where

FIOAC	=	fraction of industrial output allocated to consumption
TC	=	total consumption (dollars per year)
SO	=	service output (dollars per year)
AO	=	agricultural output (dollars per year)
IO	=	industrial output (dollars per year)

The data required for this calculation are provided for most of the countries listed in Figure 3-7. The mean value of FIOAC for those countries on which data are available is 0.43, with a very wide variance about this mean.

National differences in the fraction of industrial output allocated to consumption FIOAC are probably more directly explained by social and political differences and by the income distribution within each country than by the country's average GNP per capita. For Figure 3-19 we plotted GNP per capita versus FIOAC for 33 countries. There is no clear relationship between the two variables. Because the rate of industrial growth is strongly influenced by FIOAC, future extensions of the model should represent the sociopolitical determinants of consumption in more detail.

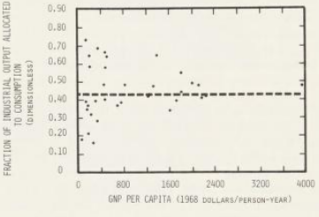

Figure 3-19 The fraction of industrial output allocated to consumption versus GNP per capita

The total consumed fraction of output was taken to include both private and government consumption expenditures. Thus the production of military hardware is defined in World3 as part of the industrial output that is consumed without feeding back to influence other model variables. Using data from the *World Bank Atlas* (IBRD 1970) and the United Nations (U.N. 1970), one can calculate the fraction of GNP devoted to defense expenditures. With very few exceptions they are less than 5 percent of the total GNP. Percentages for the United States, the Soviet Union, Japan, and West Germany are 10 percent, 8 percent, 1 percent, and 4 percent of GNP, respectively. Our treatment of military expenditures does not imply that they are unimportant in absolute terms. The approximately 250 billion dollars spent annually on military hardware and on maintaining armies would have an important influence

on the growth of population and capital if it were invested in the service or agriculture sectors of the global economy. However, since the causes and consequences of military expenditures are found primarily among the sociopolitical factors that are omitted from our model, we did not find it useful to distinguish military from other types of consumption.

In some of the equilibrium runs it was useful to define the consumption fraction as a variable FIOACV dependent upon the level of industrial output per capita and on some level of desired industrial output per capita IOPCD. The assumption implicit in the definition of FIOACV is that consumption will increase and thus investment will decrease once IOPC has reached the level desired by the global population. The nature of the assumed relationships is specified in a table FIOACVT, Figure 3-20.

```
FIOACV.K=TABHL(FIOACVT,IOPC.K/IOPCD,0,2,.2)                    59, A
FIOACVT=.3/.32/.34/.36/.38/.43/.73/.77/.81/.82/.83             59.1, T
IOPCD=400                                                      59.2, C
    FIOACV - FIOAC VARIABLE (DIMENSIONLESS)
    TABHL  - A FUNCTION WITH VALUES SPECIFIED BY A TABLE
    FIOACVT- FIOACV TABLE
    IOPC   - INDUSTRIAL OUTPUT PER CAPITA (DOLLARS/
             PERSON-YEAR)
    IOPCD  - INDUSTRIAL OUTPUT PER CAPITA DESIRED
             (DOLLARS/PERSON-YEAR)
```

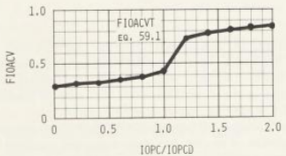

Figure 3-20 Fraction of industrial output allocated to consumption table

Indicated Service Output per Capita ISOPC In section 3.4 we described the general features of the process employed in World3 to allocate industrial output among the service, agriculture, and industrial sectors. The detailed DYNAMO flow diagram for the investment in services is shown in Figure 3-21.

The growth in the service sector results from an increased service capital investment rate SCIR, defined to be a function of industrial output IO and the fraction of industrial output allocated to services FIOAS. The latter is determined by the actual service output per capita SOPC and the indicated service output per capita ISOPC. The value of ISOPC at any level of industrialization depends on the relative values society places on saving, material goods, food, and services. Implicit in the