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Life insurance companies and the interest rate structure.

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Thesis

LIFE INSURANCE COMPANIES

AND

THE INTEREST RATE STRUCTURE

by

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APPROVED

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Basically, this thesis is divided into two parts:

1) A theory section .... Chapters 1 - 6.
2) A 1950 to 1958 'history' section .... Chapters 7 - 15.

Theory Section

A) Interest rate theory

In chapters 1 - 4 we intend to introduce the following:

Ch. 1) A short presentation of the Keynesian interest theory.
Ch. 2) A short presentation of the loanable funds theory.
Ch. 3) An elaboration of the saving-expenditure process for life insurance.
Ch. 4) The determination of the theory with which life insurance can be associated.

The purpose of the first four chapters is stated under item (4).

B) Interest rate changes

In chapters 5 and 6 we present:

Ch. 5) The reaction of life insurance companies to changes in the rate of interest.
Ch. 6) A dynamic model which shows the stability of the supply of loanable funds by life insurance companies for the period 1950 to 1958.

The purpose of chapters 5 and 6 is to show how changes in the
rate of interest affect:

a) the supply of loanable funds by life insurance companies;
b) the composition of their portfolios.

'History' Section

In chapters 7 - 15 we take those types of securities which make up a life insurance portfolio such as Government bonds, industrial bonds, mortgages, etc., and examine how the life insurance industry adjusted its portfolios from 1950 to 1958 as the rate of interest changed. In other words, we attempt a correlation of interest rate changes with the sales and purchases of securities.

Conclusions

The conclusions which can be drawn from this thesis are:

1) Life insurance companies are properly associated with the loanable funds theory.
2) They are mainly concerned with the long-term rate of interest.
3) The industry is sensitive to changes in the Treasury bill rate.
4) Changes in rates cause no substantial change in the supply of loanable funds.
5) New savings and funds released from redemptions are channelled into investment opportunities which promise higher returns. The industry does not, however, sell securities already in its portfolios to effect adjustments in the face of interest rate changes.

H.E.
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Chapter 1

The Keynesian Liquidity Preference Theory.

In this chapter we wish to give a short description of the determination of the rate of interest under Keynesian premises.

We shall endeavor to stress only those points which are of importance to the comparative analysis which is undertaken in chapters 3 and 4.

Let us start off with the proposition that interest is a monetary phenomenon. Monetary in the sense that the rate of interest is determined by the demand for, and the supply of, money.

Money is demanded because it is the only perfectly liquid asset. People, who need money for personal and business reasons, and do not possess it, are willing to pay a price for its use.

Before a holder of money will surrender the advantages that attach to the ownership of the only perfectly liquid asset, he must be paid a reward. Interest, therefore, is the reward for parting with liquidity.¹

The rate of interest is determined by the strength of the preference for liquidity in relation to the quantity of money available. The higher the liquidity preference, the higher the rate of interest that is offered; and the greater the quantity of money, the lower the rate of interest that is demanded. A decrease in liquidity preference

will tend to lower the rate of interest and a decrease in the quantity of money will tend to raise the rate of interest.

The rate of interest, like any other price in the market, is established at a level at which the demand will be equilibrated with supply. According to what has been said above, an increase in the rate of interest means that a larger reward is paid for not-hoarding. If the rate of interest did not rise when liquidity preference increased, the total amount of cash the public would wish to hold, at the existing rate of interest, would exceed the available supply. This condition is shown in Figure 1.

When liquidity preference shifts from $L_2$ to $L_2'$, the rate of interest increases from $i_a$ to $i_b$, the supply of money being constant at $S_m$. If the rate of interest is 'forced' to remain at the level $i_o$, e.g., through the intervention of monetary authorities, we obtain a point $i_c$ on the $L_2'$ schedule. However, the $i_c$ position can only be maintained if the amount of money is increased to $S_m'$. In case the supply of money remains constant, the only possible movement of the rate of interest is toward $i_b$. 
Since, in the Keynesian system, the quantity of money is the other factor which, along with the degree of liquidity preference, determines the rate of interest, it is possible for the monetary authority to meet an increase in the desire of the public to hold money with an actual increase in the supply of money.\(^1\) Figure 1 shows that when the quantity of money is increased, in proportion to the rising liquidity preference, the rate of interest will not rise.

Following Keynes,\(^2\) we shall differentiate between transaction, precautionary, and speculative motives.

We assume that the total amount of money which is demanded is a function of income and the rate of interest:\(^3\)

\[
M = L(Y, i). \tag{1}
\]

The component \(M\) contains money which is demanded for the transaction and precautionary motives, \(M_1\), and for the speculative motive, \(M_2\), such that

\[
M_1 + M_2 = M. \tag{2}
\]

Money, which is put aside for transactions and for precautionary purposes, does not depend on the rate of interest but on income.

Therefore,

\[
M_1 = k(Y). \tag{3}
\]

\(^1\) General Theory, ibid., chapter 13.

\(^2\) General Theory, ibid., p. 170.

\(^3\) Hicks, J.R., 'Mr. Keynes and the Classics', Econometrica, 1937.
where $k$ is a parameter.

$M_2$, on the other hand, is functionally related to the rate of interest and we have

$$M_2 = L_2(i). \quad (4)$$

When we add both functions we obtain

$$L(Y,i) = k(Y) + L_2(i). \quad (5)$$

It should be clear that the parameter $k$ of $k(Y)$ is not a constant coefficient but changes with rising or falling levels of income. Also, $M_1$ is not completely independent of the rate of interest. This relationship has been shown traditionally by plotting $M_1$ against the rate of interest where the schedule is inelastic over its relevant portion but tilts to the left at high interest rates.

$L_2(i)$ in Keynes' structure is a monotonically decreasing function of the rate of interest but has two important properties at its limits.

In the first place there is a value of $i$, say $i_1$, such that

$$L_2(i) = 0 \text{ for } i \geq i_1. \quad (6)$$

For there must be for every individual some minimum net yield per income period that will induce him to part entirely with money as an asset. Hence, if he can find securities which, by holding them

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1 Kurihara, K.K., 'Introduction to Keynesian Dynamics', N.Y., Columbia University, 1956, p. 67.
for a given number of income periods, result in a net yield equal or larger than the minimum, his demand for money will approach zero. Since this is true for every individual, there must be some system of interest rates which is sufficient to reduce the aggregate demand for money to zero.\(^1\)

The second characteristic is more peculiar. Since securities are an inferior way of holding assets, compared with money, it is recognized that there must be some minimum rate of interest, say \(i_2\), at which nobody will be willing to hold nonphysical assets except in the form of money. When this level is reached, the demand for money to be held in balances becomes absolute and the rate of interest cannot fall any lower. Hence,

\[
L_2'(i) = \infty \text{ for } i \neq i_2. \tag{7}
\]

Both conditions are familiar to us. The first one is met by giving the liquidity preference schedule a finite axis intercept while the second condition results in a horizontal line at a very low rate of interest which Keynes assumed to be about 2\%.\(^2\)

The limits are shown graphically in Figure 2.\(^3\)

---

\(^1\) Modigliani, F., ibid., section 5.


\(^3\) The 2 marginal, or limiting cases, can be stated more accurately. From equation (1) we obtain \(\frac{di}{dy} = \frac{-L_y}{L_i}\), where the subscripts denote partial derivatives. Then,

\[
\frac{di}{dy} = 0 \text{ if } |L_i| = \infty \text{ and } (8)
\]

\[
\frac{di}{dy} = \infty \text{ if } |L_i| = 0.
\]
It has become general practice to follow Hicks in the determination of the short-term rate of interest.¹

Hicks shows a final schedule in which the rate of interest is on the ordinate and income on the abscissa. A particular rate of interest, say, i₀, is determined by the intersection of an IS curve with a liquidity preference curve.

However, it is often forgotten that in the General Theory - in contrast to the Treatise - it is the marginal efficiency of capital that adjusts to the money rate of interest rather than the other way around.² Therefore, we shall disregard the Hicksian schedule and proceed to determine the short-run rate of interest with as few variables as possible.

We also assume that the supply of money is constant in terms of stocks of money and not in terms of flows.

Then the supply of money, S₂, is the portion which is not needed for transactions. This means that

\[ S₂ = M - k(Y) \]  \hspace{1cm} (9)
\[ L₂(i) = M - k(Y) \]  \hspace{1cm} (10)
\[ L₂(i) = S₂. \]  \hspace{1cm} (11)

We reach a position of equilibrium when individuals are willing to hold for an income period all the available supply of money, S₂. This situation is shown in Figure 2.

In this diagram we replace the complex system of interest rates

¹ Hicks, J.R., ibid.
that exists in practice by a single rate, $i$.

$L_2$ is the demand curve for money to hold, sloping downward and to the right. The vertical lines are various supply curves of money for inactive purposes corresponding to different values of income and a constant amount of total money.

As income increases, the supply for inactive purposes falls. This is so because the total is fixed and because a higher income requires a larger amount of money for transactions.

Hence, the following inequality should be noticed in the diagram:

$$Y_4 > Y_3 > Y_2 > \ldots$$
Equation (10) \[ L_2(i) = \bar{N} - k(Y) \] indicates that \( L_2 \) is small when \( Y \) is large and \( i \) must rise considerably to get wealth-holders to part with money.

As shown in Figure 2, the direct determinants of the rate of interest are the liquidity preference and the supply of money which is held idle. Although this result is correct in the Keynesian sense, we should realize that both variables - liquidity preference and supply of money - are not independent. Liquidity preference depends on the speculative motive which again is a function of several variables such as economic activity, expectations, etc. The supply of money also depends on economic activity which in turn is a function of consumption and investment. However, for our purposes, the exposition through \( L_2 \) and \( M_2 \) which is given in Figure 2 is sufficient.

This concludes our analysis of the Keynesian theory with the exception of one additional point that should be emphasized, viz., the composition of money. Keynes does, in general, include time deposits as money. However, it is doubtful whether savings that are made in the form of life insurance, can be considered money or even near-money. There are several reasons for this. First, even though policy loans can be obtained quite easily, usually a certain period of time and effort is required to negotiate such loans. Secondly, policy loans have to be repaid in order to receive full payment of the face amount of the policy. Individuals have to pay interest for loans to the insurance company. If we assume that we are close to \( i_2 \) in Figure 2, the actual rate of interest to the individual would become negative were he only to borrow to satisfy his demand for liquidity.

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1 Dillard, ibid., p. 183.
Keynes was more concerned with the individual\textsuperscript{1} while we shall give emphasis to life insurance companies as institutions representing aggregates of individuals. This makes a considerable difference as we shall see in chapter 4.

For purposes of summarization, the following points should be stressed which are important for subsequent analyses:

(1) liquidity preference and supply of money determine the rate of interest;
(2) the schedule of liquidity preference has two limiting values;
(3) injections of money into the economy within the limits change the rate of interest;
(4) changes of liquidity preference have a certain impact on the bond market inasmuch bonds are either bought or sold.

Chapter 2

The Robertsonian Loanable Funds Theory.

The title is somewhat misleading in the sense that the loanable funds theory cannot solely be ascribed to Robertson. A number of people contributed to its present formulation such as Hawtrey, Ohlin, and Hicks.\(^1\)

Robertson's name has been used because he has spoken most eloquently for the loanable funds theory and given one of the best statements of the theory.\(^2\)

* *

Only a few years before 1937, economists, on being questioned what determined the rate of interest, would have unanimously replied that it was determined by the supply and demand for capital. What the concept of capital stood for, was less clear. Did it mean real capital, in the sense of concrete goods? If so, the forces governing the rate of interest are reduced to technical and psychological components and we have a theory such as has been elaborated by Boehm-Bawerk.\(^3\) Or did capital mean money capital, in the sense of loanable funds - the power to dispose of a given

---

2. Rejoinders by Ohlin, Robertson, Hawtrey in E.J., Sept. 1937.
quantity of money? There is a great difference depending on which point of view we take. According to Hicks, only one side can be right.

After the appearance of Keynes' General Theory, the emphasis was laid more on the second interpretation (although there are some outstanding economists who emphasize the first version).

Keynes split the monetary theorists into two camps by holding that the rate of interest is not determined by the supply and demand for loanable funds, but rather by the supply and demand for money itself.

In dealing with life insurance companies, we immediately have in mind the huge funds of money which are at their disposal. A 'real' interest theory which discounts money as unimportant clearly is not adequate for our purposes. We are therefore interested in a 'monetary' theory and to discover how the loanable funds theory integrates money, hoarding, and saving into a theory of interest determination is the task of this chapter.

* * *

In this theory, the rate of interest is determined by the demand and supply of loanable funds.

We may state first those factors which influence the supply of loanable funds.

Part of the supply is made up of savings. An individual saves if he does not spend all of his income which he received in the preceding

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3 Keynes, General Theory, chapter 13.
period for the purchase of goods and services in the present period.
Total savings for the economy as a whole amount to the total money
income earned in the preceding period, less money spent for consumption
in the present period.
In symbolic form

\[ Y_{t-1} = C_t + S_t \]  \hspace{1cm} (1)

Income of the present period is made up of consumption and investment
and we have

\[ Y_t = C_t + I_t \]  \hspace{1cm} (2)

Therefore, if \( I_t = S_t \) then \( Y_{t-1} \) must be equal to \( Y_t \); if \( I_t > S_t \) then
\( Y_t > Y_{t-1} \); and finally if \( I_t < S_t \) then \( Y_{t-1} > Y_t \). Equations (1) and (2)
and their implications are known as the Robertsonian version of savings,
in contrast to the Keynesian form which states that saving is not a
function of the last income period but rather of the present one.

In other words, Keynes does not lag his equations.\(^1\)

Aside from individuals, there are, what might be called, the savings
of business corporations. Companies, instead of paying out all their
earnings as money incomes, retain part of them for investment
purposes. In symbols

\[ R.E. = \pi_{t-1} - d_{t-1} \]  \hspace{1cm} (3)

where \( \pi \) stands for profit, and \( d \) for dividends paid out.
Since these savings do take place within a firm for definite purposes,
they do not appear on the supply side of the market for loanable funds.

We know, however, that such funds are not kept in the form of cash but we may expect that business savings are used to keep larger inventories or that they are offered in the market for short periods of time.

Saving minus dissaving releases funds which constitute part of the total offer of loanable funds to the market. In other words, these are hoards or money which has been saved in the past. There is a presumption that the transfer of savings takes place with only a minor time lag. This follows from the consideration that interest is paid on money which would mean a loss of opportunity income if the time lag were large. However, it has happened that liquidity motives are so strong that interest losses are no deterrent to increased cash balances.¹ Taking money as a whole, this would result in a decrease in the velocity of money, or, in other words, K in the Cambridge equation becomes larger.²

We may say that hoarding decreases the supply of loanable funds, and conversely, unless the monetary authorities inject more money into the system.

Another source of loanable funds is amortization, or depreciation, depending on whether we have intangibles or physical assets. Although amortization and depreciation quotas are excluded from net savings, they can justly be included in gross savings.

Money set aside for the maintenance of capital has many of the qualities of a new supply of loanable funds.

¹ Keynes, General Theory, p. 207.
² Robertson, D.H., 'A Note on the Theory of Money', Economica, pp. 245 - 247; also in Readings in Monetary Theory.
Lastly, we should mention the impact of public policy on consumption and savings decisions. Outstanding among these are taxes, social security reserves, old age benefits, etc.

* *

Before we can derive a schedule of loanable funds we need to know more than what makes up the supply of loanable funds. Therefore, we shall examine what lies behind the 'schedules' of demand and supply of loanable funds.

The demand for funds is either a demand for consumers' or a demand for producers' credit. However, this distinction does not point by itself to the close relationship of the two concepts. We know that the investment demand of entrepreneurs is not a demand for investment goods for the sake of investment goods but a derived demand depending on the demand for consumers' goods. Therefore, we may assume that demand for consumers' credit does elicit without considerable time lag a demand for producers' credit too.

The demand for loanable funds by entrepreneurs depends on the anticipated profitability of the planned investment. Conventionally, the different investment possibilities can be arranged in a sequence of decreasing profitability. The degree of the profitability determines the eagerness of the competing entrepreneurs to obtain loanable funds and their disposition to pay interest rates only slightly lower than the expected profits, should competition force them to do so.¹

¹ This is nothing but the MEI; or what I. Fisher called 'return over cost'; Fisher, I., 'The Theory of Interest', pp. 158-59; Kelley, N.Y.
The schedule of 'decreasing profitability' is influenced, in terms of its shape and location, by the state of technology, expectations, the demand for consumers' goods, the amount and age of the existing capital stock, and the prices of new capital goods.

If we assume that these variables are given, we can draw a schedule, by plotting the rate of interest against investments.

This has been done in Figure 3.

![Figure 3](image)

In addition to the rate of interest, we have also shown on the ordinate the marginal efficiency of investment, \( r \).

Suppose that we are at \( I_1 \). At this level of investment the marginal efficiency of capital is high and investments will be made until the marginal efficiency has fallen to the level of the rate of interest, \( i_0 \), which, in the diagram, is the distance
We may assume, in contrast to earlier multiplier-accelerator expositions by Hicks, Kaldor, Goodwin, Harrod 1, that the schedule of decreasing profitability of investment is rather elastic.2

Next we may inquire what determines the demand for loanable funds by consumers. The answer is that it is the marginal time preference,3 which, by the way, is Boehm-Bawerk's second cause for interest to be paid.

A diagram, such as Figure 4, shows the relationship between today's and tomorrow's consumption.

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1 Hicks, J.R., 'A Contribution to the Theory of the Trade Cycle', 1950;
Hicks, J.R., 'Mr. Harrod's Dynamic Theory', Econometrica, 1949;
Kaldor, N., 'A Model of the Trade Cycle', E.J., 1940;
Goodwin in Hansen's 'Business Cycles and National Income';
4 The diagram comes from Samuelson's Introductory Analysis, p. 584.
The equilibrium position in this diagram results from:
(1) a vertical bias of the transformation curve SR;
(2) a vertical bias of the consumer's indifference curves.

At the optimum position E positive interest is paid because the slope of the tangency-equilibrium is larger than 1.0.

Suppose we had a tangency position at $\infty$, which means that the transformation curve and the indifference contours are symmetrical around the $45^\circ$ line, then the rate of interest would be zero.

This follows because of the symmetry condition which says that the consumer is no longer biased in favor of present goods but regards present and future goods as equally desirable.

As far as the supply schedule is concerned, we have listed those items that make up the supply of loanable funds.\(^1\)

In addition we should mention that not only the interest rates and the income of today determine the supply of loanable funds, but also the expectations as to future income and to future interest rates.

* 

We are now ready to derive the schedule of loanable funds and to determine the rate of interest.

Figure 5 shows such a schedule.

$S$, in the diagram, is the supply of loanable funds to which we have added depreciation and amortization reserves.

$M$ shows the supply of funds through credit creation.

$S$ and $M$ together constitute the total supply of loanable funds.

\(^1\) p. 11-14.
The line M could include dishoardings which would shift it to the right. An alternative way, which we have used in this diagram, is to subtract dishoardings from hoardings and show a net schedule on the demand side.

I, in the diagram, is the investment demand for loanable funds;

H the demand for loanable funds for inactive cash balances.

I and H constitute the total demand for loanable funds.

The I schedule includes consumers' as well as producers' demands.

The $I+H$ and the $M+S$ lines intersect at R which determines the
market rate of interest, $i_c$.

The line $M$ shows the amount of money or credit which is in existence within a time period.

Money may come into existence without consideration for the rate of interest, in which case, $M$ would become a vertical line.

If, on the other hand, commercial banks hold excess reserves, the line may become rather elastic. In the case of contraction by monetary authorities, $M$ would appear in the second quadrant as a negative magnitude, $M'$, and $S$ would shift to the west, $S'$.

Figure 5 shows essentially the classical concept of interest rate determination. However, there are important additions and changes incorporated in our approach which were absent from the classical model. In the classical theory money was generally disregarded as an asset. In other words, hoarding did not receive any attention.\(^1\)

Even more important, our schedules are influenced not only by the rate of interest, but also by changes in income.

This concludes our analysis of the loanable funds theory.

In chapters 3 and 4 we shall examine how the rate of interest is determined when we introduce institutions.

---

\(^1\) Lange, Oscar, 'Studies in Mathematical Economics', University of Chicago Press, - A Restatement of Say's Law.
Chapter 3

Life Insurance Theory

In this chapter we are mainly interested in examining savings for life insurance investments by individuals in relation to changes in income and the rate of interest. The conclusion, which we may state now, is that such savings are rather interest inelastic and depend chiefly on income, as we would expect in the case of precautionary savings.

* * *

A life insurance policy is an instrument which serves a dual purpose. First of all, life insurance provides security of income in case of death of the wage earner. Clearly, insurance is not used to insure against death but rather against the loss of earning power. Secondly, it is a form of investment which, by itself, would be an unfavorable investment outlet compared with other opportunities, because the actuarial value of the premium payments is reduced by the costs of administration. However, in addition to the security feature, life insurance offers certain advantages to an investor, such as tax savings, 'forced' savings, etc.

In analysis, we can treat premium payments either as savings or as expenditures, depending on whether we choose to look at life insurance as an investment or as a necessary precautionary transaction. If savings depend on income we may state symbolically the following
functional relationships:

\[
S = S(Y) \quad (1)
\]

\[
S(s_1, s_2, s, \ldots ; Y) = 0. \quad (2)
\]

Or, in terms of expenditures

\[
C = C(Y) \quad (3)
\]

\[
C(c_1, c_2, c_n, \ldots ; Y) = 0. \quad (4)
\]

Savings and expenditures are related in the sense that

\[
S = (1 - c_1 - c_2 - \ldots - c_n)(Y). \quad (5)
\]

Equation (5) shows that savings are regarded as residuals. Therefore, strict analysis would require that we should mainly be concerned with the expenditure side of premium payments. However, it seemed relevant to approach the relatively fixed positions of either \(c_{1f}(Y)\) or \(s_{1f}(Y)\) from investment considerations as well.

* 

The history of the life insurance business seems to indicate that the holders of life insurance policies will endeavor to save for their premium payments as long as their income permits them to do so.¹ We may establish the hypothesis that individuals will pay their premiums even after their incomes have declined to such low

levels that they will cease to save for most other purposes.

We shall assume that the total savings of an individual consist of savings in the form of life insurance and all other savings such that

\[ S(Y) = s_1 f(Y) + k(Y), \quad \text{or} \quad (6) \]
\[ S(Y) = a(Y) + k, \quad \text{or} \quad (7) \]

where \( a(Y) \) are the savings for life insurance and \( k \) the savings for all other purposes.

Equation (7) should be rearranged to account for the statement that premiums will be paid even when income declines sharply so that

\[ S(Y) - a(Y) = k, \quad \text{or} \quad (8) \]

where \( k \) appears as a residual.

When income changes, the parameters \( S \) and \( a \) assume different values. We may expect that at low levels of \( Y \), the coefficient \( a \) rises proportionally faster than \( S \), whereas at high levels of income, \( S \) increases faster than \( a \). At very high levels of \( Y \) we probably have

\[ S(Y) - a(Y) = k. \quad \text{or} \quad (9) \]

We may give a graphical representation of the above relationships such as in Figure 6.

The \( C \) curve in this diagram has been drawn for various levels of income. The total savings curve, \( S(Y) \), has been omitted.

The curve for life insurance savings, \( a(Y) \), is an ascending step
function depending on various levels of income.

Income, in our diagram, is real income and is therefore independent of any inflationary trends.

Although we may assume that total savings increase continuously as income goes up, the savings of an individual for purposes of life insurance investment increase 'by jumps' which has been indicated by drawing a step function.

Equation (9) is shown by giving \( a(Y) \) zero slope at high levels of income.

When income declines, the savings parameter, \( a_0 \), is changed and we
obtain a new savings function, \( b(y) \). This change is due to the fact that an individual, who has insured his life for a large amount at high levels of income, tries to meet his premium payments after income has declined. Only after \( Y \) has fallen substantially, will adjustments for lower premium payments be made.

Several reasons account for, what we may call the different regression path, of life insurance savings:

1. the adjustment lag in the downswing may be larger than in the upswing;
2. policyholders have the assurance that they can obtain loans on their life insurance policies at any time;
3. psychological reasons which stem from the fact that the precautionary motive seems to increase in intensity as income declines.

We may assume that even after \( Y_0 \) in the diagram has been passed, a certain amount of life insurance savings will be forthcoming which is paid by dissavings. For example, the Life Insurance Fact Book for 1959, reports of a Survey by the Survey Research Center of the University of Michigan, which is summarized in Table 1.

We know that there is a low-income group which dissaves and which increases and decreases as people move out of it and into it. As far as Table 1 is concerned, we may assume that the income recipients within the range 0 - \$2,000 belong to the group which

\[ ^1 \text{Kuznets, S., 'National Income and its Composition', 1919-1938, NBER, 1941, chapter 7.} \]
Table 1
Family Characteristics of Life Insurance Ownership in 1956

<table>
<thead>
<tr>
<th>Income of Family:</th>
<th>% of Families insured:</th>
<th>Average Premium Payments of Insured Families:</th>
</tr>
</thead>
<tbody>
<tr>
<td>under $ 1,000</td>
<td>43 %</td>
<td>$ 60</td>
</tr>
<tr>
<td>1,000 - 1,999</td>
<td>53</td>
<td>60</td>
</tr>
<tr>
<td>2,000 - 2,999</td>
<td>67</td>
<td>85</td>
</tr>
<tr>
<td>3,000 - 3,999</td>
<td>81</td>
<td>105</td>
</tr>
<tr>
<td>4,000 - 4,999</td>
<td>91</td>
<td>120</td>
</tr>
<tr>
<td>5,000 - 7,499</td>
<td>93</td>
<td>185</td>
</tr>
<tr>
<td>7,500 or over</td>
<td>96</td>
<td>440</td>
</tr>
<tr>
<td>all Families</td>
<td>79</td>
<td>190</td>
</tr>
</tbody>
</table>


Table 2
Assets and Premium Payments of Families in 1956

<table>
<thead>
<tr>
<th>Liquid Assets of Families:</th>
<th>Average Premium Payments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>$ 80</td>
</tr>
<tr>
<td>$ 1 - 199</td>
<td>135</td>
</tr>
<tr>
<td>200 - 499</td>
<td>165</td>
</tr>
<tr>
<td>500 - 999</td>
<td>190</td>
</tr>
<tr>
<td>1,000 - 1,999</td>
<td>205</td>
</tr>
<tr>
<td>2,000 - 4,999</td>
<td>215</td>
</tr>
<tr>
<td>5,000 and over</td>
<td>475</td>
</tr>
<tr>
<td>All Families</td>
<td>190</td>
</tr>
</tbody>
</table>

In terms of expenditures we may use an indifference curve analysis to show the relationship between income and expenditures.

Figure 7 shows an Engel's curve for life insurance expenditures with a separate regression path.

Table 1 shows, what we expect, that the higher the level of income, the higher the expenditures for life insurance.

Table 3, gives an indication as to the professional groups and their premium payments.
Table 3

Distribution of Life Insurance as to Professional Groups
1956

<table>
<thead>
<tr>
<th>Occupation of Family Head</th>
<th>% of Families Insured</th>
<th>Average Premium Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>90%</td>
<td>$290</td>
</tr>
<tr>
<td>Managerial, Self-Employed</td>
<td>92</td>
<td>415</td>
</tr>
<tr>
<td>Clerical, Sales</td>
<td>89</td>
<td>185</td>
</tr>
<tr>
<td>Skilled, Semi-Skilled</td>
<td>88</td>
<td>140</td>
</tr>
<tr>
<td>Unskilled</td>
<td>72</td>
<td>95</td>
</tr>
<tr>
<td>Farm Operators</td>
<td>57</td>
<td>130</td>
</tr>
<tr>
<td>Other</td>
<td>60</td>
<td>105</td>
</tr>
<tr>
<td>All Families</td>
<td>79</td>
<td>190</td>
</tr>
</tbody>
</table>

Source: Life Insurance Fact Book, 1959

We have taken the data from Table 1 and plotted them on Charts 1 and 2.

According to equation (9) we assume that the curve of Chart 1 flattens out at high levels of income.

It is evident, from Chart 2, that the percentage in premium payments of income declines rapidly within the range 0 to $2,000 and then slopes off gently to the right. The curve remains asymptotic to the abscissa.

The reason for the sharp drop in Chart 2 may be an element of indivisibility in life insurance, viz., minimum units of $1,000 each.
Up to now, income has been the independent variable which determined the amounts to be saved or spent on life insurance. In our analysis we have employed partial equilibrium methods which involved a number of ceteris paribus assumptions of which one was that the rate of interest remained constant. Now we inquire how expenditures or savings for life insurance change when the rate of interest fluctuates, income being given.

In Figure 8 we have plotted savings for life insurance against the rate of interest.

As the shape of the curve indicates, we have relative inelasticity at both ends of the schedule and almost complete inelasticity within the relevant range \( i_{ul} \) and \( i_{ll} \). The subscripts \( ul \) and \( ll \) denote the
upper and the lower limits of the movements of the rate of interest within a 'normal' business cycle.

We have interchanged the axes such that the independent variable is shown by the ordinate and the dependent variable by the abscissa. If we assume that the level of \( Y \) can be adjusted statistically to the various phases of a business cycle, we discover that the influence of the rate of interest on life insurance savings is negligible.

As far as the limits are concerned, we may assume that there is a small group among the insured, whom we can call the speculative group, which increases savings for life insurance purposes at low rates of interest. At such rates, the liquidity preference of the savers within the group has increased to such an extent that they decide to sell their holdings of securities in order to increase their cash balances. Rather than hold cash, we could assume that more life insurance is purchased which, as we stated, is a form of investment. A more intense precautionary motive may also be important.\(^1\) Conversely, when the rate of interest rises to very high levels, the speculative group may freeze\(^2\) life insurance and employ the funds which otherwise would be paid to the insurance companies in premiums, in more profitable investments. In addition, the group members may borrow from the companies using their policies as collateral.

\(^1\) Item 3, page 24.

\(^2\) To freeze life insurance means to let the policy lapse and revive it again within a certain prescribed period.
The two limiting cases, although theoretically possible, are not likely to occur in practice because we ascribe to investors a degree of rationality which in reality does not exist. However, these limits are not less 'realistic' than those of the Keynesian theory.¹

The great majority of savers will be within the range u₁, u₁.

* * *

Keynes, in the General Theory ² assumed that money which is used for transactions is a function of economic activity. Later writers changed his function somewhat to include the rate of interest ³, namely

\[ S = S(i, Y) \] ¹

or in particular for any \( S_i \), such as savings for life insurance

\[ S_i = F(i, Y). \] ¹

Figure 8 shows that we may omit the rate of interest as an important independent variable. This changes our function to

\[ S_i = G(Y). \] ¹

For one individual we have

\[ a_j = a(Y)^4 \] ¹

¹ Chapter 1, pp. 4-5.
³ Hicks, J.R., 'Mr. Keynes and the Classics' Econometrica 1937.
⁴ Chapter 3, page 22, Equation (7).
and for the whole economy:

\[ S_i = A(Y). \] (14)

Because total savings equal total receipts by life insurance companies we have the identity

\[ S_i = R_i \] (15)

or the equation

\[ R_i = A(Y). \] (16)

We may expand equation (16) and introduce a structural parameter so that

\[ R_i = A(Y) + \varphi(E), \] (17)

where \( \varphi(E) \) depends on changes in attitudes of the public toward security.

Equation (17) is our final function which establishes that the premium receipts of life insurance companies depend on income and on the general 'psychological' and sociological propensity for security.

We established in our analysis that the rate of interest is irrelevant to the determination of the level of savings for life insurance investments.
Chapter 4
Life Insurance Theory (Continued)

To discover whether the Keynesian or the Loanable Funds Theory is applicable in the determination of the rate of interest when we introduce institutions, is the main objective of this chapter. We shall prove that we obtain a proper interest determination by using the Loanable Funds Theory whereas the Keynesian analysis results in an indeterminate solution.

* * *

We start with Keynesian theory and assume that the supply of money which is regulated by the monetary authorities is fixed over the time interval under examination. This is not so unrealistic as it may sound because we can choose the time interval as small as we please.

As mentioned before, money is demanded for two purposes, \( M_1 \) and \( M_2 \), where the symbol \( M_1 \) stands for the transaction and precautionary motives and \( M_2 \) for the speculative motive.\(^1\)

Customarily, the functions

\[
M_1 = k(Y) \quad \text{and} \quad (1)
\]
\[
M_2 = f(i) \quad (2)
\]

have been shown graphically such as in Figures 9-A and 9-B.

The curve in Figure 9-A is made up of two parts: a section

\(^1\) Keynes, General Theory, p. 170.
which has infinite slope — represented by $L_1$ — and a section which slopes down to the right — $L_2$.

When more money is needed for transaction purposes we shift from $L_1$ to $L_2$.

Contrary to Keynes who held that

$$L_2 = f(i)$$

we know that it is in the form

$$L_2 = g(i, Y)$$

of which fact we took account in 9-A by writing $L_1(Y_1)$.

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1 Kurihara, ibid., p. 67.
Suppose we assume that Figures 9-A and 9-B are not the schedules for an individual but for an institution. How would this change affect the slope of the curves?

The shape of the curve in Figure 9-B is based on transactions and the stock of money as well as the level of income. Such factors are usually given to any particular industry and the curve would retain its particular position and slope.

The curve in Figure 9-A, on the other hand, is based on the speculative motive and in that case we have to make a considerable adjustment in the elastic portion of $L_2$ because it seems to be established that life insurance companies do not engage in speculations.¹

There are several reasons for this:

1. Life insurance companies have mainly a long-range outlook.
2. Contractual obligations have to be met in the life insurance business. When the expectations of individuals change, they can obtain money to satisfy their liquidity preferences by selling securities. In depressions, the loss to individuals for holding cash is small compared to the alternative which we assume is the interest payments on bonds. Life insurance companies, on the other hand, have to pay large amounts in benefits which come due regardless of business conditions. We may expect that even at a low rate of interest, when liquidity preference is generally strong,

¹ O'Leary, ibid.
the demand for cash by life insurance companies will
not change much. Companies may try to readjust their portfolios
by investing new savings and redeemed funds in short-term
bills and notes but this is not the same as holding cash.
There will be some demand for more cash because applications
for policy loans increase in depressions. However, the ratio
of policy loans outstanding to total assets held has always
been rather small.

(3) As administrators of huge public funds, life insurance companies
have been subject to rather strict supervision by authorities.

From these observations we can deduce the following:

(1) Life insurance companies offer all of their funds to the market
and keep only small amounts of cash as reserves.

(2) The offer of loanable funds to the market - in relation to
a choice between cash and securities - is relatively interest
inelastic.

(3) Because life insurance companies stand in a fiduciary
relationship to their policyholders, they are forced to employ
all funds in each phase of a business cycle.²

Let us examine the implications of the above statements in relation
to the determination of the rate of interest under Keynesian
premisses.

We stated that in the Keynesian theory the rate of interest is

---

¹ The Equitable, ibid., chapter 7.
² O'Leary, ibid.
determined by the intersection of the schedule of the supply of money and the schedule based on liquidity preference always taking into account that Keynes assumed that the marginal efficiency of investment is a function of the mentioned schedules and not conversely.\(^1\)

Using the mentioned two schedules we can differentiate three cases.

Case 1 - the supply of money is inelastic.
Because there is no speculative element in the life insurance business, the demand curve for money is interest inelastic.

This situation is shown in Figure 10.

\[ k = \frac{M}{Y} \]

---

\(^1\) Dillard, ibid., pp. 167 - 179.
In the diagram we have two curves - the supply curve of money, and the demand curve for money - which are interest inelastic and only functions of the corresponding 'level' of income. It is obvious that we have no solution because we need an intersection of the two curves in order to obtain a certain rate of interest.

It can be argued that it is not life insurance companies who desire to become liquid in depressions but the policyholders. However, such reasoning does not take into account the contractual nature of life insurance contracts. Individuals, who have claims on the existing stocks of money, give up part of their claims to life insurance companies whose liquidity preference is interest inelastic. If we assume, as has been pointed out, that individuals do not negotiate policy loans merely to satisfy their liquidity preference - on account of the negative rate of interest - the shape of the demand schedule in Figure 10 is justified.

Case 2 - the supply of money is elastic.

In case 1 we assumed that the supply of money is interest inelastic because we argued that the time interval could be chosen as small as we desired. However, when we base our analysis on a longer time period we may assume that the supply of money is elastic. For example, it has been reported that the banking system expanded its loans by 8.9 billion dollars or 10.7% in 1955, in the face of a credit policy which resulted in a reduction of 600 million dollars of member bank reserves and 2.3 billion
dollars in the money supply. In other words, if we assume that the rate of interest is an indication of business expansion and contraction, we may expect that the existing stock of money will be turned over at a faster rate at a higher level of interest and at a slower rate at a lower level.

As Figure 11 shows, we obtain an intersection of the schedules under such conditions. However, the rate of interest which is determined is static and remains at one level, a. Suppose that we are in the expansionary phase of a business cycle and that the banking system finances a higher income by increasing the velocity of money. This corresponds to a movement from a to b in Figure 11.

1 Smith, W., 'On the Effectiveness of Monetary Policy', AER, 1956.
However, a higher income corresponds to a movement of the $S_m$ schedule to the right, which is analysed in the next case, and not along the curve. To go from a to b means that for any given level of income more money will be supplied at higher interest rates than at lower rates. Therefore, even if we have a high rate of interest which results in a faster money turnover, we still remain at the intersection position, a, because the demand schedule, which depends on the level of income, does not shift. The result is a static interest rate which is meaningless.

Case 3 - the supply of money is elastic and changes for various levels of income.

In this case the monetary authorities change the supply of money. This also can be regarded as an adjustment to changing levels of economic activities.

Under such conditions, however, the demand schedules $D_m$, $D_m'$, give new points of intersections and, because the variable $Y$ is the same in the supply as well as in the demand schedules, these new points are at about the same level of the rate of interest as the original intersection a.

Again, we get a rather static interest determination which not only contradicts actual interest rate fluctuations, but is also of little use in any theoretical analysis.

In summary, we have to conclude that it is not possible to derive a meaningful concept of interest rate determination
under Keynesian premisses when we employ partial equilibrium analysis and assume that the liquidity preference parameters of all spending units are constant except those of life insurance companies.

* 

Next, let us look at the loanable funds theory.

In this theory, liquidity preference is only one of several determinants of interest rate determination. For example, we may
state the identity

$$I + H = S + M \quad (5)$$

and give to $H$, the propensity to hoard, a value of zero such that

$$\lim_{H \to 0} F(I+H) = S + M \quad (4)$$

and still have a meaningful solution.

To make the limit (4) clear, Figure 5 of chapter 2 is reproduced below.
As mentioned before, the demand for loanable funds consists of hoarding and investment. If we assume that the demand for hoarding is zero, the schedule H becomes inelastic and parallel to the ordinate. However, there is the I schedule which gives an intersection with the supply curve.

In the liquidity preference theory, life insurance companies were not directly included in the determination of the rate of interest because of the absence of any speculative demand for money. Even if the hoardings schedule is zero, life insurance companies are included in the loanable funds theory because they supply the portion of aggregate savings to the market which underlies the relatively inelastic savings schedule of Figure 13.

Life insurance companies may also influence the shape and position of the money schedule by selling securities, for example, Government bonds, despite capital losses at a high rate of interest if they think that the high level of interest rates will persist.¹

We may establish that in the loanable funds theory life insurance companies participate directly in the determination of the rate of interest.

¹ O'Leary, ibid.
Chapter 5
Interest Rate Changes and Portfolio Adjustments

In chapter 5 we shall examine how life insurance companies react to changes in the short-, and long-term rates of interest and how such changes influence the portfolio composition of the companies. The conclusions to be drawn from the analysis which follows are:

(1) there is a small degree of short-term interest rate elasticity;
(2) there is a considerable time lag before portfolios are adjusted to changed market conditions.

* * *

Up to now, we regarded interest rates as one rate ruling in a market. This is a convenient device that facilitates analysis considerably. In reality, there is, of course, a multitude of rates at any moment of time which guide the actions of the business community. For our purposes, a 'standard' rate is quite sufficient but we need to differentiate between the short-, and the long-term interest rates.

It is well known that for any given change in the rate of interest, the prices of long-term securities fluctuate more widely than those of short-term paper. The explanation lies in the fact that a distant future is quite uncertain, and the result of such uncertainty is a lower present value of long-term securities.
Conversely, for an equal decline in the prices for long-term and short-term securities, the interest rate fluctuates more on short-term bills than on long-term bonds.

This situation is shown in Figure 14. 1

When the rate of interest falls from $i_0$ to $i_1$, the price of short-term bills rises from $P_0$ to $P'_1$, while the price of long-term bonds increases from $P_1$ to $P'_1$, which, as the diagram shows, is a substantially higher jump than the short-term price increase.

---

1 The diagram has been taken from E.S. Shaw's 'Money, Income and Monetary Policy', Irwin Series in Economics, Chicago, 1950, p. 312.
Conversely, when we move in the opposite direction, from $i_1$ to $i_0$, short-term prices fall less than long-term quotations. It follows that interest rates are more stable in the long run than in the short run. When we translate this statement into the principle of interest rate determination, we can say that a like change in the supply and demand for loanable funds has different effects on short- and long-term rates. The reason for the relative instability of the short-term rates is that commercial banks are often forced, on very short notice, to switch from a pro-borrowing to a pro-lending position.  

The divergence between the short- and long-term rates is of importance to the speculator who, by acting on this divergence, assists in eliminating it. We may use an indifference curve approach to show the behavior of a speculator such as in Figure 15.

In this diagram, the purchases of long-term securities are measured along the abscissa; those of short-term securities along the ordinate $Y$. The various indifference curves, $I_0$, $I_1$, ..., $I_n$, show the increase in the absolute levels of satisfaction which is due to the increasingly larger amounts of securities owned. The $45^\circ$ line has been used to show that, at points of intersections with indifference curves, the speculator is indifferent to whether

\[1 \text{ Shaw, ibid., pp. 312, 316.}\]
he holds short-, or long-term securities. In other words, the \( 45^\circ \) line traces the loci when a 'normal' rate of interest prevails which rules out uncertainty. At the normal rate, the speculator may hold either short-term securities, \( x'_0 \), or only long-term bonds, \( y'_0 \), or a combination of both, \( x'_0 y'_0 \).

When we introduce uncertainty, we will diverge from the normal rate of interest and, therefore, the speculator is going to change the composition of his portfolio.

Figure 15
If the rate of interest goes up, the slope of the normal—a normal is a line which is perpendicular to another line (here the 45° bisection)—becomes increasingly steeper. This means that the speculator sells short-term paper and buys long-term bonds. Conversely, when the rate falls, he will sell long-term bonds to take advantage of capital gains.

Bond prices fall when the rate of interest goes up. As the speculator buys long-term securities, he will, through his action, lower the rate of interest and raise the prices of bonds. The interest line, which assumed a steep slope with the rise, will become more elastic as the rate of interest falls and approach its original position in an oscillatory fashion. This means that we have an internal mechanism which tends to adjust the rate of interest to, what we might call, moving equilibrium.

The behavior which we have ascribed to speculators corresponds approximately to actual practice as described, for example, by Keynes in the General Theory.¹

When we leave speculators and examine the behavior of life insurance companies, we discover considerable inelasticity of reaction. This is due to the fact that life insurance companies are primarily interested in the long-term rate of interest.²

This situation is shown in Figure 16 which is similar to Figure 15 with the exception that the indifference curves are

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¹ Keynes, ibid., chapter 12
² O'Leary, article, ibid.
When the rate of interest goes up, long-term securities will be bought but, as Figure 16 shows, in smaller quantities than in the preceding case. In other words, a change in the rate of interest does not cause a substantial portfolio readjustment. Therefore, we may conclude that life insurance companies contribute to the stability of the capital and money markets.

The indifference curve analysis may also be used to show portfolio adjustments between several types of securities.
In Figure 17 we show a portfolio which consists of bonds, measured along the abscissa, and stocks, measured along the Y ordinate. When the rate of interest goes up, there is a tendency to dispose of bonds which have a relative low rate of interest and offer the released funds to the market at the prevailing higher interest rate. Under the assumption that the higher interest rate is expected to last for a long period of time, the life insurance company would sell $x_0 x_1$ of bonds and buy $y_0 y_1$ of stocks (the X and Y scales are different). The company will stop selling bonds at $x_1$ and buying stocks at $y_1$ because the indifference curve, $I_s$, has a sharp break at this
point. The reason for the particular shape of the $I_i$ curve is that life insurance companies are limited, by legislation, in their purchases of common stock. This legislation was enacted for the security of policyholders. However, the New York Insurance Law, which has been the 'standard legislation', was amended in 1951 and in 1957 to permit life insurance companies to carry a higher percentage of common stock in their portfolios. Such a change of attitude may be due to the fact that life insurance companies invest only in high-quality stocks of companies which have shown stable earnings and dividend payments in the past.

Finally, let us examine a portfolio which consists of mortgages, industrial bonds, and Government bonds. Figure 18 has been devised to show the relationship between the rate of interest, income, Government bonds, mortgages, and industrial bonds. The interest circle, $i_o$, shows a given relationship between the several variables. When the rate of interest goes up, the circle changes to an ellipse having the form

\[ \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \]

where $a > b > 0$. As the interest rate changes, the slope of the
ellipse becomes steeper in relation to the x-axis and flatter in relation to the z- and y-axes.

An increase in the rate of interest will cause a change in the portfolio composition resulting in the disposal of Government securities - from $x_0$ to $x_1$ - and in purchases of mortgage-and industrial bonds. However, the adjustment process may take a
considerable period of time.¹
When the rate of interest falls, the interest circle, \( i_0 \), becomes an ellipse in an east-west direction. This means that more Government bonds are acquired relative to other securities.
Such behavior can be explained by assuming that many companies are unwilling to buy industrial- and mortgage bonds at very high prices but rather invest in a secure and marketable paper until the rate of interest has risen again.²

This concludes our exposition of the effects of changes in the rate of interest on the composition of portfolios.

¹ O'Leary article, ibid.
² Keynes, General Theory, ibid., p. 169.
Chapter 6
The Supply of Loanable Funds
A Model

In this chapter we shall set up a sequence model to show how the supply of loanable funds was affected for the period 1950 to 1959 as business conditions changed. The contention is that the supply of loanable funds by life insurance companies was not much affected by changes in interest rates during the period under examination.

*  

Since 1950, we have had two business recessions, 1954 and 1958. Both recessions were not severe and we may say that we had rather continuous growth in all sectors of the economy since 1950. Perhaps it would be more interesting to subject a model to sharper fluctuations than have occurred in the last two recessions. However, it is not likely that we will experience again a depression similar to that of the thirties. Therefore, the last 10 years are adequate for our purpose.

The model in this chapter is quite simple. We wish to show how net receipts - total receipts less expenses - change when the values of certain parameters are changed. The parametric values have been derived from statistics and adjusted to our model.

---

1 Life Insurance Fact Books, 1950 to 1959; Spectator Year Books.
There is an expectational parameter whose value has been estimated between certain stated limits.

* 

Let us first examine those items which make up the receipts of life insurance companies.

Premium receipts.

We shall assume that the level of premium payments is a function of income such that

\[ P_t = a(Y_{t-2}) + r a(Y_{t-1} - Y_{t-2}) + r_s a(Y_t - Y_{t-1}), \]  

(1)

where \( a \) is the consumption coefficient for life insurance purchases,\( r \) a coefficient of expectations for the previous time period, and \( r_s \) is the expectational coefficient for the present time period.

It appears that the consumption coefficient \( (a) \) has a value of about .05 of personal disposable income. In our model, however, we doubled this parametric value to .1 in order to obtain larger amounts and therefore larger changes.

Equation (1) says that the premium receipts of the present period depend on the level of income two time periods before, on the changes of income during the last three time periods, and on the value of the expectational parameters.

The amounts of life insurance purchased depend on expectations that rule in the present period, \( r_s \).

We shall assume that if the value of the coefficient of expectations is zero, individuals expect only temporary changes. When the
coefficient is one, a given rate of change is assumed to continue.
The expression \( a(Y_{t-2}) \) is arbitrary and could also have been
expressed in the form of

\[
P_t = ra(Y_t - Y_{t-1}) + ra(Y_{t-1} - Y_{t-2}) + \\
ra(Y_{t-2} - Y_{t-3}) + \cdots + ra(Y_{t-n+1} - Y_{t-n}).
\]

However, a simple level expression \( a(Y_{t-2}) \) is easier to handle
than a series of difference equations.

Investment receipts.
The investment income of life insurance companies depends on
the amount of assets held at the beginning of the time period,
minus sales of assets in the present period, minus redeemed
securities of the present period.
Therefore,

\[
E_t = \bar{i} (K_{t-1} - S_K - R_K), \quad (2)
\]

where \( E_t \) is investment income in the present period, \( K_{t-1} \)
the investment stock of the previous period, \( S_K \) and \( R_K \) sales
and redemptions of securities.
To be accurate we should add into equation (2) the purchases
of securities in the present time period. However, we assume the
presence of certain time- and reaction lags in the portfolio
adjustment processes.
\( \bar{i} \) is the long-term interest rate which, traditionally, was held
to be about 3%.
Sales and redemption receipts.

When we computed the return on investments, we subtracted the sales and redemption receipts from the previous stock of investments. However, the amounts from sales and redemptions have to be added back to the total receipts of life insurance companies, in order to arrive at the amount that can be used for new investments.

We assume that life insurance companies act prudently and consider sales of securities only when the long-term rate of interest changes.

In other words, sales are a function of the rate of interest such that

$$S_K = F(i) \quad (3)$$

which leads to the more exact formulation

$$S_K = \frac{\Delta K_{t-1}}{(1+i)} a^{-2} \quad (4)$$

In equation (4) we assume that for any given change in the rate of interest there is always only a portion of the total amount of securities which life insurance companies would consider for sale. This portion, $\Delta K_{t-1}$, is divided by the rate of interest times an exponential parameter, $a^{-2}$ or $\frac{1}{a^2}$, which is based on the fact that long-term securities, which make up the major part of life insurance portfolios, are subject to larger fluctuations in prices, for any given change in the rate of interest, than short-term securities.
Although a functional statement such as equation (3) appears to be correct, it seems that in the case of life insurance companies sales of securities are relatively interest inelastic.\(^1\) Commonly, securities are held until maturity and then channelled into more profitable investments. Therefore, we shall assume in the model that \(S_K\) is a constant which changes only in relation to total assets. Total life insurance receipts are also increased by security redemptions. Again we assume that the amount of redeemed funds is a relative constant proportion of total assets.

Four items, then, make up the total supply of funds and we can establish the relationship

\[
\text{Total Receipts} = P_t + S_K + R_K + \bar{I}(K_{t-1} - S_K - R_K). \quad (5)
\]

Before we can arrive at the amount which is available for new investments, we have to consider a number of deductions.

Benefit payments.

We shall assume that benefit payments are generally a percentage of present income - income is assumed to consist of premium receipts and investment returns - which we take to be 50% or \(\frac{1}{2}\).

Therefore,

\[
B_p = b(I), \quad (6)
\]

\(^1\) O'Leary, article, ibid.
where $B_p$ are benefit payments, $b$ the percentage coefficient, and $I$ the mentioned income.

Next we should consider general administrative expenses, selling expenses, taxes, dividends, retained earnings, all of which have to be deducted from total receipts. Again we can assume that these items are a certain proportion of income and we write

$$G = c(I), \quad (7)$$

where $G$ is the total of the above mentioned payments and deductions, and $c$ the percentage coefficient which is assumed to be 20% or $1/5$.

By adding up equations (6) and (7) we can simplify so that

$$B_p + G = h(I), \quad (8)$$

where $h = b + c$.

Cash retained for policy loans.

We may assume that cash retained for policy loans is a function of income and the rate of interest, such that when the rate of interest goes down - which is assumed to be an indication of declining business activity - the amount of cash retained goes up. This results in a hyperbolic equation of the form

$$H = \frac{y(I)}{(1 + i)}, \quad (9)$$

where $H$ stands for cash retentions, $y$ for the percentage coefficient
which is assumed to be 2½% or 1/40, and \( i \) the short-term rate of interest.

When \( i > \bar{i} \), the amount of policy loans will decline; when \( i < \bar{i} \), loans will increase.

Finally, we shall make a deduction for funds which are held in the form of near-money, such as Treasury certificates, bills, notes, etc.. To keep the equation simple, we shall assume that funds which are retained to be invested in short-term securities, depend on \( I \) and \( i \), which results in another hyperbolic equation

\[
J = \frac{x(I)}{(1 + i_0^2)}, \quad (10)
\]

where \( J \) is the amount retained, \( x \) a coefficient which we assume to be about 1/5, and \( i_0 \) the long-term rate of interest.

Equation (10) says that when the rate of interest goes down, the funds which are retained to be invested in bills, notes, and certificates, become larger. We have squared the rate of interest to indicate that a sharp decline in business activity increases the funds which are to be kept in short-term paper in quadratic proportions.

By introducing an equation such as (10), we have allowed a certain element of speculation in our model and we shall see that changes in the rate of interest affect the supply of loanable funds only to a small degree through equation (10).
Having stated the basic components of the model, we may begin to put our equations together.

Therefore,

\[ P_t + E_t + S_K + R_K = aY_{t-2} + raY_{t-1} - raY_{t-2} + \]
\[ r_s aY_t - r_s aY_{t-1} + I(K_{t-1} - S_K - R_K) + S_K + R_K \]
\[ = aY_{t-2}(1 - r) + aY_{t-1}(r - r_s) \]
\[ + r_s aY_t + I(K_{t-1} - S_K - R_K) + S_K + R_K. \quad (11) \]

Equation (11) represents the total receipts of life insurance companies.

Next, we have deductions such that

\[ B_p + G + H + J = hI + \frac{yI}{(1+i)} + \frac{xI}{(1+i^2)}. \quad (12) \]

If we substitute \( P_t + E_t = I \), we obtain the identity

\[ I + S_K + R_K = B_p + G + H + J + S_f \quad (13) \]

which can be simplified to

\[ I + S_K + R_K - I(h + \frac{y}{(1+i)} + \frac{x}{(1+i^2)}) = S_f, \quad (14) \]

where \( S_f \) is the supply of loanable funds to the market.
In several symbols, the time subscript \((*)_t\) has been dropped to facilitate easier reading of the equations.

We can expand equation (14) to

\[
I(1 - h - \frac{y}{(1+i)} - \frac{x}{(1+i^2)}) + S_K + R_K = S_P \quad (15)
\]

which, by substitution results in the final form

\[
[aY_{t-2}(1 - r) + aY_{t-1}(r - r_s) + r_s aY_t + \bar{I}(K_{t-1} - S_K - R_K)(1 - h - \frac{y}{(1+i)} -
\]

\[
\frac{x}{(1+i^2)}) + S_K + R_K = S_P. \quad (16)
\]

However, we can simplify equation (16) by substituting the letter A for the first term with brackets, the letter B for the second term within parentheses, and obtain

\[
AB + S_K + R_K = S_P. \quad (17)
\]

If \(r = 1\), the first term in equation (16) drops out; if \(r = r_s = 1\), then the first two terms drop out.

We shall assume that in periods of expansion the coefficient of expectations has the value 1. In a recession, this coefficient is assumed to decline to a value of .2.

Both values are arbitrary and indicate that in an expansionary period, businessmen expect that the present prosperity will continue while a slight business contraction will affect future expectations considerably and reduce the coefficient to
a value of .2.

To show how our equations work when applied to the period 1950 to 1959, we have computed in Table 4 the supply of loanable funds to the market.

In column (1) of the Table, we gave GNP in constant 1954 dollars.

Columns (2) and (3) show changes in interest rates.

In (4) and (5) we have given the values for the coefficients of expectations. The values in columns (6), (7), (8), and (9), have been computed from equation (16) and taken from the available life insurance statistics.

Column (10) shows the supply of loanable funds according to equation (16).

The actual figures for the period are shown in column (11) and range from 13.7 to 18.2 billion dollars. With the exception of 1951, we have a continuous increase in the yearly supply of loanable funds to the market. Our model is more stable because in reality we probably have larger lags than we assumed in the model.

From the figures in Table 4 we can draw the following conclusions:

(1) the relative constant growth of GNP for the period 1950 to 1959 was mainly responsible for the relative constant supply of loanable funds to the market;

(2) the influence of changes in interest rates on the supply of loanable funds was negligible;

(3) the items $S_k$ and $R_k$, growing with total assets,
accounted mainly for changes in the supply of loanable funds;

(4) the flow of premium receipts was relatively constant and depended on lagged income and on the parameter of expectations.

This concludes our analysis of a theoretical flow-of-funds model.

TABLE 4

<table>
<thead>
<tr>
<th>Year</th>
<th>GNP</th>
<th>i</th>
<th>r</th>
<th>A</th>
<th>B</th>
<th>S_R</th>
<th>R_K</th>
<th>S_F</th>
<th>S_R</th>
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<tr>
<td>1950</td>
<td>320</td>
<td>3%</td>
<td>3%</td>
<td>1.0</td>
<td>1.0</td>
<td>33.8</td>
<td>.0760</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>1951</td>
<td>340</td>
<td>2 3/4</td>
<td>3</td>
<td>1.0</td>
<td>1.0</td>
<td>36.0</td>
<td>.0757</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>1952</td>
<td>355</td>
<td>3</td>
<td>3</td>
<td>1.0</td>
<td>1.0</td>
<td>37.6</td>
<td>.0760</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>1953</td>
<td>370</td>
<td>3 1/2</td>
<td>3</td>
<td>1.0</td>
<td>1.0</td>
<td>39.1</td>
<td>.0758</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>1954</td>
<td>365</td>
<td>3</td>
<td>3</td>
<td>1.0</td>
<td>1.0</td>
<td>39.1</td>
<td>.0760</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>1955</td>
<td>390</td>
<td>3 1/2</td>
<td>3 1/2</td>
<td>.2</td>
<td>1.0</td>
<td>41.8</td>
<td>.0758</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>1956</td>
<td>400</td>
<td>3 1/2</td>
<td>3 1/2</td>
<td>1.0</td>
<td>1.0</td>
<td>42.4</td>
<td>.0758</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>1957</td>
<td>410</td>
<td>3 1/2</td>
<td>3 1/2</td>
<td>1.0</td>
<td>1.0</td>
<td>43.4</td>
<td>.0759</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>1958</td>
<td>400</td>
<td>3 3/4</td>
<td>3 1/2</td>
<td>1.0</td>
<td>.2</td>
<td>43.3</td>
<td>.0760</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>1959</td>
<td>420</td>
<td>4</td>
<td>3 1/2</td>
<td>.2</td>
<td>1.0</td>
<td>45.4</td>
<td>.0760</td>
<td>5</td>
<td>8</td>
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</table>
Chapter 7

Government Securities

It appears that life insurance companies, as a group, increase their holdings of Government securities during war periods.

Chart 5 shows two prominent peaks for W.W.I and W.W.II, of which the latter dwarfs the former absolutely and relatively.

The Korean Conflict stood in the shadow of W.W.II and did not change the downward trend. This may be due to the fact that the Government had not tapped the capital market to any great extent.¹

Both, Chart 3 and Table 5, show that the holdings of Government securities declined from an all-time peak of 45.9% of total life insurance assets in 1945 constantly until the present.

The decline from 1945 to 1950 took place at an accelerated rate; and since 1950 at a decelerated rate.

Despite the rapid decrease after W.W.II in Government security holdings, the 1950 year-end total still represented a sizeable chunk of life insurance investments amounting to 21% of the total assets of all life insurance assets.

The figure of 21%, with the exception of the years 1942-1949, inclusive, topped every other year in history.² We should not, however, assume, as life insurance companies would like to have us do (Fact Books, Spectator Book), that the

² Life Insurance Fact Book 1959.
Chart 3

U.S. Government Securities Owned by Life Insurance Companies

% of assets
Table 5

<table>
<thead>
<tr>
<th>Year</th>
<th>In Current Dollars:</th>
<th>As Percentage of Total Assets:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>$15.459 billion</td>
<td>21.0%</td>
</tr>
<tr>
<td>1951</td>
<td>11.009</td>
<td>16.1</td>
</tr>
<tr>
<td>1952</td>
<td>10.252</td>
<td>14.0</td>
</tr>
<tr>
<td>1953</td>
<td>9.829</td>
<td>12.5</td>
</tr>
<tr>
<td>1954</td>
<td>9.070</td>
<td>10.7</td>
</tr>
<tr>
<td>1955</td>
<td>8.576</td>
<td>9.5</td>
</tr>
<tr>
<td>1956</td>
<td>7.555</td>
<td>7.9</td>
</tr>
<tr>
<td>1957</td>
<td>7.029</td>
<td>6.9</td>
</tr>
<tr>
<td>1958</td>
<td>7.183</td>
<td>6.7</td>
</tr>
<tr>
<td>1940</td>
<td>5.767</td>
<td>18.7</td>
</tr>
<tr>
<td>1945</td>
<td>20.583</td>
<td>45.9</td>
</tr>
</tbody>
</table>


increase in the holdings of Government securities during war periods, is the result of patriotic sentiments only.1 Rather, we should assume that it is businesslike to buy Government securities during a war. First, there is the strong moral pressure which the Government exerts on the economy as a whole to invest in Government bonds. Secondly, there are considerably fewer investment opportunities

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1 Life Insurance Fact Book, 1959, p.67; O'Leary's Life Ins. Reports.
for profitable long-term returns. Thirdly, institutions
do not know how successful individual companies will be
in their postwar conversion attempts. Lastly, mortgage holdings,
which are a large percentage of total assets of life insurance
companies, decline because residential construction is slowed
down by the lack of raw materials.
There is, then, an element of uncertainty which makes it advisable
for life insurance companies to invest in securities which are
certain to be redeemed.
Returning to the postwar period, we noted that since 1946 there
has been a steady decline in the holdings of Government securities
by life insurance companies. The life insurance industry did not,
however, discontinue purchasing additional Government securities.
But the acquisitions of bills, certificates, and notes were more
than offset by sales and redemptions of bonds, so that the total
holdings continued to decline.
The foregoing remarks serve as a background to our subsequent
analysis for the period 1950 to 1958.

Early in 1950, the Federal Reserve System began selling long-term
Government bonds to absorb some of the long-term funds seeking
investments.¹ These funds were supplied in part by life insurance
companies, which invested in long-term bonds in lieu of better

¹ Annual Reports of the Governors, ibid., 1951.
opportunities. About 2.5 billion dollars of such bonds, which were not eligible for purchases by commercial banks, were sold during the first 8 months of 1950. This action was reflected by a moderate change in the rate of interest.\textsuperscript{1} The rates on short-term Government securities, which had begun to rise in late 1949, moved irregularly higher for several months. The decline in yields on long-term securities, which had continued in the latter part of 1949, was arrested early in 1950. Until the end of the year, rates on long-term securities advanced only slightly. Short-term rates, however, increased even further and were, at the end of the year, at higher levels than at any time since the early thirties.\textsuperscript{2}

The reactions of life insurance companies to the above movements in rates were noticeable. The companies stopped buying long-term bonds and began to buy short-term paper instead. Because restrictive actions of the Federal Reserve System decreased the availability of credit in the second half of 1950, life insurance companies began to channel funds, that were released by sales and redemptions of long-term Government bonds, to other sectors of the economy where higher yields could be obtained. Some Government bonds were sold to the Federal Reserve Banks but the amounts were small.

Summarizing we can say that life insurance companies reacted to changed interest rates in 1950 and shifted: 1) from long-term bonds to short-term bills, notes, and certificates; 2) from Government securities to industrial bonds and residential mortgages.

\textsuperscript{1} Annual Reports of the Governors, ibid., 1951.
\textsuperscript{2} Spectator Year Book, 1953; Life Insurance Fact Book, 1952.
The main event in 1951 was the Accord between Treasury and the Federal Reserve which took place in March. The first step under the Accord was the exchange of marketable United States long-term bonds for new long-term bonds which were not directly marketable. The holders of the two longest-term 2 3/8% bank-restricted bonds of 1967-72 were offered in exchange 2 3/4% bonds 1975-80, convertible at the holders' options into 1 1/2% five-year marketable notes.¹

Life insurance companies participated on a large scale in this exchange by turning in about 5 billion dollars of 2 3/8% bonds.²

This gave the companies an opportunity to shift into higher yielding securities. In case the long-term rate of interest should continue to increase, the companies could always turn the bonds in for the marketable notes.

This exchange operation paved the way for the discontinuation of Federal Reserve purchases of Government bonds at fixed prices. After June the Federal Reserve bought practically no long-term bonds. The prices of the 2 3/8% restricted bonds, which had been supported around 100 3/4% in January and February, fluctuated around 97% during the latter half of the year when the market was on its own.

This situation contrasted sharply with the conditions that had prevailed during the postwar period before March 1951, when life insurance companies could sell any amount of bonds to the Federal

Reserve System at relatively fixed prices. After April/May 1951, the companies undoubtedly realized that prices would decline further if they forced more bonds on the market. For these reasons, the life insurance companies sold only small quantities of bonds in order to avoid capital losses.

Another important step under the Accord was the change in policy regarding short-term Government securities. Beginning in early March 1951, the short-term Government securities market was largely without Federal Reserve open market support. Any life insurance company, wishing to dispose of short-term paper, had to depend on buyers in the market. As a result of this, Treasury bill rates fluctuated more widely than previously, but generally were somewhat below the Federal Reserve discount rate.

The Accord was not as successful as anticipated. The Federal Reserve believed that once the market forces were freed, companies would be restrained from selling securities because of the capital loss which they would suffer. However, when prices fluctuate, those on long-term bonds change more than those on short-term paper. Consequently, the firms which hold mainly short-term bills, are not deterred much from selling in the market when the interest rate rises. The 'freezing-in' or 'locking-in' effect does not work well in the case of short-term bills. Since life insurance companies had bought mostly short-term bills and certificates since the end of W.W.II, they still could draw on substantial funds for

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1 Chapter 5, p. 44
investing in securities bearing higher yields. Table 5 shows that the holdings of Government securities declined by 2.5 billion dollars during 1951. While Government securities still made up 21% of total assets at the end of 1950, this percentage figure had declined to 16% by the end of 1951.

* 

Interest rates declined somewhat in the early months of 1952 but subsequent heavy demands for loanable funds caused the rates to rise again. The changing situation was reflected in the Treasury bill rate as the most sensitive market rate. In the early part of the year the bill rate was generally below the Federal Reserve discount rate of 1 3/4% but after midyear the bill rate rose above the discount rate, and reached at year-end 2%. Just as in 1951, the Treasury rate apparently fluctuated fairly widely in response to short-term changes in money market conditions. Long-term Treasury yields showed declining tendencies until July and then stiffened somewhat. Life insurance companies decreased their holdings of Government securities by only .8 billion dollars which represented a 2% relative decline in terms of total assets. Chart 4 shows that the Federal Reserve discount rate remained constant during 1952. The rates on corporate- and long-term Government bonds likewise remained rather constant throughout the year. Life insurance companies bought only few long-term Government bonds. New savings, which went to life insurance companies in the form of larger premium payments, were invested in securities other
Chart 4

Discount-, Bill-, and Commercial Paper Rates

Source: Derived from the Annual Reports of the Board of Governors.
Chart 5

Corporate-, Long-term Government-, and State and Local Bonds.

Source: Derived from the Annual Reports of the Board of Governors.
than long-term Governments. Although life insurance companies bought 3.6 billion dollars in Government securities, mainly short-term bills and certificates, during the first 9 months of 1952, sales and redemptions were larger than this figure, hence the decline.

* In January 1953, the discount rate was raised to 1 3/4% which was designed to align the discount rate with the short-term market rates.¹ Total demand in the first half of 1953 was at new higher levels. The resulting pressure on credit resulted in a moderate increase in interest rates through mid-April and then in sharp advances. Most rates reached their highs in May and June when borrowing demands were heaviest. Beginning in June rates declined sharply, in some cases more sharply than they had previously risen. At the end of the year the market yield on bills was down to 1 3/8%, substantially below the level a year earlier.

Yields on other Government securities and on short-term private paper were below those prevailing at the beginning of the year. The statistics which are available seem to indicate a rather quick reaction by life insurance companies to changes in the Treasury bill rate. This may be due to the advantages of short-term Government securities such as a high degree of liquidity, absolute safety, and a favorable return.

¹ Annual Report of the Board of Governors, ibid., 1953.
One of the reasons that we have only a small decline in Government security holdings during the year may have been that the interest rate movements during 1953 were not indicative of any trend.

* Broad recovery was under way as the year 1954 closed following the period of moderate contraction which began in mid-year 1953. Throughout 1954, credit was readily available on terms attractive to borrowers and demand for many types of credit grew. During the first half of February 1954, the discount rate was reduced from 2% to 1 3/4%. A second reduction was made later from 1 3/4% to 1 3/8%. Clearly, these actions were designed to ease credit. Interest rates declined sharply in the early part of 1954, continuing the downward trend that began in mid-1953. The decline reflected the large volume of funds available, as well as some diminution in demand. The Treasury bill rate showed the sharpest decline during the first half of the year and the sharpest rise during the second half. At its low, 1.61%, the rate was only one-fourth of the mid-1953 high and the lowest since 1947.1 The sharp advance in midsummer reflected in part a technical market reaction from the previous sharp drop and in part some tightening in the money centers.2 Yields on Government bonds declined steadily to a level of 2 3/8% and increased only slightly

1 Chart 4, p. 72.
until the end of the year.
Life insurance companies held about .8 billion dollars less in Government bonds at the end of 1954 than at the close of 1953. The total acquisitions of Government securities, however, were about 1.4 billion dollars higher in 1954 than in 1953, amounting to a total of $5.3 billion.1
The primary reason for the decrease in absolute holdings was that large amounts of bonds matured in 1954. Most purchases were made in short-term paper and turned over several times a year.
Charts 4 and 5 show the movements of interest rates during the year. A correlation between the fluctuations of the short-term bill rate and the purchases of bills by the life insurance industry is apparent although very slight. The purchases of bills seem to have been bunched into the second half of 1954 when the rates were higher than in the first half.2
While most of the new savings that went to life insurance companies were invested in short-term bills, notes, and certificates, a large portion of funds, which was released by redemptions, found its way into private industry, the largest increase being in mortgage holdings which showed the most favorable investment conditions. It will be shown3 that the slow but steady portfolio change from Government security holdings to industrial bonds and mortgages continued a movement which

1 Spectator Yearbook, 1955.
2 1954 Record of Life Insurance Investments, ibid., New York.
3 Chapter 9.
began shortly after W. II and which reflected the more favorable returns and conditions in those industries.

* High levels of output and employment, with demand pressing on resources, characterized the boom year 1955. By the end of the year most important industries were operating at, or close to, capacity. Economic resources were being intensively utilized. Growth in demand, arising from consumption and investment, pressed against available supplies in almost all areas except agriculture.¹

Interest rates which had risen somewhat in late 1954, continued to rise in 1955 in response to the strong demand for credit. The largest increase was in yields on short-term securities. At the end of the year, most short-term rates were at the highest levels in more than 20 years.²

The yields on long-term securities were only slightly above the short-term rates at the end of 1955 as is evident from Charts 4 and 5.

Federal Reserve discount rates were advanced four times during the year. The differential between yields on Treasury bills and long-term U.S. Government bonds, declined from more than 1 1/4% to less than 1%, the smallest spread since 1930.³

---

The holdings of Government securities by life insurance companies declined by .5 billion dollars during the year. The total acquisitions of Government securities were higher in 1955 than in 1954 - 6.6 billion dollars in comparison with 5.5 billion.

The assets of life insurance companies increased by about 6 billion dollars during the year as shown in Table 6.

Table 6

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Assets of Life Insurance Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>64,020 billion dollars</td>
</tr>
<tr>
<td>1951</td>
<td>68,278</td>
</tr>
<tr>
<td>1952</td>
<td>73,375</td>
</tr>
<tr>
<td>1953</td>
<td>78,533</td>
</tr>
<tr>
<td>1954</td>
<td>84,486</td>
</tr>
<tr>
<td>1955</td>
<td>90,432</td>
</tr>
<tr>
<td>1956</td>
<td>96,011</td>
</tr>
<tr>
<td>1957</td>
<td>101,309</td>
</tr>
<tr>
<td>1958</td>
<td>107,580</td>
</tr>
</tbody>
</table>


The increase in assets was mainly due to the large amounts of new savings which went to life insurance companies.

As far as the composition of the total acquisitions is concerned, most purchases were in Treasury bills and certificates and only 275 million dollars of 3% bonds were added to the portfolios.
The high rate on bills made long-term investments unattractive. Because the demand for funds by the Government increased considerably all through the year, bill prices fell to lower levels than ever.\footnote{Annual Reports by the Board of Governors, ibid., 1955.}

Because the long-term rate remained relatively constant during the year, the investment policy of life insurance companies likewise did not change much.

We may inquire at this point whether the correlation between movements of the rate of interest and the investment policy of life insurance companies is really so simple or whether there are some other variables which should be taken into consideration, such as competition for high-quality securities, cost of acquisition and carrying securities, etc.

Although institutions in general, and life insurance companies in particular, have experienced phenomenal growth during the last 15 years resulting in heavy demand for high-grade securities, such demand has been met by an equally huge supply in the postwar period. Nearly 400 billion dollars of primary securities have been issued during the period 1947 to 1958.

Table 7 shows that the average ratio of primary security issues to GNP was 9.6\%.

There was no indication of any shortage of high-quality securities at any time. For example, since the passage of the Public Utility Holding Act of 1935, most securities of public utility companies have been sold by competitive bidding. Only occasionally, life
insurance companies will bid at those competitive sales, but to date (1953) this method of acquiring securities has been of no significance in insurance company operations.¹

Table 7

<table>
<thead>
<tr>
<th>Year</th>
<th>Issues:</th>
<th>GNP (current prices)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>35.8 billion dollars</td>
<td>284.6 billion</td>
</tr>
<tr>
<td>1951</td>
<td>31.8</td>
<td>329.0</td>
</tr>
<tr>
<td>1952</td>
<td>39.4</td>
<td>347.0</td>
</tr>
<tr>
<td>1953</td>
<td>32.4</td>
<td>365.4</td>
</tr>
<tr>
<td>1954</td>
<td>31.9</td>
<td>363.1</td>
</tr>
<tr>
<td>1955</td>
<td>52.9</td>
<td>397.5</td>
</tr>
<tr>
<td>1956</td>
<td>35.6</td>
<td>419.2</td>
</tr>
<tr>
<td>1957</td>
<td>34.8</td>
<td>442.5</td>
</tr>
<tr>
<td>1958</td>
<td>44.7</td>
<td>441.7</td>
</tr>
</tbody>
</table>


There seems to be an indication that life insurance companies have been able to acquire an increasing volume of investments through private placements.² By negotiating directly with borrowers, costs of acquiring investments have been kept to a minimum.³ In addition, the cost of supervision may be lower

---
² Ibid., p. 65.
³ Ibid., p. 66.
in the case of privately negotiated investments because the average size of an investment tends to be larger and the issued securities of somewhat better quality.\(^1\)

Judging by the information which is available, it appears that a correlation between changes of the rate of interest and changes in investment policies is adequate to explain life insurance portfolio adjustments.\(^2\)

*

In 1956, economic activity continued to expand. With output near capacity in industries producing basic materials and aggregate demand for goods and services mounting, prices at wholesale and resale rose throughout the year. With overall demand for credit strong and the supply of loanable funds limited, interest rates continued to rise in 1956, reaching the highest levels since the early 1930's.\(^3\)

Yields on long-term Treasury issues rose less than those on corporate and municipal bonds, while those on intermediate securities remained above long-term Treasury yields during most of the year. Treasury bill yields fluctuated with pressure on bank reserves but rose sharply in the second half of the year as pressures on credit increased. The movement of rates is shown

---

\(^1\) 'Mgmt. of Inv. Portfolios', ibid., p. 66.
\(^2\) ibid., chapter 6, statement by D. Meredith, Exec. Vice-President of the National Life Ins. Co.; and chapter 7, A.R. La Force, Second Vice-President of the Metropolitan Life Ins. Company.
\(^3\) Annual Report of the Board of Governors, ibid., 1956.
in Charts 4 and 5.

Government security holdings by life insurance companies declined by about 1 billion dollars during the year. This was the largest decline since 1951. While the holdings of Government securities were 9% of total assets at the end of 1955, the percentage had declined to 7.9% at the end of 1956, despite an increase in total assets of 6 billion dollars. The total acquisitions of Government securities were $4.8 billion, of which 85% were in short-term bills and certificates.\(^1\)

* *

Output, employment, consumption, and investment in fixed capital established new records in 1957. At the year-end, however, economic activity was declining in the United States. The pressures of capital and credit demands on the supply of new savings and other loanable funds - in the face of restrictive monetary policies - led to the highest levels of interest rates in more than two decades.\(^2\) Interest costs to the Government rose to new high levels during the first three quarters of the year. By late summer the spread between short- and long-term Treasury securities had almost disappeared. In the last quarter of the year all rates declined sharply in response to the downturn in economic activity and the relaxation of credit restraints.

\(^1\) Record of Life Insurance Investments, 1956.
Life insurance companies decreased their holdings of Government securities by .5 billion dollars in 1957. This represented a percentage decline in relation to total assets of 1%. The total acquisitions of Government securities amounted to 3.6 billion dollars or .6 billion dollars less than in 1956. The reason for the decline in purchases was that favorable investment opportunities absorbed large amounts of new savings and released funds. Life insurance companies continued to dispose of long-term Government bonds. Statistics show that the companies bought more short-term Government securities in the 'recession' quarter than in any other quarter of the year.¹ It appears that life insurance investment policies remained relatively unchanged during the year.

* 

At the beginning of 1958, economic activity was receding. Contraction in output and employment was general, and unemployment was rising at a disturbing rate. No one was quite sure how far the downward adjustment would go, or how long it would last, although business expected an early upturn.² By the early part of the second quarter, personal income and consumer spending had ceased to decline and, in

¹ Record of Life Insurance Investments, 1957.
fact, were rising slightly. Production and employment turned upward soon after.

From late fall of 1957 through April 1958, there were four reductions in the Federal Reserve discount rate, from 3 3/4% to 1 3/4%. In the late summer of 1958, the rate was raised again to 2 3/4%.

Market interest rates on U.S. Government securities declined further in the early months of 1958, following the sharp drop which occurred in the fall of 1957. Treasury bills and intermediate-term issues fell much more than the rates on bonds. The smaller drop in long-term rates resulted in part from the continuation of a substantial volume of bond issues by corporations and State and local governments, as well as by the Federal Government, as shown in Table 8.

An increase of $154 million dollars in the holdings of U.S. Government securities reversed an 11-year downward trend in the amounts of these holdings. A total of 7.2 billion dollars of Government securities was owned by the year-end 1958 compared with 7 billion at the end of 1957. The 1958 holdings were higher than for any year prior to 1942 but were only one-third of the peak ownership of 21.6 billion dollars in 1946.

The total acquisitions of Government securities were about 5 billion dollars during the year, or about 1.4 billion dollars more than in 1957. A large share of these purchases, about 3.6 billion dollars, was in short-term Treasury bills and certificates. Despite the absolute increase of $154 million
Table 8

Total Issues of Primary Securities in the Period 1956 to 1958

<table>
<thead>
<tr>
<th></th>
<th>1956</th>
<th>1957</th>
<th>1958</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Government Securities</td>
<td>-4.1</td>
<td>-1.7</td>
<td>8.0</td>
</tr>
<tr>
<td>State and local government</td>
<td>3.2</td>
<td>4.7</td>
<td>5.7</td>
</tr>
<tr>
<td>Corporate and Foreign Bonds</td>
<td>5.0</td>
<td>7.5</td>
<td>6.9</td>
</tr>
<tr>
<td>Corporate Stocks</td>
<td>3.8</td>
<td>4.0</td>
<td>4.2</td>
</tr>
<tr>
<td>Mortgages</td>
<td>14.5</td>
<td>12.1</td>
<td>14.6</td>
</tr>
<tr>
<td>Consumer Debt</td>
<td>3.4</td>
<td>2.7</td>
<td>.3</td>
</tr>
<tr>
<td>Other Bank Loans</td>
<td>5.4</td>
<td>2.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Trade Debt</td>
<td>4.4</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>Total Net Issues</td>
<td>35.6</td>
<td>34.8</td>
<td>44.7</td>
</tr>
</tbody>
</table>

(Billions)


In Government security holdings, there was a .2 percentage decline of such holdings in relation to total assets.

We may inquire as to the cause of the increase in absolute holdings of Government securities by life insurance companies. When we look at Charts 4 and 5 and remember that the life insurance industry is sensitive to changes in the bill rate, we may get some indication for the underlying reasons.
Chart 4 shows that the Treasury bill rate was at an absolute minimum in 1958. The rate on long-term Government bonds, on the other hand, did not dip much during the same period — fall 1957 to summer 1958 — as shown in Chart 5. During this time, new savings in large amounts went to life insurance companies. A large share of such funds was invested directly in the private industry and housing market but, in contrast to preceding years, a larger portion was used to purchase short-term securities until it was reasonably clear, how the recession would develop. This seems to confirm the conclusion which we reached in Chapter 5, Figure 18. There we were concerned with long-term Government bonds and portfolio adjustments to changes of the long-term interest rate. This entailed, and we emphasized this fact, a considerable lag until sales and purchases would be completed. In the present case the lag is shorter because we are concerned with the bill rate.

An additional consideration why the absolute Government security holdings increased in 1958 is that fewer bonds were bought after W.W.II and, as time went on, smaller lots of bonds came up for redemption.

*

This chapter has been somewhat detailed in order to correlate interest rate changes and life insurance portfolio adjustments with the behavioral equations which we established in earlier chapters.
Looking at the general investment policy of life insurance companies for the period 1950 to 1958, we may state that, in relation to long-term Government bonds, the companies pursued a relatively steady course and were not much influenced by changes in the long-term rate of interest. Funds which were released from redemptions, however, were usually channelled into other investment sectors that yielded higher returns. We also discovered that the life insurance industry was sensitive to changes in the bill rate.

In the chapters which follow we shall examine portfolio adjustments in terms of other securities upon a change in the rate of interest.
Chapter 8

Industrial and Miscellaneous Bonds

Industrial bonds accounted for the second largest increase per dollars in the security holdings of life insurance companies since 1950.

Table 9

Holdings of Industrial and Miscellaneous Bonds by Life Insurance Companies

<table>
<thead>
<tr>
<th>Year:</th>
<th>Billions of Dollars:</th>
<th>Per Cent of Total Assets:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>9,526</td>
<td>14.9</td>
</tr>
<tr>
<td>1951</td>
<td>11,441</td>
<td>16.8</td>
</tr>
<tr>
<td>1952</td>
<td>13,702</td>
<td>18.7</td>
</tr>
<tr>
<td>1953</td>
<td>15,527</td>
<td>19.7</td>
</tr>
<tr>
<td>1954</td>
<td>16,926</td>
<td>20.0</td>
</tr>
<tr>
<td>1955</td>
<td>18,179</td>
<td>20.1</td>
</tr>
<tr>
<td>1956</td>
<td>19,787</td>
<td>20.6</td>
</tr>
<tr>
<td>1957</td>
<td>21,717</td>
<td>21.5</td>
</tr>
<tr>
<td>1958</td>
<td>23,439</td>
<td>21.8</td>
</tr>
</tbody>
</table>


In 1945, life insurance companies held only 1.9 billion dollars or 4.2% of total assets in industrial bonds.

As recently as 1921, only 45 million dollars of life insurance funds were invested in industrial bonds and not until 1955 did the holdings of this type of bond exceed 2% of the companies'
total assets. While we record an increase, both in aggregate amounts and as percentages of total assets, through the '30s and early '40s, the major increase came after W.W.II, when the purchases and holdings of industrial bonds by life insurance companies began an unprecedented rise that brought the total of such security holdings to 14.9% of all assets in 1950.

One of the significant developments since 1946 has been the increased use by industrial borrowers of direct placements of bonds with life insurance companies. This was not a new practice but it had not been extensively used prior to the expansion period following W.W.II. As the tremendous capital needs of American industry were being met in the late '40s, it was found that direct placements expedited the financing and proved advantageous to both borrower and lender.

Chart 6 shows, in percentages of total assets, the holdings of industrial and miscellaneous bonds since 1920. The curve shows the rapid increase in the holdings of industrial bonds since 1945, which we have described above. A detailed account of portfolio adjustments for the period 1950 to 1958 follows.

* 

The yields on corporate bonds remained relatively stable for several months in 1950, and thereafter tended to rise. While the investment demand of the private economy absorbed
Per Cent of Assets  Chart 6

Industrial and Miscellaneous Bonds Owned by U.S.
Life Insurance Companies
1920 - 1958

Source: Derived from data in the Spectator Year Book

all available life insurance funds, available in the sense of reasonable diversification and balancing of portfolios, the pattern
was still different in notable respects from what appeared to
be the prevailing trends in 1949. Although additions were
made to the nation's plants and facilities on a large scale
in 1950, the equity markets were able to furnish more new capital
than in 1949. The higher earnings of corporations also helped to
meet the capital requirements of the business community. In any
event, there was a decline in the issuance of corporate bonds
for new money, and an increase in the volume of refunding.
Consequently, life insurance companies added less to their
holdings of corporate bonds in 1950 than in 1949. As the rate
of interest was relatively constant during the year, the investment
policy of life insurance companies changed little.

* *

The rates charged by the larger banks to their customers on
prime loans rose from about 2% in mid-1950 to 3% at the end of
1951. Yields on high-grade corporate bonds rose by about one-
third percentage point during the same period. Chart 5 shows that
the interest rate on high-grade corporate bonds was usually
.2 to .5 percentage points higher than the rate on long-term
Government bonds.

The holdings of industrial bonds increased by about 2 billion
dollars during 1951 which represented a percentage increase
in relation to total assets of 1.9. This increase was financed
by the receipt of new savings, as well as by funds which were
released from sales and redemptions of industrials and other
securities, mainly Governments. The total acquisitions of
industrial bonds amounted to 3 billion dollars in 1951. According to the theory of chapter 5, we would expect that the purchases of industrial bonds increase and those of Government securities decline, when the rate of interest goes up. Considering the various risk factors by which we scrutinize a security we have to conclude that, in periods of expansion, industrial bonds have an edge over Government bonds. It is clear that the functional risk — the possibility of an enterprise going into bankruptcy — is less in the case of Government securities compared with industrial bonds. However, in a period of expansion the high-grade industrials approach Government securities in quality as far as this particular risk factor is concerned. Both types of bonds, industrial- and Government bonds, are subject to the money rate risk, which is the effect on bond prices by fluctuations in the rate of interest. When we correlate the purchases of industrial bonds by life insurance companies with changes in the rate of interest, it appears that larger purchases were made when the rate increased.¹

* *

Chart 5 shows that the interest rate level for bonds was about 3% throughout the year 1952. This was a somewhat higher

¹ Record of Life Insurance Investment, 1950 to 1958.
annual average than in 1951. However, the upward pressure on long-term rates in 1952 was moderated by the huge amount of savings seeking investments. The total assets of life insurance companies increased by 5 billion dollars and the holdings of industrial bonds by 2 billion dollars. Because the rate of interest did not change much during the year, there was little change in the composition of portfolios.

* 

In the first half of 1953, the demand for funds outstripped the supply which caused a rise in the rate of interest. In the second half we had a decline in the interest rate after the demand for funds had decreased. The yields on corporate bonds were substantially below their mid-year peaks at the end of the year, but somewhat above the level of the previous year. Because the level of the rate of interest was higher in 1953 than in 1952, we would expect an increase in the purchases of industrial bonds. Table 9 shows, however, that there was no increase. Life insurance statistics show that the companies invested large amounts in industrial bonds in the first half of the year. During the second half the main portion of the available funds was invested in Treasury bills until it was clear how long the contraction would last which began in June/July 1953.

*
Recovery was under way in 1954 after the moderate decline of 1953. The yields on corporate bonds declined steadily during the first quarter to a level of 2.85% at the end of March. Chart 5 shows that the rates increased only moderately during the second half of the year. The level of the rate of interest was about on the same average for 1954 as for 1952. The total assets increased by 6 billion dollars during the year while the holdings of bonds by life insurance companies went up by 1.5 billion dollars.

* 

The rate on long-term securities increased by about 1/4 percentage point during 1955. After an increase in the first quarter of 1955, the yields on corporate bonds were generally stable in the second quarter and increased slightly in the third and fourth quarters. While the rate moved somewhat below the 3% level in 1954, it passed the 3% mark in 1955 to remain rather constant for the rest of the year. The total holdings of corporate bonds increased by 1.2 billion dollars which was the smallest increase since 1950. The percentage increase was even less remarkable, from 20% at the end of 1954 to 20.1% at the end of 1955. Considering the fact that the year 1955 established new records in production, employment, and consumption, this result is somewhat puzzling. However, the explanation could be quite simple, namely, that other investment opportunities, particularly mortgages, were
more favorable than those in industrial bonds.

* 

With over-all demands for credit quite strong in 1956, interest rates rose during the year. The increase was especially marked in the long-term area, where private debt expansion was almost as large as in 1955. The rate on corporate bonds rose twice as much in 1956 as in 1955. Because the yield differential between industrial bonds and other investment opportunities was largely eliminated by the increase in the long-term rate, we would expect larger purchases of industrial bonds for 1956 compared with 1955. The increase was 1.6 billion dollars compared with 1.2 billion in the previous year.

* 

We stated in the previous chapter that outputs and employment set new records in 1957. The rate on long-term bonds passed, for the first time since 1950, the 4% mark, as the spread between the industrial bond rate and other yields was again decreased, we would expect an increase in the holdings of the former. Comparing the increase in 1957 with that of the previous year, we had 2 billion dollars in 1957 and 1.6 billion in 1956.

* 

At the beginning of 1958 the economy was in a period of recession.
Chart 4 shows a drastic decline of the bill rate in comparison to the slight dip of the long-term bond rate in Chart 5. Apparently this was due to the fact that corporations, as well as State and local governments, continued to issue large volumes of bonds. Because the interest rate average for 1958 was about the same as for 1957, we would not expect much change in the holdings of industrial bonds. The increase in holdings during 1958 was 1.7 billion dollars compared with 2 billion in the preceding year.

* 

Since 1950, the long-term bond rate increased by about one half of one per cent, as shown in Chart 5. We also notice a close correlation between industrial bonds and long-term Government securities; the spread continuously increasing and decreasing but always within certain limits. For the period 1950 to 1958, the spread decreased slightly which resulted in a decelerated decrease of Government bonds in comparison with the purchasing rate of industrials. Chart 6 shows that the slope of the rising portion of the curve decreased after 1953 to flatten out after 1955 for a short stretch, only to rise again, but at a decreased marginal rate. We can repeat the conclusion of the last chapter that life insurance companies invested new savings and released
funds in those securities which were most favorable at the
governing rate of interest. Taking this conclusion and
applying it to mortgages, we shall see in chapter 9
why this security shows the largest increase for the
period 1950 to 1958.
Chapter 9
Mortgages

The mortgage market shows a tremendous boom since the end of W.W.II. In the five years, 1946 to 1950, life insurance companies invested more than 16 billion dollars in new mortgages and since 1950, another 20 billion dollars. While such financing includes all types of mortgages - farm, commercial, multiple housing, residential housing - the preponderance was in homes and apartment houses.

Mortgage financing appeals to life insurance companies for several reasons:

1. Abundant security in the form of the real property;
2. Attractive income;
3. Attractive maturities;
4. Geographic diversification;
5. Diversification of credit risks;
6. A relative high degree of liquidity;
7. A price level hedge;
8. Little fluctuations in the market.

Properly selected mortgage loans provide an abundance of security. To be an attractive investment, regardless of type, a mortgage loan must offer a return which compares favorably with the yield that can be obtained by alternative opportunities. Generally, the spread in net income between mortgages and high-quality bonds should be about 3/4 to 1 1/4%. Particularly during the latter
'40s, the return available on mortgages was so much greater than that on bonds that they became very attractive to life insurance investors. And, as the increased purchases by life insurance companies show, continued to be attractive in the '50s. The larger spread, combined with the great demand for mortgage funds resulting from the housing boom, explains partly the substantial holdings in mortgages by life insurance companies. It is interesting to trace life insurance mortgage holdings during the last 40 years.

Chart 7 shows a peak in the '20s, representing holdings of about 43% of total assets in mortgages. During the '30s mortgages became quite a burden to life insurance companies when, at a time, defaults of approximately 2 billion dollars occurred. Therefore, there was a substantial decline in mortgage holdings until 1945 when the life insurance industry held less than 20% of total assets in mortgages. Since 1945, however, we have this spectacular increase in mortgage holdings which we reported.1

The main event in 1950 was that regulation X was set into operation. This regulation established the maximum amounts that could be borrowed, maximum maturity terms, and minimum amortization periods in the mortgage market. Apparently, the

---

1 Records of Life Insurance Investments, ibid., 1952-1953.
regulation had little effect on the amount of real estate credit extended during 1950. At that time, the amount of total mortgage debt outstanding in the country on small family dwellings was about $44$ billion dollars which meant an increase of $7$ billion
dollars compared with 1949.

Table 10
Holdings of Mortgages by Life Insurance Companies

<table>
<thead>
<tr>
<th>Year</th>
<th>Billions of Dollars</th>
<th>Per Cent of Total Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>16.102</td>
<td>25.1</td>
</tr>
<tr>
<td>1951</td>
<td>19.314</td>
<td>28.3</td>
</tr>
<tr>
<td>1952</td>
<td>21.251</td>
<td>29.0</td>
</tr>
<tr>
<td>1953</td>
<td>23.322</td>
<td>29.7</td>
</tr>
<tr>
<td>1954</td>
<td>25.976</td>
<td>30.7</td>
</tr>
<tr>
<td>1955</td>
<td>29.445</td>
<td>32.6</td>
</tr>
<tr>
<td>1956</td>
<td>32.989</td>
<td>34.4</td>
</tr>
<tr>
<td>1957</td>
<td>35.236</td>
<td>34.8</td>
</tr>
<tr>
<td>1958</td>
<td>37.062</td>
<td>34.4</td>
</tr>
</tbody>
</table>


* 

During 1951, life insurance companies increased their assets by 4 billion dollars. As Government securities were decreased by 2 billion, 6 billion dollars were available for new investments. Of this amount, about 50% or 3 billion dollars, was used to purchase mortgages.

Although the rate on long-term bonds increased by about one-third of a percentage point during the year, the demand in the housing market pushed up the rates on mortgages even more.
For example, the gross return on city mortgage loans was about 4.17% in 1951 which represented a net of 3.52% after deduction of all costs. The average turnover rate in years was about 11. With slight variations, and with the exception of the depression years, mortgage delinquencies never exceeded 1% of the total dollar volume of loans outstanding.

* 

Regulation X was suspended in 1952. The increase in real estate credit during the year was high, although somewhat less than in the two preceding years. The life insurance industry increased its holdings of mortgages by about 2 billion dollars. During the year, the interest rate on long-term bonds increased slightly but, at the same time, the net rate on mortgages increased to 3.64%, retaining the original spread between the two types of securities. The reason for the decline in the purchases of mortgages during the year seems to have been the unattractive rates in VA loans, which carried only a gross rate of 4% compared with an average of 4.22%.

* 

Residential building in 1953 shared in the general expansion of the economy early in the year and then declined during the spring and summer. Total real estate credit increased substantially during the year, viz., by 9.6 billion dollars compared with
8.8 billion in 1952.
Life insurance companies absorbed 2½% or about 2 billion dollars of this increase. The long-term bond rate climbed beyond the 7% mark and eliminated some of the spread between bond and mortgage yields. However, the net mortgage rate increased also to 3.7½%.

* 

The residential housing market was strong during 1954. Some 1.2 million new dwelling units were started compared with 1.1 million in each of the preceding years and a record of 1.4 million in 1950. A major factor in the rise in housing construction was the increased availability of mortgage funds on attractive terms to borrowers.

The life insurance holdings of mortgages increased by 2.5 billion dollars which represented a percentage of 30.7 of total assets. Approximately two-thirds of this increase were Government-guaranteed mortgages.

The rate of interest on long-term bonds declined to an average just below 3% while the net mortgage rate increased further to 3.8½%, which increased the spread between bonds and mortgages.

* 

The long-term bond rate remained rather constant during 1955 averaging about 3%. The mortgage rate, however, increased again.
A gross return of 4.52% could be obtained which, after deduction of costs, resulted in a net rate of 3.96% representing a spread of .95 between high-quality bonds and mortgages. The total holdings of mortgages by life insurance companies increased by the largest amount yet, namely 3.5 billion dollars.

* 

Residential mortgage debt outstanding, on 1-4 family houses, rose by 11.1 billion dollars during 1956, compared with an increase of 12.4 billion in the previous year. The slowdown in the rate of expansion was, according to several statements,1 entirely due to the VA and FHA components. These Government-underwritten mortgages, with interest rate ceilings, became less attractive to investors as the general level of yields rose. Life insurance companies could earn a net rate of 4.04% on mortgages which was slightly higher than the 1955 rate but only .55% above the long-term bond rate. Consequently, some funds were shifted to industrial bonds as expected.

* 

The interest rate on long-term industrial bonds continued to rise during 1957, passing the 4% mark around June. The net rate on mortgages increased only to 4.15%. Because

1 Annual Report of the Board of Governors, 1956; Record of Life Insurance Investments, 1956.
the spread between industrial bonds and mortgages was largely eliminated, there was a decline in the purchases of the latter to 2.2 billion dollars in 1957 compared with 3.5 billion in the previous year. The purchases of industrial bonds increased considerably during 1957.

*  
The holdings of mortgages increased by 1.8 billion dollars during 1958. Because assets rose by 6 billion dollars we should not be surprised about the drop in the percentage holdings from 34.8 to 34.4%. Other securities, having more favorable returns, absorbed the majority of available funds. The reason for the decline in mortgage holdings was the pegged rate in VA loans, which put such mortgages at a competitive disadvantage with other mortgages.

*  
Looking at the period 1950 to 1958, it seems apparent that the life insurance industry behaved according to expectations. When the spread between mortgages and bonds increased, the life insurance companies bought mainly mortgages while relatively more bonds were purchased when the spread decreased. Such behavior, however, can only be related to new and released funds. The adjustment reaction was rather slow in the case of securities which had already been acquired. This may be entirely due to the relative large portfolios which life
insurance companies administer and the resulting degree of inflexibility.

In conclusion we can say that mortgage holdings constituted the largest share of total assets of the life insurance industry in the postwar period.
Chapter 10
State, Provincial, and Municipal Bonds.

The investments of life insurance companies in the obligations of political subdivisions has increased in recent years, although the total of such securities held is less than it was in the late '30s and early '40s.

Table 11
Holdings of State, Provincial, and Municipal Bonds by Life Insurance Companies

<table>
<thead>
<tr>
<th>Year</th>
<th>Billions of Dollars</th>
<th>Per Cent of Total Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>1.547</td>
<td>2.4</td>
</tr>
<tr>
<td>1951</td>
<td>1.736</td>
<td>2.5</td>
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<td>1952</td>
<td>1.767</td>
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<td>1953</td>
<td>1.990</td>
<td>2.6</td>
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<td>1954</td>
<td>2.549</td>
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<td>1955</td>
<td>2.696</td>
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<tr>
<td>1956</td>
<td>3.011</td>
<td>3.1</td>
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<tr>
<td>1957</td>
<td>3.165</td>
<td>3.1</td>
</tr>
<tr>
<td>1958</td>
<td>3.510</td>
<td>3.3</td>
</tr>
</tbody>
</table>


While the holdings of State, provincial, and local bonds - which we shall call shortly locals - have represented between 2 and 8% of total assets for the last 30 years, they have
varied considerably from year to year in amount. In 1940, we have a peak of 2.4 billion dollars in the holdings of locals by life insurance companies which represented 7.7% of total assets. During the war, little new financing of local projects was carried out and the holdings declined until in 1946 they were less than one billion dollars.

The absolute holdings of locals amounted to 1.5 billion dollars in 1950. In the first half of the year, the rates on locals remained rather steady. In the second half a sharp decline in yields set in which reflected the increased demand for tax-exempt securities resulting from higher income taxes.

About 200 million dollars were added to the holdings of locals during 1951.

New offerings of locals were unusually heavy late in 1952. Yields advanced by about one-third of one percentage point till the end of the year. The total holdings increased by only 30 million dollars.
The spread which existed between U.S. Government bonds and high-grade municipal bonds in 1951, and which amounted to about \(\frac{1}{2}\%\), decreased constantly until 1953 and was completely eliminated in July of that year. Life insurance companies responded to the elimination of the spread and purchased seven times as many locals in 1953 as in the preceding year.

*  

Not much can be reported of either 1954 or 1955.

*  

Compared with 1955, the rates on locals rose more than twice in 1956. The spread between long-term Government securities and locals increased again as shown in Chart 5. Little can be added as far as 1957 and 1958 are concerned.

*  

Looking at the period 1950 to 1958, we may state that life insurance companies reacted to changes in rates as we have outlined in preceding chapters.
Chapter 11
Public Utility Bonds

The public utility field is a broad classification and can be broken down into categories such as electric power and light, telephone, gas, etc. The capital demands of utility companies were tremendous in the postwar period and because of low capital turnover and regulation of the industry, the funds for expansion had to be raised chiefly externally. Because of steady earnings, utility bonds appeal to life insurance investors and large quantities of such bonds were purchased since the end of W.W.II.

Today, the life insurance industry provides more than half of the long-term financing needs of all utility companies. An analysis of the holdings of public utilities in 1955 showed that 55% were in securities of power and light companies, 23% in gas utilities, 18% in communications, and water companies, local transit companies, etc., made up the remainder of the utility bond portfolio.

Looking at yearly acquisitions, we have a rather steady and uninterrupted increase of from 400 to 800 million dollars per annum since 1950.

Although the long-term rate of interest rose by ½% for the period 1950 to 1958, the life insurance industry did not change its

1 Record of Life Insurance Investments, ibid., 1950 to 1958.
investment policy in respect to public utility bonds which it held in portfolios. Just as in previous cases, the companies kept their bonds until maturity which was a stabilizing factor to the public utility bond market.

Table 12
Holdings of Public Utility Bonds by Life Insurance Companies

<table>
<thead>
<tr>
<th>Year</th>
<th>Billions of Dollars</th>
<th>Per Cent of Total Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>10.587</td>
<td>16.5</td>
</tr>
<tr>
<td>1951</td>
<td>11.265</td>
<td>16.4</td>
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<tr>
<td>1952</td>
<td>11.953</td>
<td>16.3</td>
</tr>
<tr>
<td>1953</td>
<td>12.327</td>
<td>16.3</td>
</tr>
<tr>
<td>1954</td>
<td>13.511</td>
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<td>1956</td>
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<td>15.1</td>
</tr>
<tr>
<td>1957</td>
<td>15.252</td>
<td>15.1</td>
</tr>
<tr>
<td>1958</td>
<td>15.958</td>
<td>14.8</td>
</tr>
</tbody>
</table>

Chapter 12
Railroad Bonds

Life insurance funds have always been a significant factor in financing the nation's railroads. In the early 1900's about one-third of all life insurance funds were invested in railroad bonds. Today, even though life insurance company holdings of railroad bonds account for the smallest proportion of total assets since the pioneer days of railroading, they represent the largest share of the railroads' funded debt ever held.

Table 13 shows that although the percentage share of bonds has steadily declined since 1950, the absolute holdings increased. Life insurance companies today hold nearly one-half of the nation's entire funded railroad debt, compared with about one-sixth in 1920.

During the '30s, a large number of railroads became bankrupt and had to be financially reorganized. Debts were scaled down in the process of readjustment but while inferior securities in comparison with the ones initially held had to be taken in exchange, those life insurance companies which held on to their railroad investments found that, as a whole, the investments worked out quite well. In other words, it has proven to be sound investment policy to ride out the storms that are created by economic cycles, provided a senior security has been held.

---

2 Record of Life Insurance Investments, 1950 to 1958.
The absolute holdings of railroad bonds were about 3.2 billion dollars in 1950. This figure increased to 3.9 billion in 1955 and has declined since to 3.8 billion. As percentage of total assets, railroad bonds accounted for 5% in 1950 but declined to 3.6% in 1958 because of the rapid increase in total assets. Because railroads are a dying industry, at least this seems to be the general opinion, there is not much sense in correlating portfolio adjustments with interest rate changes. Only a small portion of the available funds has been used to purchase railroad bonds. Diversification, custom, may be some reasons why life insurance companies bother to hold railroad bonds at all.

Table 13
Holdings of Railroad Bonds by Life Insurance Companies

<table>
<thead>
<tr>
<th>Year:</th>
<th>Billions of Dollars:</th>
<th>Percentage of Total Assets:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>3.187</td>
<td>5.0</td>
</tr>
<tr>
<td>1951</td>
<td>3.307</td>
<td>4.9</td>
</tr>
<tr>
<td>1952</td>
<td>3.545</td>
<td>4.8</td>
</tr>
<tr>
<td>1953</td>
<td>3.643</td>
<td>4.7</td>
</tr>
<tr>
<td>1954</td>
<td>3.757</td>
<td>4.5</td>
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<tr>
<td>1955</td>
<td>3.912</td>
<td>4.3</td>
</tr>
<tr>
<td>1956</td>
<td>3.877</td>
<td>4.0</td>
</tr>
<tr>
<td>1957</td>
<td>3.863</td>
<td>3.8</td>
</tr>
<tr>
<td>1958</td>
<td>3.843</td>
<td>3.6</td>
</tr>
</tbody>
</table>

In 1958, stock holdings amounted to 4.1 billion dollars. Until recently, stock investments did not bulk large in life insurance portfolios. In 1903, the holdings in stocks were about 7% of total assets. With the prohibition of investments in stocks in the State of New York, these securities vanished from life insurance portfolios, amounting to 56 million dollars in 1922. In 1928, the law was changed and New York again permitted investments in qualified preferred stocks. Although this had an immediate effect on the purchases of stocks, the 1930 holdings were still less than 5 billion dollars.

The greatest increase in stock investments came in the middle and late 1940s when the total of stock holdings rose from 652 million dollars in 1943 to 3.6 billion in 1955.

Today, the greater part of investments in stocks is in common stock, in contrast to ten years ago when the major portion was in preferred stocks. The change is due to the fact that the law in the State of New York was amended in 1951 and 1957, to permit life insurance companies to hold limited amounts of their investments in common stocks. However, it should be pointed out that the increase in stock holdings, as shown in Table 14, is partly due to valuation adjustments.

Unlike most bonds, which are carried in financial statements at amortized cost, stocks are usually quoted at year-end market values. Effective with 1957, most preferred stocks
were also permitted to be carried at stabilized values.

We have experienced the phenomenon that the spread between bonds and stocks has been eliminated in the preceding years. It is commonly thought that this is the result of creeping inflation. However, as indicated, life insurance companies are barred from holding more than a certain percentage of their investments in common stocks which contributed to the very selective holdings of only high-quality stocks in life insurance portfolios.

Table 14
Holdings of Stocks by Life Insurance Companies.

<table>
<thead>
<tr>
<th>Year</th>
<th>Billions of Dollars</th>
<th>Per Cent of Total Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>2.103</td>
<td>3.3</td>
</tr>
<tr>
<td>1951</td>
<td>2.221</td>
<td>3.3</td>
</tr>
<tr>
<td>1952</td>
<td>2.446</td>
<td>3.3</td>
</tr>
<tr>
<td>1953</td>
<td>2.573</td>
<td>3.3</td>
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<tr>
<td>1954</td>
<td>3.268</td>
<td>3.9</td>
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<tr>
<td>1955</td>
<td>3.633</td>
<td>4.0</td>
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<tr>
<td>1956</td>
<td>3.503</td>
<td>3.7</td>
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<tr>
<td>1957</td>
<td>3.391</td>
<td>3.3</td>
</tr>
<tr>
<td>1958</td>
<td>4.109</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Chapter 14

Real Estate, Policy Loans, and Miscellaneous Assets.

Real estate holdings of life insurance companies amounted to 3 billion dollars in 1957, which was a continuation of the steady growth in that particular asset in the postwar period. This growth has been primarily in commercial and industrial property where many buildings have been acquired on a lease-back arrangement.

Policy loans were relatively constant during the last 9 years. As a ratio of total assets, they declined from 18% in 1953 to a low of 3.6% in 1955.

Miscellaneous assets consist mainly of cash, due and preferred premium payments.

Obviously, the items enumerated here, have little to do with changes in the rate of interest.

The amount of cash which is held may rise in a period of recession but the increase will not be large. At least for the last two recessions, 1954 and 1958, we cannot observe any change in cash other than relative income adjustments.

The holdings of real estate, cash, and miscellaneous assets, which were 2.6 billion dollars in 1950 and 4.6 billion in 1958, are correlated with the growth in life insurance assets rather than with changes in the rate of interest.
Chapter 15

Earnings, Gains, and Losses

Life insurance companies have absorbed surprisingly few net losses on the disposal of securities. Not so surprising, however, if we keep in mind that a strong equity cushion exists beneath most of the securities which are held. It is the better part of wisdom to look forward with confidence to a recovery of values in due course. As long-term investors with a stable cash flow, life insurance companies have not been panicked into sales during depressed business conditions. Thus for the entire period 1929 to 1956, gains on disposal of bonds exceeded losses by approximately 561 million dollars. In only nine years have losses exceeded gains, and in no year have net losses exceeded 48 million. Most of the losses on disposal of bonds were incurred in the railroad field, but the losses were only a small portion of the interest earnings obtained on the bonds. Thus, for the period 1929 to 1956, the interest earnings on railroad bonds amounted to 3.2 billion dollars, as compared with 108 million dollars of net losses.

Life insurance statistics demonstrate the essentially long-term character of life insurance investing. Although the net gains on the disposal of securities loom large in absolute terms, actually they amount to only 7% of the volume of interest earnings on bonds over this period. The general policy of the companies of continuing investment, irrespective of the level of interest rates, and of holding securities until maturity, has served to
place great emphasis on yield and to minimize the importance of gains. Table 16 shows the earnings for 18 large companies. The Table gives an interesting picture of the rise and decline of earnings on securities from 1929 to 1956. At times, the rate on bonds which life insurance companies customarily assumed to be 3%, dropped considerably below that figure.

The earnings on total investments for all life insurance companies are given in Table 15 for the period 1950 to 1958.

The rate of return on life insurance investments is an important factor in the calculation of costs. In 1958, the net rate of earnings was 3.85% before taxes, compared with 3.75% in 1957. Despite the generally higher rates of return on life insurance investments in the '50s as compared with the '40s, the average net earning rate after taxes for the years 1950 to 1957 of 3.18% was only little higher than the average of 3.14% for the '40s.

In the decade 1940 to 1950, the net rate was high at the beginning and low at the end; while in the 1950's the rate was low at the beginning and high at the end of the period. Perhaps, after adding the 1958, 1959, and 1960 results to the average, we may get a larger differential between the two decades.

It is further evidence of the long-range view of the life insurance industry that the yields rose only slowly since W.W.II. Life insurance companies could have obtained higher returns if they had sold more of their Government bonds without suffering capital losses prior to the Accord of 1951. It is obvious that the portfolio changes are gradual and take a considerable period of time.
Table 15

Rate of Return on Invested Life Insurance Funds
1950 - 1958

All Companies

<table>
<thead>
<tr>
<th>Year</th>
<th>Rate Before Federal Income Tax:</th>
<th>Rate After Federal Income Tax:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>3.1%</td>
<td>3.00%</td>
</tr>
<tr>
<td>1951</td>
<td>3.18</td>
<td>2.98</td>
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<td>1952</td>
<td>3.28</td>
<td>3.07</td>
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<td>1953</td>
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<td>1954</td>
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<td>3.24</td>
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<tr>
<td>1955</td>
<td>3.51</td>
<td>3.23</td>
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<tr>
<td>1956</td>
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<tr>
<td>1957</td>
<td>3.75</td>
<td>3.44</td>
</tr>
<tr>
<td>1958</td>
<td>3.85</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

Table 16
Rates of Return on Bonds, Pfd.-, and Common Stocks
1929 - 1956
Eighteen Life Insurance Companies

<table>
<thead>
<tr>
<th>Year:</th>
<th>Bonds:</th>
<th>Pfd.:</th>
<th>Common:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1929</td>
<td>4.72%</td>
<td>4.70%</td>
<td>4.68%</td>
</tr>
<tr>
<td>1930</td>
<td>4.72</td>
<td>4.96</td>
<td>4.68</td>
</tr>
<tr>
<td>1931</td>
<td>4.65</td>
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</tr>
<tr>
<td>1932</td>
<td>4.56</td>
<td>4.75</td>
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<td>1934</td>
<td>4.12</td>
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<td>1935</td>
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<td>3.09</td>
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<td>1936</td>
<td>3.63</td>
<td>5.86</td>
<td>3.40</td>
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<td>1937</td>
<td>3.51</td>
<td>5.67</td>
<td>3.37</td>
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<td>1938</td>
<td>3.35</td>
<td>4.82</td>
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</tr>
<tr>
<td>1939</td>
<td>3.32</td>
<td>4.83</td>
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<td>1940</td>
<td>3.26</td>
<td>4.74</td>
<td>3.90</td>
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<td>3.16</td>
<td>4.82</td>
<td>3.92</td>
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<td>3.18</td>
<td>5.03</td>
<td>3.95</td>
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<tr>
<td>1943</td>
<td>3.00</td>
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<td>1944</td>
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<td>5.53</td>
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<td>1945</td>
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<td>1946</td>
<td>2.74</td>
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<td>1947</td>
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<td>1948</td>
<td>2.81</td>
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<td>2.88</td>
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</tr>
<tr>
<td>1956</td>
<td>3.37</td>
<td>4.37</td>
<td>7.25</td>
</tr>
</tbody>
</table>

Weighted Average
1929 - 1956 3.17  4.51  5.79

Source: Derived from Record of Life Insurance Investments; Life Insurance Fact Books; Spectator Year Books.
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