§ A STATIC MACROECONOMIC Model of a Closed economy.

A Simple Linear (Keynesian) Macroeconomic model of a closed economy is the following which includes (aggregate) consumption C, investment I, national income Y, Rate of interest R, and government expenditure G

$$C = \alpha_1 + \alpha_2 Y \quad , \quad \alpha_1, \alpha_2 \in \mathbb{R}$$

$$(*) \quad I = \beta_1 + \beta_2 Y + \beta_3 R, \quad \beta_1, \beta_2, \beta_3 \in \mathbb{R}$$

$$Y = C + I + G$$

(The constants $\alpha_1, \alpha_2; \beta_1, \beta_2, \beta_3$ have interpretations as e.g. $\alpha_2 = \frac{dC}{dY}$ = The Rate of change of consumption w.r.t. national income, called the marginal propensity to consume etc)

The Variables C, I & Y are the endogenous variables, whose values are determined By the system parameters or coefficients $\alpha_1, \alpha_2, \dots, \beta_3$ & the exogenous variables R & G.

Rewrite (*) as:

$$AX = b \quad \text{where}$$

$$A = \begin{pmatrix} 1 & 0 & -\alpha_2 \\ 0 & 1 & -\beta_2 \\ -1 & -1 & 1 \end{pmatrix} \begin{pmatrix} C \\ I \\ Y \end{pmatrix} = \begin{pmatrix} \alpha_1 \\ \beta_1 + \beta_3 R \\ G \end{pmatrix}$$

$$X = \begin{pmatrix} C \\ I \\ Y \end{pmatrix} \quad \& \quad b = \begin{pmatrix} \alpha_1 \\ \beta_1 + \beta_3 R \\ G \end{pmatrix}$$

§ An alternative way to describing and analyse an economy is By means of the Leontief static input-output model. This assumes that there are n-industries, each producing one particular commodity & that net outputs of these goods are required for use By consumers. We denote these final demands as $f_1, f_2, \dots, f_n$. However there are other demands for the goods Because to produce any given good, other goods are required. Let a_{ij} denote the number of units of good i required to produce one unit of good j, then the total amount of good i Required in production is:

$$a_{i1}x_1 + a_{i2}x_2 + \cdots + a_{in}x_n \; ; \quad i = 1, 2, \dots, n$$

where x_j are the total output units of good j.

We therefore have $f_i + a_{i1}x_1 + \cdots + a_{in}x_n = x_i$ for $i = 1, \dots, n$

OR in MatRix form: $$f + AX = X$$

$$\underset{n \times 1}{f = \begin{bmatrix} f_1 \\ \vdots \\ f_n \end{bmatrix}} \quad \underset{n \times n}{A = \begin{bmatrix} a_{ij} \end{bmatrix}} \quad \& \quad \underset{n \times 1}{X = \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix}}$$