5.2 Short-Term (Keynesian) Equilibrium

We have short-term equilibrium when planned saving net of depreciation expenditure ($S$) equals planned net investment ($I$) plus planned wasteful investment ($W$). (All of these variables are defined in nominal terms.) That is, we have short-term equilibrium when

$$S = I + W$$  \hspace{1cm} (1)

$I$ represents private and state investment that eventually increases labor productivity. $W$ represents expenditure of saving that does not have the eventual effect of increasing productivity.\(^1\) It is that part of the government deficit that finances wasteful expenditure (for example, military expenditure with very limited spin-offs) plus the private financing of wasteful expenditure (such as speculation and advertising). For our purposes, we can treat foreign investment as wasteful since it does not increase domestic productivity. For simplicity, we will assume that all investment is private, domestic, and not wasteful. Thus, (1) becomes

$$S = I$$  \hspace{1cm} (1')

where both $S$ and $I$ are net of depreciation and are private. Equation (1') assumes that net exports = 0 and that the government deficit = 0. Inventories, output, and capacity utilization adjust to make (1') true in short-term equilibrium. Divide (1') by the nominal stock of capital ($K$) so that we can restate (1') for use in a growth model:

$$\frac{S}{K} = \frac{I}{K} \quad \text{or} \quad G_s = G_I$$  \hspace{1cm} (2)

where $G_s = S/K$ is the rate of growth warranted by saving and $G_I = I/K$ is the rate of growth warranted by investment. Both of these variables are
"real." That is, with fixed prices they correspond to the rate of accumulation of means of production.

The right-hand side of (2), the investment-warranted growth rate, was derived in chapter 4:

\[ \frac{I}{K} = G_I(z, m, P, h, \ldots) = G_I(z, a, \ldots) \tag{4.9} \]

where the partial of \( G_I \) with respect to each of the listed variables is positive. (\( a \) is the vector \((m, P, h)\); \( a_1 = m \), etc.)

Now consider the saving-warranted growth rate. Assume that saving is a positive function of surplus \((R)\) and, to a lesser extent, of wage income. (Note that \( Y - R = wN_p + wN_o \) by equation (3.4).)

\[ S = s_r R + s_w (Y - R) \quad (1 \geq s_r > s_w \geq 0) \]

\[ = (s_r - s_w) R + s_w Y \tag{3} \]

Capitalist saving is for investment—to make future profits—and is necessary for survival in the competitive battle among capitalists. On the other hand, workers' saving is "life cycle" saving for future consumption: its purpose is to cover the future costs of illness, unemployment, and retirement, plus future expenditure on children and consumer durables (houses, autos and so forth). Workers' lack of significant income-earning property (capital) forces them to save in this way (though their incomes may be too low at times to do so). Similarly, their circumstances as workers prevent significant wealth from being passed on to children. Because of this, the dissaving of retired, young, and unemployed workers cancels out most of the saving of the middle-aged and employed when the saving of the working class is aggregated.² (An exception is when the age structure is distorted by accelerating
population growth.) Thus, it will turn out that \( s_r > s_w \) in general (and 
\( s_w = 0 \)). Wealth and debt effects are represented by changes in these 
parameters.

Dividing (3) by \( K \), we can derive the saving-warranted growth rate

\[ G_s = (s_r - s_w) r + s_w \frac{Y}{K} \quad \text{(since } r = R/K) \quad (4) \]

By (3.4) and since \( Q = z Q^P \), \( Q_m = g_2 \), \( P = P/p_m \), and \( h = p Q^P/K \):

\[ \frac{Y}{K} = z (1 - g_2/P) h \quad (5) \]

So

\[ G_s = (s_r - s_w) r + s_w z (1 - g_2/P) h \quad (6) \]

More generally, with constant \( s_r \) and \( s_w \):

\[ G_s = G_s(z, a) \quad (7) \]

For \( G_s \) as stated in equation (6), \( G_s \) is a positive function of each of 
the elements of \( a \). However, \( G_{sz} \) is ambiguous. Because

\[ G_{sz} = [(s_r - s_w) f_z + s_w (1 - g_2/P)] h \quad (8) \]

\( G_{sz} > 0 \) for \( z < 1 \) but it is not true that \( G_{sz} < 0 \) for \( z > 1 \) unless the 
quantity in brackets is negative. Workers' saving will increase beyond 
\( z = 1 \) so that the fall in capitalist saving may be swamped. Two special 
cases of (6) are relevant. First, there is the classical case, where 
workers don't save:

\[ G_s = s_r r \quad (6c) \]

For this case, \( G_{sz} < 0 \) for \( z > 1 \). The second case is the neoclassical
case where there is no differential between workers' and capitalists' saving ratios \( s_r = s_w \).

\[
G_S = s_w z \left( 1 - \frac{g_2}{P} \right) h
\]  

(6n)

Here \( G_S \) is positive for the entire range.

Given equations (4.9), (7), and (2), we can define the short-term equilibrium rate of growth as

\[
G_e = G_S(z, a) = G_I(z, a, \ldots)
\]  

(9)

It is relative adjustment speeds that differentiate short-term equilibrium from medium-term equilibrium. In the short term, \( a \) are assumed constant. (At the same time, the only determinants of \( z \) that will be acknowledged are saving and investment.) The rate of capacity utilization adjusts to make (9) true. One example of such an equilibrium is shown in diagram 5.4 (which assumes classical saving). The intersection of the \( G_S \) and \( G_I \) schedules determines the short-term equilibrium rate of capacity utilization \( z_e \) and the short-term equilibrium growth rate. We can also solve for the equilibrium rate of profit from (2.14') to get

\[
r_e = f(z_e, m, P) h
\]  

(10)

which is shown in the lower quadrant of diagram 5.4. The case shown there is less than the potential rate of profit \( r^P \).

In short-term equilibrium, \( K \) is growing at rate \( G_e \). If the index number of means of production prices \( (p_{1p}) \) is constant, then the index number of the stock of means of production \( (MP) \) is growing at this same rate. Since \( h \) and \( z \) are constant, \( p Q^P \) and \( p Q \) are growing at rate \( G_e \). Since \( P \) and \( g_2 \) are constant, \( Y \) is growing at this rate. With \( p \) constant, real net national product is also growing at this rate.
Diagram 5.4: Short-Term Equilibrium.
Assume that there is a unique equilibrium for $1 \geq z > 0$. That is, assume that $G_z$ and $G_I$ intersect but once. A necessary condition for this uniqueness is that both $G_I$ and $G_z$ are monotonically increasing with $z$ and have different slopes (for the range under consideration). For this equilibrium to be stable, $G_I$ must have a lower slope with respect to $z$ than does $G_z$. ($G_{zz} < G_{zz}$) If, on the other hand, $G_{zz} > G_{zz}$, the economy will implode or explode: a small deviation of $z$ above $z_e$ will imply that $G_I(z) > G_z(z)$ and expansion of the economy since inventories will run down. $z$ will increase and the small deviation will be amplified. This will increase the deviation between $G_I$ and $G_z$ and again $z$ will increase... The economy will implode if $z < z_e$.

Diagram 5.4 shows a stable equilibrium. Given the argument of the last chapter, we might expect a strong relationship between $G_I$ and $z$ so that $G_{zz} > G_{zz}$, and the short-term equilibrium is unstable. However, it seems likely that the short-term effects of $z$ on $G_I$ are smaller than the medium-term effects so that the short-term equilibrium is stable. Investment is made in terms of a long planning horizon even when it is driven by the incessant competition of capitalists. We'd expect that the longer the economy stays at high levels of capacity utilization, however, the greater the effects of $z$ on investment would be. Thus, we will assume that the economy is stable in the short term while it is less so in the medium term. This medium-term instability will be considered in section 5.3.2.

Other types of short-term equilibria are possible. For $z > 1$, consider two basic cases: (a) $G_{zz}^*$, $G_{zz}^*$ both negative, and (b) $G_{zz}$ positive and $G_{zz}$ negative. The latter does not happen with the classical saving assumption. For case (a), we have an unstable case if $G_I$ is less
responsive to $z$ than is $G_x$. Thus, if our argument about the relative adjustment speeds is correct, equilibria above $z = 1$ will be unstable. But as shown in diagram 5.5a, if an equilibrium exists above $z > 1$, it is likely that a stable equilibrium exists for $z < 1$. If $G_x$ is more responsive to $z$ than $G_y$, then this equilibrium above $z = 1$ will be stable; here there is no stable equilibrium below $z = 1$.

For case (b), see diagram 5.5b. Here $G_{xx} < G_{yx}$ because $G_{xx}$ is negative and $G_{yx}$ is positive. This is a stable equilibrium, similar to the second case of case (a).

We will consider only the stable short-term case, though it is quite possible to extend the analysis to include the unstable case. For the classical saving function this implies, as noted above, that there are no relevant equilibria for $z > 1$. However, there may be stable equilibria for $z > 1$ with the more general saving function, as shown in diagram 5.5b.

Given a stable model, we can do comparative dynamics. See diagram 5.6. Given the $G_y$ and $r$ curves, a downward shift in the $G_x$ curve (say, due to an exogenous fall in $y^0$) implies a fall in both $r_e$ and $z_e$.

$(G_x$ shifts down at each level of $z$.) This is a realization crisis and captures the Keynesian multiplier logic. (For the unstable case, on the other hand, $z_e$ and $r_e$ will increase. However, it is unlikely that $z = z_e$ and $r = r_e$ in this case.)

This analysis suggests a comparison with the Cambridge growth model where saving propensities and investment determine the rate of profit. But here the rate of profit is determined by investment, $s_i$, and $s_r$ only when we're given the parameters $a$. Also, investment itself is endogenously determined, unlike in the steady-state Cambridge model.
Diagram 5.6: Comparative Dynamics (Stable Case).

1. For a fall in expectations, $G_S$ shifts to $G'_S$ and equilibrium falls from $z_e$ to $z'_e$.

2. For a rise in $m$ (or $e_F$), $G_S$ shifts to $G''_S$ and $G_I$ is assumed to remain unchanged. In this case, equilibrium falls from $z_e$ to $z''_e$.

Note: It is not necessarily true that $z'_e > z''_e$. 
growth model. It is affected by the same variable \( z \) that determine
the rate of profit in the short term. Finally, the economy is not in
medium-term equilibrium as in the N. Kaldor (1955-6) or Passinetti
(1974, ch. 5,6) models. The Kaldor-Passinetti story is no longer very
relevant because medium-term equilibrium is unstable.  

Another example of comparative dynamics is that of underconsumption-
ism. Suppose that \( P \) and \( h \) are constant. Assume that Baran and Sweezy
are right and that \( m \) tends to rise over time. This shifts the \( G_e \) curve
upward. If the \( G_e \) curve does not shift in response to the rise in \( m \)
(because \( G_{Im} = 0 \)), \( G_{Im} \) and \( G_e \) will fall if the economy is stable. The
results are more ambiguous for the rate of profit. Though \( z \) falls, the
rise in \( m \) will shift the \( r \) curve so that the net effect may be a rise in
\( r_e \). The short-term equilibrium rate of profit will fall for the basic
equation for the saving-warranted rate of growth (equation 6) if
\[
G_e h (1 - G_{2r}/P) < G_{2r}^e. \]
Thus, the greater the responsiveness of invest-
ment to \( z \) and the smaller the workers' propensity to save, the more
likely it is that the rate of profit will fall as \( m \) rises. The rate of
profit will definitely fall in the classical case where \( G_{Im} = 0 \) if
\( G_{Im} > 0 \).

Underconsumptionist conclusions about changes in \( G_e \) also apply if
investment is less responsive to changes of \( m \) than is saving (that is,
if \( G_{Im} < G_{Sm} \)). Similar conclusions follow for the short-term equilibrium
rate of growth: if the economy is stable and \( G_{Im} < G_{Sm} \), \( G_e \) will fall as
\( m \) rises. However, for high rates of capacity utilization (\( z > z_p \)), we
will assume that investment is more responsive to \( m \) so that underconsump-
tionist conclusions do not follow: as \( m \) rises, so do \( G_e \) and \( z_e \). This
assumption fits the dynamic nature of a capitalist economy not stuck in
a deep depression. At the same time, we will assume that investment is
more responsive than is saving to changes of \( P \) and \( h \) (\( G_{Th} > G_{Sh} \);
\( G_{Th} > G_{Sh} \)). In sum, we assume that for \( z > z_e \), \( G_{Th} > G_{Sh} \).

For low levels of capacity utilization (for \( z < z_e \)), we will make
the opposite assumption, i.e., that \( G_{Th} < G_{Sh} \). This is to represent
the underconsumption trap. As discussed in section 4.4.2, at low rates
of utilization, each capitalist perceives that any investment will
simply lower the rate of capacity utilization. He does not see the
multiplier effect that would allow a greater profit rate to be realized.
Thus, the capitalist might see the profit rate as irrelevant so that the
rate of capacity utilization dominates: \( G_{Th} = 0 \). We have made the more
general assumption that investment is less responsive to changes of \( a \)
than is saving. Thus, in the underconsumption trap, if \( a \) rises (i.e.,
if one or more of the elements of \( a \) rise and none fall), both \( G_e \) and \( z_e \)
will fall.

For the borderline case, where \( z = z_e \), \( G_{Th} = G_{Sh} \), and \( z_e \) will be
constant while \( G_e \) will rise (fall) as \( a \) rises (falls). (See note 6.)

These cases will be considered in further depth in section 5.3.6
after the processes that determine \( a \) are discussed. Let us turn to this
medium-term analysis. We will assume that the short-term problem is
solved, so that the economy moves from short-term equilibrium to short-
term equilibrium where \( z = z_e \) and the rate of growth equals \( G_e \).
5.3 The Medium Term

In the short term analysis, we assumed that $a$ was constant and that $x$ was determined in equilibrium. When medium-term supply-side considerations are introduced into the analysis, it turns out that each of these variables (including $z$) is changing, unless the medium-term equilibrium conditions are met. The tasks at hand are (1) the definition of medium-term equilibrium and (2) the description of movements toward and out of this equilibrium. Since this is a rather complicated problem, a simplified model will be described initially. The variables $h$ and $p$ will be assumed constant, so that labor-power markets (and changes in $m$) bear the burden of adjustment.

Throughout most of this chapter, we will assume that there is neither inflation nor deflation:

$$p = \text{constant}, \quad \tilde{p} = \ddot{p} = 0$$  \hspace{1cm} (11)

An alternative assumption that produces much the same results is that $\tilde{p} = \ddot{p}$ which equals the trend rate of growth of money wages ($\dot{w}$) minus the trend rate of growth of productivity ($\ddot{q}$). For simplicity, however, assumption (11) will be used.

Define $G$ as the medium-term equilibrium growth rate, where

$$G = \ddot{N} + \ddot{q}$$  \hspace{1cm} (12)

$\ddot{N}$ is the trend rate of growth of the labor force. $G$ is often called Harrod's "natural" rate of growth but is hardly natural. $\ddot{N}$ is not natural, since it depends on the state's immigration policies, military commitments, encouragement of education or birth control, and so forth. Similarly, $\ddot{q}$ is a social rather than a natural variable, since it depends
on state policies: for example, heavy investment in wasteful projects will depress $\bar{q}$ in the future. Even without state "interference," these variables (like state policies) depend on the logic of capitalism and not simply on Nature. However, these variables will be assumed constant in the medium term. In fact, their constancy helps define the medium term.

Medium-term equilibrium requires that

$$G_e = G$$

(13)

In diagram 5.4, a line was drawn (labelled G) representing the medium-term equilibrium growth rate. As drawn, $G_e$ exceeds G. The economy, though it is in short-term equilibrium, is not in medium-term equilibrium because the trend demand for labor-power is growing faster than supply. (Output growth ($G_e$) minus productivity growth ($\bar{q}$) is greater than labor-force growth ($\bar{n}$).) The unemployment rate is falling. This sets the stage for a full employment profit squeeze. As drawn, the rate of capacity utilization is rising. At the same time, the unemployment rate may be so high that there is no wage squeeze on profits. However, as we shall see in detail later, this situation means that the economy will move to a high employment situation. Thus, wages will eventually rise to squeeze profits (given the no-inflation assumption) so that $m$ falls, and with all else equal, $r_e$ falls. So $G_e$ and $G_o$ fall. Thus, the economy will move toward medium-term equilibrium as defined above.

We can define medium-term equilibrium further. From (13) and the definition of short-term equilibrium (equation 2), we have medium-term equilibrium when
\[ G_e = G_S(z_e, m_e, \ldots) = G_L(z_e, m_e, \ldots) = G \] (14)

where \( z_e \) and \( m_e \) are the medium-term equilibrium values of \( z \) and \( m \).

The medium-term equilibrium rate of profit is

\[ r_e = f(z_e, m_e, P) h \] (15)

Diagram 5.7 shown medium-term equilibrium as defined so far. In the upper quadrant, we see the conditions for equation (14) while in the lower quadrant, equation (15) is shown.

In this equilibrium, the labor force is growing as fast as the demand for its use. This is a usual equilibrium condition for a growth model, but as is seldom noted, is not sufficient for the maintenance of full employment or any other given rate of unemployment. It is not sufficient for medium-term equilibrium in the present model. This has already been hinted at above. Even though the unemployment rate is constant, \( G_e \) can change: with a high rate of unemployment (\( U \)), for example, money wages will fall relative to productivity and, with constant prices, \( m \) will rise. Thus, we should define medium-term equilibrium further by requiring that \( m \) has no tendency to change. Assume that this occurs at a given unemployment rate \( U = U^* \). Also assume that this corresponds to a rate of capacity utilization \( z^* \). Finally, assume that \( z^* > z_e \).

Thus, medium-term equilibrium is defined as when

\[ G_e = G_S(z^*, m^*, \ldots) = G_L(z^*, m^*, \ldots) = G \] (16)

Note that \( z^* \) is given while \( m^* \) is determined by this equation. The medium-term equilibrium profit rate is now

\[ r = r^* = f(z^*, m^*, \ldots) h \] (17)
Diagram 5.7: Medium-term Equilibrium.

If $G_S = G_I = G$, the unemployment rate is constant.

If $z$ also equals $z^*$, then $U = U^*$ and $m$ is constant.
In summary, we have to problems to consider when analyzing the medium term. First, will the short-term equilibrium growth rate move to equal \( g \)? Second, will the short-term equilibrium rate of capacity utilization move to equal \( z^* \)? Also, we must consider the (in)stability of medium-term equilibrium if it is reached. And this simple story must be extended to incorporate changes in \( P, z, \) and \( h \). The determination of these variables and \( u \) must also be analyzed.

In section 5.3.1, we will redefine medium-term equilibrium. In section 5.3.2, we will examine its instability. In sections 5.3.3–5 we will examine the dynamics of the labor-power market, the raw materials market, and the capacity-capital ratio. In section 5.6, we will summarize the analyses of the previous sections and consider medium-term disequilibrium dynamics.
5.3.1 Medium-Term Equilibrium

Medium-term equilibrium requires that the demands for labor-power and raw materials are growing with supply in the trend:

\[ G_e = G = \bar{N} + q \]  \hspace{1cm} (12,13)

\[ \bar{Q}_m^d = \bar{Q}_m^s \]  \hspace{1cm} (18)

where \[ \bar{Q}_m^d = G_e + \bar{z}_2 \]  \hspace{1cm} (19)

and \( \bar{Q}_m^d \) and \( \bar{Q}_m^s \) are the trend rates of growth of the demand for and supply of raw materials. \( \bar{z}_2 \) is the trend rate of growth of the usage of raw materials per unit output.

Also required are the conditions that

\[ z \text{ and } a \text{ are constant} \]  \hspace{1cm} (20)

An alternative assumption is that these variables fluctuate in such a way that the net effects of the rate of profit are zero. Holding \( h \) and \( z \) constant, it is possible (for example) that the effects of relatively full employment on \( m \) will cancel out the effect of excess supply of raw materials on \( P \) so that \( r \) is constant. However, this (and other cases) will be ruled out. It seems reasonable to assume that excess demand for raw materials (if it exists) will coexist with relatively full employment.

To simplify further, it will be assumed that the raw materials market will in general move with the labor-power market. Assume that \( g_2 \) is constant and that the supply of raw materials grows with \( G \) (so that \( G = \bar{Q}_m^s \)). This latter assumption is plausible if, on the trend, raw-material sector employment and productivity are growing at the same rate.
as in the domestic economy. Thus, the first equilibrium condition for raw materials becomes

\[ G_e = G \]  

(18')

which is the same as for the labor-power market. This condition only says that demand is growing at the same rate as supply. Assume also that there is no excess demand (or supply) for raw materials when \( z = z^* \) so that \( p \) is constant when \( z = z^* \) (just as is \( m \)).

As noted before medium-term equilibrium requires that \( h \) is constant. It will be shown in section 5.3.5 that \( h = G_e \). If this is so, \( z \) will be constant also.

Except when exogenous influences (such as represented by the variable \( u \) in equation 4.7) shock expectations, the expected rate of profit will change only if \( r \neq r^e \). One aspect of medium-term equilibrium is that \( r^e \) is constant. Thus, medium-term equilibrium requires that

\[ r^* = r_e = r^e \]  

(21)

and \( r^* \) is seen as permanent rather than transitory.

In conclusion, we have medium-term equilibrium when

\[ G_e = G_S(z^*, \ a) = G_I(z^*, \ a, \ ...) = G \]  

(16')

and

\[ r = r^e = r^* = f(z^*, \ m^*, \ p^*) \ h^* \]  

(17')

where the medium-term equilibrium rate of capacity utilization \( (z^*) \) is given. The variables \( a \) and \( r^e \) must adjust to make these conditions true. This gives us a set of different values of \( a^* \). Because of the possibility
that fluctuations of the different variables in \( a \) cancel out, we cannot claim that there exists a unique \( a^* \). However, there may be only one value of \( r^* \) such that (17') is true. This is true if we assume the classical saving function (equation 7c) so that

\[
G_e = s_r r^* = G_I(z^*, a^*, ...) = G
\]  

(16'c)

This implies that \( r^* = G/s_r \) (a condition familiar to the neo-Ricardian school) when the economy is in medium-term equilibrium. If we don't make the classical saving assumption, changes in \( Y/K \) (i.e., changes in \( g_z, P \) and \( h \)) affect \( r^* \).

In chapter 4, we defined an optimal quantity of investment, \( I^* \). Now we can define it further in terms of medium-term equilibrium: \( I^* = G \cdot K \).

However, note that this is optimal only under specific conditions—only when the saving schedule is such that \( G_s(z^*, a) = G \). Similarly, we can define an optimal investment schedule (as opposed to an optimal investment level). This is such that \( G_I(z^*, a) = G \), for given \( a \).
5.3.2 The Instability of Medium-Term Equilibrium

Now examine the stability conditions for medium-term equilibrium. Assume that we have medium-term equilibrium (where $a$ is constant and equal to $a^*$, $G_e = G$, $z = z^*$, and $r = r^*$) and that there is a small change in $a$. This is an exogenous or random change since in medium-term equilibrium there is no endogenous tendency for $z$ or $a$ to change. We can take total derivatives of the basic equations of the model to produce the following system of simultaneous equations:

\[ dG_I = G_{IZ} \, dz + G_{IA} \, da \]  \hspace{1cm} \text{(from 4.9)} \tag{22}

\[ dG_S = G_{SZ} \, dz + G_{SA} \, da \]  \hspace{1cm} \text{(from 7)} \tag{23}

\[ dG_S = dG_I = dG_e \]  \hspace{1cm} \text{(from 2)} \tag{24}

Now solve for $dz$ and $dG_e$:

\[ dz = \left[ \frac{(G_{IA} - G_{SA})}{(G_{SZ} - G_{IZ})} \right] \, da \] \hspace{1cm} \text{(25)}

\[ dG_e = \left[ \frac{(G_{IA} \, G_{SZ} - G_{IZ} \, G_{SA})}{(G_{SZ} - G_{IZ})} \right] \, da \] \hspace{1cm} \text{(26)}

Consider the case where one element of $a$ increases while the other two stay constant or increase. In this case, $dz$ is positive if

\[ G_{IA_i} > G_{SA_i} \quad \text{for all } i \] \hspace{1cm} \text{(27)}

and

\[ G_{SZ} > G_{IZ} \] \hspace{1cm} \text{(28)}

If both of these conditions are true, then $G_{IA_i} / G_{IZ} > G_{SA_i} / G_{SZ}$ for all $i$ and $dG_e$ is positive.

This is just as with the stable case discussed at the end of section 5.2. If movement out of equilibrium ($G_e > G$, $z > z^*$) leads to
a depression of the elements of \( a \), then \( z \) and \( G_e \) will fall back toward equilibrium. Similarly, if one element of \( a \) falls and the rest stay constant or fall, and (27) and (28) are true, a deviation from equilibrium will lead to a reversion to \( z^* \) if movement out of equilibrium in this downward direction leads to a rise in one or more of the elements of \( a \).

We have assumed that (27) is true (since \( z^* > z_T \) and the economy is not in an underconsumptionist trap). We also are assuming short-term stability (condition 28). In sections 5.3.3-5, we will show that (with some simplifying assumptions), the elements of \( a \) fall together for \( z > z^* \) and \( G_e > G \) (and rise together for \( z < z^* \) and \( G_e < G \)).

In medium-term equilibrium, however, we have a different situation. The longer that the economy stays here, the greater will be \( G_{Iz} \) as the effects discussed in section 4.5 accumulate. The effect of \( z \) on internal funds, on induced investment, and on the slope of the mei curve will become stronger as the economy stays in medium-term equilibrium and \( z^* \) is seen as "permanent." At the same time, there will be the effect of \( z^* \) on \( r^* \) which will have a greater effect on \( r^e \) as \( r^* \) becomes permanent. This suggests that \( G_{Iz} \) may increase so that (28) becomes false and the denominators of (25) and (26) becomes negative. (We will assume throughout that it is never true that \( G_{Sz} = G_{Iz} \) so that there is a discontinuity in the process of the rise of \( G_{Iz} \). At the same time, we will assume that the other partials in (27) and (28) are constant here.) Thus, with all else equal, it is very likely that we can have a stable short-term equilibrium where the medium-term equilibrium conditions are met, but in the medium term, this stable equilibrium becomes an unstable knife-edge.
That is, $z$ will rise rather than fall in response to a fall in $a$ that results from an upward deviation of the economy to $z > z^*$, $G_e > G$. It may no longer be true that $G_{Ia_1}/G_{Sa_1} > G_{IZ}/G_{SZ}$, so that the sign of the numerator in (26) may change at the same time that the sign of the denominator changes. Thus, the sign of (26) may be the same. Thus, as $a$ falls, $G_e$ may fall (even though $z$ is rising). However, this is not necessarily true and is still a movement out of equilibrium.

The economy could just as easily fall out of medium-term equilibrium so that $z < z^*$, $G_e < G$. Then the forces described in sections 5.3.3-5 will lead to an upward movement of the elements of $a$ and a continued fall of $z$. $G_e$ may fall or rise, as noted in the previous paragraph. However, the induced-investment argument suggests that the economy has a bias toward expansion from medium-term equilibrium rather than a fall from medium-term equilibrium.

Once out of medium-term equilibrium, the economy will eventually revert to the state where $r$ and $z$ are no longer seen as permanent, that is, to the stable short-term equilibrium case (though medium-term equilibrium conditions are no longer met). This logic is shown in diagram 5.8. The economy starts where $G_S = G_I(ST_1) = G$, a stable equilibrium. In the medium term, however, the relevant $G_I$ curve is $G_I(MT)$, so that the equilibrium becomes unstable. The economy moves out of medium-term equilibrium to a short term equilibrium such as where $G_S = G_I(ST_2) \neq G$. $G_I(ST_2)$ is flatter than $G_I(MT)$ because investment is determined more by past than by current values of $z$ and $a$. If $z$ and $a$ were to remain constant here, then investment would rise so that $G_I = G_{I3}$ on the $G_I(MT)$ curve, and there would be a corresponding $G_I(ST_3)$ curve for short term movements away from this. However, since the economy is no longer in a
Diagram 5.6: Short-Term Stability and Medium-Term Instability.
situation where $G_e = G$ or $z = z^*$, neither $a$ nor $z$ are constant. Thus, medium-term relations are no longer relevant.

In medium-term equilibrium, as $z$ remains constant, we have seen that $G_{iz}$ rises. What happens to the other partial derivatives in this situation?

Given the argument above concerning the rising value of $G_{iz}$ as $z$ becomes permanent, we'd expect that $G_{ia}$ would also rise. How does this affect the instability of medium-term equilibrium? If (25) is negative because condition (28) isn't met, then a rising $G_{ia}$ will make it more negative. Thus, the medium-term equilibrium is made more unstable by this effect. A rise in $G_{ia}$ will make it less likely that the numerator of (26) becomes negative, so that it is less likely that $G_e$ will move in the same direction as $a$.

What about $G_{sz}$ and $G_{sa}$? Consider the permanent income hypothesis concerning consumption (Friedman, 1957) or any other theory of consumer expenditure that sees it as determined by a distributed lag of past income rather than simply current income. According to these theories, consumption becomes more responsive to an income level as that income level is seen as permanent. (We will assume that $s_r$ and $s_w$ are affected equally here.) A transitory change in income, it is argued, will have little or no effect on consumer expenditure except that a windfall may increase purchases of consumer durables. Thus, the marginal propensity to consume rises—and the marginal propensity to save falls—as an income level is seen as permanent. Thus, as the economy stays in medium-term equilibrium for awhile, $G_{sz}$ and $G_{sa}$ should fall. This contributes to the instability of medium-term equilibrium since it makes the denominators of (25) and (26) more negative. It has contradictory effects.
on the numerator of (26), while the numerator of (25) is made more positive. The latter makes the system more unstable.

The shift from a short-term time-frame to a medium-term time-frame has ambiguous effects on the numerator of equation (26). We will assume that the sign of this numerator stays the same, so that when medium-term considerations lead to the negation of condition (28) and a change of the sign of the denominators of (25) and (26), \( \frac{dG_e}{da} \) also changes sign. Thus, \( z \) and \( G_e \) move together.

In conclusion, though the economy can meet the medium-term equilibrium conditions in the short term, this equilibrium becomes unstable in the medium term. Thus, the economy should usually be in a medium-term disequilibrium situation (though it should be in short-term equilibrium). Here, where \( G_e \neq G \) and/or \( z \neq z^* \), there are tendencies for the components of \( a \) to change. Let us turn now to the determination of these components: in section 5.3.3, \( m \) will be considered. At the same time, the determination of \( z \) will be analyzed further. In section 5.3.4, \( p \) will be considered. In section 5.3.5, \( h \) will be considered. Throughout, we will assume that the economy is in short-term equilibrium.