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**WEST GERMAN MONETARY POLICY
AND BANK PORTFOLIOS, 1962-68**

**by
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**A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
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in The University of Michigan
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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	vi
LIST OF ILLUSTRATIONS	vii
LIST OF APPENDICES	ix
Chapter	
I. BACKGROUND	1
Introduction	
The Policy Environment and Tools	
The German Economy 1962-68	
II. THE PORTFOLIO BEHAVIOR OF WEST GERMAN CREDIT INSTITUTIONS	20
Introduction	
The Theoretical Framework	
The Balance Sheets of West German Credit Institutions	
III. ESTIMATION	56
Introduction	
Specification	
Estimation	
Discussion of Estimates	
Conclusions	

IV.	ANALYSIS OF BUNDESBANK POLICIES	Page 98
	Introduction	
	Short-Term Foreign Asset and Liability Policies	
	Domestic Asset and Liability Policies	
	Foreign Long-Term Capital Movements	
V.	CONCLUSION	129
	BIBLIOGRAPHY	150

LIST OF TABLES

Table		Page
1.	Asset Ratios as of January 31, 1967	42
2.	Liability Ratios as of January 31, 1967	44
3.	Regression Results	64
4.	Coefficients on Seasonal Dummy Variables and Intercepts	69
5.	Equilibrium Values of Coefficients in Domestic Asset Equations	70
6.	Equilibrium Values of Coefficients in Foreign Asset Equations	72
7.	Equilibrium Values of Coefficients in Liability Equations	73
8.	Changes in Short-Term Foreign Borrowing	114
Appendix B		
1.	Correlation Matrix of Interest Rates	138

LIST OF ILLUSTRATIONS

Figure	Page
1. Important Economic Indicators, Federal Republic of Germany, 1962-68	11
A. Prices and Wages B. Industrial Production C. Money Supply D. Balance of Payments	
2. Indicators of Bundesbank Swap Policy, 1962-68	102
A. Premium (+) or Discount (-) on Swap Rate Between Dollars and Marks B. Differential Between Foreign and German Three-Month Interest Rates C. Bank Holdings of Foreign Money Market Paper and Foreign Time Deposits, and Swap Commitments of Deutsche Bundesbank D. Bank Foreign Investments as a Proportion of Investable Assets	
3. Short-Term Borrowing from Foreigners	111
A. Ratio Form B. Non-Ratio Form	
4. Interest Rates Set by the Bundesbank	121
Appendix B	
1. Scatter Diagrams of Dependent Variables	142
A. Cash B. Secondary Reserves C. Medium-Term Notes D. Domestic Short-Term Loans	

- E. Long-Term Loans
- F. Foreign Sight Deposits
- G. Non-Ratio Foreign Sight Deposits
- H. Foreign Time Deposits
 - I. Foreign Money Market Paper
 - J. Short-Term Loans to Foreigners
- K. Short-Term Borrowing from Foreigners
- L. Non-Ratio Short-Term Borrowing from Foreigners
- M. Domestic Short-Term Borrowing
- N. Long-Term Borrowing
- O. Bundesbank Credit

LIST OF APPENDICES

Appendix	Page
A. SOURCES OF DATA	136
B. RESULTS OF SOME ALTERNATIVE ESTIMATIONS . . .	137
Cash	
Secondary Reserves	
Foreign Sight Deposits	
Foreign Time Deposits	
Short-Term Loans to Foreigners	
Short- and Long-Term Domestic Borrowing	

CHAPTER I

BACKGROUND

Introduction

The purpose of this chapter is to acquaint the reader with the facts about the German economy and economic policy essential to an understanding of the ensuing discussion. The chapter is divided into two parts, the policy environment and tools and a short economic history of Germany from 1962 to 1968. In both sections, special emphasis is given to monetary policy and to those factors in the economic environment which influence the nature and effectiveness of monetary policy tools.

The Policy Environment and Tools

The Bundesbank is an autonomous branch of the Federal Government. The law creating the bank contained instructions for it to cooperate with the Federal Government in setting stabilization policy except as such cooperation might interfere with the Bundesbank's principal task of "safeguarding the value of the currency." Price stability, then, is considered the overriding goal of the central bank. The alternative goals of full employment and external balance are subordinate to stability. The external balance goal is usually given as zero basic balance consisting of a current account surplus offset by an outflow of long-term capital.

The nature and effectiveness of the tools used by the Bundesbank to pursue these goals depend to a large extent on the structure of the capital market within which the Bundesbank works, the structure of the banking system through which the policies filter to the rest of the economy, and the nature of fiscal policy actions whose effects may complement or contradict the direction monetary policy is taking at a given time.

The capital markets, for both debt and equity issues, are completely dominated by the banking system. In 1967, credit institutions absorbed 81 per cent of new bond issues, only slightly larger than the usual percentage. Savers in Germany show a predilection for short-term savings accounts rather than direct investment in the money market, while the government, a major borrower, prefers to have its debt at longer term. The imbalance of the time preferences between savers and borrowers puts a severe strain on the intermediation abilities of the banks. The small number of participants in the markets and the resulting lack of available funds preclude the possibility of substantial amounts of hedging between long- and short-term maturities. Since long-term maturity purchases are dominated by banks, monetary policy, which works directly through the banks, has as great or greater impact (in absolute terms) on long-term as it does on short-term interest rates.¹

¹From 1962 through 1968, the long-term government bond rate was almost always above the 3-month treasury bill rate by 350 basis points. The differential declined slightly during the tight money period of 1965 and 1966 and rose to a peak of 400 basis points for a time while a policy of aggressive monetary ease was in effect in 1967 and the first half of 1968.

The banks dominate the share market as well, acting as underwriters, brokers, and owners of equity capital. Bank ownership of businesses and the resulting strength of the ties between individual banks and corporations somewhat circumscribe competition for loans and investments among banks.

Since the 1966 credit squeeze, when the situation in the long-term bond market became so tight that trading had to be suspended, steps have been taken to give both bond and share markets more breadth and depth. Banks have agreed not to bypass the stock market when placing equity issues, medium-term savings instruments have been made more attractive, and Federal Government debt management has become more orderly. Still, the markets are shallow enough to force the Bundesbank to carry out its policies in an exclusive or closed market with the credit institutions. Because of this closed market, the immediate impact of monetary policy falls on the banks and is transmitted through them to the rest of the economy. This type of transmission mechanism gives added importance to the examination of bank responses to central bank policies.

As a further result of the closed market, the Bundesbank, through its choice of assets to deal in, can directly affect the composition as well as the level of bank liquidity. This contrasts with the United States where Federal Reserve open market operations change the composition of bank portfolios by changing asset yields in the market. Because Bundesbank open market operations have a direct impact on bank

portfolios, both the composition and the level of bank liquidity are considered immediate policy variables.

"Credit institutions" will be taken in our discussion to refer to almost all financial intermediaries in Germany. The institutional structure is dominated by nine large commercial banks affiliated into three groups. The rest of the credit institutions include smaller commercial banks, savings banks, mortgage banks, credit cooperatives, private banks, and others. Despite having started, in many cases, as specialized intermediaries lending only to certain sectors of the economy, these groups of institutions have more recently begun to generalize their holdings of assets. Giro institutions, clearing houses for the various groups of banks, are also included under "credit institutions" and hold considerable amounts of short-term liquid assets. Since 1967, the savings giros especially have begun to hold large quantities of foreign assets.

Fiscal policy in postwar Germany has been somewhat chaotic. The constitution stipulates that the budget should be balanced on ordinary and extraordinary accounts. However, this is not a meaningful injunction, since the latter category encompasses expenditures covered by borrowing and there is no firm rule as to which items belong in which account. But the option to have an anticyclical budgetary policy that this flexibility affords the government was not used. What little discretionary anticyclical fiscal policy was enacted concerned expenditures, not revenues, and was only attempted during inflation. Then the sole

guideline seems to have been keeping the Federal budget a constant percentage of gross national product when it threatened to rise even faster. The major anticyclical impact of the budget arose from the automatic stabilizing properties of revenue collections. Discretionary tax changes, such as the 1965 reduction in the middle of an inflationary period, were often made procyclically. The passage of the "Stabilization and Growth Law" in 1967 incorporated short-run stabilization considerations into the budgetary process and, in particular, provided for countercyclical discretionary taxing as well as spending policy.

As a consequence of their rather haphazard fiscal policy, the Germans never had to face an "assignment problem." Rather, their problem was how to use monetary policy to reach several goals simultaneously. The revaluation of 1961 was a result of the inability to reconcile conflicting internal and external balance goals with one policy tool. It attacked the balance of payments surplus leaving the Bundesbank free to combat inflation. The period since that time, the concern of the present study, has seen the same conflict, but its solution has been approached in a different manner. Special policies were designed which would have their initial and largest impact on the foreign asset and liability holdings of the banks, thereby inducing them to "offset" the liquidity inflow from a balance of payments surplus. This freed the more general policy tools to deal with domestic imbalances. These special policies were devised as variations of more

usual tools and are so classified in the subsequent discussion. The workings of the policies are discussed in more detail in Chapter IV, which also contains an evaluation of their effectiveness.

Discount policy is very important to the Bundesbank. It buys commercial bills from the banks at the current discount rate. The bills, which must be backed by three parties and mature within three months, generally have a minimum maturity of one month.² The Bundesbank will buy any amount of such paper from a bank up to a ceiling, or quota, determined by a coefficient on the bank's capital position. The quota, therefore, grows as the bank grows. The Bundesbank is obliged to honor all discount requests up to the quota limit, provided a bank fulfills the "General Business Conditions" which set minimum standards for capital and liquidity. Quota changes influence a bank's portfolio decisions by affecting the potential liquidity available to the bank. The Bundesbank has found such changes to be a valuable policy tool as an adjunct to changes in the discount rate. In 1964 and 1965, all banks had their liquidity reduced by two large reductions in their quotas. Also, between August 1, 1964, and January 1, 1967, quotas were lowered by the amount of the increase in foreign borrowing over the average for an earlier period. This was an attempt to discourage banks from borrowing liquid resources abroad

²The Report of the Deutsche Bundesbank for the Year 1967, pp. 94-103, contains a summary of the rules governing discounts, loans, and required reserves.

for use in Germany.

Banks can also acquire short-term funds by borrowing from the Bundesbank against eligible collateral, mostly short- and medium-term government paper, at the "Lombard" rate, which is usually one percentage point above the discount rate. There is no statutory limit on the amount of borrowing that can be done at this higher rate, but loans are at the discretion of the Bundesbank and should be "to cover for a short period a temporary need for liquidity."³ Borrowing is done at the Lombard rate even when discount quotas have not been exhausted if very short-term credit is desired and the banks do not want to give up a full one month's interest on their discountable bills. The differential between the Lombard and discount rates has been changed as a tool of monetary policy, increasing when additional tightness was desired and decreasing when policy was to be relaxed.

Banks also have access to a market for overnight loans comparable to the Federal funds market in the United States. The relationship between the discount rate and the overnight rate is not static. When the banks are highly liquid, the overnight rate tends to be below the discount rate and the Bundesbank does very little discounting. At such times, the Bundesbank is said to be "in the market." It must rely on open market operations to effect bank liquidity. (See p. 9.) In more restrictive monetary climates, the banks are less liquid. The discount

³ Report of the Deutsche Bundesbank for the Year 1967, p. 96.

rate is the lowest rate at which the banks can borrow and, consequently, they become heavily indebted to the Bundesbank. Then, the "market is in the Bundesbank."

Until 1966, the discount rate was crucial in the determination of banks' creditor and debtor interest rates. The maximum rates the banks could charge on loans and the interest rates they were permitted to pay on deposits were set by the Bundesbank in relation to the discount rate. When loans were being made at the maximum rate, a change in the discount rate had an immediate and often equal effect on the cost of borrowing from the banking system. In a special effort to discourage foreign deposits, the right to pay interest on foreign time deposits was suspended several times during the 1960's. In 1966, the Bundesbank began to relinquish control over many of the interest rates and to allow them to be determined by market forces.

Reserve ratios differ by types and terms of the liabilities, by size and class of bank, and by residence of the depositor (foreign or domestic). Changes in reserve ratios are employed more frequently in Germany than in the United States, although their use is still limited by the lumpiness of the adjustments they require. They are thought to be an effective tool of monetary policy because of the lack of excess reserves in the banking system and because extra pressure to watch reserves is exerted by the existence of discount quotas.

The Bundesbank has used reserve requirements to affect the foreign position of the banks by putting higher reserve requirements

on foreign liabilities than on domestic liabilities and by allowing those higher reserves to be released by "offsetting" the foreign liabilities with foreign assets. Thus, the reserve requirement on foreign liabilities is zero up to the amount of foreign assets held. As long as foreign liabilities exceed foreign assets, a powerful incentive to invest abroad is created; the return on foreign assets is raised by the amount of the return on the freed reserves.

Open market operations by the Bundesbank can affect both the liquidity of the banks and the interest rate structure facing them. The Bundesbank decides which maturities and types of paper it will trade and at what rates. The initiative in each transaction is with the banks who are the only ones allowed to trade with the Bundesbank. The Bundesbank uses the relationship among the various rates at which it buys and sells to influence the maturity structure as well as the total amount of bank liquidity. Open market operations are considered to be a fine-tuning mechanism, particularly important when the banks are very liquid and changes in the discount rate would have little effect on their borrowing. At such times, when the Bundesbank must operate in the market, it absorbs liquidity by manipulating the prices of government securities in such a way as to induce banks to buy them from the central bank.

From time to time, the Bundesbank carries out open market operations in assets denominated in foreign currencies through its foreign exchange swap facilities. It offers to swap dollars and marks

with German banks at rates set to elicit an outflow of capital. On such occasions, initiative is again with the banks who may use the open market to exchange the dollars for third currencies. From March 1964 through November 1967, this privilege was circumscribed as only dollars used to buy U. S. Treasury bills were eligible for the favorable rates.

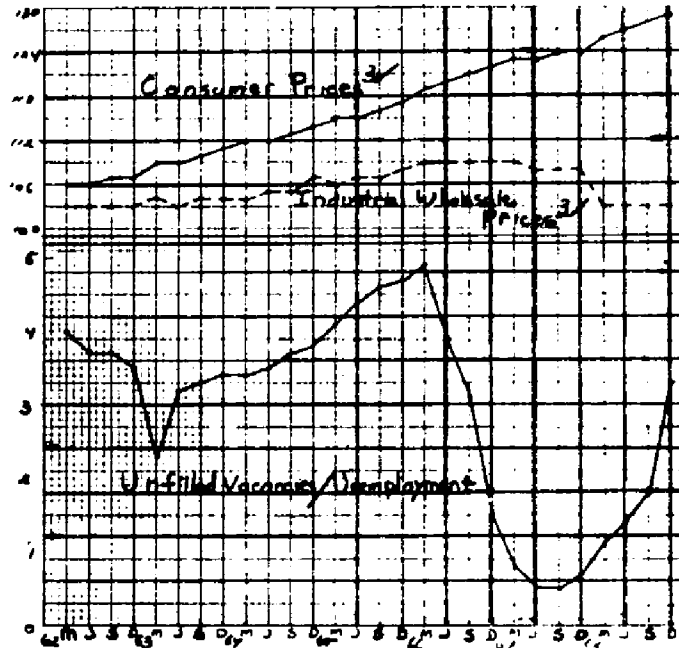
The German Economy 1962-68

As is indicated by the employment and industrial production graphs in Figure 1, this period was defined by an upswing in economic activity from 1962 to early 1966, a recession from early 1966 to mid-1967, and recovery and strong growth through 1968. The other indicators acted in a predictable fashion. The basic balance swung from surplus to deficit at the top of the cycle and back to surplus on the downturn. The money supply virtually stopped growing at the peak of the cycle and then picked up again just before the upturn. Industrial wholesale prices rose to a peak in 1966 and declined starting in 1967; their behavior obviously lagging the other indicators. The following paragraphs detail the events of the period, paying particular attention to the components of the foregoing aggregative measures and to monetary policies enacted in response to their movements.

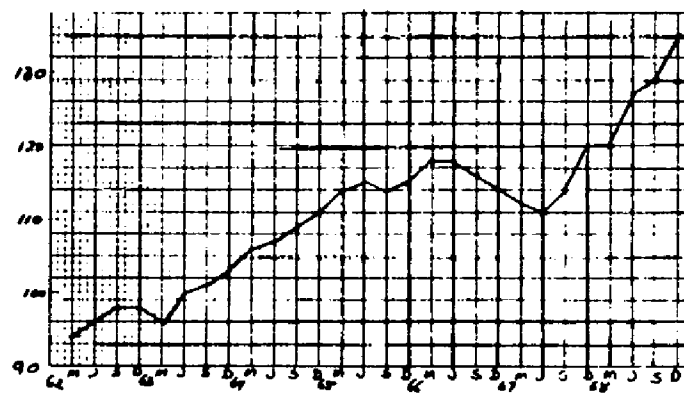
The year 1961 was one of strong growth for Germany. Internally, demand, led by public and private investment, expanded rapidly and prices began to rise in the latter part of the year. The inflation was precipitated in part by the raising of the Berlin wall in June 1961 which,

Figure 1. Important Economic Indicators, Federal Republic of Germany, 1962-68¹

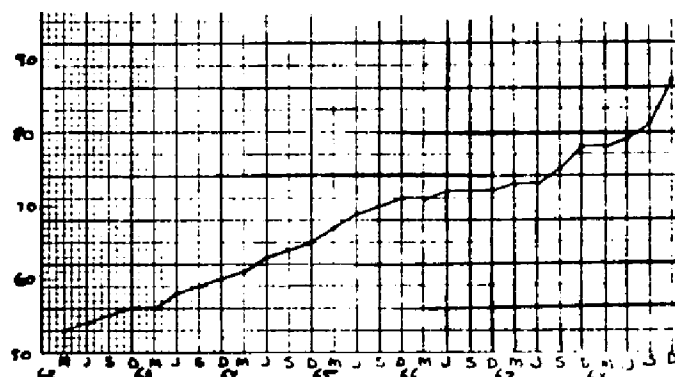
A. Prices and Wages



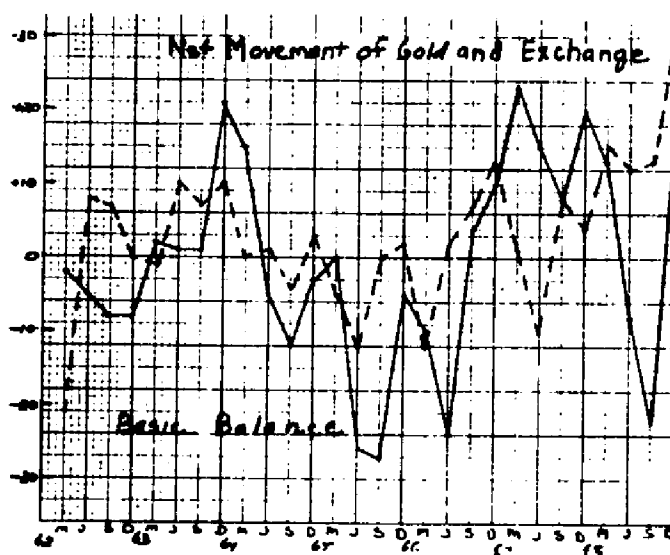
B. Industrial Production⁴



C. Money Supply
(In billions of deutsche mark)



D. Balance of Payments
(In billions of deutsche mark)



¹ All data are seasonally adjusted. The price and industrial production indices are quarterly averages of monthly figures; the rest of the series are end-of-quarter.

² 1960 = 100; food prices are excluded.

³ 1958 = 100.

⁴ 1963 = 100; construction activity is excluded.

Sources: Deutsche Bundesbank, Monthly Reports; OECD, Main Economic Indicators.

by cutting off an important component of the labor supply, led to rapidly rising wages. Despite the price rises, the current account remained in a strong surplus position because of relatively stronger inflation abroad and both long-term and short-term capital accounts showed net inflows. The long-term flows were caused by high interest rates and high profits in Germany, and the short-term flows by high interest rates and speculation against other currencies in favor of the mark, which was expected to be revalued.

Internal monetary policy, tight because the Bundesbank feared inflation, had exacerbated the inflows of capital in 1960. External pressures forced loosening of the policy in 1961. But, despite the lower interest rates, rising income, and attempts to stem the capital flow with selective controls (such as differential reserve requirements on foreign and domestic demand deposits in German banks and pegging the dollar/mark one month forward rate at a premium), the mark had to be revalued by 5 per cent in March. It was felt that this would correct an imbalance in the international price structure that had existed for many years.

By the end of 1961, the basic balance was in deficit. The effects on the current account lagged the revaluation by two quarters, but by the fourth quarter export prices had risen by about the amount of the revaluation. Part of this price rise can be attributed to the pressure on prices arising from the higher wages that resulted from the raising of the Berlin wall, although some of the wage increases were absorbed

by smaller profit margins. A slowdown in economic growth in the other developed countries also contributed to the leveling off of exports. At the same time, imports were rising with income and German tourists raised the service deficit. The Federal Government had obligated itself to debt prepayments and stepped up payments for foreign troops stationed on its soil.

The movements just mentioned were continued in 1962. GNP still grew rapidly although less so than in 1961, and more of it was siphoned off into price increases that accompanied the wage increases resulting from near zero unemployment. Foreign workers were imported, but they were almost entirely unskilled and so did little to relieve pressures on the tightest sector of the labor market. The workweek continued on its downward trend and profit margins were already low, having been trimmed the year before. The result was faster rising wages and prices than in the other industrial countries and a continuation of the unfavorable balance of payments trend begun in 1961. The steep rise in imports was abetted by a poor harvest. Exports continued to grow less quickly and the public capital outflow largely offset the private capital inflow that continued at about the same level as in 1961. The existence of the slight basic balance deficit was considered by the Bundesbank to be proof of the existence of a classic situation of an overheated economy running a deficit. Thus, the Bundesbank felt justified in not offsetting the resulting losses of liquidity. The higher level of interest rates fostered a

small inflow of short-term capital which was not, however, enough to prevent a loss of reserves.

Despite rising government spending, GNP grew even less quickly in 1963. The slower rise in demand was finally felt in a leveling off of prices and wages. By the fourth quarter, the balance of payments deficit had turned to surplus. Exports increased rapidly as other industrial countries experienced a greater inflation and German manufacturers were able to meet foreign demand with excess capacity left by the internal slowdown. The slowdown also accounted for a slower rise in imports and a decline in the invisibles deficit from fewer German tourists. The current account surplus of the fourth quarter of 1963 continued to grow in the first quarter of 1964 and the economy came under the influence of an export-led boom. Large inflows of long-term capital enlarged the surplus position.

Faced with the dilemma of a surplus in the face of a rapidly expanding economy, the Bundesbank employed a tight monetary policy but added several selective controls to forestall the capital inflow that would have been aggravated by such a move. The most effective of these maneuvers was the proposal to the Bundestag of 25 per cent withholding tax on interest payments of German bonds to foreigners. Proposed in March, it resulted in an immediate reversal of the capital inflow trend. Although the bill was not passed for nearly 12 months, the announcement effects were as desired. In addition, the Bundesbank forbade interest payments on foreign demand deposits in German banks

and raised required reserves. The Federal Government also attempted to lower the current account surplus by unilaterally lowering tariffs a small amount.

These measures, in conjunction with the profit squeeze that began when wages started going up and excess capacity was eliminated, produced a sharp turnaround in the long-term capital flow. In addition, rising prices at home and reduced demand abroad lowered the demand for exports while imports continued to rise with internal demand. The result was a deficit on basic balance in the second half of 1964.

This condition worsened in 1965. Imports climbed rapidly with internal boom conditions and rising prices. The price increases were due to wage increases that exceeded productivity increases and the economy running very close to capacity. The current account deficit was aggravated by the usual horde of prosperous German tourists swarming through Europe, increased outflow of investment income resulting from previously large capital inflows, and larger remittances from a larger foreign work force. The long-term capital account was in approximate balance, the private inflow being cancelled by a public outflow. There was an inflow of short-term capital to offset some of the basic balance deficit.

Throughout this period, the Bundesbank was faced with its familiar quandary of how to use a tight monetary policy without attracting too much foreign capital. Their solution was similar to that employed in early 1964. They tightened monetary policy considerably by raising

the discount rate, reducing the banks' discount quotas, and raising reserve requirements. At the same time, they encouraged German lending abroad by offering favorable rates on dollar swaps with the United States, discouraged capital inflows by prohibiting interest rate payment on foreign-held time deposits, and cut the rediscount lines of each bank by the amount by which foreign borrowing exceeded the average of such borrowing in the first half of 1964. All these actions reinforced the effects of tight money since they reduced the incentive for banks to obtain liquidity from outside Germany. The policy was not entirely successful. Banks continued to expand business loans by liquidation of other types of credit, and excess demand was increased through a tax cut which took effect January 1, 1965.

Consequently, boom conditions continued into 1966 and monetary policy remained restrictive in the sense of not offsetting losses of liquidity resulting from the deficit. By mid-1966, high interest rates and the erosion of profit margins resulting from rises in unit labor costs had caused a fall in investment and a deceleration in the growth of demand. With the slowdown in activity imports leveled off and the current account went into surplus. At the same time, borrowing abroad declined as more funds became available internally from smaller credit demands and from an inflow of liquidity accompanying the surplus on basic balance which the Bundesbank did not try to offset.

By the end of 1966, the German economy was in a recession. The liquidity increases arising from the payments surplus were not sufficient

to induce an expansion of credit because banks were rebuilding their stocks of highly liquid assets . The export surplus was not particularly demand stimulating as it arose primarily from a drop in imports and only to a small degree from an increase in exports . Thus, starting in December of 1966 and continuing through 1967, the Bundesbank engaged in a more expansionary policy by stepwise reductions in reserve requirements and the discount rate .

The balance of payments in 1967 showed a substantial current account surplus offset by capital outflows induced by the easing of monetary policy . To reverse some of the outflow, which it desired to have invested internally, the Bundesbank used forward market intervention and the suspension of the "right to offset." While the basic balance did not change much between the first and second halves of 1967, a turnaround from outflow to inflow of short-term capital enabled the Bundesbank to recoup in the second half of 1967 more reserves than it had lost in the first half.

The recovery begun in the last half of 1967 continued throughout 1968, when it was stimulated by sharp increases in inventory investment and exports . The current account surplus was offset to a large degree by unprecedented large outflows of long-term capital . These resulted from the relatively higher Euro-bond yields that were caused by high U. S. interest rates and also from unusually large increases in the medium- and long-term deposits of German banks --a consequence of increased cash flow in domestic businesses . The second half of

1968 was marked by accelerated increases in exports and business fixed investment. The former were caused by high imports of the United States and some payments and purchases caused by DM re-valuation rumors and border tax changes to take place December 1, 1968. September to November, 1968, was marked by a speculative inflow of short-term funds amounting to DM 10 billion. The Bundesbank took steps to halt the flow by raising reserve requirements, banning new deposit accounts by foreigners, and using swap policy to encourage an outflow. By the end of January 1969, most of the inflow had been reversed.

CHAPTER II

THE PORTFOLIO BEHAVIOR OF WEST GERMAN CREDIT INSTITUTIONS

Introduction

It is the purpose of this chapter to construct a framework in which international flows of capital into and out of the West German banking system can be analyzed. The variables which have the greatest impact on these transactions and the means by which the central bank can affect them are established by examining the motivations of the banks. The first part of the chapter is devoted to deriving a general theoretical framework and pointing out problems likely to be encountered in its application. In the second part of the chapter, the theory of bank behavior is applied to specific items on the balance sheets of German credit institutions

The Theoretical Framework

Introduction

The theory focuses on the magnitude of various items in the credit institutions' balance sheets. While those items entering international capital flows are given special attention in the application, the theory is formulated to encompass all balance sheet categories since the interrelations between domestic and foreign items are important in understanding and assessing central bank policies. First, two generalized equations are developed: one to

be applied to any asset category and the other to explain various types of bank borrowing. Equations are not developed for the other two major liability categories—deposits and the capital account. The banks are assumed to be passive in the determination of deposit stocks, accepting whatever the public wishes to give them.¹ The capital account is assumed to be small, stable, and not subject to short-term manipulation by the central bank. It is, therefore, of little interest for the ensuing analysis.

The model is a ratio-adjustment type. The banks decide what proportion of their resources they would like to have in a balance sheet category. In a period's time (one month in this study), adjustments are made towards, but not fully to, the desired ratio. Movements in observed ratios from the end of one month to the end of the next are a combination of contemporaneous changes in the desired ratio and adjustments that are still being made to past changes in the desired ratio. In the complete model, an observed change in a ratio will be a function of the variables which determine the desired level of that ratio and, also, the lagged level of the dependent variable. The coefficient on the lagged dependent variable measures what portion of the difference between the actual and desired ratio is made up in one time

¹Interbank balances are not treated symmetrically. As assets, they are determined endogenously as part of a larger asset category. As liabilities, they are lumped with the rest of deposits (of which they constitute 15 to 20 per cent) and are considered to be given to the banking system.

period.

The motivational framework of bankers in determining their desired asset and liability ratios is derived from the Tobin-Markowitz mean-variance analysis; the banks are assumed to be risk averters and profit maximizers.² The independent variables that determine desired ratios, therefore, reflect risk, return, and cost to the bankers. Also included as independent variables are factors which, by affecting the flow of resources into the banks, might impinge upon the banks' ability to make desired adjustments in their portfolios. To set forth a fully developed theoretical model which could be solved for the quantity of each balance sheet item, it would be necessary to specify a utility function which would give precision to the trade-off between risk and return. Since the aim of this chapter is only to isolate the proper variables and to suggest the direction of interactions among them, this exercise has been deemed unnecessary.

There are no difficulties with aggregation in either the theory or the data. The subject is total bank transactions, not just bank-nonbank, and consequently there need be no netting out of interbank balances. The balance sheet we are seeking to explain is the sum of all the balance sheets of all the banks in West Germany and there should be few conceptual problems in the switching between a single "typical bank" and the whole system.

²The original work is in Tobin [46] and Markowitz [32].

Assets

In its most generalized form, the demand for any asset to be held in the portfolio can be written:

$$A_a = f(i_B, \sigma_a^2, W)$$

where:

A_a = the quantity of asset a desired to be held in the portfolio

i_B = the expected interest rates on this and all other assets it is possible for the bank to hold

σ_a^2 = variance of asset a

W = total wealth available for investment.

The quantity rather than the price of the asset is the dependent variable. The banks are postulated to be price takers, adjusting the quantity of any asset in their portfolios to a set of prices they are given. For this assumption to be justified for the banking system, it must be assumed that the supplies of assets to all banks are unlimited at the going prices. This would be true if the total supplies of the assets were perfectly elastic or the banking system was such a small part of the asset markets it could not affect their prices. It would also hold if there were imperfections in the markets and prices were prevented from adjusting by a floor or ceiling imposed on them, or if a market did not exist but one of the asset holders stood ready to absorb or lose unlimited assets at the established price. The usual assumption in studies of the U. S. banking system is that banks are

price takers in the security markets and price setters in the loan markets. They are considered price takers for securities because they are a sufficiently small part of the market, and price setters for loans because they tend to have quasi-monopolies in their local areas and can, therefore, influence both price and quantity. Moreover, banks may lose short-run control over the quantity of loans if longer run profit considerations force them to honor loan requests, especially from established customers, even when this leads to less than an optimum portfolio position for the bank. The accuracy of assuming quantity as a dependent variable for the German banks will be examined below when each asset is discussed in greater detail.

The banks are assumed to take the mean of a probability distribution of possible returns as their expected return. Since it probably would be an unrewarding task to attempt to formulate a function describing how banks form their expectations about the level of interest rates in the period during which they will be investing, the assumption is usually made that banks take the actual return prevailing over the period as their expected return. The central bank influences portfolio decisions by actions designed to change the level or structure of rates facing the banks. There is no room in this formulation for the banks to alter their holdings because of expectations about the future course of interest rates. They do not extrapolate past trends, compare the present to some "normal" rate,

listen to econometricians or central bank rhetoric, or predict the influence on interest rates next period from central bank actions this period.

But the central bank does, in fact, influence banks' expectations about interest rates and capital gains and losses on their portfolios. More important, in this regard, than public pronouncements may be discount and open market actions which create the expectation of further action by indicating the general drift of monetary policy. In Germany, where the discount rate plays a pivotal role in the financial markets, expectations about its future movements are especially important in bank portfolio management. Changes in the discount rate also have a direct impact on asset choice by altering the cost of acquiring liabilities through discounting. A rise in the discount rate would lower the expected profit on a given portfolio. Similarly, a policy of lowering the discount quota would lower expected profit by increasing the probability that, in the event of a shortfall, more expensive ways of acquiring reserves would have to be used. A bank might be forced to sell securities, borrow from the public or other banks, or borrow from the central bank at the higher Lombard rate.

Risk associated with an asset arises from uncertainty about its future value. It is usually specified as the standard error or variance of a probability distribution of possible returns, the mean of which is the expected return. Investors use their observation of the past behavior of returns to form their opinions about variance. They attempt

to minimize the variance of their portfolios for a given return, or to maximize the return for a given variance. Since investors are assumed to be risk averters, higher yields are therefore associated with higher risk. Because there is less than perfect covariation among possible returns on different assets, diversification of the portfolio produces lower total variance for a given return.

In empirical studies of financial portfolio behavior, risk is almost always ignored.³ It is assumed that portfolios are diversified, but changes in the composition of these portfolios are attributed to changes in yield, the composition of wealth, or less than instantaneous adjustment to desired asset levels. The theoretical literature, on the other hand, affords risk an equal place to yield in determining portfolio behavior, for without its presence, portfolios would not be diversified.⁴ Changes in asset risk have been used as one of the rationales for the effectiveness of monetary policy. Intervention in the government securities market by the central bank creates uncertainty as to future yields which increases the risk associated with the banks' portfolios. To reduce the riskiness of their portfolios, bankers will substitute securities for loans.⁵ The Bundesbank sets rates of return, not quantities of assets, in its open market operations.

³The one exception to this is Pierce [38].

⁴See, for example, Tobin [46].

⁵Scott develops this argument in [44].

Frequent changes in these are likely to have analogous effects.

In keeping with a great tradition, risk as embodied in variance will be ignored in this study. One reason for this is that the use of variance as a measure of what the probability distribution looks like assumes that the investor looks upon gains and losses as equally likely.⁶ Since their effect is not independently estimated, changes in the riskiness of assets are likely to show up as a slower response to changes in other independent variables and will be part of the explanation for the size of the coefficient on the lagged dependent variable.

Investment in foreign assets may entail other kinds of risk in addition to possible changes in yield. If the asset is uncovered by a forward transaction, there is the possibility of a change in the price of the foreign currency vis-a-vis the domestic currency. If it is covered, there still exists the danger that capital controls will be imposed by the country in which it is invested, preventing the repatriation of funds. This latter risk can be represented by the balance of payments deficits of the country in question, although some measure of the level of reserves in relation to the deficit would make more sense.⁷ Since the banks' assets are almost always covered, the

⁶Not only are they equally likely, but they are as equally likely at an interest rate of 2 per cent as at an interest rate of 10 per cent.

⁷Miller and Whitman [33] use the liquidity balance lagged one quarter.

first type of risk is practically nonexistent. In this era of convertible currencies, there is considerable doubt whether the second risk has much relevance to short-term assets.

The total wealth available for investment, W , is a determinant of asset holdings because it acts as a constraint upon the investor's ability to take a position in any one asset. However, in the case of a financial institution, its portfolio of financial assets is not limited by its net worth or capital position, common definitions of wealth, but can be as large as its total resources. Thus total liabilities, including deposits, borrowing, and capital, is the proper constraint variable for banks and acts analogously to a wealth constraint for nonfinancial institutions.

The admission of deposits and borrowings into the constraint gives the banks short-run control over the total size of the portfolio. No longer is the problem the same as that posed by Tobin and Markowitz of how to allocate a portfolio of a given size, but rather the banks must determine the size and composition of the portfolio simultaneously. It is for this reason that estimations must be made of borrowing behavior as well as asset choice, despite the fact that the focus is on the asset side. Use of borrowing and deposits in the constraint also means that there is a cost involved with obtaining investable funds, which will affect asset choices. The simple "return" variable of Tobin-Markowitz is better thought of, in this context, as a profit variable.

While the use of the balance sheet guarantees that total assets

equal total liabilities, the relationship between a particular asset and the liabilities side is complex. Theoretical models of portfolio behavior solve this problem by solving for each asset as a proportion of the total portfolio.⁸ This implies that, ceteris paribus, a doubling of the portfolio size will double the holdings of each and every asset, or that asset holdings are homogeneous of degree one in portfolio size (measured, for financial intermediaries, by liabilities). Thus, the proper dependent variable to test the portfolio balance theories is the ratio of an asset to portfolio size. In addition to its theoretical correctness, the use of the ratio has the virtue that it allows the investigation to focus more clearly on determinants of asset holdings other than portfolio size. Since many of the Bundesbank policies attempted to affect the proportions of portfolios allocated to foreign and domestic assets without greatly affecting their growth, the ratio seems most appropriate for use in this study.

Most empirical models of the financial sector have not used this stock ratio as the dependent variable. Several have used the absolute amount of an asset, while others have used the ratio of the change in an asset to total wealth. In these latter studies, it is the flow of assets (change in asset holdings), rather than their stock, that is

⁸See Tobin [46], Markowitz [32], Roskamp [43], and Renshaw [42].

proportional with a resource or wealth constraint.⁹ If the value of the resource constraint is changing slowly, the stock ratio and flow ratio formulations will give nearly identical results in the short and long runs. When a nonratio model was tested against several flow ratio versions, there was very little difference in the results.¹⁰

In those studies that have used a ratio model, the denominator has been either total liabilities or liabilities minus required reserves (freely usable earning assets).¹¹ Either of these can be objected to on the grounds that they are too aggregative, that banks do not react identically to inflows of different kinds of liabilities. A new demand deposit will be invested differently than would a new time deposit which should be more stable and less likely to be withdrawn quickly. This problem can be overcome by making the ratios of various types of liabilities to each other or to total liabilities independent variables in the determination of an asset ratio. The hypothesis that holdings

⁹The Fed-MIT [31] and Goldfeld [15] models use the nonratio variable. The Brookings model [30] uses the asset flow ratio. Silber [45] fits his equations using both the nonratio and asset stock ratio variables. He then chooses the equation that gave him the best fit to include in his final set of equations, which contains both types. Although he occasionally reports that one or another of the formulations gave him nonsense results (p. 28), he makes no attempt to explain this phenomenon. Brainard-Tobin use the stock ratio variable, but their coefficients are not statistically estimated.

¹⁰See Goldfeld [15], pp. 139-46.

¹¹The Brookings model [30] uses the former method; Brainard and Tobin [5] use the latter. Pierson [39] also uses earning assets as her scale variable for commercial banks in fitting reduced form financial equations.

of a particular asset depend on the mix as well as the level of liabilities would then be tested.

The Bundesbank has created more than the sight, time, and savings distinctions among deposits by putting differential reserve requirements on foreign-owned deposits and then granting the banks the right to offset these higher reserve requirements by the amount of their foreign asset holdings. Thus a bank can hold nine categories of deposits, with almost as many different reserve requirements: domestic sight, time, and savings deposits, offset foreign sight, time, and savings deposits (reserve requirement = 0), and not offset foreign deposits. Switches among these will result in changes in both total and freely usable assets.

The use of ratios will give misleading results if the assumption of first degree homogeneity is incorrect. That is, even if all liabilities increased in the same proportion and interest rates and risk remained constant, the asset ratios would still change if the demand for the assets is simply not homogeneous with total resources. The greatest likelihood of this exists with respect to excess and highly liquid secondary reserves which are held for precautionary and transactions purposes, to guard against shifts in deposits.¹² To some degree they are substitutes for required reserves and, therefore, an increase in the required reserves ratio would probably induce a decrease in

¹²A point made by Christ [7] in his discussion of the Brainard-Tobin model.

the desired ratio of excess¹³ and secondary reserves to total liabilities. The demand for secondary reserves is also a function of the alternative costs of meeting deposit outflows (the discount and advance rates) as well as the returns on other assets.

Tobin has tackled this aspect of the homogeneity problem by extending the separation theorem he proved for the individual investor in his original article to the banking system.¹³ In the article, he proved that an investor's decisions could be made in two independent steps—the first one to determine what proportion of his portfolio to hold in risky or riskless assets, and the second to decide in what proportions the various risky assets should be held. Analogously, a bank can divide its assets into a defensive position, consisting of free reserves and short-term government bills, and the rest. The bank first decides on the size of its defensive position (a function of the difference between the loan and bill rates) and then decides on the proportion of the defensive position it wishes to hold as free reserves (a function of the bill and discount rates). Under this scheme, the defensive position plus required reserves would be homogeneous of degree one in total liabilities (in constant proportions) and the rest of the portfolio would be homogeneous of degree one in total liabilities minus the defensive position.

The problem is simplified in the German banking system inasmuch

¹³The banking analysis is part of Tobin's unpublished book. This elucidation is taken from Goldfeld [15], pp. 11-14.

as the banks have no need to hold excess reserves under normal conditions since they have an automatic line of credit with the Bundesbank up to their discount quotas. The defensive position of German banks encompasses almost all short-term money market paper in their possession. The position of short-term foreign assets in this scheme is not clear. In form (interbank deposits and short-term money market paper) most of them qualify as part of the banks' defensive position. While they are not discountable at the central bank, they are usually exchangeable on the New York or London money markets and, therefore, highly liquid. On the other hand, they entail the extra risk involved in investment in foreign countries. It is doubtful that the German banks consider them perfect substitutes for domestic paper. To avoid possible mistakes arising out of misclassification, the resource constraint used in this study will be total liabilities minus the banks' cash position (reserves at the Bundesbank plus vault cash) or their freely usable assets. At the same time, variables reflecting precautionary and transactions motives will be used in the explanation of secondary reserves.

The central bank has a direct impact on the resource constraint through required reserve ratios which determine freely usable assets and through the discount and open market rates which set the cost of borrowed liabilities. Changes in these policy parameters induce the banks to take actions which result in a multiple expansion or contraction

of credit and resources. One objective of Bundesbank policy has been to manipulate total resource variables in the manner it felt necessary for domestic stability while preventing such manipulation from having its usual effects on one type of asset—foreign assets.

It is also plausible that the direction and speed of change in deposits, as well as their total and composition, affect asset holdings. A precautionary demand for assets would be increased by a steady decline in deposits that was expected to continue, or by highly unpredictable and volatile deposit fluctuations. Since deposit shifts contribute to the risk and uncertainty associated with a level of expected profits, a shift towards less risky assets would be expected to occur in the face of this type of activity. Kane and Malkiel argue, however, that the bank's best approach to such a situation is to reduce its deposit volatility by continuing to grant loans to steady customers in order to keep their accounts.¹⁴ Therefore, central bank actions to tighten monetary policy will result in reduced holdings of government securities rather than reduced commercial loans. Kane and Malkiel stress the importance of the "quality" or longevity of a deposit account in the bank's profit function. From this line of reasoning, one would expect portfolio adjustments to take place in the highly liquid parts of the balance sheet. In order to maintain loans when money is tight, banks will sell government securities and buy them back as

¹⁴See Kane and Malkiel [24].

deposits expand, and it is easier to satisfy customers' needs. This tendency to make adjustments in the most liquid parts of the portfolio has been widely observed and is taken for granted by the Bundesbank, which partially judges the effects of its monetary policy by the banks' liquidity positions.

The banks probably conceive of their asset ratios in relation to some normal growth in deposits. Especially large or small changes will be reflected in changes in desired asset proportions. There is also the possibility that reactions to unusual deposit changes will show up as a lagged response to changes in resources. A bank will not adjust its actual to desired holdings until it is sure the new level of deposits will persist.

The lagged level of the dependent variable is used as an independent variable because it is not expected that the banks adjust the actual to the desired ratios within one time period. Uncertainties about the stability of the levels of the other independent variables will contribute to a lagged response. Also, any divergence between the expected and actual levels of the independent variables will cause the coefficient on the lagged term to be larger since incomplete adjustment to the actual levels used in estimation will be observed. Reaction to changes in missing variables, especially risk, and delays in the decisionmaking process will also explain the size of the lag coefficient.

Another interference with the adjustment process would be a lack of readily available liquid funds to make the desired portfolio

changes. In the short run, the flow of new funds into the banks may not be great enough to allow them to make the desired marginal adjustments in all asset categories after fulfilling obligations on required reserves and previous loan commitments. A short-run liquidity constraint consisting of the change in liabilities less the change in required reserves and loans sets the bounds within which adjustments to changes in total resources, rates of return, or uncertainty can take place.¹⁵

The completed generalized asset formulation reads:

$$\Delta \left[\frac{A_a}{L - C} \right] = f \left[i_B, \Delta D, \frac{\Delta(L - C - LN)}{L - C}, \frac{D_s}{L}, \left[\frac{A_a}{L - C} \right]^{-1} \right]$$

The additional symbols are:

L = total liabilities,

C = cash position (reserves at the Bundesbank and vault cash),

D = deposits,

D_s = sight deposits,

LN = loans.

¹⁵The form of the liquidity constraint used in this study is similar to the constraint variable in the Brookings model [30]. There, the change in deposits less the change in loans and reserves is the numerator. The greater relative importance of borrowing for the German banks suggests that its omission would be incorrect if the intent of the variable is to measure the short-term availability of unencumbered resources in the banking system. The idea that these are flows that the banks have no control over is sacrificed by the modification. Goldfeld [15] uses the idea of the constraint variable but estimates a coefficient on each part of it, rather than on the whole variable.

Liabilities

The banks' liabilities can be subdivided into deposits and loans. The capital account will be ignored on the grounds that it is small and stable. The usual assumption is that the banks accept all deposits offered to them, so that the total of time and demand deposits is determined by the public. (This ignores interbank deposits.) The banks have control over the rates they offer to pay on time deposits and through manipulation of these rates can affect the mix of deposits which in turn will affect total deposits because of differential reserve requirements. While German banks pay interest on their demand or sight deposits, this rate is controlled by law and has been at a maximum throughout the period being studied. Time and savings deposit rates have also been at their legal ceilings for much of the period. Apparently the ceiling was avoided in some cases by classifying deposits as borrowings, but the extent of this evasion is not known. Since 1966, there has been a loosening of control over time deposit rates. The maximum maturity of time deposits under control dropped from four years to three months. The consequent raising of rates, especially in the shorter maturities, caused some switching from sight to time deposits. This shift affects asset choices by increasing freely usable assets, and by giving banks a more stable mix of liabilities which reduces profit variance and should induce investment in higher yield, higher risk, assets.

While the banks have no direct control over their demand deposits,

they can affect the quantity of time deposits the public wishes to hold by changing the rates paid on them. A fully developed model of the German financial sector would require an equation describing how the rates were set (after controls were loosened) and another equation describing how the public reacted to those rates to determine the quantity of time deposits. Since our goal is more modest, this mechanism will be ignored. The banks are assumed to be passive in the determination of both time and sight deposits. This assumption will introduce distortion into the model if bank asset choices and the time deposit rate are not independent. It is most likely that the rate banks are willing to pay on deposits depends on the general level of profitability of investing the funds they obtain, but that choices among assets are independent on the time deposit rate.

Since 1960, the banks have been forbidden to pay interest on most foreigners' deposits except savings deposits of individuals. Therefore, practically all foreign deposits at the banks are sight deposits. In this study the exceptions are lumped together with sight deposits to form "nonresidents' deposits" and are treated as sight deposits.

The levels of bank deposits and borrowing from the central bank are closely interrelated. In many models of the financial system the total amount of deposits is a function of banks' demands for assets operating through the free reserve effect. A rise in interest rates induces banks to economize on excess reserves and to borrow more

from the central bank. The investment of these funds causes them to flow back through the banks as either time or demand deposits or to be held as currency, depending on the asset preferences of the recipient. So total deposits are a function of the interaction between public and bank asset preferences and the money supply is elastic to the interest rate.

In an open economy the free reserve effect becomes considerably more complex. A rise in foreign interest rates would produce a reduction in free reserves without an increase in the domestic money supply since the sellers of the asset do not recirculate the money they receive in the purchaser's home country. A rise in domestic interest rates relative to foreign rates might cause an expansion of the domestic money supply without a reduction in free reserves if banks substitute domestic assets for foreign assets while keeping the same levels of excess and borrowed reserves. The increase in the money supply under these circumstances will become greater if the banks borrow abroad for investment at home, as the American banks did during 1969. Since excess reserves are insignificant in the German system, the interest elasticity of the money supply arises from the banks' borrowing activities from foreigners and from the central bank. For this reason, there is no "free reserve" equation in the model. The free reserve effect is a proxy for many complicated portfolio decisions in the economy. The bank side of these decisions is covered under its various components.

German banks borrow on both long and short terms. Short-term borrowing is done from the central bank, from other domestic sources, and from abroad. The profit maximizing bank will borrow as long as the marginal cost of borrowing is less than the marginal revenue that can be obtained from investing the funds obtained.

The generalized equation for bank borrowing is:

$$\Delta \left[\frac{BR_a}{L} \right] = f \left[i_B, i_{BR}, \Delta D, Q, \left[\frac{BR_a}{L} \right]^{-1} \right]$$

The new symbols are:

BR_a = quantity of borrowing liability a

i_{BR} = the cost of that type of borrowing

Q = discount quota.

As with assets, the quantity of the balance sheet item is the dependent variable and the price the independent. There can be no doubt this is true with respect to foreign borrowing, especially that done in New York. There might be a problem with the Euro-currency market, but the American banks dominate this market in such a manner as to make the German banks almost perfect competitors despite their sizable presence there. The supply of funds to the banks through the central bank discounting procedures is perfectly elastic up to the point of its quota when it becomes somewhat less elastic at the Lombard rate 1 per cent higher than the discount rate.

The banks cannot be said to be perfect competitors when they

borrow domestically outside the central bank. As the principal suppliers of liquidity to the domestic economy, they are simply too large a part of the long-term and short-term debt markets. Most of the bank borrowing is from other credit institutions rather than from outside the system.

Borrowed funds do not add to the risk of a bank's profits. Indeed, since the amount of the borrowing and the terms of repayment are known, a larger percentage of borrowed liabilities should reduce the variance of profit. On the other hand, the more the banks use their discount quotas, the greater the danger they will have to resort to more expensive forms of credit to meet unexpected outflows of deposits. Approaching the quota, whether interpreted as a downward revision in expected profits or an increase in risk, will definitely affect the bank's portfolio decisions.

The change in deposits is an independent variable because it is thought that much borrowing, at least short-term, takes place to meet outflows of deposits. A large and positive change in deposits should give the banks an opportunity to pay back past borrowing. The interest rate terms represent the opportunity cost of not borrowing and the cost of borrowing. A lagged term was added for the same reasons that one would expect it in the asset equations, decision lags, uncertainty about the future course of events, etc.

The Balance Sheets of West German Credit Institutions

Tables 1 and 2 give a breakdown of the balance sheet items of

TABLE 1
ASSET RATIOS AS OF JANUARY 31, 1967

	Per Cent of Total Assets		Per Cent of Total Assets Less Cash	
	All Banks	Selected Banks	All Banks	Selected Banks
1. Cash	3.7	3.2	3.8	3.3
2. Domestic Short-term Money Market Paper and Liquid Assets	16.6	19.1	17.3	19.8
Domestic Interbank Balances	(9.1)	(8.7)		
Postal Chequeing Account	(.1)	(0)		
Matured Bonds, etc.	(.3)	(.4)		
Equalization Claims	(1.3)	(1.0)		
Bills	(4.6)	(7.2)		
Treasury Bills	(1.2)	(1.8)		
3. Medium-term Notes	.8	1.4	.8	1.4
4. Domestic Short- and Medium- term Lending	17.2	20.7	17.9	21.3
5. Long-term Lending	56.8	49.7	59.1	51.2
Securities and Syndicate Participations	(7.9)	(6.3)		
Long-term Lending	(40.4)	(31.8)		
Loans on a Trust Basis	(8.0)	(10.8)		
Participations	(1.5)	(.8)		
6. Other Assets	3.6	2.8	3.7	2.9
Other Assets	(1.7)	(1.7)		
Real Estate	(1.0)	(.6)		
Covering Claims	(.6)	(.2)		
Bonds of Own Issue	(.3)	(.3)		

(Cont'd.)

TABLE 1
(Cont'd.)

	<u>Per Cent of Total Assets</u>		<u>Per Cent of Total Assets Less Cash</u>	
	<u>All Banks</u>	<u>Selected Banks</u>	<u>All Banks</u>	<u>Selected Banks</u>
7. Foreign Sight Deposits	.4	.9	.4	.9
8. Foreign Time Deposits	.6	1.2	.6	1.2
9. Foreign Money Market Paper	.1	.1	.1	.1
10. Foreign Short-term Lending	.4	.8	.4	.8

TABLE 2
LIABILITY RATIOS AS OF JANUARY 31, 1967

	Per Cent of Total Liabilities	
	All Banks	Selected Banks
1. Sight Deposits	12.5	12.5
2. Time Deposits	13.5	22.8
3. Savings Deposits	27.8	10.0
4. Short-term Borrowing	.8	.9
Acceptances	(.3)	(.5)
5. Bonds and Long-term Borrowing	35.9	41.9
Long-term Borrowing	(1.3)	(1.3)
Bonds	(16.2)	(10.4)
Long-term Loans	(10.4)	(13.5)
Loans on a Trust Basis	(8.0)	(10.7)
6. Other Liabilities	8.1	8.5
Capital	(4.0)	(4.2)
Other Reserves	(.2)	(.3)
Reserves for Special Purposes	(.9)	(1.0)
Value Adjustments	(.7)	(.5)
Other Liabilities	(2.3)	(2.5)
7. Foreign Deposits	1.0	2.1
8. Foreign Short-term Borrowing	.4	.7
9. Resort to DB Credit Facilities	1.3	2.2

West German credit institutions . The headings are taken from the banks' balance sheets as published monthly by the Bundesbank . Balance sheet items are consolidated so as to preserve the strongest substitution effects among domestic assets and between domestic and foreign assets while minimizing the number of categories .

Foreign categories are not aggregated since they are the focus of the study . Columns one and three of Table 1 give the proportion of each item in the balance sheets of all institutions on January 31, 1967, an arbitrarily chosen date . Total assets or liabilities are used as the base in column one, and freely usable assets in column three .

Foreign assets or liabilities are not given separate categories in the complete balance sheets as published, but are reported monthly in a separate table . Domestic categories in Tables 1 and 2 were obtained by subtracting the foreign item from the figure found in the balance sheets . Unfortunately, this is not a legitimate practice . The foreign asset and liability figures are accurate, but the consolidated balance sheets for all credit institutions are published with foreign bank branches' assets and liabilities to parent and sister institutions included on a net basis . For this reason, both total assets and total liabilities are understated, but by a minimal amount and affecting all ratios alike . However, particular domestic asset or liability categories may be more seriously understated if they contain concentrations of the foreign assets or liabilities that were added to them

on a net basis. The extent of this problem is impossible to gauge. Since 1961, the foreign bank branches have held between 10 per cent and 20 per cent of the total foreign assets and liabilities in German banks, but what percentage of these represents dealings with parent and sister institutions cannot be determined from the published figures. All categories are probably affected, especially long-term borrowing, which includes working capital obtained from the head bank.

Since not all banks engage in foreign transactions, an attempt was made to subtract the assets and liabilities of the banks that didn't from those that did. Any efforts to affect the flow of foreign assets and liabilities would have to operate on those banks holding or likely to hold them. Columns two and four of Table 1 and column two of Table 2 represent this effort. The banks which were excluded include mostly mortgage banks, savings banks, and consumer credit institutions. These held an average of .9 per cent of total foreign assets of credit institutions and 7.3 per cent of total foreign liabilities between 1961 and 1968 while accounting for 48.8 per cent of all assets of credit institutions in January 1967. Their foreign liabilities were concentrated in savings accounts and short-term borrowing (10 per cent of the total) and their percentage in the latter category has been increasing to such an extent that their being omitted probably would impart some bias to the ratio of foreign borrowing to total liabilities. The included credit institutions concentrate more in

short- and medium-term lending and investing than the average and obtain more of their resources through long-term borrowing and less through deposits than the average. Foreign assets and liabilities are not broken down by type of bank and were assumed to be held entirely by selected banks when computing the ratios. The foreign liability ratios in Table 2, column two, are therefore overstated by about 7 per cent.

What follows is the application of the generalized equations developed for assets and borrowing to specific items on German credit institution balance sheets. The goal is to move towards a specification of bank behavior capable of being empirically estimated. Deviations from the general framework necessitated by idiosyncrasies of the German financial system or peculiar characteristics of an asset are justified as they are introduced into each equation. The determinants of the categories "other assets" and "other liabilities" are not specified, nor will they be estimated. The two categories are assumed to adjust in such a way as to satisfy the balance sheet constraint.

The new symbols used are:

r_s = reserve ratio on domestic sight deposits

r_t = reserve ratio on domestic time deposits

r_{sv} = reserve ratio on domestic savings deposits

r_{sf} = reserve ratio on foreign sight deposits

r_{tf} = reserve ratio on foreign time deposits

r_{svf} = reserve ratio on foreign savings deposits

D_t = time deposits

D_{sv} = savings deposits

D_{sf} = foreign sight deposits at German banks

D_{tf} = foreign time deposits at German banks

F_s = German bank sight deposits at foreign banks

F_t = German bank time deposits at foreign banks

i_D = discount rate

Q = discount quota

SR = secondary reserves

MTN = medium-term notes

LN_{sm} = short- and medium-term loans

Y = German income

LN_g = long-term lending

M = imports

X = exports

MM_f = foreign money market paper

LN_{sf} = foreign short-term lending

BR_s = short-term domestic borrowing

i_{DY} = rate of interest on day-to-day money

BR_g = bonds and long-term borrowing

i_L = rate of interest on long-term bonds

BR_{sf} = short-term foreign borrowing

CR_b = Bundesbank credit

Assets

1. Cash (vault cash plus Bundesbank deposits)

$$\Delta \frac{C}{L} = f(\Delta r_s, \Delta r_t, \Delta r_{sv}, \Delta r_{sf}, \Delta r_{tf}, \Delta r_{svf}, \Delta D_s, \\ \Delta D_t, \Delta D_{sv}, \Delta D_{sf}, \Delta D_{tf})$$

The banks do not manage their cash positions by the same principles that govern their other asset holdings. Cash does not earn interest, whether it is held in the bank's own vaults or at the Bundesbank, so the cash position is minimized as much as possible within the constraints of the Bundesbank's reserve requirements. Usually only small amounts of excess reserves are held (between 1 and 3 per cent of required reserves). However, extraordinarily large inflows of deposits, such as those associated with threats of devaluation of other currencies, are kept partly as excess reserves since they are expected to reverse themselves rapidly. The inclusion of borrowings in liabilities also keeps the cash equation from being an identity.

2. Secondary Reserves (domestic short-term money market paper, liquid assets, and interbank deposits)

$$\Delta \frac{SR}{L - C} = f \left[i_B, \Delta D, \frac{D_s}{L}, i_D, \frac{\Delta(L - C - LN)}{L - C}, \Delta Q, \right. \\ \left. CR_b, \frac{C}{L}, \left[\frac{SR}{L - C} \right]_{-1} \right]$$

Secondary reserves are part of the bank's defensive position.

As such, they are held to meet sudden deposit losses as well as for investment purposes. Large deposit changes (ΔD) and a high proportion of sight deposits $\left[\frac{D_s}{L} \right]$ indicate a potentially unstable deposit base and will induce more investment in the highly liquid assets that comprise secondary reserves. As the banks approach their discount quotas, they will hold more secondary reserves to prevent having to borrow at the higher Lombard rate. Unfortunately, there are no regularly published series on either the aggregated total size of the banks' borrowing quotas or on their unused portion. The effect of the discount ceilings is approximated by the amount of Bundesbank credit the banks are using (CR_p should be positively related to the secondary reserve ratio since the more credit is used, the less is available) and the large discrete changes in quotas (ΔQ) initiated by the Bundesbank as a policy tool. This specification is inaccurate to the extent that advances are included in the Bundesbank credit figures (very minor) and that the steady growth of the ceilings, as related to changes the banks' capital structure over time, influence bank behavior. The banks' cash position (C/L) is included to take account of the substitution between primary and secondary reserves within the defensive position.

The Bundesbank's open market and discount facilities limit the degree of fluctuation of the rates on short-term paper. Except for during short periods of very tight money, the discount rate is the ceiling on these rates. This is because the banks, who are a prime

source of short-term paper, can obtain funds at least that cheaply. Even when short-term rates went above the discount rate, the Lombard rate remained an effective ceiling. The Bundesbank's policy of setting an open market rate and accepting all transactions at that rate effectively makes the supply of eligible paper to the banks completely elastic. It also means that the assumption that the banks are price takers in the markets for secondary reserves is not unreasonable, especially for marginal adjustments.

3. Medium-Term Notes

$$\Delta \left[\frac{\text{MTN}}{L - C} \right] = f \left[i_B, \frac{\Delta(L - C - \text{LN})}{L - C}, \left[\frac{\text{MTN}}{L - C} \right]_{-1} \right]$$

These are primarily of government issue. Many of them are traded by the Bundesbank in its open market operations.

4. Short- and Medium-Term Lending (loans)

$$\Delta \left[\frac{\text{LNsm}}{L - C} \right] = f \left[i_B, \frac{\Delta(L - C - \text{LN})}{L - C}, \Delta Y, \left[\frac{\text{LN}}{L - C} \right]_{-1} \right]$$

5. Long-Term Lending

$$\Delta \left[\frac{\text{LNg}}{L - C} \right] = f \left[i_B, \Delta Y, \frac{\Delta(L - C - \text{LN})}{L - C}, \left[\frac{\text{LNg}}{L - C} \right]_{-1} \right]$$

The change in income (ΔY) is included in these equations as a proxy for default risk. When ΔY is large and positive, default risk is less and the banks should be willing to lend more. There is a simultaneity problem because a positive change in income will also

cause an increase in the demand for loans by the public. Thus, a positive coefficient on ΔY is expected, but its meaning is not clear.

There are more serious simultaneity problems if the public's demand for loans is not perfectly elastic to the banks. Since the banks are the dominant holders of this type of asset, there is no reason to believe that such is the case. But, if the ceilings that the Bundesbank sets on interest rates charged by the banks are effective, there exists a disequilibrium situation such that, within limits, the banking system faces an elastic demand for its loans. For large loans, however, terms have probably been negotiable, except in the tightest of monetary environments. Proper estimation of the effects of the independent variables would require another equation showing the other side of the market. The problems that may arise from not having postulated a supply equation will have to be considered when evaluating the results.

6. Foreign Sight Deposits

$$\Delta \left[\frac{F_s}{L - C} \right] = f \left[i_B, M, \left[\frac{F_s}{L - C} \right]_{-1} \right]$$

The opportunity cost of holding these deposits is represented by i_B . Since most of these deposits represent working balances held by the banks to help their customers finance trade, the volume of imports should give an estimate of the transactions demand for overseas balances. If the banks treat these balances as an inventory, then they might be linear in $\sqrt{M}$.

7. Foreign Time Deposits

$$\Delta \left[\frac{F_t}{L - C} \right] = f \left[i_B, \frac{\Delta(L - C - LN)}{L - C}, \left[\frac{F_t}{L - C} \right] -1 \right]$$

8. Foreign Money Market Paper

$$\Delta \left[\frac{MM_f}{L - C} \right] = f \left[i_B, \frac{\Delta(L - C - LN)}{L - C}, \left[\frac{MM_f}{L - C} \right] -1 \right]$$

German bank holdings of foreign time deposits and money market paper were treated simply as financial investments which respond to the usual portfolio variables. The two categories include Euro-dollar deposits and holdings of U. S. Treasury bills.

9. Foreign Short-Term Lending

$$\Delta \left[\frac{LNs_f}{L - C} \right] = f \left[i_B, X, \frac{\Delta(L - C - LN)}{L - C}, \left[\frac{LNs_f}{L - C} \right] -1 \right]$$

A large proportion of German banks' lending to foreigners is to foreign importers financing their trade with Germany. Consequently, the volume of exports will largely determine their volume of loans outstanding to foreigners.

Liabilities

1. Deposits

All deposits, domestic and foreign, are considered to be determined exogenously to the banks. Although this is certainly not true of interbank balances, they are included in this category and not separately estimated.

2. Short-Term Borrowing

$$\Delta \left[\frac{BRs}{L} \right] = f \left[i_B, i_D, i_{DY}, \Delta Q, \Delta D, \left[\frac{BRs}{L} \right]_{-1} \right]$$

The various interest rates represent the return on the employment of borrowed funds and the costs of alternative methods of borrowing. A reduction in quotas should reduce borrowing. Large changes in deposits will either necessitate borrowing or afford the opportunity to pay debts incurred in the past.

3. Bonds and Long-Term Borrowing

$$\Delta \left[\frac{BRg}{L} \right] = f \left[i_B, i_L, \left[\frac{BRg}{L} \right]_{-1} \right]$$

Long-term borrowing will be positively related to the returns from using the borrowed funds and negatively related to the cost of borrowing.

4. Foreign Short-Term Borrowing

$$\Delta \left[\frac{BRs_f}{L} \right] = f \left[i_B, M, \left[\frac{BRs_f}{L} \right]_{-1}, \Delta Q_{BR} \right]$$

A large part of foreign borrowing is done to help German importers finance trade. Hence M should explain most of this ratio. On occasion, the Bundesbank has penalized credit institutions by reducing their discount quotas by the amount they have increased foreign borrowing after a specified date, and ΔQ_{BR} is meant to capture that effect. Larger reductions in quotas will cause increasing reluctance to borrow more.

5. Use of Bundesbank Credit

$$\Delta \left[\frac{CR_b}{L} \right] = f \left[i_B, i_D, \Delta D, \left[\frac{CR_b}{L} \right] -1 \right]$$

Bundesbank credit covers both discounts and advances . The elements in CR_b are also contained in the short-term borrowing category .

CHAPTER III

ESTIMATION

Introduction

This chapter contains the estimation of the equations formulated in the last chapter. The first part delineates the changes needed to get the equations in a form capable of being estimated. Next, details of data and methodology necessary for interpretation of the results are given. After the estimates are presented, they are discussed for each equation. Finally, an evaluation of the model and its estimation is made. Discussion of alternative estimations, scatter diagrams, and some other extraneous material can be found in Appendix B.

Specification

In estimating the equations, the relationships among the variables was assumed to be linear and additive. (That is, linear with the asset or liability ratio, not with the asset or liability itself.) The form that the equations were fitted in was:

$$\Delta Y_t = a + bX_{it} + cY_{t-1} + dSi_t + u_t.$$

The asset or liability ratio is Y , the X_i are interest rates and other variables, the S_i are seasonal dummies, and u is the error term.

It was necessary to specify i_B , the spectrum of interest rates confronting the German banks as they make their portfolio decisions.

Rates were chosen to apply to each balance sheet category that was estimated. For categories that contained several varieties of financial instruments, an attempt was made to use a representative rate. For some assets, it was necessary to choose a specific series merely because it was available continuously over the period studied. Domestic rates of return used were the discount rate, the Lombard rate, the overnight rate (comparable to the Federal funds rate in the United States), the rate on three-month Federal Government bills, a short-term loan rate, a rate on long-term securities, and a rate on 24-month government bonds. Foreign rates are the New York and London time deposit rates (on deposits in their home currencies), the London three-month Euro-dollar rate, and the three-month U. S. Treasury bill rate.

Data and Methodology

The ordinary least squares regression technique was used. An unsuccessful attempt was made to correct for first order autocorrelation of the error terms by running each regression twice, the second time including the lagged residuals from the first time as an independent variable. Because the lagged dependent variable is so closely related to the residual, when a regression included both, one drove the coefficient of the other towards zero and insignificance. It was very rare that both the autocorrelation coefficient and the coefficient on the lagged dependent variable were significant in the same equation. Since reporting the occurrences where the speed of adjustment

coefficient is zero would entail a hypothesis that the ratio adjustment model developed in the last chapter was wrong (a hypothesis I do not believe to be correct), the equations are reported without the autocorrelation correction. Consequently, the speed of adjustment is exaggerated in some instances (since it soaks up the autocorrelation) and the Durbin-Watson statistic is not useful for pointing out such cases although, following convention, it will be reported.¹

The dependent variable in each regression is the change in the asset or liability ratio and the independent variables are the levels of interest rates and the lagged level of the dependent variable, as formulated in Chapter II. It is possible to regress the level of the dependent variable on the same independent variables, using the same theoretical basis, but this yields inflated R^2 s. When the change in the ratio is used, the coefficient on the lagged level of the dependent variable is the per cent of the gap between last period's actual ratio and this period's desired ratio made up during this period multiplied by -1.

Monthly data were used. Seasonal adjustments to the data were made by estimating 11 dummy variables and an intercept for each equation. February was the omitted month since it falls in the middle of a quarter and was expected to show little variation that

¹An attempt to break the tie between the autocorrelation coefficient and the speed of adjustment coefficient by running $\Delta Y_t = a + bX_t + cY_{t-2}$ the first time and then $\Delta Y_t = a + bX_t + cY_{t-1} + de_{t-1}$ (where e_{t-1} is the lagged residual from the first equation) also failed.

would be interesting to observe directly. May or November would have done just as well. August, being vacation month for most Germans, often displayed coefficients contrary in size and sign to other mid-quarter months.

Each equation was estimated separately, not simultaneously. "Other assets" and "other liabilities" were residual categories and were not estimated. They are assumed to adjust in such a way as to satisfy the balance sheet identity. They were, in fact, quite stable over the period.

Since the focus of the model is on foreign assets and liabilities, two different sets of banks were used in the asset and liability equations, coverage of foreign items being the criterion for selection. Because foreign liabilities are well spread out (although commercial banks have most of them, the rest are scattered evenly among the other institutions), the whole group of credit institutions was used to estimate the liabilities equations. Foreign asset holdings are more concentrated; the commercial banks hold over 85 per cent of all foreign assets and giro institutions the rest. So, the subset of credit institutions called "selected banks" in Chapter II, Tables 1 and 2, was used for estimating the asset equations. Selected banks include the Bundesbank Monthly Report categories "Commercial banks," "Central Giro Institutions," and "Credit Institutions with Special Functions." The last category, which contains some giro institutions, also includes the Reconstruction Loan Corporation, a

government agency which channels foreign aid to less-developed countries. This agency's sometimes large holdings of U. S. Treasury bills were motivated by political rather than economic factors. Its balance sheet has been subtracted from the totals for foreign assets, total assets, and liabilities.

Estimation

List of Variables (See Appendix A for sources.)

Unless otherwise noted, all balance sheet variables are for the end of the month; all interest rate variables are averages of daily or weekly rates over the month; asset items are ratios with liabilities minus cash in the denominator; and liabilities items are ratios to total liabilities. The terms following the colon give the specific contents of the variable, as listed in the data source.

Asset and Liability Ratios

- C The cash position of selected banks: their deposits at the Bundesbank plus cash.
- SR The secondary reserves of selected banks: interbank balances plus balances on postal check accounts plus matured bonds, interest and dividend coupons, checks and bills for collection, plus equalization claims plus Treasury bills and noninterest bearing Treasury bonds plus commercial bills less foreign money market paper and deposits at foreign banks.
- MTN Medium-term notes of selected banks.
- LNsm Domestic short- and medium-term loans of selected banks: debtors.
- LNg Long-term loans of selected banks: long-term lending, securities and syndicate participations, loans on a trust basis, and participations.

F_s	Sight deposits held outside Germany.
TF_s	Total, non-ratio, sight deposits held outside Germany.
F_t	Time deposits held outside Germany.
MM_f	Foreign money market paper.
LN_s_f	Short-term loans to foreigners.
BR_s_f	Short-term borrowing from foreigners.
TBR_s_f	Total, non-ratio, short-term borrowing from foreigners.
B_s	Domestic short-term borrowing.
B_g	Long-term borrowing.
CR_B	Use of Bundesbank credit facilities.
SCR_B	Use of Bundesbank credit facilities by selected banks.

Interest Rates

i_{DY}	The day-to-day, or overnight rate.
i_D	The discount rate.
i_R	The Lombard rate.
i_{NY}	The New York bill rate: the average of weekly tenders for three-month U. S. Treasury bills in New York. ²

² The i_{NY} and i_E rates were corrected for swap premium or discount and also for effects of offset rights or the "compensation privilege." For the former correction, monthly averages of daily swap rates were available for the last five years. The swap rates were calculated for the first two years by averaging end-of-month figures (e.g., the July 1963 swap rate was obtained by averaging June 30, 1963, and July 31, 1963). For the offset correction, the covered New York or Euro-dollar rates were adjusted upwards by multiplying them by 1 plus the per cent of reserves freed, using for this latter figure an average of the reserve requirements then in effect against foreign liabilities. This method is not entirely accurate since the worth of the offset right depends on where the money is reinvested, reinvestment abroad produces a further reserve offset. However, it seemed more accurate than the usual convention

- i_3 The German bill rate: the Bundesbank's rate on three-month German federal government bills.
- i_L The long-term rate: the rate on fixed interest securities, already in circulation, of over four years maturity.
- i_E The three-month Euro-dollar deposit rate in London.
- i_{LN} The short-term loan rate: the charge for discount credits of DM 5,000 to DM 20,000.³
- i_{24} The medium-term note rate: the rate on 24-month non-interest bearing federal government, federal railways, and federal postal authority bonds.
- i_{NYTD} The New York time deposit rate: the ceiling rate on single maturity, greater than \$100,000, less than 60-day time deposits, as set by the Federal Reserve System.⁴
- i_{LTD} The London pound-dominated time deposit rate: the rate on three-month deposits at finance houses.

Other Variables

- Δr The change in required reserves of selected banks as a percentage of their total liabilities.⁵
- SD Total deposits at selected banks as a percentage of their liabilities.

of adding 1 percentage point to the covered rate.

³This particular representation of the loan rate was chosen because it was published both before and after debtor interest rates were freed. Before the relaxation of control over loan rates, they all moved together since they were all tied to the discount rate.

⁴Neither the New York nor London pound time deposit rates were corrected for cost of cover or offset since deposits subject to those rates are assumed to be a result of economizing on foreign demand deposit balances. They are not considered to be money market investments capable of substitution for domestic investments.

⁵For Credit Institutions with Special Functions, the cash position was used for this variable, as statistics on required reserves were not available.

- SD_s Sight deposits at selected banks as a percentage of their total deposits.
- Δ^2SD The rate of change of deposits at selected banks.
- CSTR The liquidity constraint: the percentage change in the flow of freely investable funds into selected banks; $\frac{\Delta(L - C - LN)}{L - C}$, all variables for selected banks.
- ΔSQ Quota change: the change in discount quotas as percentage of the liabilities of selected banks.
- ΔQ The change in quotas as a percentage of the liabilities of all banks.
- ΔSQ_{BR} The change in discount quotas resulting from an increase in foreign borrowing over the average for January to June, 1964: the difference between the actual borrowings and the average for the base period as a percentage of the liabilities of selected banks.
- ΔQ_{BR} ΔSQ_{BR} using liabilities for all credit institutions as the base.
- Y Income: the index of industrial production (excluding construction), unadjusted seasonally, 1963 = 100.
- TR Trade: the total volume of merchandise imports and exports (in millions of DM).
- D Deposits of all credit institutions.
- X Exports: merchandise exports (in millions of DM).
- M Imports: merchandise imports (in millions of DM).
- Ls_f Short-term foreign liabilities.
- RTR Ratio of TR to liabilities minus cash of selected banks.
- RLs_f Ratio of Ls_f to liabilities minus cash of selected banks.
- RX Ratio of X to liabilities minus cash of selected banks.
- RM Ratio of M to liabilities minus cash of selected banks.

TABLE 3
REGRESSION RESULTS

1. Cash

$$\Delta C = A + 1.44 \Delta r - .0003 \Delta^2 SD + .007 i_{DY} + Si$$

(7.66) (-.09) (.25)

$$(R^2 = .91 \quad SEE = .25 \quad DW = 2.75)$$

2. Secondary Reserves

$$\Delta SR = A - .27 i_D - 1.11 (i_R - i_D) - .086 i_{NY} + .45 i_3 - .46 i_L + .005 \Delta SD$$

(-.97) (-3.34) (-.89) (1.58) (-1.66) (1.13)

$$+ .012 SD_s - .003 CSTR - 1.20 SCR_B + .67 \Delta SQ - 1.60 \Delta SQ_{BR}$$

(.40) (-.03) (-9.83) (2.55) (-2.27)

$$- .14 C - .54 SR - 1 + Si$$

(-1.15) (-9.46)

$$(R^2 = .90 \quad SEE = .31 \quad DW = 1.65)$$

3. Medium-term Notes

$$\Delta MTN = A + .067 i_D + .026 (i_R - i_D) + .033 i_{NY} - .035 i_E + .030 i_{DY}$$

(.98) (.35) (1.57) (-1.41) (1.21)

$$- .025 i_3 - .032 i_L - .043 i_{LN} - .0003 i_{24} + .0006 SR - .019 SD$$

(-.27) (-.61) (-1.36) (.00) (.03) (-3.65)

$$- .003 \Delta Y + .002 \Delta Y - 1 + .006 CSTR - .06 MTN - 1 + Si$$

(-.99) (.57) (.38) (-1.40)

$$(R^2 = .54 \quad SEE = .061 \quad DW = 1.89)$$

(Cont'd.)

TABLE 3
(Cont'd.)

4. Short- and Medium-term Loans

$$\Delta \text{LNsm} = A + .20 i_D + 1.50 (i_R - i_D) + .58 i_{NY} - .34 i_E + .29 i_3 - .009 i_L$$

(.37) (2.65) (3.70) (-1.73) (.37) (-.02)

$$- .15 i_{LN} - .35 i_{24} - .02 \Delta Y - .04 \Delta Y - 1 + .004 \text{CSTR}$$

(-.62) (-.60) (-.86) (-1.65) (.59)

$$+ .012 \text{CSTR} - 1 - .14 \text{SR} - .45 \text{LNsm} - 1 + \text{Si}$$

(1.33) (-1.15) (-4.08)

$$(R^2 = .69 \quad \text{SEE} = .49 \quad \text{DW} = 2.34)$$

5. Long-term Loans

$$\Delta \text{LNg} = A - .55 i_D - 1.26 (i_R - i_D) - .73 i_{NY} + .83 i_E + 1.01 i_3 + .36 i_L$$

(-.83) (-1.91) (-3.63) (3.44) (1.15) (.75)

$$- .056 i_{LN} - .84 i_{24} - .94 \text{CSTR} - .07 \text{CSTR} - 1 + .056 \Delta Y$$

(-.18) (-1.30) (-34.77) (-2.48) (1.91)

$$+ .091 \Delta Y - 1 - .061 \Delta^2 \text{SD} - .071 \text{LNg} - 1 + \text{Si}$$

(3.38) (-1.86) (-2.64)

$$(R^2 = .99 \quad \text{SEE} = .61 \quad \text{DW} = 2.69)$$

6. Foreign Sight Deposits

$$\Delta F_S = A - .016 i_3 + .011 i_{NYTD} - .032 i_{LTD} + .019 i_{NY} + .00005 \text{TR}$$

(-.52) (.46) (-2.75) (1.17) (4.21)

$$- .68 F - 1 + \text{Si}$$

(-6.38)^S

$$(R^2 = .48 \quad \text{SEE} = .07 \quad \text{DW} = 2.22)$$

(Cont'd.)

TABLE 3
(Cont'd.)

7. Foreign Sight Deposits (non-ratio form)

$$\Delta TF_s = A - .25 i_E - .22 i_{NYTD} - .83 i_{LTD} + .13 TR + .09 TR - 1$$

(-1.88) (-.44) (-3.16) (4.51) (2.69)

$$- .63 TF_s - 1 + Si$$

(-6.02)

$$(R^2 = .50 \quad SEE = 144 \quad DW = 2.07)$$

8. Foreign Time Deposits

$$\Delta F_t = A - .054 i_D - .027 i_E - .059 i_{NYTD} + .031 i_{LTD} - .073 RTR$$

(-.39) (-.34) (-1.16) (1.21) (-.60)

$$+ .032 RTR - 1 + .144 (i_E - i_{NY}) - 5.01 RLs_f + .163 CSTR$$

(.28) (2.19) (-.57) (4.21)

$$- .197 F_t - 1 + Si$$

(-2.65)

$$(R^2 = .75 \quad SEE = .22 \quad DW = 1.80)$$

9. Foreign Money Market Paper

$$\Delta MM_f = A - .002 i_D + .033 i_{NY} - .050 i_{DY} - .020 (i_E - i_{NY}) - 2.28 RLs_f$$

(-.03) (1.00) (-1.23) (-.55) (-.58)

$$- .008 CSTR + .008 CSTR - 1 - .123 MM_f - 1 + Si$$

(-.38) (.46) (-2.15)

$$(R^2 = .30 \quad SEE = .11 \quad DW = 2.02)$$

(Cont'd.)

TABLE 3
(Cont'd.)

10. Short-term Loans to Foreigners

$$\Delta \text{LNs}_f = A - .0018 i_{\text{LN}} - .0028 i_{\text{DY}} + .00008 \Delta X + .00001 \Delta X^{-1}$$

(-.13) (-.22) (2.12) (.73)

$$- .264 \text{RX} + .150 \text{RX}^{-1} + 3.43 \text{RLs}_f - .018 \text{CSTR} - .300 \text{LNs}_f^{-1}$$

(-3.57) (1.77) (1.54) (-1.98) (-3.06)

+ Si

$$(R^2 = .50 \quad \text{SEE} = .041 \quad \text{DW} = 2.30)$$

11. Short-term Borrowing from Foreigners

$$\Delta \text{BRs}_f = A - .020 i_E - .002 i_{\text{DY}} - .00002 \Delta M + .00003 \Delta M^{-1}$$

(-1.86) (-.17) (-.61) (2.08)

$$+ .077 \text{RM} - .106 \text{RM}^{-1} + .184 \Delta \text{SQ}_{\text{BR}} - .017 \text{BRs}_f^{-1} + \text{Si}$$

(1.16) (-1.55) (2.58) (-.36)

$$(R^2 = .59 \quad \text{SEE} = .035 \quad \text{DW} = 1.92)$$

12. Short-term Borrowing from Foreigners (non-ratio form)

$$\Delta \text{TBRs}_f = A + 205.2 i_D - 111.8 i_E - 8.5 i_{\text{DY}} + 576.8 \Delta \text{SQ}_{\text{BR}} + .10 \Delta M$$

(2.32) (-2.67) (-.19) (2.10) (1.87)

$$+ .11 \Delta M^{-1} + .18 \text{TBRs}_f^{-1} + \text{Si}$$

(2.01) (3.49)

$$(R^2 = .63 \quad \text{SEE} = 142.8 \quad \text{DW} = 1.91)$$

(Cont'd.)

TABLE 3
(Cont'd.)

13. Short-term Borrowing from Foreigners (non-ratio form)

$$\Delta \text{TBRs}_f = A + 97.9 i_D - 86.1 i_E - 2.5 i_{DY} + 489.6 \Delta \text{SQ}_{BR} + .053 M$$

(1.11) (-2.06) (-.06) (1.83) (1.26)

$$+ .004 M - 1 + .150 \text{TBRs}_f - 1 + \text{Si}$$

(.09) (2.96)

$$(R^2 = .65 \quad \text{SEE} = 138.4 \quad \text{DW} = 2.03)$$

14. Short-term Borrowing

$$\Delta \text{BRs} = A + .013 i_D + .064 (i_R - i_D) + .005 i_{DY} - .036 i_3 - .015 \Delta D$$

(.17) (.76) (.18) (-.56) (-1.77)

$$+ .009 \Delta Q - .070 \text{BRs} - 1 + \text{Si}$$

(.11) (-1.16)

$$(R^2 = .41 \quad \text{SEE} = .086 \quad \text{DW} = 2.61)$$

15. Long-term Borrowing

$$\Delta \text{BRg} = A - .102 i_D + .101 i_3 - .143 i_L - .061 \Delta D - .004 \Delta Y - .020 \Delta Y - 1$$

(-.93) (.84) (-1.87) (-4.48) (-.66) (-3.49)

$$+ .031 \text{BRg} - 1 + \text{Si}$$

(1.39)

$$(R^2 = .84 \quad \text{SEE} = .14 \quad \text{DW} = 2.24)$$

16. Use of Bundesbank Credit

$$\Delta \text{CR}_B = A - .42 i_D - .17 (i_R - i_D) + .27 i_{DY} + .17 i_3 - .026 i_E - .015 \Delta D$$

(-3.08) (-1.39) (6.03) (1.47) (-.56) (-1.10)

$$+ .15 \Delta Q - .54 \text{CR}_B - 1 + \text{Si}$$

(1.17) (-5.50)

$$(R^2 = .78 \quad \text{SEE} = .14 \quad \text{DW} = 2.03)$$

TABLE 4
COEFFICIENTS ON SEASONAL DUMMY VARIABLES AND INTERCEPTS^{a/}

	^{a/}	S ₁	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	S ₁₀	S ₁₁	S ₁₂
C	.17	-2.25*	.23	c/	.21	.21	.20	.11	.36*	.03	.05	1.55*
SR	17.27	-.76*	-.70*	.21	.18	.28	.08	.08	.71*	.10	.02	.91*
MTN	1.00	.09	.02	.05	.02	c/	.03	.01	.03	.04	c/	.05
LNsm	7.44	.09	1.03*	.78*	.76	1.47*	.31	.18	1.26*	1.10	.86	1.04*
LNg	5.44	.25	-3.02*	-1.63*	-1.42*	-2.85*	.68	.07	-2.74*	-2.74*	-1.97*	-2.21*
D _{sf}	.35	c/	.13*	.06	.07	.03	.11*	.02	.03	.05	.09	.11*
TD _{sf}	605	-161	-351*	-313*	-306*	-256*	-345*	-171	-145	-280*	-405*	-416*
D _{ff}	.75	.68*	.49*	.09	.18	.01	.26	.01	.34*	.11	.03	.42*
MM _f	.18	.10	.03	.11	.06	.01	.03	.01	.04	.08	.03	.03
LNsf	.57	.04	.02	.04	.01	.04	.02	.01*	.06*	.04	.06	.02
BRsf	.04	.06*	.01	.01	.03	.03	.04	.06*	.04	.06*	.04	.02
TBRsf1	532	-325*	51	20	125	124	183*	193*	110	219*	148	41
TBRsf2	589	-282*	23	87	126	147	210*	227*	121	273*	200*	58
BRs	.07	.10	.02	.08	c/	.05	.10*	.02	.01	.06	.04	.14*
BRg	.33	.61*	.58*	.36*	.15	.16	.36*	.08	.39*	.51*	.12	.28*
CRB	.42	.12	.27*	.03	.15	.20*	.04	.08	.23*	.05	.07	.14

a/ Asterisk denotes significance at the 5 per cent level.

b/ The program employed did not calculate standard errors for the constant term.

c/ Less than .005.

TABLE 5
EQUILIBRIUM VALUES OF COEFFICIENTS IN DOMESTIC
ASSET EQUATIONS^{a/}

	SR	MTN	LNsm	LN _g
i_D	- .51	1.12	.45	- 7.75
$i_R - i_D$	- 2.06	.43	3.35	-17.75
i_{NY}	- .16	.55	1.29	-10.28
i_3	.82	- .42	.65	14.23
i_L	- .86	- 5.33	- .02	5.07
i_{DY}		.50		
i_E		- .58	- .76	11.69
i_{LN}		- .72	- .34	- .79
i_{24}		- .005	- .78	-11.83
ΔSD	.008			
SD_s	.02			
CSTR	- .0005	.107	.010	-13.24
CSTR - 1			.03	-10.0
SCR_B	- 2.22			
ΔSQ	1.24			
ΔSQ_{BR}	- 2.94			
DY		- .05	- .04	.79

(Cont'd.)

TABLE 5
(Cont'd.)

	SR	MTN	LNsm	LN _g
$\Delta Y - 1$		.03	- .08	1.28
SR		.01	- .31	
$\Delta^2 SD$				- .86
SC	- .27			

a/ C is omitted since instant adjustment was assumed.

TABLE 6
EQUILIBRIUM VALUES OF COEFFICIENTS IN FOREIGN
ASSET EQUATIONS

	D_{sf}	TD_{sf}	D_{tf}	MM_f	ENS_f
i_{DY}				- .04	- .01
i_D			- .27	- .02	
i_{NY}				.27	
i_E	- .03	- 41	- .14		
i_{LN}					- .01
i_{NYTD}	.17	- 35	- .30		
i_{LTD}	.003	-132	.16		
$i_E - i_{NY}$			.71	- .16	
CSTR			.81	- .07	- .06
CSTR - 1				.07	
RTR	.17		- .36		
RTR - 1			.16		
TR		.21			
TR - 1		- .15			
RLs_f			-25.4	-18.5	11.3
ΔX					.0003
$\Delta X - 1$					.00004
RX					- .87
RX - 1					.50

TABLE 7

EQUILIBRIUM VALUES OF COEFFICIENTS IN LIABILITY EQUATIONS^{a/}

	BR _s _f	BR _s	CR _B
i _{DY}	- .11	.07	.50
i _D	2.18	.19	- .78
i _R - i _D		.91	- .32
i ₃		- .51	.32
i _E	- 1.18		.05
ΔQ _{BR}	10.82		
ΔQ		.22	.28
ΔM	- .001		
ΔM - 1	.002		
RM	4.53		
RM - 1	- 6.18		
ΔD		- .214	.03

^{a/} TB_s_{f1}, TB_s_{f2}, and BR_g have been omitted since the coefficients on their lagged dependent variables were positive.

Discussion of Estimates

Tables 3 and 4 give the results of the estimations. Table 3 lists the coefficients, their t values (in parentheses), the coefficient of determination (R^2), the standard error of estimate (SEE), and the Durbin-Watson statistic (DW) for each equation. Table 4 gives the intercept and seasonal coefficients for each equation. Tables 5, 6, and 7 contain the equilibrium values of the coefficients. This is the contribution of each independent variable to the asset or liability ratio after the adjustment process has worked itself out. The equilibrium values are estimates of the influence of each variable on the desired portfolio ratio.

Cash

As explained in Chapter II (p. 49), the banks are assumed to adjust their actual to desired cash positions within one month, the reserve computation period. Also, it has been observed that very large deposit inflows seemed to cause banks to hold higher than usual amounts of excess reserves. The very significant coefficient on the change in required reserves and the high R^2 for the equation tend to confirm the first hypothesis; but the low, negative, and insignificant coefficient on the rate of change in deposits casts doubt upon the second. The overnight interest rate was inserted to see whether its rise would induce banks to economize on their cash positions more than usual. Since, however, it is a rate in a market (for reserves) that has banks as both suppliers and demanders, its

expected effect on the entire banking system is unclear. To the extent that the rate is correlated with returns on other assets, one would expect banks to reduce their excess reserves as it rose (a "free reserve" effect). However, it is also a cost of borrowing and is highly correlated with the Bundesbank's discount rate. A rise in the cost of borrowing will cause more excess reserves to be held.

The very strong December and January seasonality of these holdings is reflected in the high positive coefficient on the December dummy variable and the low negative coefficient on January. The buildup of cash balances in December is part of the attempt by the banks to present a highly liquid balance sheet for end of the year "window dressing" and is often made at the expense of their portfolios of foreign assets. In order to maintain levels of foreign asset holdings through December, the Bundesbank has several times made swap rates for foreign exchange contracts maturing after December much more favorable than rates on shorter contracts. Occasionally, they have also lowered the Lombard rate for December advances in order to get the banks to part with their domestic assets temporarily as collateral, rather than selling them. This should minimize the permanent effect of window dressing on the capital markets.

Secondary Reserves

The results of the estimation of the secondary reserves equation

illustrate the multi-collinearity problem encountered throughout the model. The secondary reserves ratio conformed very closely to an inverse pattern of the business cycle over the period. The ratio fell sharply from 1964 to 1966, when credit conditions were getting tighter and loan demand was strong, and then rose from 1966 to the end of 1967, when easier monetary conditions and a slowdown in credit demands allowed banks to rebuild their liquidity. Several of the coefficients reflect the highly correlated movement of all financial variables through the business cycle, rather than their own contribution to the asset ratio. This is especially obvious for the discount rate (i_D) and the difference between the discount and Lombard rates ($i_R - i_D$). One would expect a positive coefficient on i_D . As i_D rises, banks should hold more liquid assets to guard against the possibility of being forced to borrow at the higher rates. The negative coefficient reflects the collinearity between the discount and other interest rates that results from the pivotal role it plays in the interest rate structure of West Germany. Until 1967, many rates the banks could charge were tied, by law, to the discount rate. Since the banks dominate the capital markets, all rates tended to rise and fall very closely with the discount rate. The own rate in this equation, i_3 , has the correct sign, as do the two rates on two substitutes, i_{NY} and i_L (U. S. Treasury bills and long-term investments), although none are significant.

The coefficients on the deposit variables behave as expected, although they also are not significant. Banks make their initial

adjustments to changes in deposits in the most liquid part of their balance sheets. Larger proportional holdings of sight deposits, which are potentially more volatile than time deposits, will lead the banks to hold more highly liquid assets. The constraint variable is surprisingly negative, but very small and very much smaller than its standard error. Evidently the deposit variables captured the constraint effects.

Results of the borrowings and quota variables are mixed. The negative and highly significant coefficient on borrowings from the Bundesbank is a result of the correlation between borrowings and the business cycle. The coefficient on the quota changes is correct, given the way the variable was formulated. A decrease in quota ceilings produces an increase in the secondary reserve ratio as banks use their defensive position to guard against having to borrow at the Lombard rate.

Secondary reserves showed significant seasonal variation, especially in the months ending quarters. The positive coefficient in December reflects the shift to liquid assets as part of yearend window dressing.

Medium-Term Notes

The results of estimations of the demand for medium-term notes are quite unsatisfactory. Although the equation is significant in the 99 per cent level, the only highly significant variable is SD, the proportion of sight to total deposits. Its negative coefficient

indicates that these assets are thought of as less liquid than secondary reserves and are not considered a hedge against unexpected deposit outflows. The poorness of fit is a result of the changing nature of the asset over the period. Gradually the Bundesbank made more and more of this maturity asset eligible for buying and selling in its open market activities, thereby reducing the risk involved in holding it and increasing its liquidity. This trend was accelerated during the recession year of 1967, when the Bundesbank greatly extended the range of eligible paper in order to make the banks feel more liquid and to encourage them to make business loans. As a consequence, the proportion of freely usable assets invested in medium-term notes doubled during 1967. Since the Bundesbank's action was taken in discreet jumps and over a short period of time, an accurate representation of this phenomenon in variable form is impossible and a bad fit must be accepted.

Domestic Short- and Medium-Term Lending

The simultaneity problem for short- and medium-term lending is very serious. The inability to identify separate supply and demand effects of the variables makes interpretation of their coefficients quite difficult. The problem is compounded by the existence of very close institutional ties between the banks and business firms which mitigate against the success of any combination of market-oriented equations in explaining this ratio. Furthermore, the ratio does not follow the cyclical pattern demonstrated by most of the other dependent

variables. (See Appendix B, Figure 1-D, for a scatter diagram of the ratio.) Unlike the other variables, its decline during the recession is not followed by a recovery to levels maintained before the period of inflationary growth. Rather, it seems to stabilize at a lower level.

The reasons for this asymmetrical pattern are not readily apparent. It was not caused by a realignment of short- and long-term rates. Despite the freeing of the short-term rate from Bundesbank supervision in 1967, the long- and short-term rates were in the same relative positions in 1968 as they were earlier in the decade. The fundamental reason for the downturn in lending is, of course, the recession, and it could be that the seeming stabilization at the lower values is simply a long lag in the recovery of lending behind the economic upswing. This is hard to confirm since there is no comparable recession in postwar German economic history in which to compare the behavior of LNsm. An affirmative clue is given by the length of the lag at the top of the cycle. Industrial production (seasonally adjusted) turned down in March 1966 and most of the financial variables turned concurrently, or lagged by one or two months. However, LNsm does not peak until September or October. A change in the method of reporting bank balance sheets makes it impossible to follow this exact ratio beyond November 1968, but a ratio containing many of the same components begins to climb in January 1969, more than one year after the trough in industrial production. The lag of LNsm behind LNg (long-term lending), which should adjust more slowly, can be

partially explained by the inclusion of long-term foreign assets in the latter category. Bank purchases of these increased rapidly in 1967 and 1968, cushioning the decline in total long-term loans and accelerating their upturn.

The behavior of LNsm may also have been affected by the cash flow and liquidity conditions of businesses. The buildup of cash flow in the initial stages of a business recovery will cause the lending cycle to lag the production cycle by reducing firms' reliance on outside sources of funds. In Germany in 1967 and 1968, businesses had their liquidity further augmented through the prepayment of debts and export bills by foreigners who feared Deutsche mark revaluation. Foreigners doing business with Germany would not have wanted to be holding mark denominated debt when the value of the mark rose. There is no data on leads and lags in foreign shipments and payments.⁶ However, the increase in business and bank lending to foreigners over the 1967-68 period would seem to contradict this line of reasoning.

The coefficients in the equation exemplify the problems surrounding an understanding of the behavior of this asset. By reasoning analogous to that used to justify negative coefficients on i_D and $i_R - i_D$ in the SR equation, positive coefficients here might reflect the association between high loan demand (obviously not captured in ΔY which has a negative coefficient) and tight monetary policy. The expected negative

⁶See Paul Einzig [10] for a discussion of this lead-lag problem and its implications.

coefficients were supposed to represent the reluctance to hold an illiquid portfolio when the cost of borrowing was high.

While the coefficient on i_L (the interest rate on long-term loans) is very small in this example, it was much larger in many of the other experiments and sometimes significant. The coefficient in the constraint term is biased downwards because -SML is included in it, i.e.,

$$\frac{LN_{sm}}{L - C} = b \left[\frac{L - C - L_n}{L - C} \right]$$

or

$$\frac{LN_{sm}}{L - C} = b \left[\frac{L}{L - C} \right] - b \left[\frac{C}{L - C} \right] - b \left[\frac{LN_{sm}}{L - C} \right] - b \left[\frac{LN_g}{L - C} \right].$$

In the third term, b is, by identity, -1 . When the constraint is lagged one month, the link is broken slightly and the coefficient is larger and more significant. The problem is even more severe in the long-term lending equation inasmuch as long-term lending is between two-thirds and three-fourths of total loans.

An effort was made to minimize the simultaneous equation bias on the interest rate coefficients by introducing the change in industrial production (ΔY) as a demand proxy. Not only did the signs on the interest rates once again fail to conform to expectations, but the coefficients on the changes in production also have the wrong signs. The result is difficult to rationalize. It could be that the lag structure of the relationship between loan demand and production is so much longer and more complicated than postulated in the equation that the simple

contemporary and one month lags yield perverse signs.⁷

Long-Term Lending

The constraint variable in this equation should be viewed skeptically, for reasons noted in the discussion of short-term lending, but the lagged constraint also is negative, indicating that large inflows of funds are not associated in the same or following month by an expansion of long-term lending. Rather, they are put into secondary reserves. This is confirmed by the negative coefficient on Δ^2SD (the rate of change of deposits of selected banks). The constraint also inflates the R^2 , which would be .92 without it. The extremely slow speed of adjustment is not surprising, given the nature of the assets, about one-fourth of which are mortgages.

Foreign Sight Deposits

Two versions of the banks' demand for foreign sight deposits are given. The first is simply an extension of the portfolio theory that forms the basis for the other equations. Negative signs were expected on the interest rates since higher rates of return should cause the banks to economize on the noninterest bearing sight deposits. The foreign time deposit rates were used since they are likely to be the closest substitute for demand deposits held at London and New York banks. The total volume of trade was used, rather than just

⁷The same perverse result was obtained when industrial production variables were inserted into the secondary reserve equation. (See Appendix B, p. 137.)

imports (or less likely, exports), because the banks act as agents for importers and exporters, holding foreign deposits for both.

In the second equation, the assumption that banks look upon their holdings of foreign sight deposits as they do other assets was dropped. Instead, it was assumed that since the deposits pay little or no interest and bear the extra costs of needing forward exchange cover (or, if uncovered, have special risks), they would be dominated in the banks' portfolios by noninterest bearing domestic assets, such as vault cash. Hence, bank holdings of foreign sight deposits must be primarily for transaction purposes, and the total of such holdings (rather than the proportion in the portfolio) is determined by the total of trade that is to be transacted. Interest rate variables were included since higher interest rates would still constitute an incentive to increased efforts at economizing on sight balances. The results from this formulation are much more satisfactory in that all coefficients have their expected signs and many are significant.

Foreign Time Deposits

The German banks' holdings of foreign time deposits are primarily Euro-dollar deposits and are held as an investment asset. However, some of F_t must be a result of transaction demands for foreign assets since both the ratio and the absolute amounts of F_t seem to have a lower limit that is not even breached by December window dressing. Consequently, an attempt was made to account for a transactions demand for time deposits by including the ratio of total

trade to investable assets as an independent variable (so that the absolute amount of time deposits depends on total trade, as in the second sight deposit equation). Both in ratio and absolute amounts, F_t started rising in the latter half of 1965. This is surprising inasmuch as it preceded the loosening of credit conditions in Germany by more than a year. The increase in F_t was prompted by a growing differential between Euro-dollar and German rates throughout 1966, as Euro-dollar rates rose much faster than comparable German rates. Also, contributing to the growth of F_t was an increase in the differential of the Euro-dollar rate over the New York three-month Treasury bill rate during 1965 which caused some shifting of dollar investments from New York to London. Foreign time deposit holdings continued to grow rapidly during the first part of 1967 despite the recession of the offset privilege which reduced their effective interest rate by about 1 percentage point. The German economy was approaching the bottom of its deepest postwar recession at that time and domestic investment opportunities were scarce.

The lack of success in fitting a F_t equation yields little statistical evidence to confirm or dispute the hypotheses in the previous paragraph. The coefficient on $i_E - i_{NY}$ is positive and significant as is proper, as is the coefficient on the constraint. Neither the transactions effects of changes in trade nor the link between time deposits and total foreign liabilities (RLs) that should have resulted from the offset privilege was captured. Both coefficients had the wrong sign and were not

significant. The coefficients on i_E and i_{NYTD} are also of the wrong sign and not significant. The speed of adjustment seems too slow for such a highly liquid asset. The Bundesbank believes there to be a trend away from dealing on the New York market towards dealing in the London dollar market because the banks prefer to deal on their "doorstep."⁸ This might be one factor missing from the equation.

Foreign Money Market Paper

The foreign money market paper equation is not successful. As can be seen from Table 3, the various interest rates have the proper signs, but none are significant. Between 70 and 93 per cent of the banks' holdings of money market paper are U. S. Treasury and mark denominated Belgian bills, in varying proportions. Perhaps the unavailability of the Belgian rate hinders the estimation. If the Belgian bonds are issued at rates comparable to those prevailing in the German internal market, then the effects of Belgian rate changes would have been picked up by i_D in the estimation. While the internal rates in Belgium did have a similar pattern over time with German rates, they did not rise quite as steeply to a peak in 1966, so i_D probably does not capture their full effect.

Short-Term Loans to Foreigners

Short-term lending to foreigners is done exclusively by the commercial banks, is over 90 per cent mark denominated, and is

⁸Monthly Report of the Deutsche Bundesbank, November, 1967, pp. 9-10.

mostly made to foreign banks who are acting on behalf of their customers doing business in Germany. The German banks are largely passive in these transactions, accommodating the needs of their foreign correspondents.

The total volume of loans is postulated to depend on German exports (as a demand proxy) and some variables that reflect the cost of the loan. The foreign lending and borrowing equations share the difficulty that data on interest rates specific to this kind of transaction are unavailable. The demand for loans from German banks by foreigners is further approximated by use of the change in exports. This is a proxy for the profitability of the export trade and, hence, for the demand for loans to finance trade. Rapid expansion of exports might indicate new markets were opening up or that demand was shifting quickly. When German exports are stable, the foreign importers will be generating enough cash flow to finance increasing amounts of their transactions internally.⁹

The equation was fitted in the same half portfolio-half transactions mold that was used for foreign time deposits. Thus, the export variable

⁹Leamer and Stern [27], pp. 13-14, would use the same variables but only when "new markets" were opening up, the smaller firms supposedly opening these markets being more in need of external financing. They seem skeptical of the link between trade financing and bank assets or liabilities, giving as a possible reason "good customer relations." Such a link does undoubtedly exist for German banks and "good customer relations" may well be the reason if one subsumes under that heading foreign correspondent and branch bank relations as well as those with the bank's domestic customers.

is a ratio to investable assets. The interest rate on domestic short-term loans was used to approximate what the banks were charging on foreign loans. It is not only insignificant, but also ambiguous, in an equation which has both supply and demand factors. The negative sign on exports is puzzling, but may result from a misspecification of the lag structure. Such speculation is reinforced by the positive sign in the volume of exports lagged one period.

Short-Term Borrowing from Foreigners

Short-term borrowing from foreigners is mostly non-mark denominated and represents borrowing by German banks from foreign banks for the purpose of financing their customers' imports. Banks also borrow abroad for investment at home. This second reason for borrowing corresponds to the motivations that were assumed when the generalized borrowing equation was developed in Chapter II. The banks should be deciding what proportion of their liabilities to hold as short-term foreign debt. The Bundesbank acted on the premise that some borrowing was for reinvestment at home when it reduced discount quotas by the increment to foreign borrowing over the average for a few preceding months. Credits taken to finance trade were specifically excluded from the calculations. The variable that was to have measured the effects of this policy, ΔQ_{BR} , was conceived incorrectly, its positive bias is so built in that its coefficient should be ignored. To avoid the quota reduction penalty, banks reclassified some borrowings as deposits.

This has the byproducts of muddying the economic meaning of the foreign borrowing series and distorting the estimation results.

Since about 30 per cent of the borrowings are in Euro-dollars,

i_E is a measure of the cost of borrowing.

The lack of significance of the lagged dependent variable is puzzling. It could be that the ratio adjustment model does not hold for this liability. In the other two regressions when total short-term borrowing was used, a slightly better fit was obtained and all the signs except for the one on the lagged dependent variable were correct. Its positive sign indicates an unstable adjustment process in which banks move away from their desired stocks.

The threat of revaluation that faced the mark from 1967 onwards should have had great effect on both foreign lending and borrowing. Short-term lending should have gone down (or ceased to climb) and borrowing gone up as foreign investors rid themselves of mark denominated loans. In fact, BRs_f and $LNsf$ in both ratio and absolute form rose throughout 1967 and especially in 1968. Evidently those who borrowed from the German banks did not find that the cost of covering their loans was prohibitive.

Domestic Short- and Total Long-Term Borrowing

Both short- and long-term borrowing by the banks are difficult to fit because the definition of borrowing was changed in the middle of the sample period. Before mid-1965, the Bundesbank exercised very close control over the interest rates banks could pay on time and savings

deposits. The restrictions were circumvented by calling deposits "loans" and paying a higher rate to the "lender" than he could earn on a deposit. The "Interest Rate Order" which freed the time deposit interest rates also defined more strictly what constituted a "loan." As a consequence, after May 1965, when long-term rates were freed, and July 1966, when some shorter rates were allowed to float, there was an immediate reclassification of some accounts from loans to deposits and a downward trend in loans became evident. However, the period from mid-1966 to mid-1967 is also a recession and borrowing may have declined because opportunities to invest were not as lucrative and the need for liquidity not as great.

In the BRs equation the interest rate coefficients have the wrong signs. The discount, Lombard, and overnight rates are costs of borrowing and, therefore, their coefficients should be negative. The three-month rate is a use for the funds and its coefficient should be positive. The sale of money market paper is also an alternative source of funds. But here again the relationship with the rate should be positive since higher rates are associated with lower prices realized on the sale of securities. The negative coefficient on deposit changes confirms the hypothesis that increases in deposits will result in repayment of borrowings, whereas outflows are likely to necessitate more borrowing.

Many of the same comments apply for BRg as well. Here i_L

represents the cost of obtaining long-term funds. Industrial production variables were introduced as proxies for long-term loan demand because such demand would be most likely to give rise to long-term borrowing. The confusion arising from incorrect signs is compounded by a positive coefficient on the lagged dependent variable.

Use of Bundesbank Credit

With the exceptions of the coefficients on the Euro-dollar rate and on the change in quotas, this equation performed as expected. The balance sheet category includes borrowings at both the discount and Lombard rates, so these are properly negative. The overnight market is an alternative source of funds and the money market is a use for borrowings. The speed of adjustment is quite rapid, over one-half of the difference between desired and actual holdings is made up in one month.

Conclusions

Technical Considerations

Among other things, more work needs to be done on the simultaneity problems of the model. This would entail, as a minimum, the addition of supply variables to the demand model¹⁰ and, ideally, the specification of supply equations for each asset. The obvious inaccuracies of the coefficients in the short-run lending (LN_{sm} , LN_{sf}) and borrowing (BR_{sf} , BR_s) equations indicate that supply estimations for these

¹⁰As Goldfeld [15, Chapter II] did in his first set of estimations.

categories would be quite valuable in ascertaining the true values of the coefficients on the variables in the demand equation. It is clear that the interest rate ceilings on short-term loans were not always effective in making the supply of commercial loan paper to the banks completely elastic at the ceiling level. In all of the short-term categories, the supply of debt paper to the bank is strongly influenced by past behavior and institutional ties, such as correspondent banking relationships. Better estimation of foreign short-term assets and liabilities requires return variables specific to these items and much more information about the institutional framework of the market and the characteristics of the instruments.

A better solution to the simultaneity problem would make the multi-collinearity problem more tractable. At least, if more coefficients had correct signs and reasonable sizes, they could be used to draw conclusions with more confidence despite their high standard errors. They would also lend themselves to addition into categories, the standard errors of which might be relatively low after subtracting covariance. While such a technique cannot impart as much knowledge as individually significant coefficients, a significant average rate of return on a set of "domestic substitutes" would be of some assistance in evaluating the domestic effects of central bank policies.

The autocorrelation problem might be better dealt with, also. One possibility would be to constrain the lagged independent variable and the autocorrelation coefficient in various configurations which made

a priori sense, and see what happened to the other coefficients and the fit.¹¹

Theoretical Considerations

The general lack of success in fitting the model raises questions of a more theoretical nature about the correctness of the ratio form of the portfolio adjustment model and the degree of disaggregation used in this study.

For assets, the model that was tested is theoretically correct and performs not too much worse than models that do not use ratios as their dependent variables. Findings of significant coefficients on the interest rates of substitutes in commercial bank asset equations are extremely rare whatever form of the model is used.¹² When results of various forms of the portfolio adjustment model have been compared, little basis has been found for choosing among them.¹³ In this context, the model which most closely conforms with its theoretical underpinnings is the correct choice.

The theoretical considerations surrounding the form of the liability equations are not as clear-cut. The banks' decisions about

¹¹Others who have worked with the same type of data (Silber [45] and Goldfeld [15]) didn't seem to have been greatly troubled by this problem.

¹²Both Silber [45] and Goldfeld [15], using non-ratio forms, have the same problem. Silber does find significant substitution effects for nonbank financial intermediaries.

¹³See Goldfeld [15, pp. 138-141] and [16].

their liabilities were formulated in the ratio adjustment framework as an analogy to their asset decisions. However, the estimates of the liability equations make it clear the application of the ratio adjustment model in this context may be wrong. The ridiculously low or positive speed of adjustment coefficients and the poor fits are the most cogent reasons for this conclusion. (Both types of results are worse than could reasonably be expected from changes in the nature of the liabilities over the period.)

The problem arises from the analogy linking asset and liability behavior. A bank's decision to borrow is not a question of realigning a given amount of liabilities, but of expanding the entire portfolio. Unlike assets, one liability can be expanded without necessitating offsetting declines in others. Increasing a liability category affects not only the rate of return and risk of the portfolio, but also the size of the base upon which profit will be earned. The assumption of homogeneity in portfolio size that is made when the ratio of one liability to total liabilities is used as the dependent variable has no theoretical basis. If a bank's liabilities were to double from an inflow of deposits, there is no reason to believe that, without a change in interest rates, the bank would double its borrowing of all types and maturities. If, given the rates of return on assets, such borrowing were profitable, it would have been done regardless of the size of deposit inflows.

There is probably a strong correlation between borrowing and deposit size, even if the relationship is not strictly proportional.

There may well be a fixed cost to managing the cash flow of a bank so closely as to require occasional borrowing to meet reserve shortages. Once the bank is large enough to afford the fixed cost, the proportion of borrowings to deposits should tend to rise over a significant range as the average cost of borrowing declines. Also, to the extent that borrowing is done to meet unexpected deposit outflows, these will be larger, in absolute terms, the larger are deposits. But all these considerations should be examined in the broader context of a profit maximization model of bank borrowing, in non-ratio form. In general, banks will borrow until the marginal cost of borrowing equals the marginal revenue to be gained from lending the borrowed funds.¹⁴ Included in "cost" for German banks is the additional risk that would be assumed by using up discount quotas. These conclusions also hold for borrowing from the central bank, despite the good fit and significant coefficients obtained with a ratio in this model, and its use in other models.¹⁵

An accurately specified model to explain bank portfolios would have liabilities in non-ratio form and assets as ratios. Although

¹⁴Kareken [25] works out a model like this where the cost of obtaining liabilities arises from the cost of servicing demand deposits.

¹⁵The Brookings Model [30], for example, uses the ratio. It may be that the ratio works because of offsetting tendencies. Fixed cost considerations would tend to increase the ratio as deposits increase and profit motivations should decrease it. It is possible that the net effect is that borrowings are close enough to being a fixed proportion of deposits to give a good statistical fit.

decisions about assets and liabilities would be made simultaneously, the process can be thought of in two steps. First, the level and composition of liabilities (and, therefore, total portfolio size) would be determined and, second, the portfolio would be allocated among various assets.¹⁶ The liability categories could be explained under a variety of assumptions. Banks might be assumed to accept all deposits but set borrowing levels, as in this model, or they could be assumed to accept some deposits, set interest rate levels on others (e.g., time deposits), and determine either amounts or rates of return on nondeposit liabilities.¹⁷

In addition, questions can be raised as to the desirability or efficacy of estimating a model with so many of the bank's balance sheet categories. Most large-scale financial models consist of estimates of the market for bank reserves and some short-term asset (such as Treasury bills). The results of these estimations are then extrapolated to determine prices of longer-maturity assets by use of a term structure equation. Alternatively, separate supply and demand

¹⁶Pierce [38] follows this type of reasoning when he assumes that the central bank determines the size of the portfolio through open market operations and the banks then allocate it.

¹⁷In models of the U. S. banking system, banks are assumed to accept demand deposits and set the rate on time deposits at which they will accept all deposits offered. Borrowing from the Federal Reserve System is also estimated either by itself or as part of a free reserve equation. The recent growth in the use of nondeposit sources of funds by U. S. banks (Euro-dollar borrowing, issuing commercial paper, etc.) will make the problems encountered in this study in estimating liabilities increasingly difficult for U. S. model builders to ignore.

equations for each maturity asset could be estimated. The model presented in this study is a step in this latter direction.¹⁸ Correctly specified, both models would give identical results.¹⁹ The supply and demand model should be more useful in specifying the factors that tend to segment asset markets and result in less than perfect substitution between them. The banking system's relationship to the balance of payments would seem a particularly fruitful area in which to pursue such a detailed structural model because of the crucial role the system plays in the transmission and origination of foreign transactions.²⁰

The Use of the Estimations

The analysis of Bundesbank policies in the following chapter relies primarily on observation and "casual empiricism." Because of the failure of the estimations, it is not possible to trace the effects of monetary policy on the German banks' holdings of domestic and foreign assets as precisely as had been hoped when the study was undertaken. However, the equation results have been utilized wherever possible. Some coefficients and their derivative elasticities are used as "best

¹⁸Although, of course, it could be appended to the other type of model, in which case its function would be to help explain the short-term rate and some other assets, like business loans, that are not completely determined by the term structure equation.

¹⁹Pierson [39] working with highly aggregated U. S. data, found little difference between the explanatory or predictive powers of a demand and supply or term structure model.

²⁰Leamer and Stern [27] urge that capital flows be analyzed in a portfolio context by transactor. The banking system is one of the most important transactors.

guesses, " especially when they conform to a priori expectations, and after their obvious faults and biases have been taken into account. Also, there is an attempt to utilize the size and direction of movement of the unexplained variance in gauging the impact of variables omitted from the equations .

While some of these excercises may be unorthodox and all are of questionable statistical significance and meaning, it is hoped that their use will add a small degree of precision to the analysis and will also further illuminate the problems encountered in formulating, estimating, and interpreting the equations .

CHAPTER IV

ANALYSIS OF BUNDESBANK POLICIES

Introduction

The analysis of Bundesbank policies is made in three parts . The first covers policies aimed primarily at the banks' holdings of short-term foreign assets and liabilities, the second part covers those policies whose targets were domestic assets and liabilities, and the third examines movements of long-term foreign assets and liabilities in the banks' portfolios . The first part is subdivided into policies to induce holdings of short-term foreign assets and policies to discourage holdings of short-term foreign liabilities.¹

This distinction among the three main sections, while useful, may be misleading for several reasons . First, all policies that are discussed, whether aimed at foreign or domestic portions of the balance sheet, had internal rather than external balance as their goal . The role of the foreign asset and liability policies was to forestall movements in gold and exchange which would have precipitated domestic adjustments to external forces . They attempted to isolate the foreign from the domestic money markets so as to avoid conflict between external and internal goals . Second, the distinction is false because a change in any one asset ratio means there has been an equal

¹This follows the classification scheme used by Mills [34] .

and opposite change in the sum of all other ratios. Therefore, it is incorrect for modelbuilders or policymakers to think of policy actions as affecting only one asset or set of assets; such an analysis is incomplete.² The portfolio model was constructed to measure the responses of all assets to central bank policies so that the indirect as well as the direct effects of those policies on the economy would be apparent. Although the estimation of the model was unsuccessful, its lessons ought not to be lost. The model postulates that, in the absence of direct controls, all asset choices are interdependent. Thus, the Bundesbank did not really "isolate" the foreign from the domestic money markets, but it did isolate the rates of return and risk that applied to the German banks in an asset market from the rates and risk prevailing in that market for all other participants. This type of isolation could then be used to induce movements in bank assets and liabilities contrary to the dictates of the market.

Short-Term Foreign Asset and Liability Policies

The German monetary authorities gave banks the incentive to increase their holdings of foreign assets by using devices to keep the interest differential between foreign and domestic assets favorable for outward arbitrage. There were two major methods of doing this: through the "offset right" or "compensation privilege," and through offering to swap dollars and marks at a more favorable rate than the

²This is the tenor of the Brainard and Tobin article on financial models [5].

one offered in the open market.

The offset right, instituted May 1961 and rescinded January 1, 1967, enabled a commercial bank to subtract its short-term foreign assets (not including short-term loans to foreigners, LNs_p) from its foreign liabilities before computing required reserves. This was an especially lucrative right for German banks as, unlike in most other countries, their foreign currency denominated liabilities are subject to higher reserve requirements than comparable domestic liabilities. Since reserve requirements were higher on sight deposits than they were on time deposits and higher on time than they were on savings deposits, liabilities were offset in that order, and there was a declining marginal return to offsetting.

In measuring the value of this privilege to the banks, the common practice is to add one percentage point to the foreign interest rate.³ This is probably an understatement since interest rates were over 5 per cent for much of the period and almost all of the foreign liabilities were either sight deposits, with a reserve requirement of 30 per cent, or time deposits whose requirement was over 20 per cent. Investing in the Euro-dollar market for 5 per cent or more (available throughout 1966 and most of 1965) and re-investing the freed reserves in the same market would raise the effective yield by at least one percentage point, without taking into

³See, for example, Report of the Deutsche Bundesbank for the Year 1964, p. 18.

account the new round of offsetting effects the second investment would have. During the tight money period of 1965-66, when the Bundesbank was most interested in inducing foreign asset holdings, domestic rates on long- and short-term loans were well over 6 per cent, making the minimum increment to foreign returns 1.2 percentage points.⁴

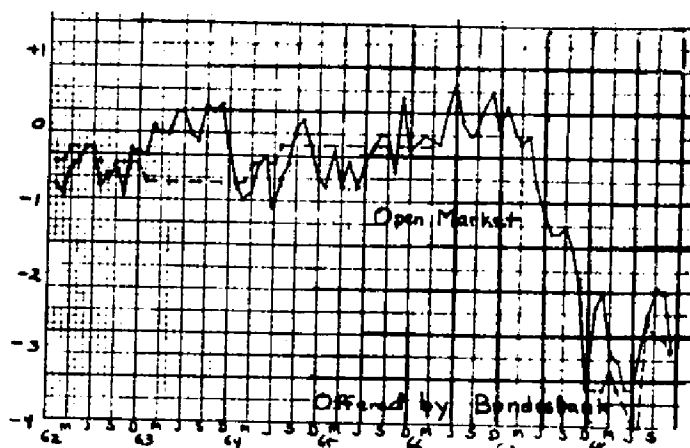
The offset right kept the effective Euro-dollar and New York three-month interest rates well above the comparable German interest rates throughout the tight money period of 1965 and 1966. (See Figure 2-B.) The 1967-68 rise in holdings of foreign money market paper and time deposits, despite the lower or negative interest differential after the rescission of the right, is a result of the highly liquid status of the banks at that time. Short-, medium-, and long-term lending were falling throughout 1967, although the last named category began to rise in 1968. The lowering of reserve requirements during the same period gave the banks an incentive to buy highly liquid assets to maintain their defensive positions.

Offset rights obviously have a very powerful effect on foreign asset holdings. But, once instituted, they can only be adjusted marginally by changes in reserve requirements against foreign liabilities. When these have reached their legal maximums, effectiveness of the right to offset is at the mercy of the market forces governing interest

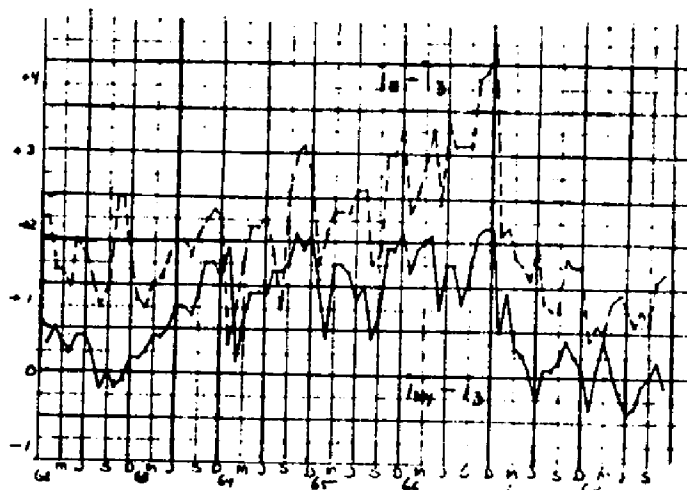
⁴Chapter III, footnote 2, explains the method used in this paper to compute the value of the compensation privilege.

Figure 2. Indicators of Bundesbank Swap Policy, 1962-68¹

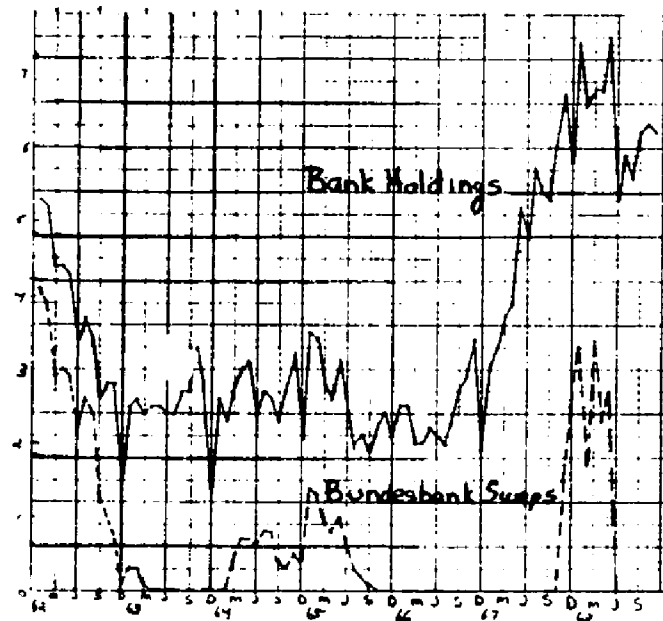
A. Premium (+) or Discount (-) on Swap
Rate Between Dollars and Marks
(Per cent per annum)



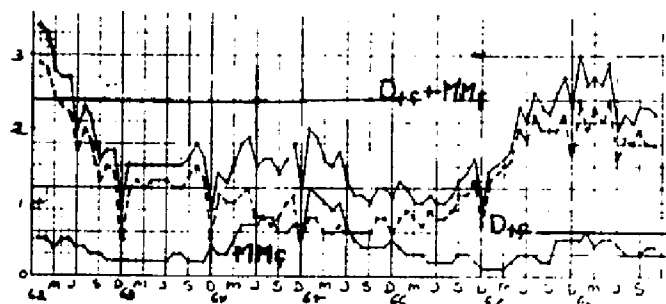
B. Differential between Foreign and
German Three-Month Interest Rates²



C. Bank Holdings of Foreign Money Market Paper and Foreign Time Deposits, and Swap Commitments of Deutsche Bundesbank
(In billions of deutsche marks)



D. Bank Foreign Investments as a Proportion of Investable Assets



Sources: Deutsche Bundesbank, Monthly Reports; IMF, International Financial Statistics.

¹Data are for end of month.

²Corrected for the effects of swap and offset policies. (See Chapter III, footnote .)

rates. In addition, they cannot be directed towards assets of a given maturity or currency denomination. The second facet of the Bundesbank's policy to keep banks holding foreign assets, the swap policy, showed none of these defects. When it was necessary to neutralize incoming flows of liquidity, the Bundesbank offered to sell forward marks (purchase forward dollars) either on an outright or swap (selling spot dollars) basis to the member banks at rates which were more favorable (less discount) than offered by the open market and which established a favorable margin for outward interest arbitrage. The swaps were carried out only with the banks and only in dollars. The dollar market was deep enough to absorb the transactions without having them affect U. S. interest rates and the dollar was easily convertible into other currencies the banks might want.

The Bundesbank set the terms, encompassing maturity and cost, at which it provided whatever amount of cover the banks desired. The length of cover provided ran from one day to six months, often with the longer maturities covered at more favorable rates in order to freeze bank liquidity for longer periods. Terms were also set to affect future flows in specific months. In 1962, to discourage repatriation of foreign assets for yearend window dressing, the Bundesbank refused to conclude contracts which would expire in December; and in November of 1967, during the sterling devaluation crises, contracts had to expire after January 2, 1968.

As can be seen in Figure 2-C, there have been three episodes of

Bundesbank intervention in the swap market. The first, ending in the beginning of 1963, is the last phase of a series of swap operations that was begun in 1959 and reached a peak in January 1962. It was the period before revaluation in 1961, when liquidity inflows were forcing an unwanted easing of monetary policy, that the value of swap operations for domestic stability was first recognized. By November of 1962, it had become cheaper for the banks to cover on the open market and the Bundesbank's commitments ran out quickly.

The second episode ran from February 1964 through October 1965. During this time, the Bundesbank provided cover solely for the acquisition of U. S. Treasury bills—not for Euro-dollar deposits. This narrowed the gap between the European and New York three-month rates and resulted in a shift from Euro-dollars to U. S. Treasury bills (clearly seen as a bulge in the MM_f diagram and less clearly as a small dip in the F_t graph in Figure 2-D) as well as a shift from domestic to foreign assets. Since $MM_f + F_t$, in both absolute and ratio form, seemed to stabilize at a lower level after the period of intervention than before, it is reasonable to assume that the swaps kept total short-term foreign investment higher than it might otherwise have been.

The coefficients in the MM_f equation, although not significant, provide, in their signs and sizes, some corroboration for the above conclusions. The elasticity of the MM_f ratio with respect to the New

York interest rate (evaluated at their means) is 2.52 using equilibrium values and .317 for a one-month period. The elasticity of the MM_f ratio to a narrowing of the gap between the Euro-dollar and New York interest rates is .054 for one month and .429 after all adjustments are completed.⁵ These elasticities imply that an increase in the New York rate of .5 (the actual swap rate change from February 1964 to October 1965) will produce, ceteris paribus, an 80 per cent increase in the MM_f ratio over its February 1964 level and a rise in the total of bank investments in foreign money market paper of DM 460 million. (The actual increase was DM 312 million.) About 40 per cent of the computed increase is attributable to the change in the differential between the New York and Euro-dollar interest rates.

The 1964-65 policy was able to reverse temporarily the trend that persisted through the 1960's for German banks to shift their short-term foreign assets from New York to the Euro-dollar market. The shift was caused not only by a widening interest rate differential in favor of Euro-dollars, but also by an institutional preference to "deal at one's doorstep" in London and other European financial centers, rather than in New York.⁶ A temporary reversal of this process was considered desirable by the Bundesbank because keeping the banks out

⁵The equilibrium elasticity of the response of F_t to a reduction in the differential of the Euro-dollar over the New York rate (as calculated from the F_t equation) is -.575.

⁶Monthly Report of the Deutsche Bundesbank, November 1967, pp. 9-10.

of the Euro-dollar market would prevent liquidity from flowing back into Germany directly through German firms borrowing there and indirectly "through the financing of the balance of payments deficits of certain countries whose economy was very expansive at that time."⁷

However, it is doubtful that German banks were such a large part of the Euro-dollar market that removing some of their deposits would materially increase the cost and reduce the availability of credit to German businesses financing there. From February of 1964 until January of 1965 (December is affected by seasonal factors), German banks reduced their foreign time deposits from DM 1.7 billion to DM 1.4 billion. The reduction of less than \$100 million compares to the total size of the Euro-dollar market of \$9.0 billion in 1964. Foreign time deposit holdings continued to decline in 1965, reaching DM 1.0 billion in June and climbing slightly to DM 1.2 billion in September. This additional reduction of around \$100 million compares to an estimated size of the Euro-dollar market during 1965 of \$11.5 billion.⁸ Even if it is assumed that all of the funds flowing to New York would have gone into Euro-dollars, the total amount diverted is hardly enough to significantly enhance the ability of German businesses to obtain Euro-dollar credit.

⁷Monthly Report of the Deutsche Bundesbank, September 1965, p. 18.

⁸Euro-dollar market estimates are from Bank for International Settlements, Annual Report, 1966.

The "certain countries" who were financing their deficits in the Euro-dollar market in 1964 probably refers primarily to Italy, whose banks had been borrowing Euro-dollars very heavily to offset losses of liquidity associated with a balance of payments deficit. It cannot refer to the United States since dollar deposits in New York or London would finance a U. S. deficit almost equally well. Neither would necessitate the loss of any U. S. reserves, although the latter would require offsetting by Federal Reserve open market operations. Actually, by the time the swap policy was implemented, the Italian central bank had clamped down on bank borrowing and a recession was beginning in Italy which was to result in a balance of payments surplus by the end of 1964.

The third episode of swap intervention took place during the sterling devaluation crises of late 1967 and on into 1968. At this time, the Bundesbank was offering swap contracts up to and including 90 days; so the swap rates are not exactly comparable to previous data. However, it is clear that the rates were attractive to banks as they acquired large amounts of forward cover in a short time. This helped to neutralize tremendous inflows of liquidity into Germany from speculation against the dollar and pound in favor of the mark.

The effectiveness of the swap-offset policy mix can be seen in the changes in the banks' balance sheets in the period from April 1964 to April 1965, during the second episode of swap policy. The German economy was in boom conditions; industrial production was

up 11 per cent; wholesale prices rose 3.5 per cent (quite rapidly for Germany); a tighter monetary policy was signalled by a one-half percentage point discount rate increase early in 1965; and a surplus existed on current account through much of the period. At the same time, the secondary reserve ratio of the banks dropped 12 per cent and the ratio of borrowings from the Bundesbank went up 33 per cent. But, in the face of a liquidity squeeze, the bank holdings of foreign money market paper plus foreign time deposits fell by less than 5 per cent. The current account and basic balance started going heavily into deficit in the second quarter of 1965, so that the Bundesbank no longer faced a conflict between internal and external goals and could raise the discount, Lombard, and open market rates more rapidly knowing that the net effect of balance of payments would still be to drain liquidity from the banking system. But while the dilemma existed, the swap policy was effective in preventing the potential repatriation of foreign assets.

A second type of Bundesbank policy towards the banks' foreign portfolios was aimed at discouraging banks from obtaining liquid funds from abroad by accepting deposits or borrowing. The most important method adopted to accomplish this was to penalize foreign borrowing by reducing the rediscount quota of each bank by the excess of such borrowing (not including trade credits) over its average for the period January to June 1964. The policy took effect August 1, 1964, and was rescinded December 31, 1966. Because a part of the

bank response to this measure was to reclassify some borrowing as deposits, it is difficult to judge its overall effectiveness. An observed decline in borrowing from abroad would only partially result from a reduction in bank imports of liquid funds; it would also reflect a re-channeling of these funds. The regression estimates are of little direct help in evaluation since the variable that was supposed to represent the quota reductions (ΔQ_{BR}) contains a very strong bias towards a positive correlation with the amount of borrowings.

Despite these problems, and in lieu of a reliable regression coefficient, two methods were used to test the tool's effectiveness. One was simply to compare the movements of BRs_f with other variables during the time the policy was in effect to see if its behavior indicated that it was being acted upon by a force which was not affecting the others. Another was to use the estimated equations without the ΔQ_{BR} coefficient, and examine the unexplained variance and deviations of actual from calculated values for indications of the quota reduction policy at work.

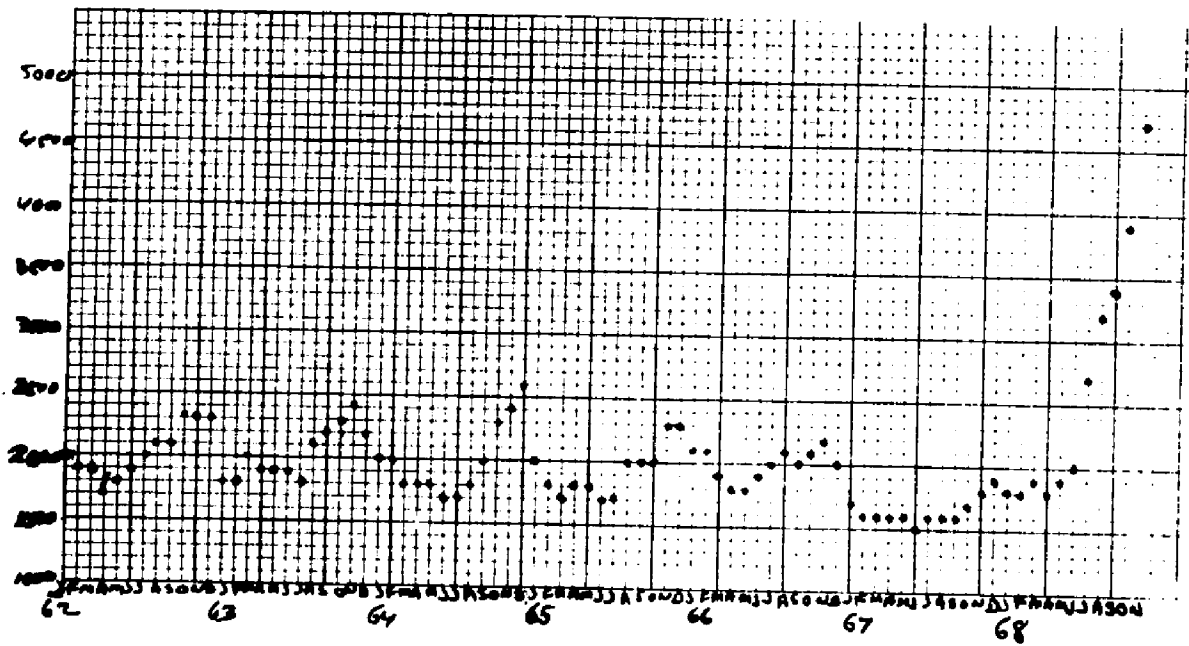
Using the first method, a decline of 16 per cent in BRs_f can be observed between July 31, 1964, and December 31, 1966. (See Figure 3-A.) At the same time, over the peak of the business cycle, the secondary reserve ratio was reduced by 2 per cent, the ratio of borrowing from the Bundesbank to total liabilities went up 4 per cent, long-term borrowing was down 2 per cent, and short-term borrowing was down 17.5 per cent. The downward movements of

Figure 3. Short-Term Borrowing from Foreigners

A. Ratio Form



B. Non-Ratio Form



both long- and short-term domestic borrowing are partly the result of the Interest Rates Order which took effect during this time. The Order freed interest rates on long- and short-term time deposits and tightened criteria governing the classification of liabilities in such a way as to cause some balance sheet transfers from borrowing to deposits. The quota policy would seem more successful if April or May of 1966 were used as the end date, since these marked the peak of the business cycle and a subsequent reduction in loan demand and the incentive to borrow. Between July 1964 and April 1966, BR_{sf} fell 20 per cent, while CR_B was up 90 per cent and SR down 13.7 per cent, indicating a severe credit tightening. In non-ratio terms, BR_{sf} grew slightly from DM 1.7 billion to DM 1.8 billion by April 1966. (See Figure 3-B.)

By the second method, the changes in BR_{sf} and TBR_{sf} were calculated using all the coefficients in the estimated equations with the exception of the ones on ΔQ_{BR} . If it is assumed that the quota change policy accounts for a substantial proportion of the unexplained variance in the equations (after ΔQ_{BR} is removed), then the calculated values of the ratio and level of borrowings should be above the actual levels—the intended effect of the policy being to reduce borrowings. Deletion of ΔQ_{BR} reduces the R^2 from .59 to .55 in the BR_{sf} equation and from .65 to .63 in TBR_{sf} . (The TBR_{sf} equation including the level of imports, rather than the change, was used.) Calculations were made with both the equilibrium and short-run coefficients for BR_{sf}

but only the short-run coefficients for $TBRs_f$ since the positive speed of adjustment coefficient in the latter equation makes the wisdom or meaning of dividing through to derive longer-term coefficients doubtful. The use of equilibrium coefficients implies that the changes in the independent variables occurred at the beginning of the period and the adjustment process had worked itself out by the end date. The use of short-run coefficients implies that all changes in the independent variables occurred last month and, therefore, very little adjustment to the new desired ratio has taken place. As with the first method, two end points were used—one when the rule was rescinded (December 31, 1966) and one when the business cycle reached its peak (April 30, 1966).

The results, as given in Table 8, with only one exception contradict the effectiveness of the quota penalty policy by predicting smaller positive or larger negative changes than actually occurred. In five of six cases, the difference between the actual and predicted values implies that the variables not included in the calculations pushed the banks' borrowings from foreigners away from the direction the Bundesbank wanted them to go. (In the sixth case, they did not have any effect.) Of course, the lack of explanatory power of the equations makes any interpretation of these results tenuous, at best.

A secondary tool against borrowing abroad was the classification of such borrowings for reserve purposes as time deposits and raising the requirement against them to its legal maximum, 20 per cent. This

TABLE 8

CHANGES IN SHORT-TERM FOREIGN BORROWING

	Actual	Predicted Without ΔQ_{BR}
<u>July 1964 through December 1966</u>		
BRs_f	- .08	- .08
BRs_f equilibrium	- .08	- 5.39
$TBRs_f$	+188	+169.5
<u>July 1964 through April 1966</u>		
BRs_f	- .08	- .09
BRs_f equilibrium	- .08	- 5.06
$TBRs_f$	+ 22	-139.8

was meant to discourage borrowing abroad for domestic use. The policy would, of course, have no effect if the right to offset were in effect and short-term foreign assets are greater than short-term foreign liabilities so that any accrual to foreign liabilities could be used for domestic lending without incurring additional reserve requirements. In this case, foreign and domestic borrowing would have an equal effect on a bank's reserve position. If all foreign sight and time deposits were offset, but not all foreign savings deposits, then increased borrowing would necessitate additional reserves at the savings deposit rate. The policy would be

most effective if some time deposits as well as no savings deposits were not offset.

Unfortunately, a breakdown of foreign deposits at German banks prior to 1969 is available only for December. To get a crude measure of whether or not the additional reserves required by an increase in borrowing would be at the 20 per cent time deposit level or at the 10 per cent savings deposit level, it was assumed that the December level of savings deposits had persisted throughout the previous year.⁹ The net liability position (the banks' net foreign position was negative until 1967) was measured against this assumed level. If the net liability position is larger (short-term foreign assets minus short-term foreign liabilities is more negative) than savings deposits, then there must have been some time deposits or short-term borrowings not offset by foreign assets and the reserve requirement against foreign borrowing would be 20 per cent rather than 10 per cent. In 1962, in only one month was the net liability position less than December savings; one month in 1963; four months in 1964; five months in 1965; and six months in 1966. Because of an upward trend in savings deposits (making the December levels the highest for each year) and because some foreign assets which were included in this calculation of the net liability positions are not counted towards offset (most lending to foreigners, LN_{s_f} is not), this is the minimum number of months the

⁹The 1969 monthly figures indicate no seasonal fluctuation in December.

higher reserve requirement would not have been effective.

The Bundesbank tried to limit increases in German bank liquid funds derived from time deposits of foreigners by forbidding the banks to pay interest on these deposits, except for the savings deposits of individuals. This rule was in effect during the entire time span covered by this study except for a period from May 1962 to May 1964. Statistics on time deposits of foreigners are available only for December. They do show a small decline from December 1963 to December 1964. Total nonresident deposits seem, by observation of the data, to be more responsive to changes in the total volume of trade than to changes in their eligibility for interest earnings. The primary effect of the rule was probably to cause transaction balances to be shifted entirely to demand deposits, whose higher reserve requirements would cause a tightening of the banks' liquidity position. During the foreign exchange crisis of November 1968, the Bundesbank put stringent controls on demand deposits as well, requiring permission to open new accounts and imposing a 100 per cent reserve requirement on increases in total foreign deposits.

These policies aimed at foreign assets and liabilities are not neutral toward domestic assets and liabilities. Any increase in the MM_f or F_t ratio must be accompanied by a decrease in another balance sheet ratio. The presumption is that foreign short-term assets are closest substitutes for domestic short-term assets, either SR or MTN. The equation estimates are highly inconsistent and

contradictory with respect to effects of foreign interest rates on domestic assets. An increase in the New York rate properly decreases SR and increases MM_f but inexplicably has opposite, large, and highly significant effects on long- and short-term domestic lending. The Euro-dollar rate, i_E , which is very closely correlated with German rates (.910 is the correlation coefficient between i_D and i_E , and .903 between i_E and i_3) has a negative sign in F_t which is clearly incorrect.

In almost all equations fitted with both i_E and i_{NY} , the two have opposite signs. This is even true in the two domestic lending equations where i_E , like i_{NY} , changes sign from one maturity to the next. This may be caused, despite the high correlation between i_{NY} and i_E (.93), by the slightly lower correlation coefficients between i_{NY} and German rates (.87 with i_D and .88 with i_3), or it may be the result of the ambiguous role of the Euro-dollar rate as a cost of borrowing as well as a return on investment. For the latter reason, also, the positive coefficient of i_E in the CR_B equation is expected since in this case both aspects reinforce themselves. A rise in i_E would divert some borrowing from the Euro-dollar market to the central bank and would also make additional borrowing from the central bank more attractive since a higher return can be earned on the funds obtained.

To the extent that the foreign and domestic liquid assets merely substitute for one another, a policy of inducing holdings of foreign

assets will be unsuccessful in reducing short- and long-term lending ratios, important measures of the impact of the banks on the private economy in Germany. The substitution of foreign for domestic assets does, however, have an effect on the total size of the portfolio since there are no secondary rounds of credit expansion when a foreign asset is purchased. The swap and compensation arrangements were the German methods for neutralizing the domestic impact of the balance of payments surplus. The failure to prevent reserve accumulation would have resulted in large amounts of credit expansion since the average reserve requirement over the period was 7.3 per cent and the average SC ratio was 3.2 per cent.

The reduction of foreign borrowing will alter the composition of portfolios through its effect on the flow of funds into the banks (the constraint), which, in turn, has differential impacts on individual asset ratios, affecting lending most strongly. Foreign borrowing also works on asset ratios by altering the proportion of deposits in total liabilities. An increase in borrowing so as to reduce the ratio of deposits to liabilities by 1 per cent would reduce the desired SR ratio by .023. But the primary impact of policies to discourage borrowing abroad, except as borrowing from the Bundesbank was substituted for it, was on the size rather than the composition of bank portfolios since such borrowing is a source of reserves and will lead to a multiple expansion of credit.

Domestic Asset and Liability Policies

This category includes those policies affecting interest rates, reserve requirements, and discount quotas that were intended to have their fullest effect felt on domestic asset and liability ratios. Their impact on other balance sheet items will be evaluated insofar as the data allow.

The Bundesbank has explicit control over the discount, advance, and open market interest rates and, through the structure of German money market and the effects of bank regulations, very tight implicit control over most other domestic interest rates. Problems of collinearity among interest rates and simultaneity in the structure of the equations have resulted in contradictory signs and few significant results in the interest rate coefficients. Consequently, it is impossible to measure with any confidence the effectiveness of interest rate policies. However, several tendencies can be noted.

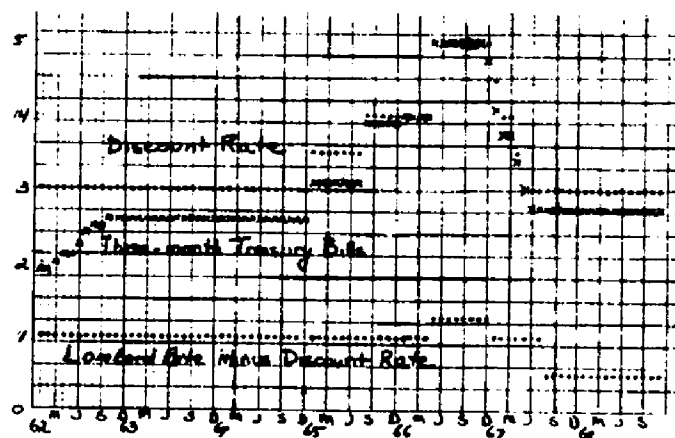
In the foreign asset equations F_t and MM_f , domestic interest rates have the expected effect, if the discount rate is taken as representative of all domestic rates. Raising the discount rate and the domestic rate structure will reduce the proportion of the portfolio held in foreign assets. This is the essence of the surplus-inflation dilemma. Steps taken to cool the domestic economy aggravate the balance of payments surplus by causing a capital inflow. The difference in sizes of the coefficients on i_{NY} and i_D in the MM_f equation implies that it matters whether changes in the domestic-foreign interest differential

come from changes in domestic or foreign rates. If the relationship between the sizes is correct, a policy of raising internal rates while also raising external rates through the swap arrangements should be effective even though the swap rate is not changed by as many basis points as the domestic rate. That is, a constantly falling interest differential could be consonant with a steady level of foreign investments. The corroborative evidence is mixed. By inspection (ceteris paribus does not hold), a fairly constant MM_f in 1963 was accompanied by a rising $i_{NY} - i_3$ differential instead of a falling one. In 1968, however, a steady MM_f was accomplished with a declining $i_{NY} - i_3$. Euro-dollar transactions also give contradictory indications. A falling F_t in 1963 and 1964 was accomplished with a slightly rising $i_E - i_3$ and F_t rose in 1967 as $i_E - i_3$ fell rather sharply.

Throughout the 1960's, The Bundesbank was striving to make its open market operations a more effective tool of monetary policy. In the latter part of the 1950's and early 1960's, a fixed margin between the discount and open market rates had been maintained. The open market rate on government paper was so low that the banks could not be induced to hold it except in periods of very low interest rates and high liquidity. The Bundesbank felt that by raising the rate of return it could induce banks to hold greater quantities of open market paper and thereby obtain an extra lever in the control of bank liquidity and through that, bank loans. In 1962, the open market rate started the year 1.1 percentage points below i_D , but ended it only .4 below.

(See Figure 4.) When the discount rate was raised from 3.5 per cent to 4.0 per cent in August 1965, the differential was closed further to .1, and finally eliminated entirely in January 1966. The relationship was maintained when i_D was raised to 5 per cent in March of 1966. When i_D went back down to 3 per cent, i_3 was dropped .25 below that. Judging from their different signs in three of the four equations where the two rates appear simultaneously (even though they should have the same sign in the SR equation), the effects of changes in the two rates were successfully differentiated. Especially impressive is the positive sign on i_3 in the SR equation. This implies, for example, that the extra increase in i_3 in 1965 induced extra holdings of government securities by the banks, thereby reducing the volume of business loans.

Figure 4. Interest Rates Set by the Bundesbank



In this model, a change in reserve requirements first produces a change in the cash position which, in turn, causes a change in the holdings of secondary reserves as the banks adjust their defensive

positions. An increase of one percentage point in required reserves ($\Delta r = 1$) yields a change of 1.44 in the cash position which gives rise to a decrease of .21 in the secondary reserves ratio in the first month. To fulfill the balance sheet constraint, other asset ratios must also decrease. The same change in reserves reduced the desired SR ratio by .39 and the other asset ratios by somewhat less than their short-run changes. The power of reserve requirement changes implied by the preceding figures was clearly illustrated in 1959 and 1960 when the Bundesbank relied quite heavily on them to check a booming economy at the same time that the balance of payments was in surplus. Between November 1959 and July 1960, reserve requirements on demand deposits were increased 7.15 percentage points and a higher reserve requirement was put on additions to demand deposits. The consequent attempt of the German banks to reduce their liquid asset ratios resulted in increases in domestic interest rates that attracted large amount of foreign funds. These partly offset the credit tightening the Bundesbank desired and accelerated the rate at which it was accumulating reserve assets. Finally, the Bundesbank was forced to lower reserve requirements back to the level of August 1959.

The Bundesbank also reduced the banks' liquidity by reducing their rediscount quotas. The cut was announced in March 1965, and carried out in two steps—the first half in October 1965 and the second half (after several postponements) in March of 1966. The effect of

the reductions was to reduce the potential liquidity available to the banks through borrowing at the Bundesbank. This, in turn, should force a realignment in the banks' defensive positions. It is not clear that the quota change variable used in the model (ΔQ) accurately measures the impact of this policy since it moves with the actual changes and ignores announcement effects or anticipatory behavior by the banks. The sign in the SR equation is right and the coefficient is significant. A reduction in quotas equivalent to 1 per cent of the total portfolio produces an increase of .67 percentage points in SR in the first month and 1.2 percentage points increase in equilibrium as banks substitute actual liquidity for the loss of borrowing power.

Since the coefficient on ΔQ in the use of Bundesbank credit (CR_B) equation has the wrong sign, the technique used to evaluate the effects of quota changes on foreign short-term borrowing was applied to use of Bundesbank credit. The change in CR_B from January 1965 (before the cut was announced) to June 1966 (two months after the final cut on May 1) was calculated using all the variables, with both equilibrium and short-run coefficients, except ΔQ . (The CR_B equation loses almost no explanatory power without ΔQ , the R^2 would be .772 rather than .777.) The increases calculated due to changes in the other variables are 1.41 with equilibrium coefficients and 1.22 in the short run. The actual change was +.85. The lowering of the quota was probably part of the reason for the smaller than predicted change.

Quota changes are an instrument generated by balance of payments

considerations. They reduce liquidity of banks and induce them to hold greater secondary reserves and borrow less without raising the general level of interest rates and exacerbating the surplus situation. The various schemes to prevent repatriation of foreign assets and borrowing abroad were necessary to the effectiveness of quota changes, since a large part of whatever borrowing was discouraged at home would otherwise have been done abroad.

Foreign Long-Term Capital Movements

Although the focus of this study is on short-term capital, two episodes of radical shifts in long-term capital movements form an integral part of the monetary history of the period. The first was the large inflow of portfolio investment in 1963 and 1964, and the second was the growth of long-term capital exports from Western Germany in 1967 and 1968. These flows have acted as a constraint upon German monetary policy just as short-term flows have. Because the long-term capital market is dominated by the banks, it seems particularly vulnerable to a tight money policy. This was demonstrated in 1959-60 when reserve requirement increases had such a strong impact on long-term interest rates that the capital attracted to Germany forced the Bundesbank to reverse its policy. Since that experience, the Bundesbank has had to keep a close watch on the responses of both long- and short-term capital flows. Unfortunately, a detailed breakdown of the banks' participation in the foreign long-term market is not available monthly and not at all available beyond September

1967, before the most recent upsurge in bank holdings of long-term foreign assets. Hence, these movements can only be traced very generally; their precise effects and tradeoffs with other portfolio items cannot be estimated precisely.

Despite the Bundesbank's avowed goal of balancing a current account surplus with an outflow of long-term capital, until 1967 the net private flow of long-term capital was inward. A high growth rate made Germany an attractive place for foreigners to invest. The Germans, who had their foreign assets confiscated after the two World Wars, retained a wariness of overseas investments. These forces produced private long-term capital inflow of DM 2,963 million in 1963 and DM 495 million in the first quarter of 1964. In March 1964, the Federal Government, with the cooperation of the Bundesbank, acted to reduce the flow without lowering domestic interest rates by proposing a 25 per cent coupon tax to be withheld on all German bonds. The tax would be refunded for citizens of countries which had reciprocal tax agreements with Germany and who cared to set the refunding process in motion by telling their governments about their investments. Apparently many investors found this prospect distasteful, and there resulted a capital outflow of DM 751 million in 1964 II, most of it to Switzerland. Over the entire year, net long-term capital imports amounted to DM 369 million, only a little over 10 per cent of the previous year's flow. The task of the German authorities was eased by the imposition of the U. S. interest equalization tax, which made it

more expensive to borrow in the United States for use in Germany .

The second important episode in the long-term capital markets was the change in the nature of the credit institutions' positions from net importers of DM 344 million in 1966 to net exporters of DM 1,107 million in 1967 and DM 5,425 million in 1968 . The increased capital exports primarily came from DM denominated foreign long-term credit and loans (Euro-DM loans) . German banks increased their participation as underwriters of foreign loan issues from DM 870 million in 1967 to DM 5.2 billion in 1968 . Of all foreign loans in European markets, 8 per cent were DM denominated in 1967 while 31 per cent were in 1968 . The rise in underwriting was accompanied by an increase in the per cent of foreign DM bonds being placed with German residents from 22 per cent in 1967 to 78 per cent in 1968 and 74 per cent in the first half of 1969 . Most of the increase in holdings and underwriting came in "international" issues—those underwritten by banks and brokerage houses in several countries . There was also an increase in the "traditional" foreign loans which had exclusively German sponsorship . In contrast to most other developed countries at this time, Germany had no direct controls on loans of this type .

The increased demand for Euro-DM loans was mainly a result of casier German monetary policy in 1967 . This policy, in contrast to tighter policies being followed in many other industrialized countries, contributed to the decline of the domestic German internal rates below the comparable Euro-DM rates in 1967 and to the fall of the Euro-DM

rate to more than one full point below the Euro-dollar rate by 1968 (it had exceeded it until 1967). The Bundesbank made no attempt to offset a balance of payments surplus which added to the banks' liquidity and enabled them to absorb the new issues. Investors' worries about future par values of other currencies also contributed to raising the demand for DM bonds. The supply of borrowers was enhanced when, in January 1968, restrictions were placed on U. S. firms borrowing at home for investing abroad, which caused them to seek financing in the Euro-bond market.

The long-term rate used in the model was for domestic bonds, but it can be reasonably assumed that a change in the rate on foreign DM denominated loans would have very similar effects, there being little difference between foreign and domestic DM bonds to the German investor. From the beginning of 1967 through the end of 1968, the rate on foreign DM bonds rose one-third of a point (it had risen even more by the end of 1967, after which it dropped slightly) while the rate of return on domestic long-term loans fell about one percentage point, with most of the decline having taken place by June 1967. From that point on (which is also where the two rates are approximately equal), the decline in the domestic rate was matched by the rise in the foreign rate. One would expect no change in the L/N ratio if, as hypothesized above, the two assets were perfect substitutes for each other. The rise in L/N throughout 1968 reflects the combined decline of the rates of return on competing assets, including i_3 , i_{LN} , and the

margin for short-term outward interest arbitrage.

The effect of the increased holdings of foreign loans on German monetary policy is not clear. To the extent that the domestic long-term capital market responds to attempts to widen and deepen it, future monetary moves can be made without fears of massive shifts of long-term capital in response to mild changes in policy. The banks' and public's holdings do, however, constitute an additional source of liquidity, which may move in a destabilizing fashion when the Bundesbank again tries to tighten up policy.

CHAPTER V

CONCLUSION

It is not possible to draw very precise conclusions about the success of the German monetary authorities in coping with the conflicts between internal and external balance in the 1962-68 period. One difficulty arises from lack of significant results obtained with the model. The absence of accurate measurements of the effects of monetary policies prevents comparisons with outcomes that might have resulted from the use of different varieties or mixes of policies.

An additional problem is in the definition of success—the standards against which the outcome should be measured. Measured against the long-term external goal of zero basic balance, the German economy performed rather well. Over the seven years from 1962 to 1968 the German balance of payments had accumulated a basic balance deficit of only DM 1.35 billion. Over the same time span, however, the central bank gained DM 9.08 billion in gold and foreign exchange. It is this latter phenomenon, and the short-term capital inflow that caused it, which was the most immediate concern of the Bundesbank. Its policies were intended to reduce the inflow and minimize its effects on the liquidity of the German financial system. That is, the Bundesbank's short-term goal was to avoid

internal adjustment to external forces. Accomplishment of this objective would be incompatible with longer-term goals if it postponed necessary price and income adjustments by surplus and deficit countries.

Within the context of offsetting or neutralizing short-term capital flows, there are several degrees of success possible. An entirely successful policy would be one which allowed the central bank to pursue its domestic goals and disregard the external effects of its efforts. This test would be met if it were found that the Bundesbank was able to create whatever monetary environment it desired. Policy could be judged to be partially successful if the central bank were able to induce the banking system to offset actual and potential capital inflows by enough to forestall the necessity of taking actions which would aggravate internal problems. That is, in a situation of conflict between internal and external goals, the authorities might have to accept financial conditions which were not ideal from an internal standpoint, but they wouldn't have to make the situation worse than it already was.

There can be little doubt of success under the less rigorous definition. In 21 of the 28 quarters from 1962 I through 1968 IV, the bank's net foreign short-term position (short-term foreign assets minus short-term foreign liabilities) moved so as to offset the change in official holdings of gold and exchange that would have occurred from basic balance. When basic balance was positive, foreign assets

were accumulated, and vice versa. Of special import because of the trend towards accumulation of reserve assets, the bank's net asset position rose 9 of the 13 times basic balance was positive. The tie between exports and short-term loans to foreigners (LNsp) makes some offsetting inevitable, but its size and frequency bears out German claims of success.

The ability of the Bundesbank to isolate the banks from the open market is confirmed by the contrary movements of the net short-term foreign positions of banks and business enterprises which are both presumably subject to similar market forces. In 17 of the 28 quarters from 1962 I through 1968 IV, the banks' foreign portfolios shifted in opposite direction to changes in the short-term position of business enterprises and individuals. This occurred despite similar trends for the entire period, the banks moving toward a net export position by DM 1,038 million and business enterprises increasing their net capital exports by DM 786 million. Of the 11 quarters where the movements by banks and businesses were in the same direction, six occurred in the nine quarters from 1965 III through 1967 III. Four, at the beginning of this period, involved both sets of institutions importing capital. The balance of payments deficit at that time permitted the Bundesbank to tighten monetary conditions, while leaving the swap rate unchanged and erasing the margin for outward interest arbitrage, without undue concern over capital inflows. The other two of the six quarters of agreement occurred in 1967 when monetary policy

had eased, the economy was beginning to recover from recession, and the recession of the offset right had removed the differential incentive for banks to export capital. There were also matching changes in the last two quarters of 1968 when speculation in favor of the mark inflated banks' liability balances while tighter monetary conditions induced enterprises to borrow abroad. The flow of funds into the banks was reversed in the next couple of months as the Bundesbank used favorable swap rates to induce an increase in foreign time deposits and money market paper and as speculators repatriated their funds when the mark was not revalued.

The Bundesbank's ability to prevent inflows of liquidity during tight money periods does not necessarily mean that these potential flows did not affect the intensity and timing of domestically oriented monetary policy moves. This higher level of success is difficult to judge because it involves ex post judgments about economic conditions which may not have been obvious in an ex ante policymaking position. The problem is particularly acute when judging monetary policy in 1964. The year started with a very large surplus on basic balance that gradually moved toward a small deficit at midyear and a substantial deficit by June 1965. The surplus reflected a large increase in exports in 1963 which in turn precipitated a domestic boom that saw industrial production climb 9 per cent in 1964, the ratio of unfilled vacancies to unemployment rise 1.2 per cent, and wholesale prices rise 3.5 per cent. In retrospect, 1964 can be

clearly seen as the start of a long upward swing which lasted until a recession in the second quarter of 1966, and was accompanied by even faster increases in prices and a much tighter labor market in 1965. The later excesses of the cycle might have been mitigated by a more cautious monetary policy as it gathered momentum.

Yet German monetary policy in 1964 consisted almost entirely of attempts to offset the balance of payments surplus and to prevent the banks from aggravating the boom by importing liquidity. There was no easing of policy, confirming a lower level of success, but the only domestic tightening was a 10 per cent increase in reserve requirements in August. Starting in 1965, when it was clear that the balance of payments deficit was more than transitory and that the inflation was accelerating, the Bundesbank acted more decisively. The discount rate was increased in January 1965, August 1965, and May 1966. The open market rates were raised 2.25 points in the same period.

While the 1964-early-1965 situation did not look as crucial then as it does now,¹ the Report of the Deutsche Bundesbank for the Year 1964 (written in the spring of 1965) does make it clear that the authorities would have liked to have acted sooner and more forcefully, but felt

¹An independent observer, The Economist, kept predicting non-inflationary growth for the German economy throughout the year. (See [14], [17], and [47].)

the constraint of potential capital inflows.² Their immediately preceding experience with a similar situation was in 1960 when a tighter policy brought an inundation of foreign capital. Until 1965 III, credit granted to the private sector and the money supply continued to grow at a rapid rate. This suggests that action was too late.³ Indeed, the last and most severe increase in the discount rate came almost concurrently with the downturn in the economy.

On balance, the policies adopted by the Bundesbank were capable of offsetting or neutralizing potential inflows of foreign liquidity through the banks, as long as monetary conditions in Germany became no tighter. But the central bank did feel itself constrained by even larger potential flows when it contemplated changes in the intensity and timing of its policy moves. When faced with the dilemma of a balance of payments surplus in an inflationary economy, the Bundesbank was able to prevent the surplus from aggravating the inflation, but was not able to move against the internal imbalance in a manner it would have liked to.

²Note the following statement: "So far as it proved possible to stop the money inflow from abroad, there was also a growing prospect of influencing credit expansion at home by credit policy measures." Report of the Deutsche Bundesbank for the Year 1964, p. 19.

³Although, to be fair, it should be pointed out that the Bundesbank had little help from the Federal Government which cut taxes January 1, 1965, and ran a large deficit throughout the year, putting considerable strain on the credit markets. Portions of the Annual Report of the Deutsche Bundesbank for the Year 1965 are a polemic against a profligate government and a plea for understanding that monetary policy cannot bear the economic adjustment burden alone.

In October 1969, one year after the endpoint of this study, the Bundesbank found its policies completely inadequate to prevent large inflows of short-term capital and the mark had to be revalued 9.3 per cent. The reason for the central bank's impotence was that the capital was entering Germany through nonbanks, while its policies were aimed at the foreign transactions of the banking system. During the first three quarters of 1969, the banks contributed to currency stability by increasing their foreign assets more than their foreign liabilities, but business enterprises more than doubled their foreign borrowing (from banks and nonbanks) as their foreign assets increased only slightly. Businesses accounted for a net inflow of DM 5.3 billion while bank transactions resulted in a net outflow of .2 billion. Because liquidity entering the country in this manner is deposited in the banking system as a domestic liability, the offset and quota change policies based on foreign liabilities do not apply. Almost complete reliance must be placed on domestically oriented policies. The increased participation of German businesses in international capital markets has rendered the special policies designed by the Bundesbank to reconcile conflicting internal and external goals ineffective.

APPENDIX A

SOURCES OF DATA

All variables except those listed below were obtained from various issues of the Monthly Report of the Deutsche Bundesbank.

Y	Organization for Economic Cooperation and Development, <u>Main Economic Indicators</u> .
i_E	The last two years are monthly averages of daily figures obtained from the <u>Monthly Reports of the Deutsche Bundesbank</u> . The first five years are averages of end-of-month figures reported in the Bank of England, <u>Quarterly Bulletin</u> . There was some fear that a seasonal demand at the end of each month might distort the averages, so the method was tested for accuracy by measuring them against the monthly average of daily quotations as found in the <u>Financial Times</u> . The monthly bulge was found to lie a few days before the end of each month and the end-of-month averages, while emphasizing extremes to some extent, were an accurate representation of Euro-dollar rate movements.
i_{NYTD}	<u>Federal Reserve Bulletin</u> .
i_{LTD}	Bank of England, <u>Quarterly Bulletin</u> . Once again this rate was arrived at by end-of-month averaging.
TR, X, M	International Monetary Fund, <u>International Financial Statistics</u> .
Open Market Swap Rates	Last five years, <u>Monthly Reports of the Deutsche Bundesbank</u> ; first two years, IMF, <u>International Financial Statistics</u> (see Chapter III, footnote 3).

APPENDIX B

RESULTS OF SOME ALTERNATIVE ESTIMATIONS

This Appendix contains a discussion of the results of changing the variables in some of the equations. Only those alternative estimations that produced very different, interesting, or enlightening results are reported upon. Scatter diagrams of each dependent variable are at the back of the Appendix.

Cash

The equation was also fitted with the lagged level of the dependent variable, despite the dubious meaning of its coefficient. The coefficient was $-.33$ and significant, although it contributed almost nothing to the R^2 (less than $.01$) and did not reduce the SEE. When SC - 1 was used, the coefficient on the January seasonal dummy and its contribution to the explained sum of squares were reduced greatly.

Secondary Reserves

Other experiments with this equation did not produce very different results. Few of the interest rate coefficients were significant and many did not have the expected sign. Others changed signs when different combinations of explanatory variables were used. This was the case even when the interest rate variables were chosen for their lack of correlation with one another. (Table 1 gives the correlation matrix of the interest rates.) Since the coefficient on the lagged

TABLE 1
CORRELATION MATRIX OF INTEREST RATES

	i_D	$i_R - i_D$	i_{NY}	i_E	i_{DY}	i_3	i_L	i_{LN}	i_{24}
i_D	1.0								
$i_R - i_D$	.53	1.0							
i_{NY}	.88	.55	1.0						
i_E	.91	.55	.93	1.0					
i_{DY}	.89	.56	.87	.86	1.0				
i_3	.97	.44	.88	.90	.87	1.0			
i_L	.85	.14	.73	.78	.76	.91	1.0		
i_{LN}	.94	.35	.80	.84	.83	.94	.89	1.0	
i_{24}	.91	.24	.78	.82	.80	.96	.96	.92	1.0

dependent variable consistently indicated that over one-half of the adjustment between the desired and actual ratios took place in one month, it was dropped from a few equations in the hope that in the absence of such a powerful variable the others would gain in significance. This proved unsuccessful, both because it did not help the other variables and because the R^2 fell by .10 to .15. (Its absence did not produce unacceptable Durbin-Watson coefficients.)

The index of industrial production was introduced as an independent variable as a proxy for changes in loan demand over the business cycle. The rates on long- and short-term loans probably do not capture the strength and

significance of this demand because of the stickiness of the short-term loan rate (which changed only when the discount rate changed through the first three-fourths of the period) and the imperfections in the loan market. One would expect banks to honor requests for loans in interest of their continuing relationship with a business,¹ that is, they are partly passive in the determination of their loan portfolio and, hence, their nonloan portfolio. The expected coefficients on industrial production in the SR equation were negative. The results were consistently positive, indicating a misspecification of this phenomenon, a conclusion confirmed by the perverse signs on the same coefficients in the short-term loan equation. In addition, the discount rate coefficient remained negative and insignificant. Borrowing from the Bundesbank again had a negative effect, although its coefficient was closer to zero and less significant than in the reported equation.

The own interest rate (i_3) was negative except when it was run with only the deposit flow variables. Because of its high correlation with the rates on competitive assets, the substitution effects of the other assets dominated the results on the own rate.

Foreign Sight Deposits

Notably, an attempt to combine the investment and transactions motives, as in the reported equation for time deposits, gave inferior

¹This is the argument made by Kane and Malkiel [24].

results. The ratio of foreign sight deposits to investable assets was regressed on the ratio of total trade to investable assets. The adjustment time was slower, the R^2 was lower, and both the New York and London time deposit rates had the wrong sign. The addition of a lagged trade ratio added little to the explanatory power of the equation and was one-tenth the size of its standard error.

Foreign Time Deposits

A negative coefficient was also obtained when total trade (rather than its ratio to disposable assets) was used as an independent variable. Although, inexplicably, more of the interest rate variables had the correct signs, they were still not significant. The speed of adjustment was about the same. Dropping the lagged dependent variable produced only a small rise in the SEE and less than a .05 fall in the R^2 . The Durbin-Watson coefficient was 1.70 when instantaneous adjustment was assumed.

Short-Term Loans to Foreigners

Attempts to fit this equation in nonratio form were unsuccessful. The R^2 was considerably lower and many more of the coefficients had incorrect signs. If the hypothesis about bank passivity is correct, the equations explaining the foreign loan market should probably consist of a demand for loans by foreign banks and importers and a rate setting equation by German banks. This is the method commonly adopted by builders of models of the U. S. financial system for their business loan sectors where a similar hypothesis about bank behavior is made.

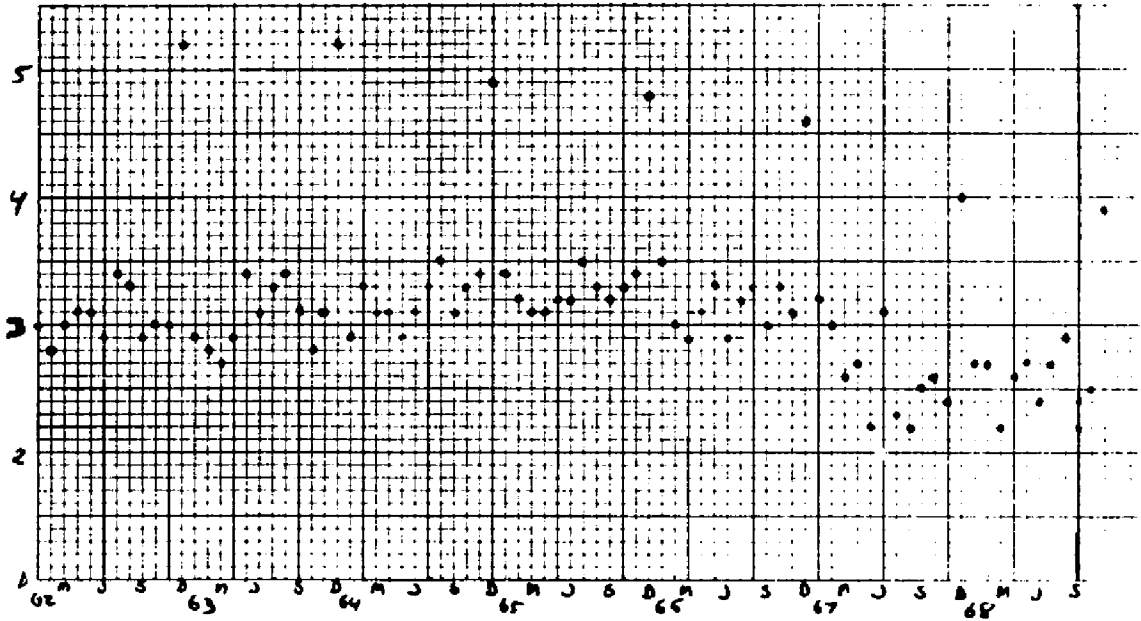
The negative sign on this period's exports was consistent across several experiments .

Short- and Long-Term Domestic Borrowing

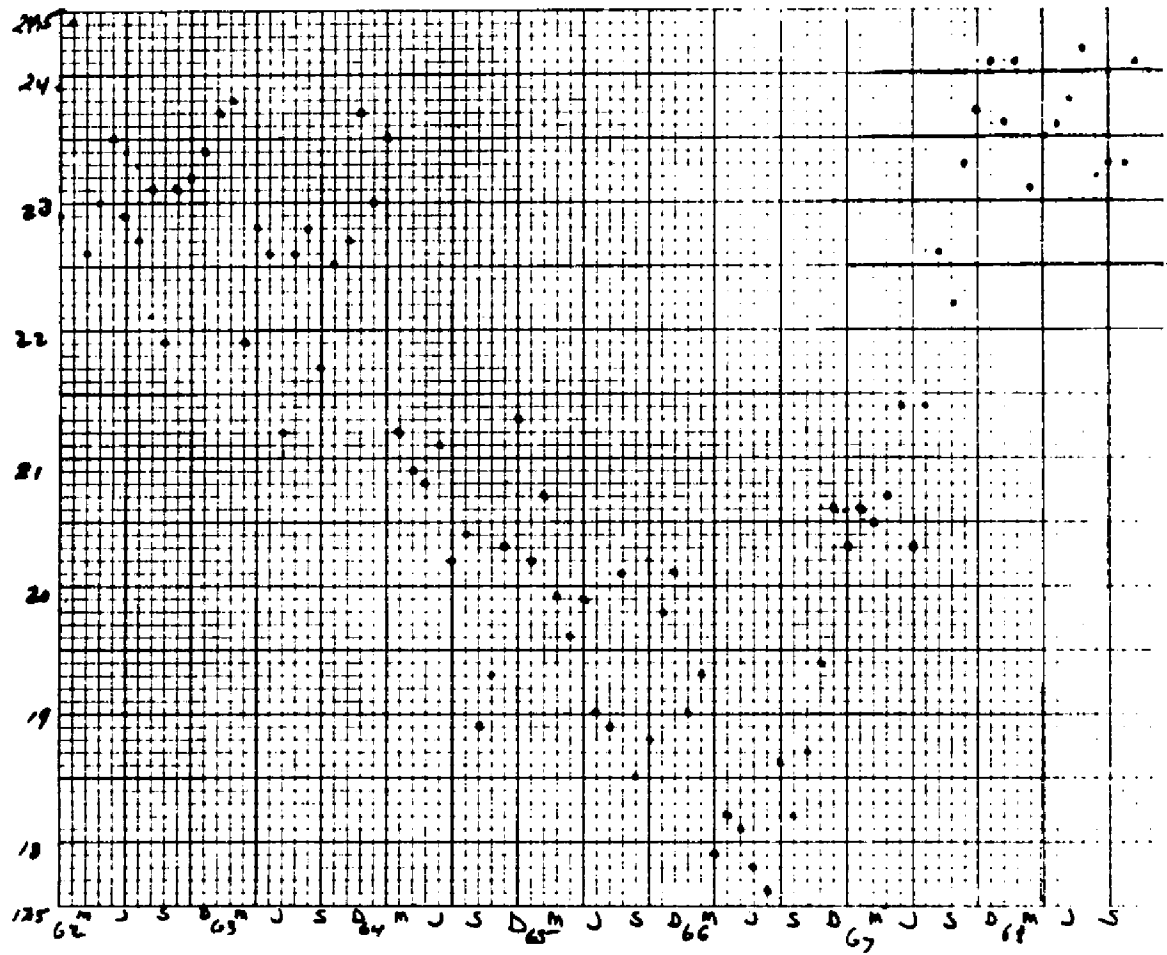
Both equations were also fitted with trend values which were constructed to capture the effects of the reclassification of loans to deposits induced by the "Interest Rates Order." In neither case did the trend greatly increase the explanatory power of the equation. The size of the coefficients on all the variables was affected very little, although the standard errors of some were reduced.

Figure 1. Scatter Diagrams of Dependent Variables

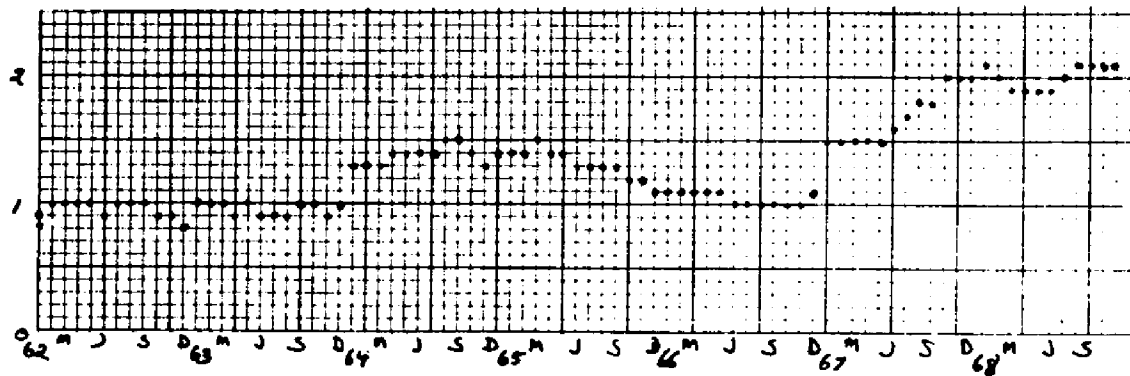
A. Cash



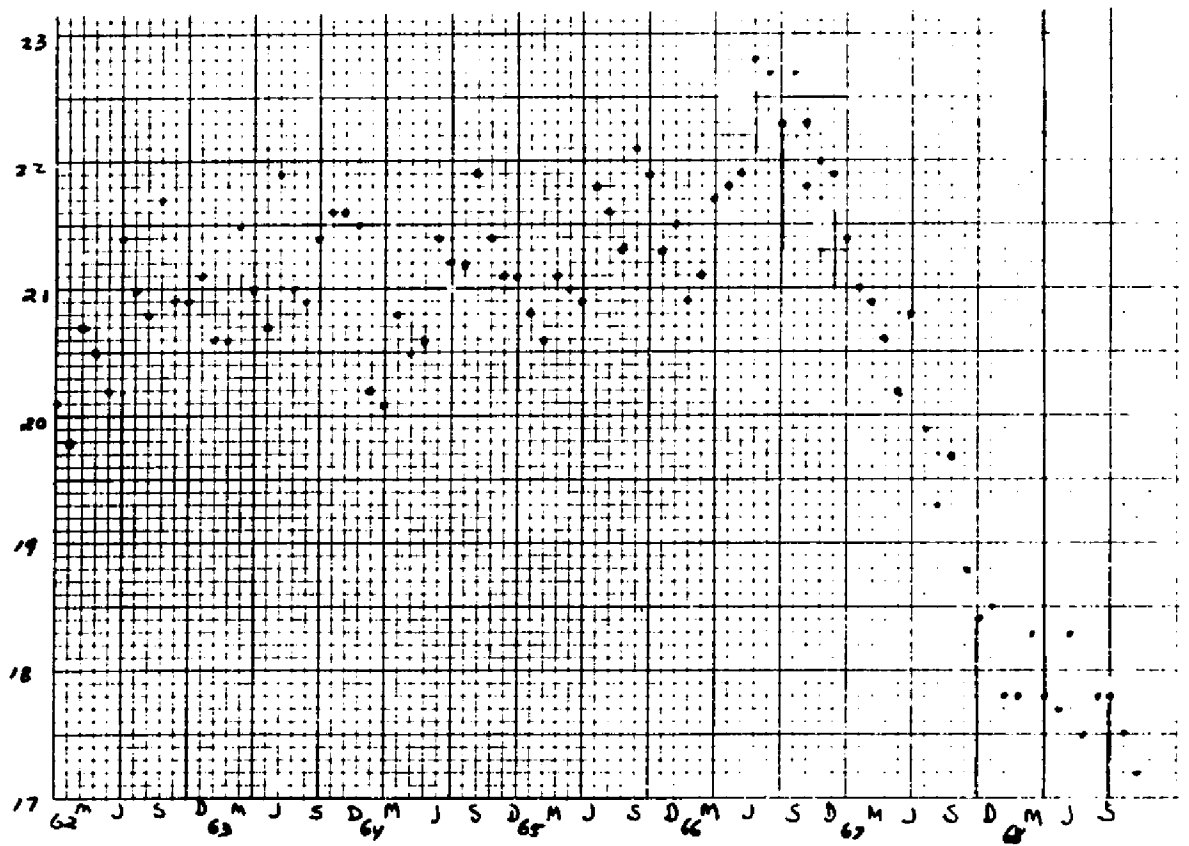
B. Secondary Reserves



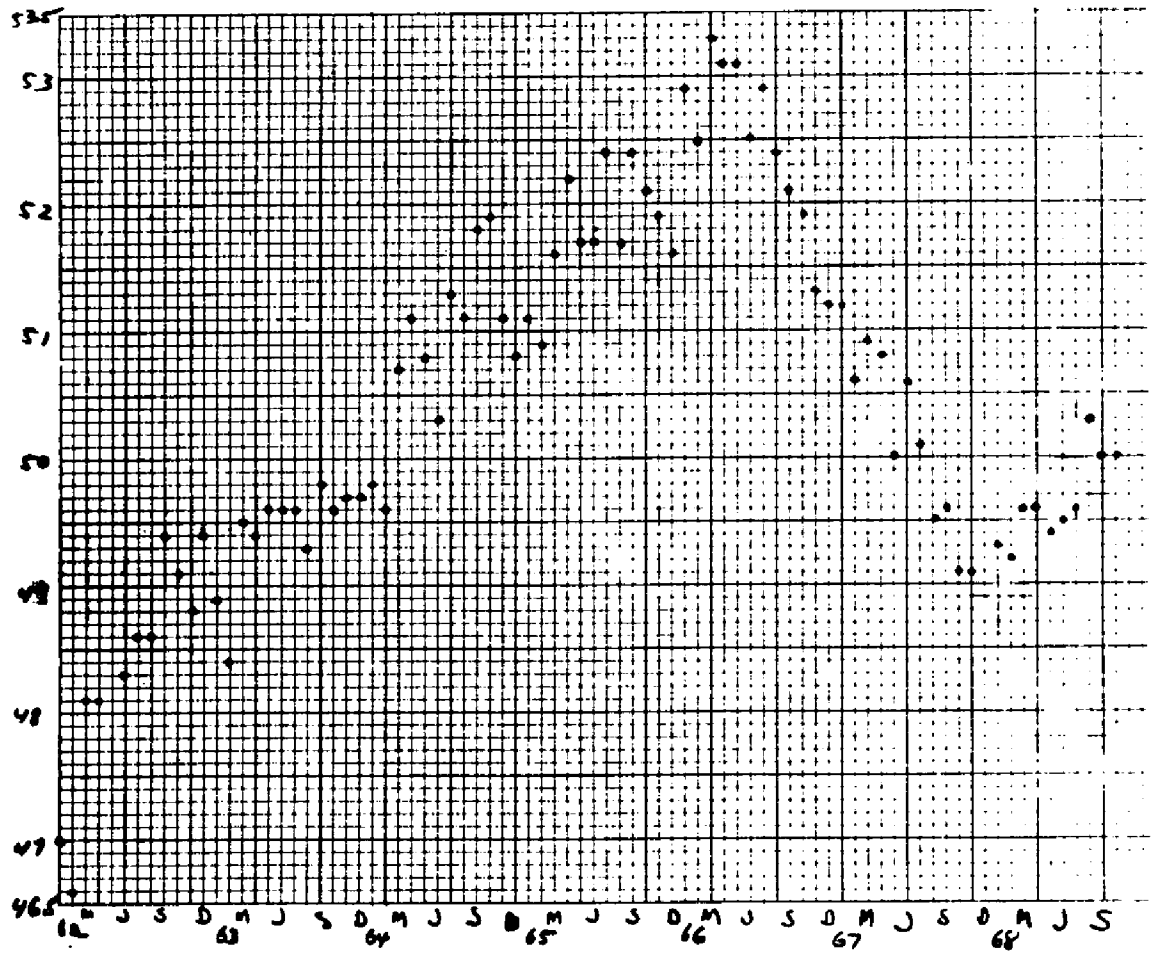
C. Medium-Term Notes



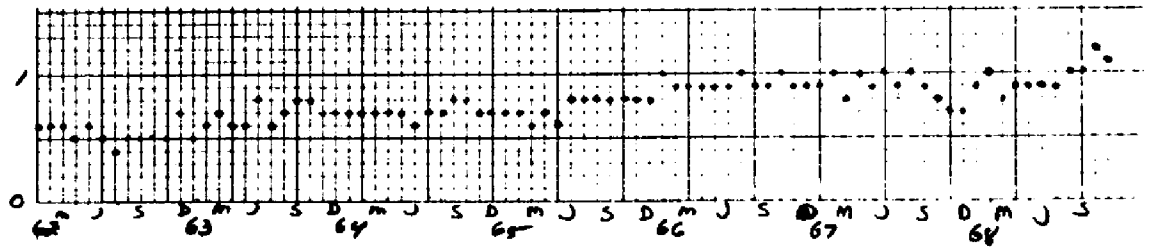
D. Domestic Short-Term Loans



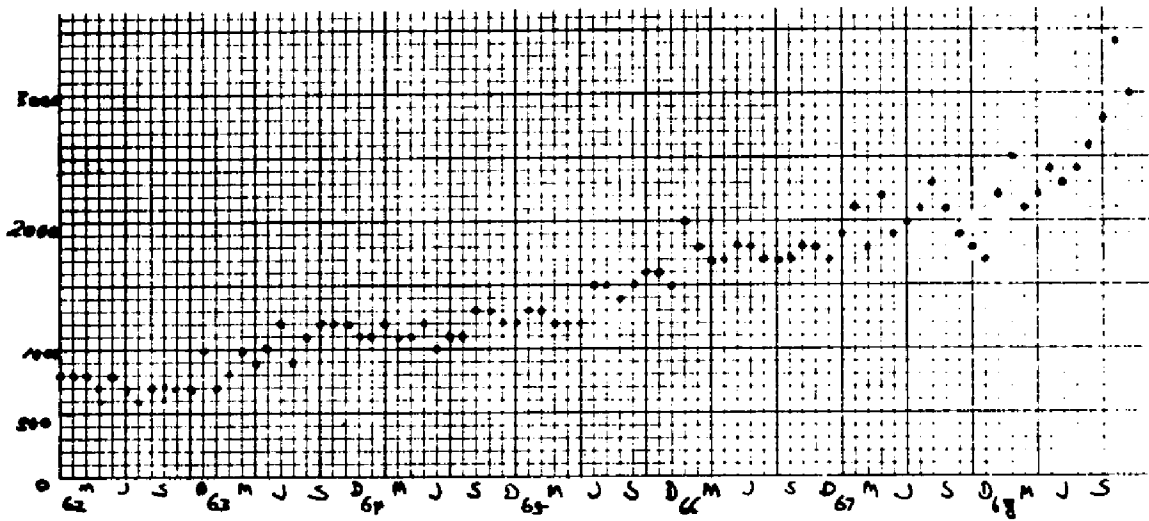
E. Long-Term Loans



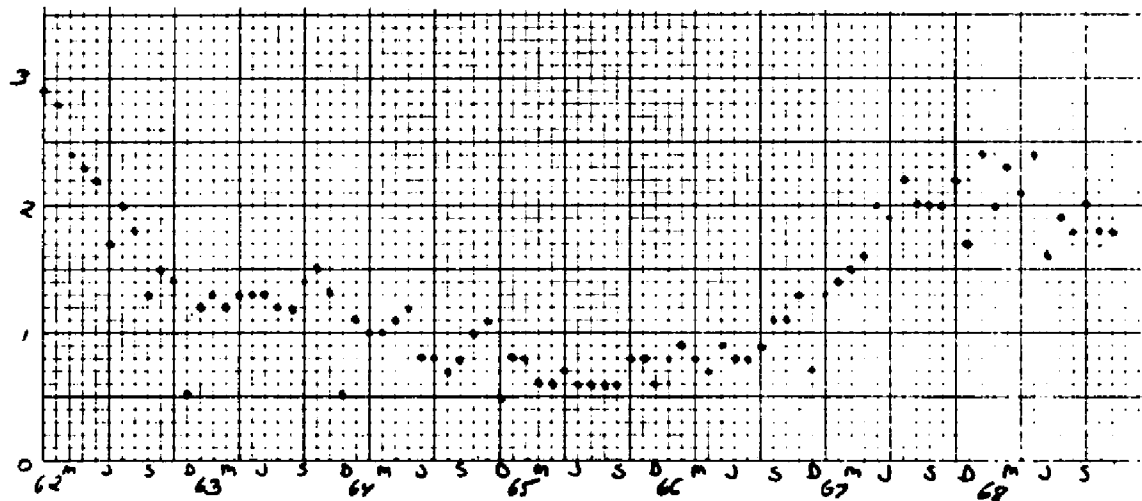
F. Foreign Sight Deposits



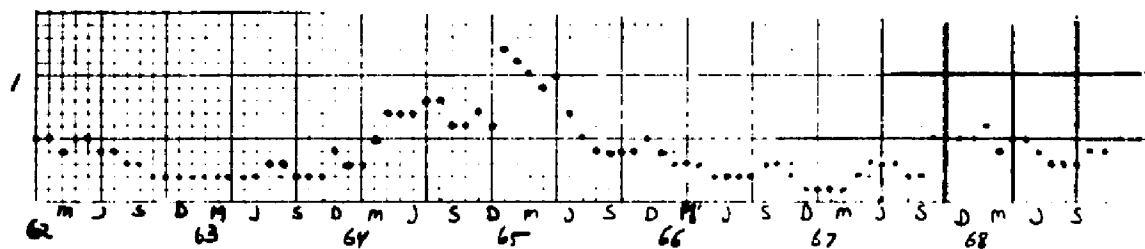
G. Non-Ratio Foreign Sight Deposits



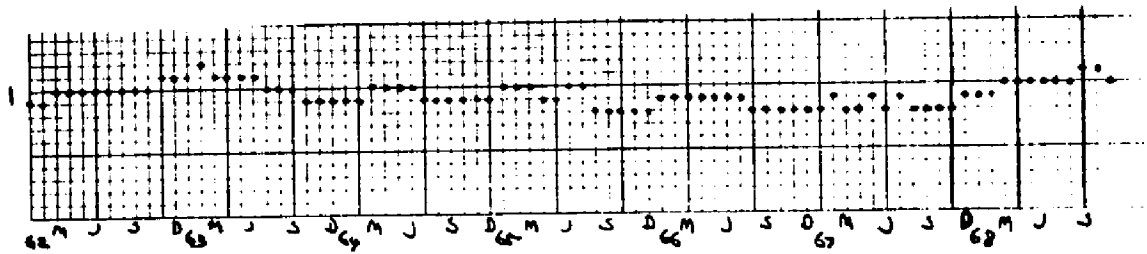
H. Foreign Time Deposits



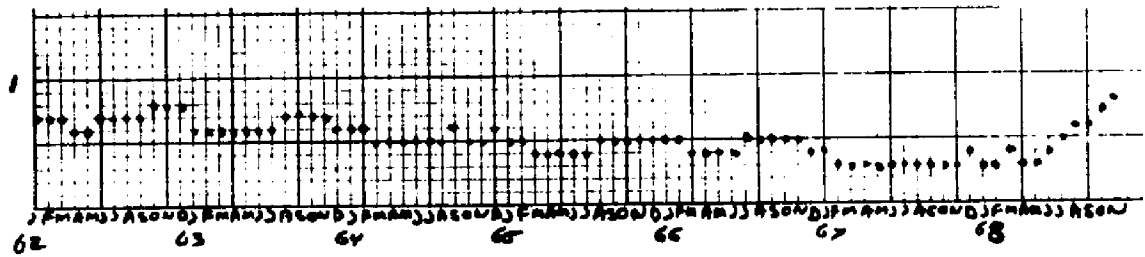
I. Foreign Money Market Paper



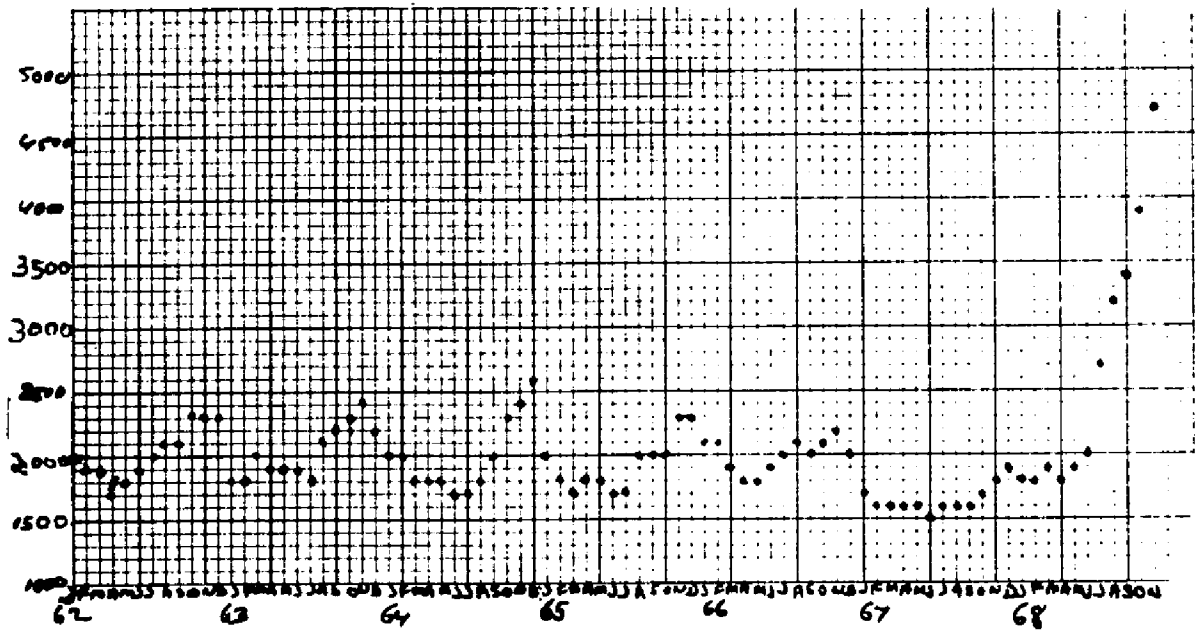
J. Short-Term Loans to Foreigners



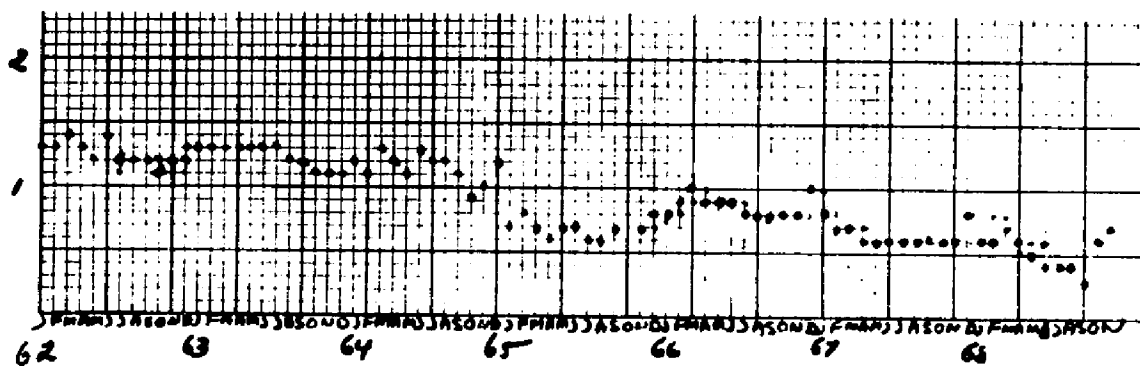
K. Short-Term Borrowing from Foreigners



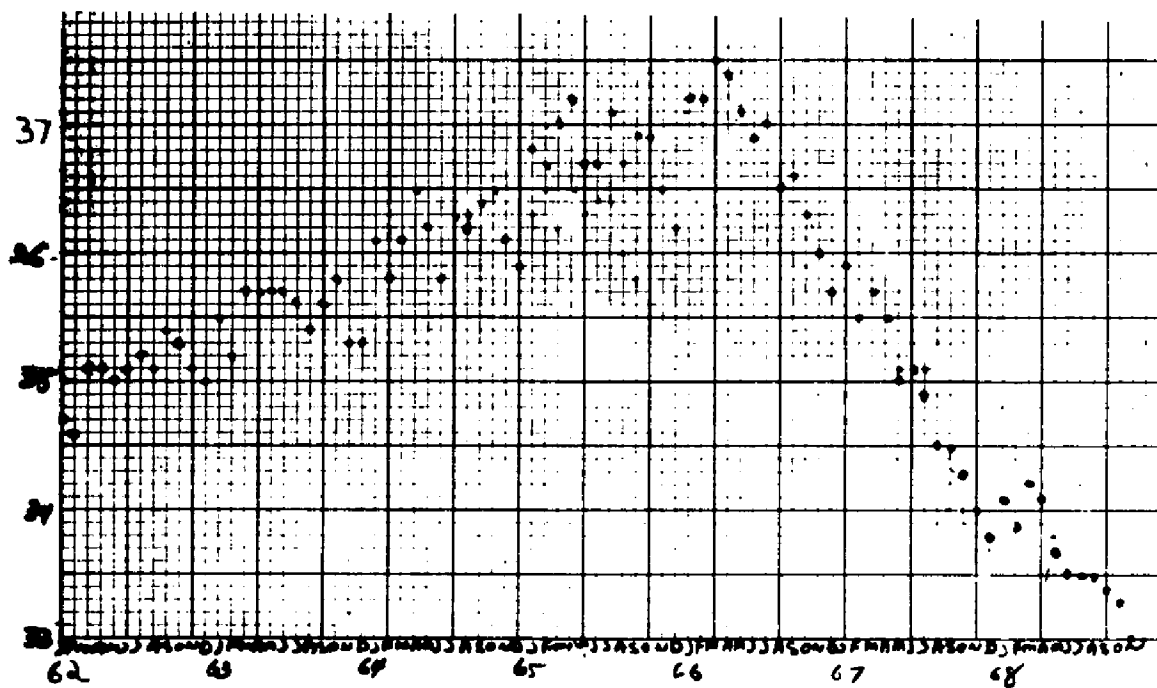
L. Non-Ratio Short-Term Borrowing from Foreigners



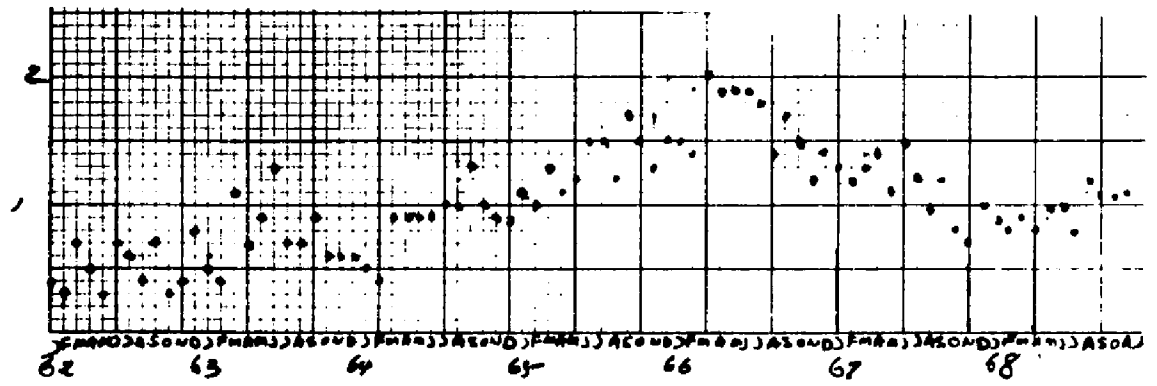
M. Domestic Short-Term Borrowing



N. Long-Term Borrowing



Ö. Bundesbank Credit



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