

# ETF5200 Applied time series econometrics

## Project 2

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## Contents

|                                       |          |
|---------------------------------------|----------|
| <b>Part I</b>                         | <b>1</b> |
| Question 1 . . . . .                  | 1        |
| Question 2 . . . . .                  | 2        |
| <b>Part II</b>                        | <b>3</b> |
| The main ideas proposed . . . . .     | 3        |
| The main techniques used . . . . .    | 3        |
| The main data used . . . . .          | 3        |
| The main results obtained . . . . .   | 3        |
| The conclusion made . . . . .         | 3        |
| My own models and proposals . . . . . | 3        |

## Part I

Personal capita consumption and income data are more likely to be inter-dependent dynamically, therefore vector autoregressive model (VAR) will be used to study their behavior in this project. By looking at the data summary, we can see we have 251 observations, there are no missing values. The period of this data set is from the first quarter 1947 to the third quarter 2009.

## Question 1

We start with checking the time plots of these two series, which are shown in figure 1. We can see the increasing time trend clearly. So since we want to fit a VAR(2) model, the interested model form is as below:

$$Y_t = \Gamma \nu_t + A_1 Y_{t-1} + A_2 Y_{t-2} + \epsilon_t$$

where

$$Y_t = \begin{pmatrix} Consumption_t \\ Income_t \end{pmatrix} \quad \nu_t = \begin{pmatrix} 1 \\ time \end{pmatrix} \quad \epsilon_t = \begin{pmatrix} \epsilon_{1t} \\ \epsilon_{2t} \end{pmatrix}$$

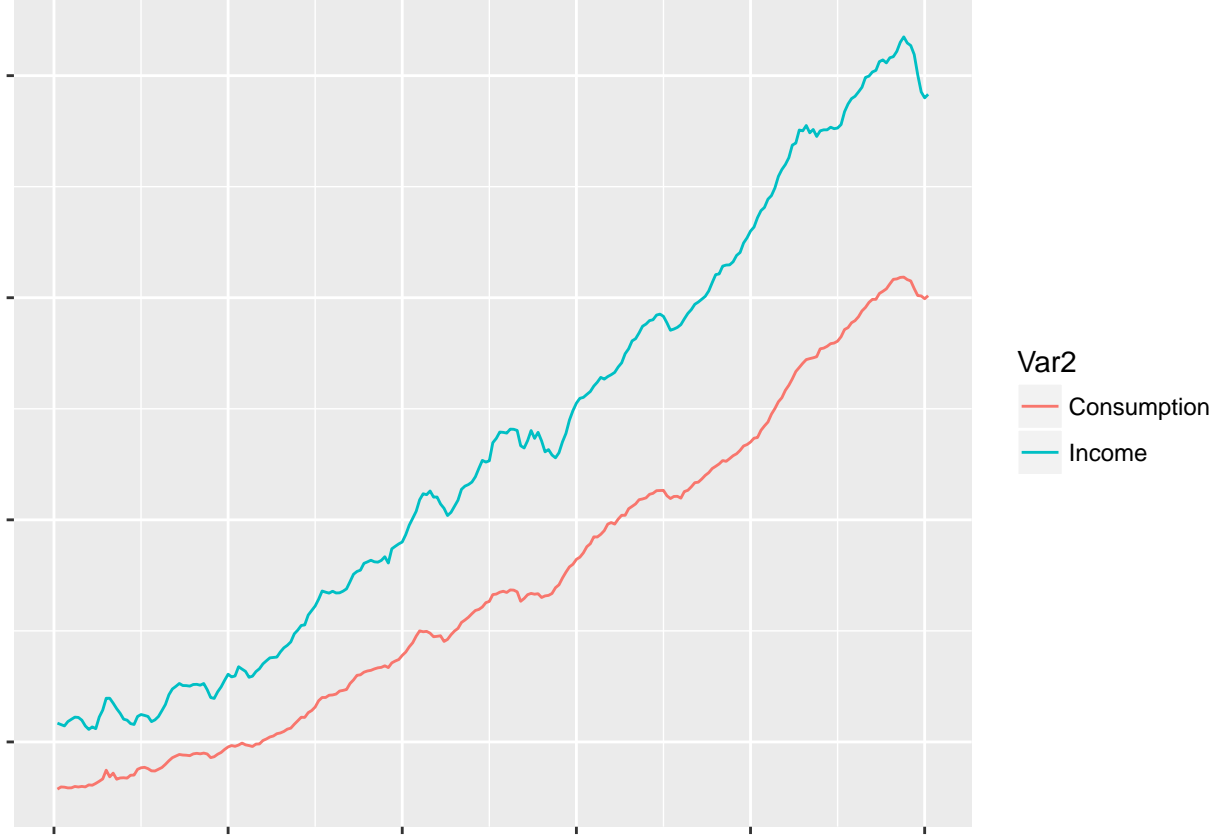


Figure 1: Time plots of personal capita consumption and income shows clear trend.

and  $\Gamma$ ,  $A_1$ ,  $A_2$  are coefficient matrices. First we want to estimate the intercept vector ( $\Gamma$ ) and the coefficient matrices ( $A_1$  and  $A_2$ ) for the VAR(2) model.

Table 1: Coefficient matrix A1

|             | Consumption lag 1 | Income lag 1 |
|-------------|-------------------|--------------|
| Consumption | 1.1360223         | 0.0933692    |
| Income      | 0.7996653         | 1.1131855    |

Table 2: Coefficient matrix A2

|             | Consumption lag 2 | Income lag 2 |
|-------------|-------------------|--------------|
| Consumption | -0.1383776        | -0.1020669   |
| Income      | -0.7390285        | -0.1850136   |

Table 3: Coefficient matrix Gamma

|             | Intercept   | Trend       |
|-------------|-------------|-------------|
| Consumption | 0.099878535 | 0.001649501 |
| Income      | 0.211463502 | 0.003618762 |

## Part II

### The main ideas proposed

In 1981, Granger first introduced the idea of co-integration in Granger (1981) without giving any estimation methods. He believed that “the practice of data-mine should be brought out into the open” and this co-integration idea was “potentially very important”. (Granger 1981) In 1983, Granger and Weiss did further study on this topic, some error-correction model forms and testing methods were discussed, but the numerical results in the three applications in that paper were all unsatisfactory. (Granger and Weiss 1983)

Therefore, in 1987, Engle and Granger wrote this paper to formally define the conception error-correcting models and co-integration. Properties and co-integration variables and their representations, estimating and testing methods were also established.

### The main techniques used

### The main data used

### The main results obtained

### The conclusion made

### My own models and proposals

Granger, Clive WJ. 1981. “Some Properties of Time Series Data and Their Use in Econometric Model Specification.” *Journal of Econometrics* 16 (1). North-Holland: 121–30.

Granger, Clive WJ, and Andrew A Weiss. 1983. “Time Series Analysis of Error-Correction Models.” In *Studies in Econometrics, Time Series, and Multivariate Statistics*, 255–78. Elsevier.