Gordon, Macro.., 2nd edition, chapter 3.

55 Figure 1-3 reveals that unemployment is closely reated to the gap between actual real GNP and natural real GNP

Actual real GNP is Q equals Y/P

Nominal GNP is Y equals PQ

Natural GNP is the rate of production at which inflation does not accelerate

Actual unemployment is % of labor force out of work

Natural unemployment is rate of unemployment that does not result in inflation.

14 Upper graph: historical variations of actual GNP now above and now below natural GNP

Lower graph: historical variations above or below the natural rate of employment where Q is below or above the natural rate of GNP.

55 Understanding the causes of movements in actual real GNP is the key to understanding movements in the unemployment rate.

Chapter 3: the elementary theory of how the actual real GNP is determined; helps explain modern recessions, the great depression of the 1930's, and operation of fiscal policy.

Assumptions:

Chapter 3 concentrates on the commodity market, leaves to chapter 4 the money market and so the interest rate

Chapters 3-5 assume a constant price level: so all changes in real income also are changes in money income. Only in chapter 6 are changing prices considered.

56 3-2 the division of disposable income between consumption and saving.

Disposable income, Q_D, is personal income minus taxes

Marginal propensity to consume: MPC is the fraction of each additional dollar of disposable income that is spent on consumption. In general, it is c; numerically, 0.75.

Autonomous consumption: the amount spent on consumption no matter what the total level of real income, Q. Taken as in general, a, and numerically as 100 billion dollars.

Hence the consumption function:
C equals a plus cQ; numerically, equals 100 plus 0.75Q.

Marginal propensity to save: inngeneral, s, numerically, o.25; note that c plus s equals 1, for spending and saving are the possible uses of disposable income.

Actual consumption is: 100 plus 75% of Q
Induced consumption is cQ, or just 75% of Q.

Actual saving is: sQ minus a, or 25% of Q minus 100.
Induced saving is: sQ

The inducement to spend more and to save more is the fact that the income, Q_D, is supposed to have increased.

Note that autonomous consumption added to induced concuemption is balanced by an equal amount subtracted from induced saving. Cf Figure3-2, p. 61.

Numerical examples to make these terms and relations clear-cut are provided in table 3-1, p.58

64 3-3: Actual U S consumption and saving behavior.

64 Why a determinate fraction of disposable income goes to consumption? Because households base their standard of living on what they consider their permanent or lifetime income. They do not adjust spending to every shift in income but steer a middle course, lower than the up's, and higher than the down's. They change their estimate of this lifetime income, when they get a x job promotion, or again when they meet exceptional adversity.

Assumption: initially the discussion will prescind from changes in investment, government spending, and tax rates. Hence,

Total expenditure on GNP inclues only investment and consumption

Total domestic investment includes business purchases of new structures and equipment, expenditures on apartments and houses by individuals and firms, and changes in business inventories.

In the post war period investment expenditures have been extremely variable. Between 1974 and 1975 investment dropped from $183.6 billion to $142.6 billion, a decline of 22%. Between 1929 and 1933 (the great depression) investment declined by over 80%.

I_p stands for planned investment expenditures, say, 200 billion

E_p stands for total planned expenditures

E_p equals C plus I_p equals a plus cQ plus I_p
equals 100 plus .75Q plus 200
equaLS 300 plus 0.75 Q

See graps 3.4 p. 67

66 Equilibrium is a situation in which there is no pressure for change.

When the economy is out of equilibrium production and income are out of line with expenditure, and firms will be forced to raise or lower production.

See figure 3-5, p. 69.

The black line, E equals Q, has the abscissa, Q, equal to the ordinate, E, at every point.

But E_p equals I_p + 0.75Q + a equals 200 + 1200 + 100

There occur unplanned inventories, I_u, of 100 billion, which satisfies equilibrium at J and E_p at H. It is necessary /line to cut production back to B, where planned expend is on equilibrium /

70 Besides the ex ante condition of macro equilibrium, E equals Q (the black line, p. 69),

there is also the ex post condition, E_p equals Q, planned expenditures equal actual income,

and this is equivalent to saying that there are no unplanned inventories, I_u.

Further, there are two graphs on page 69, one determining equilibrium by the intersection of the consumption function with the ex ante condition, the other using the saving function, namely,

autonomous planned spending, A_p, equals induced saving, sQ.

One starts from the ex post condition, Q equals E_p, and from both sides substracts induced consumption, cQ. Hence

$Q - cQ$ equals $E_p - cQ$

$(1 - c)Q$ equals $(A_p + cQ) - cQ$

sQ equals A_p, or numerically $0.25Q$ equals 300

In the lower graph, sQ, is the rising black line, and A_p is the level red line. They intersect at B where Q is 1200, but when Q is at 1600, they are separated by unplanned inventories, I_u, worth 100 billion.

3-5 The Multiplier Effect

72 Since sQ equals A_p

Q equals A_p/s equals 300/0.25 equals 1200 (3.12)

Now consider successive situations in which A_p has increased from 300 to 400, then

Take new situation $Q_1 = A_{p1}/s = 400/0.25 = 1600$

Subtract old situation $Q_0 = A_{p0}/s = 300/0.25 = 1200$

Difference is $\triangle Q = \triangle A_p/s = 100/0.25 = 400$

Let us name the reciprocal of s as the multiplier, viz. k, so $k = \triangle Q / \triangle A_p = 1/s = 1/0.25 = 4$

The old situation is diagrammed in 3-5, p. 69; the new and the old are combined in 3-6, p. 75

Note: The Greek capital letter, delta, $\triangle$, is used to denote marginal propensity to consume or to save, etc.

The definition of marginal is taken usually in terms of relatively small quantities: one dollar when is thinking of billions, eg, for every additional dollar of income, 0.75 is spent on consumption.

However, average propensity to consume is defined as the consumption function ($C = 100 + 0.75Q_D$) divided by Q_D, to wit, $C/Q_D = 100/Q_D + 0.75$. See page 60.

The average propensity to save is deduced from the average propensity to consume and the equation $c + s = 1$.

78 Government spending and taxation

Gov't spending on goods and services is simply a part of planned expenditure, E_p. Hence, modifying 3.6,

$$E_p = C + I_p + G \qquad 3.14$$

A positive level of tax revenues reduces disposable income below total actual income,

$$Q_D = Q - T \qquad 3.15$$

Inserting Q_D into the consumption function

$$C = a + cQ_D = a + c(Q - T) \qquad 3.16$$

Hence

$$E_p = a + cQ - cT + I_p + G \qquad 3.17$$

but

$$E_p - cQ = A_p$$

so subtracting cQ from both sides of 3.17 one obtains

$$A_p = a - c\bar{T} + I_p + G \qquad 3.18$$

Note: T stands for taxes; $\bar{T}$ stands for taxes apart from income taxes, which vary automatically as income changes, eg inflation. See appendix, page 89 ff.

Now our concern is with changes in planned expenditure and from 3.18 we note that four ways arise of changing A_p so we write

$$\triangle A_p = \triangle a - c\triangle\bar{T} + \triangle I_p + \triangle G \qquad 3.19$$

$$\triangle Q = \triangle A_p/s \qquad 3.13$$

But what holds for A_p also holds for its components; hence

$$\triangle Q = \triangle G/s \qquad 3.20$$

$$\triangle Q = -c \triangle \bar{T} /s \qquad 3.23$$

80 Assume that initially autonomous planned spending, A_p, is 300, so that the level of real income is 1200.

Now if natural GNP were 1200, this situation would be satisfactory. But if natural GNP happened to be 1600, and many were out of work, what can be done to remedy the situation?

Gov't spending 100 billion, to raise A_p to 400 and advance Q to 1600, since $A_p/s = Q$, and $400/0.25 = 1600$.

Since tax revenues are unchanged, there is a gov't / deficit of 100 billion: deficit = G - T = 100 - o.

But we have already seen (pp 38 & 46) that

$$S - I = G - T \qquad (2.12)$$

but what is true of the variables must hold for their changes:

$$\triangle S - \triangle I = \triangle G - \triangle T \qquad (3.21)$$

but neither investment nor taxes have changed;
the change in G was 100 billion
the change in S is $s\triangle Q = 0.25(400) = 100$.
There is no room for further investment, and so the 100 billion saved is available to purchase the bonds the gov't must sell when it runs a deficit.

3-7 Tax increases and the balanced-budget multiplier

The alternative way to cover the 100 billion deficit is by increasing taxes instead of gov't selling bonds.

See the lower frame of figure 3-6.

From 3.19

$$\triangle A_p = \triangle a - c\triangle T + \triangle I_p + \triangle G$$

But the change in A_p results solely from the change in T; so

$$\triangle A_p = -c\triangle T = -0.75(100) = -75 \qquad (3.19)$$

Hence, autonomous planned spending drops from 400 to 325; as exhibited in new red line in 3-6.

The change in Q is calculated from the multiplier

$$\triangle Q = \triangle A_p/s = -c\triangle \bar{T}/s \qquad (3.22)$$

and the multiplier is obtained by dividing through by the element that has been changed. Hence

$$\triangle Q/\triangle \bar{T} = \triangle A_p/\ s\triangle \bar{T} = -c\triangle \bar{T}/s\triangle \bar{T} = -c/s = -3.0 \qquad (3.23)$$

<u>The balanced budget multiplier</u>:

$$\triangle Q\ /\ \triangle G + \triangle Q\ /\ s\triangle \bar{T} = 1/s - c/s = (1 - c)/s \qquad (3.24)$$

However, since income taxes vary with Q and are say, $\bar{t}Q$, the balanced multiplier ceases to be unity, as explained in appendix to chapter 3.

<u>The Great Depression</u> Figure 3-9 page 86.

<u>Change in the Multiplier due to income tax</u>

Page 90, equations (3) to (6)

91, equation (7)

<u>92</u> <u>Exports</u>, if X, add X to the four components of A_p. The money is earned by producers of exports but paid from abroad.

<u>Imports</u>, if hQ, a fraction of real income, comes out of money earned at home and spent abroad. It has the same effect as the income tax. Hence,

$$Q = \frac{A_p}{\text{marginal leakage rate}} = \frac{a - c\bar{T} + I_p + G + X}{s(1 - \bar{t}) + \bar{t} + h} \qquad (10)$$