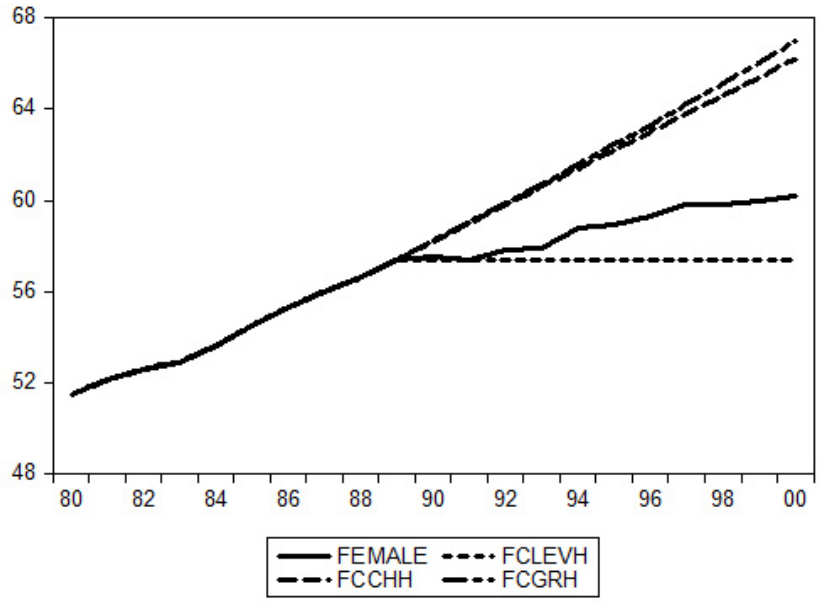

Figure 9: Female participation: multi-step forecasts: 1990-2000