#### INFORMATION TO USERS

This material was produced from a microfilm copy of the original document. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the original submitted.

The following explanation of techniques is provided to help you understand markings or patterns which may appear on this reproduction.

- The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting thru an image and duplicating adjacent pages to insure you complete continuity.
- 2. When an image on the film is obliterated with a large round black mark, it is an indication that the photographer suspected that the copy may have moved during exposure and thus cause a blurred image. You will find a good image of the page in the adjacent frame.
- 3. When a map, drawing or chart, etc., was part of the material being photographed the photographer followed a definite method in "sectioning" the material. It is customary to begin photoing at the upper left hand corner of a large sheet and to continue photoing from left to right in equal sections with a small overlap. If necessary, sectioning is continued again beginning below the first row and continuing on until complete.
- 4. The majority of users indicate that the textual content is of greatest value, however, a somewhat higher quality reproduction could be made from "photographs" if essential to the understanding of the dissertation. Silver prints of "photographs" may be ordered at additional charge by writing the Order Department, giving the catalog number, title, author and specific pages you wish reproduced.
- 5. PLEASE NOTE: Some pages may have indistinct print. Filmed as received.

Xerox University Microfilms 300 North Zeeb Road Ann Arbor, Michigan 48106

## 73-23,964

. . . .

. .

----

SKOMP, Stephen Elwood, 1941-AN EMPIRICAL INVESTIGATION OF COMMERCIAL PAPER SUB-MARKETS: 1955-1968.

• . . . .

• - -

The University of Oklahoma, D.B.A., 1973 Economics, finance

University Microfilms, A XEROX Company, Ann Arbor, Michigan

THIS DISSERTATION HAS BEEN MICROFILMED EXACTLY AS RECEIVED.

# THE UNIVERSITY OF OKLAHOMA GRADUATE COLLEGE

# AN EMPIRICAL INVESTIGATION OF COMMERCIAL PAPER SUB-MARKETS: 1955-1968

A DISSERTATION SUBMITTED TO THE GRADUATE FACULTY in partial fulfillment of the requirements for the degree of DOCTOR OF BUSINESS ADMINISTRATION

> BY STEPHEN ELWOOD SKOMP Norman, Oklahoma

AN EMPIRICAL INVESTIGATION OF COMMERCIAL

PAPER SUB-MARKETS: 1955-1968

A DISSERTATION

APPROVED FOR THE DEPARTMENT OF BUSINESS ADMINISTRATION

ВΥ imesi no le mula Brau

#### ACKNOWLEDGMENTS

I would like to express my gratitude to the members of my reading committee for their cooperation and constructive suggestions during the dissertation writing stage. I am most especially grateful to Professor Robert A. Ford who as chairman of the committee provided an extraordinary measure of encouragement and counsel during the entire research process.

I am also indebted to the faculty and administration at the University of Portland for receiving every possible assistance while engaged in the completion of this dissertation.

Appreciation is due the Robert B. Pamplin Foundation which lent its financial support.

I would like to express my sincerest appreciation to Mrs. Eleanor Semon, who willingly consented to assume and admirably performed the task of preparing preliminary drafts and the final copy of this dissertation, for her endless patience and always cheerful cooperation.

But perhaps I am indebted most of all to my wife and family whose support has been too pervasive and personal for public acknowledgment.

iii

## TABLE OF CONTENTS

· .

		Page
LIST OF	TABLES	vii
LIST OF	ILLUSTRATIONS	ix
Chapter		
Ι.	INTRODUCTION	1
	Purpose of the Study Scope of the Study Definition of Terms Explanation Commercial Paper Supply and Demand Market Sector Previous Studies Estimation Procedure Theoretical Framework Statistical Framework Organization of the Study	
II. F	PREVIOUS STUDIES OF THE COMMERCIAL PAPER MARKET	9
	Introduction Trends and Cycles in the Commercial Paper Market the Selden Study Objectives Method Conclusions Commercial Paper as a Source and Use of Funds the Baxter Study Objectives Method Conclusions Demand and Supply in the Commercial Paper Market the Schadrack Study Objectives Method	
	Metnoa Conclusions	

The Market for Commercial Paper -- the Joss Study Objectives Method Conclusions Conclusions DEVELOPMENTS IN THE COMMERCIAL PAPER MARKET: III. 33 Introduction Trends in the Supply of Commercial Paper Introduction Direct Paper Market Dealer Paper Market Trends in the Demand for Commercial Paper Introduction Direct Paper Market Dealer Paper Market Conclusions IV. 83 Introduction The Underlying Theory of Working Capital Management Introduction The Investment Decision The Financing Decision The Working Capital Decision Working Capital Management and the Commercial Paper Market Introduction Assumptions about Collateral Issues in the Theory of Finance Specifications of Behavioral Hypothesis Conclusions ۷. 103 Introduction Specification of Statistical Models The Direct Market The Dealer Market Data and Sources Nature of Data Sources of Data Uses of Data

Page

Statistical Problems and Qualifications The Direct Market for Commercial Paper Supply Estimations Demand Estimations The Dealer Market for Commercial Paper Supply Estimations Demand Estimations Derivation of Elasticity Coefficients	
VI. SUMMARY AND CONCLUSIONS	133
Introduction Interpretation of Empirical Results The Direct Paper Market The Dealer Paper Market Summary Policy Implication Suppliers Buyers Money Market Managers Researchers of the Money Markets	
APPENDIX	148
BIBLIOGRAPHY	154

.

## LIST OF TABLES

Table		Page
3.1	Commercial Paper Outstanding: 1955-1968	36
3.2	Annual Rate of Change in Commercial Paper by Sub-Market: 1955-1968	37
3.3	Analysis of Distribution of Supply for Commer- cial Paper by Market for Selected Years: 1955-1968	41
3.4	Financial Assets and Liabilities of Finance Companies for Selected Years: 1955-1968	44
3.5	Financial Assets and Liabilities of Non-Financial Corporations for Selected Years: 1955-1968	49
3.6	Relative Positions of Selected Short-Term Liabili- ties of Non-Financial Corporations for Selected Years: 1955-1968	52
3.7	Number of Commercial Paper Issuers Within the Dealer Paper Market from 1955 through 1968	54
3.8	Relative Distribution of Commercial Paper by Holder for Selected Years: 1955-1968	58
3.9	Relative Position of Selected Financial Assets of Non-Financial Corporations for Selected Years: 1955-1968	62
3.10	Financial Assets and Liabilities of Commercial Banks for Selected Years: 1955-1968	69
3.11	Analysis of Distribution of Demand for Directly Placed Commercial Paper by Sector for Selected Years: 1955-1968	72
3.12	Financial Assets of Life Insurance Companies for Selected Years: 1955-1968	74

Table

Page
------

3.13	Analysis of Distribution of Demand for Dealer Placed Commercial Paper by Sector for Selected Years: 1955-1968	76
3.14	Financial Assets of Open-End Investment Com- panies for Selected Years: 1955-1968	79
5.1	Ordinary Least Square Estimate of Supply of Directly Placed Commercial Paper by Finance Companies, Based on the Data Period 1955-1968 Inclusive	119
5.2	Ordinarv Least Square Estimate of Demand for Directly Placed Commercial Paper by Non- Financial Corporations, Based on the Data Period 1955-1968 Inclusive	121
5.3	Ordinary Least Square Estimate of the Demand for Directly Placed Commercial Paper by Commercial Banks, Based on the Data Period 1955-1968 Inclusive	122
5.4	Ordinary Least Square Estimate of the Demand for Directly Placed Commercial Paper by Life Insurance Companies, Based on the Data Period 1955-1968 Inclusive	124
5.5	Ordinary Least Square Estimate of the Supply of Dealer Placed Commercial Paper by Fi- nance Companies, Based on the Data Period 1955-1968 Inclusive	125
5.6	Ordinary Least Square Estimate of the Supply of Dealer Placed Commercial Paper by Non- Financial Corporations, Based on the Data Period 1955-1968 Inclusive	126
5.7	Ordinary Least Square Estimate of the Demand for Dealer Placed Commercial Paper by Non-Finan- cial Corporations, Based on the Data Period 1955-1968 Inclusive	127
5.8	Ordinary Least Square Estimate of the Demand for Dealer Placed Commercial Paper by Commercial Banks, Based on the Data Period 1955-1968 Inclusive	129
5.9	Ordinary Least Square Estimate of the Demand for Dealer Placed Commercial Paper by Open- End Investment Companies, Based on the Data Period 1955-1968 Inclusive	130

## LIST OF ILLUSTRATIONS

Figure		Page
3.1	Supply of Commercial Paper by Finance Companies (FC) and Non-Financial Corporations (NFC) for Selected Years: 1955-1968	40
3.2	Selected Money and Capital Market Rates for Selected Years: 1955-1968	47
3.3	Demand for Commercial Paper by Non-Financial Cor- porations (NFC), Commercial Banks (CB), Invest- ment Companies (IC), and Life Insurance Companies (LIC) for Selected Years: 1955-1968	5 <b>6</b>
3.4	Selected Money Market Rates: 1955-1968	66
4.1	Segmentation of Working Capital Assets Within a Static Framework	90
4.2	Segmentation of Working Capital Assets Within a Dynamic Framework	91

#### CHAPTER I

#### INTRODUCTION

The amount and ownership of various money market instruments outstanding have been a matter of continuing interest to government, business, and students of the money market throughout the postwar years. In the past several years, however, as the tools and objectives of monetary policy have grown more complex, the characteristics of these money market instruments and the behavior of the issuers and holders of such instruments under differing economic circumstances have acquired still greater significance.

One of the notable developments in the money market since World War II has been the rapid expansion of the commercial paper instrument, rising from a yearly average level outstanding of \$159 millions in 1945 to a truly remarkable level of \$31 billions by 1972.

## I. PURPOSE OF THE STUDY

The purpose of the present study is to analyze those factors which affect the supply of and demand for commercial paper and to formally specify the underlying market structure.

A principal objective is to establish the major determinants of buying and issuing of commercial paper instruments for each specific ownership and issuing sector, respectively, on the basis of the available data.

It is hoped that because the study focuses attention on what has become one of the most important money market instruments in the United States, a contribution is made toward a better understanding of the financial system.

#### II. SCOPE OF THE STUDY

The investigations of this study are limited to the 1955-1968 period, inclusive. The availability of reliable data dictates concentration on only post-1955 years. A major contribution of this study rests on the identification and investigation of sub-market sectors. Since participation within the commercial paper market by several of these sectors is not a matter of record prior to 1955, empirical analysis must be limited to the post-1955 era.

In a related fashion, recent developments in market structure suggest the 1968 parameter. Commercial bank holding companies began issuing commercial paper instruments during the first quarter of 1969.<sup>1</sup> Until additional time has transpired, a sufficient number of observation periods is not available to provide a statistically meaningful analysis of this market occurrence.<sup>2</sup> Consequently, consideration of market events exclusive of the 1955-1968 period is, of necessity, beyond the scope of this study.

<sup>&</sup>lt;sup>1</sup>For an excellent review of this recent development in commercial paper activity, see Frederick C. Schadrack and Frederick S. Breimyer, "Recent Developments in the Commercial Paper Market," <u>Monthly Review</u>, Federal Reserve Bank of New York, (December, 1970), 280-291.

<sup>&</sup>lt;sup>2</sup>For a good discussion of the problems involving the use of small samples, see Mordecai Ezekiel and Karl Fox, <u>Methods of Correlation and Regression Analysis</u> (3rd ed.; New York: John Wiley & Sons, Inc., 1959), pp. 293-299.

Accordingly, the approach of the study is to review and analyze previous buying and issuing behavior of participants within the direct and dealer sub-markets, respectively, for the 1955-1968 period, and then, by combining an awareness of these behavioral patterns with an understanding of relevant theoretical considerations, to develop behavioral hypotheses for subsequent empirical analysis.

#### III. DEFINITION OF TERMS

#### Explanation

Explanation of variations in commercial paper instruments outstanding is emphasized in this study, not their prediction. The distinction between explanation and prediction is frequently overlooked. The essential element in an explanation of economic phenomena is the notion of causation. Economic prediction is distinguished from economic explanation because the element of causation plays no necessary role in the former -- a good "forecasting variable" may or may not enter in the direct causal determination of the variable that is forecast.<sup>3</sup> Instead, the indispensable element in economic forecasting is correlation with a lead -- the forecasting variable must signal changes in the variable which is forecast before the changes occur.

#### Commercial Paper

Commercial paper is an unsecured type of security issued by business and financial corporations needing short-term financing. Because commercial paper is unsecured, some risk is evident. Therefore, only

<sup>&</sup>lt;sup>3</sup>For a concise statement of the relationship between causation and forecasting, see Dennis J. Aigner, <u>Basic Econometrics</u>, (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1971), p. 6.

companies having a high credit standing can obtain funds through the commercial paper market. Strict credit standards must be met before an issue is given a high credit rating by the National Credit Office, an affiliate of Dun and Bradstreet. Instruments with "desirable" through "prime" ratings are considered to be relatively safe.

Commercial paper is issued as a discounted promissory note. The borrowing corporation promises to pay the holder of the commercial paper a stated sum of money on a certain date. Since the issue is sold for less than its maturity value, the rate of interest depends on the size of the discount.

To avoid registration requirements of the Securities and Exchange Commission, most issues mature in less than nine months. The period of borrowing is often for thirty days, but may be for only three days. Although the range is from \$5,000 to over \$100,000, the most common denomination is \$25,000.

Commercial paper may be sold either through dealers or directly to buyers. When the instrument is sold directly to a buyer by the issuer, a bank or sales organization acts as an agent for the sale. Dealer paper is purchased mainly by a small number of dealers for resale to customers at a slightly higher price.

In this study, then, the term "direct paper" refers to commercial paper which is sold directly to the buyer from the issuer, while the term "dealer paper" refers to commercial paper sold indirectly through commercial paper houses -- dealer organizations. In the latter case, the intermediary is the owner of an inventory of commercial paper that is for resale to the open market. Because these two sub-markets exist, the

term commercial paper is used to reference the total of all paper -direct and dealer issues combined.

#### Supply and Demand

This study is concerned with the supply of and demand for commercial paper; here the term "supply" refers to the borrower's desires to issue commercial paper and here the term "demand" refers to the lender's desires to purchase commercial paper. In essence, the point at issue is the flow of commercial paper, not the flow of funds.

#### Market Sector

An array of institutions, financial and non-financial alike, issue and/or purchase commercial paper instruments. For analysis purposes, this study divides each sub-market (direct and dealer) into "market sectors" consisting of institutional categories that best represent the market participants within the relevant sub-market.

Accordingly, the direct market is assumed to consist of one market sector on the supply side (finance companies) and of three market sectors on the demand side (non-financial corporations, commercial banks, and life insurance companies). The dealer market, in turn, consists of two market sectors on the supply side (finance companies and non-financial corporations) while three market sectors exist on the demand side (non-financial corporations, commercial banks and open-end investment companies).

In this study, statistical estimation procedures are applied to financial market transactions data pertinent to each of these market sectors to obtain empirical estimates of market supply and demand relationships for commercial paper within each sub-market.

This empirical division of sub-markets into market sectors, more than any other factor, distinguishes the present study from those previously undertaken by others.

#### IV. PREVIOUS STUDIES

Much has been written about the commercial paper market by a number of scholars. However, some of the more complete works have been produced by Selden, Baxter, Schadrack, and Joss.<sup>4</sup> Selden provides a general picture of the commercial paper market over time and under varied aggregate economic conditions through graphic analysis of end-of-year balance sheet data over the period 1946-1960. Baxter, on the other hand, develops, through personal interviews and questionnaires, specific information relating to the behavior of both issuers and buyers of commercial paper during 1963. Lastly, the Schadrack and Joss studies provide the first formal approximations of supply and demand equations describing the economic and behavioral relationships which existed in the commercial paper market during the 1955-1968 period.

The present thesis is very much in the spirit of the Schadrack and Joss studies. However, basic differences exist which justify clear expression. These include:

(1) division of direct and dealer sub-markets into market sectors.

<sup>&</sup>lt;sup>4</sup>Richard T. Selden, <u>Trends and Cycles in the Commercial Paper</u> <u>Market</u>, Occasional Paper 85, (New York: National Bureau of Economic Research, 1963); Nevins D. Baxter, <u>The Commercial Paper Market</u>, Econometric Research Program Memorandum 69, (Princeton, N. J.: Princeton University, 1964); Frederick C. Schadrack, "Demand and Supply in the Commercial Paper Market," <u>Journal of Finance</u>, XLII (September, 1970), 837-852; and Robert L. Joss, "The Market for Commercial Paper," (unpublished Ph.D. dissertation, Stanford University, 1970).

- (2) application of both trend and empirical analysis to submarkets by market sector.
- (3) adoption of the underlying theory of working capital management as the foundation for specification of empirical models for both sides of the commercial paper sub-markets.

#### V. ESTIMATION PROCEDURE

#### Theoretical Framework

While the basic principles of micro-economics prevail throughout this study, the principal theoretical framework from which all empirical models are developed is that underlying working capital management. An integration of these theoretical underpinnings with an awareness of the behavioral patterns of previous market participants provides a basis for composing an array of behavioral postulates describing the commercial paper market. These behavioral postulates, in turn, form a foundation from which structural models are specified for each commercial paper sub-market and subsequently tested empirically.

#### Statistical Framework

Estimations of market sector behavior are made by the method of ordinary least squares.

#### VI. ORGANIZATION OF THE STUDY

The remainder of this study is divided into five chapters. Chapter II contains a review of the more important literature pertaining to the commercial paper market. The objectives of each study are outlined, along with the methods used to accomplish those objectives, as well as the relevant conclusions. Chapter III incorporates a discussion of the developments which are evident within the commercial paper market during the period under consideration (1955-1968). Trends on both sides of the market are analyzed, first for the entire market and then for each sub-market by market sector.

The theoretical foundation for the empirical analysis is presented in Chapter IV. First, the underlying theory of working capital management is developed in a general framework and then related more specifically to the commercial paper market. Collateral issues in the theory of finance are also touched upon, followed by the specification of behavioral hypotheses relevant to the commercial paper market in general.

Chapter V includes the development of specific empirical models pertaining to various market sectors within each sub-market. The empirical results from testing these models are then presented, along with a brief discussion of several basic qualifications which are made necessary by the existence of two common statistical problems: autocorrelation and multicollinearity.

Chapter VI summarizes the objectives and procedures of the study, provides analysis of the empirical results, and outlines some possible implications of the findings.

#### CHAPTER II

## PREVIOUS STUDIES OF THE COMMERCIAL PAPER MARKET

#### I. INTRODUCTION

While the commercial paper market has undergone a series of major changes, particularly in the past decade, an adequate explanation for these occurrences is lacking in the current financial literature. Several researchers have contributed meaningful insights, but limited empirical analysis relevant to explanation of the supply of and demand for commercial paper is available for examination as a result of their efforts.

This chapter fulfills two functions. First, an outline is provided of the objectives, methods, and conclusions of each of the four principal studies performed in the area of commercial paper during the past decade. Second, this chapter furnishes a basis from which a theoretical framework may be developed for an empirical analysis of the commercial paper market. Chapter III will be a continuation of this latter function.

II. TRENDS AND CYCLES IN THE COMMERCIAL

PAPER MARKET -- THE SELDEN STUDY

#### Objectives

Richard T. Selden<sup>1</sup> examined the commercial paper market as but one part of a more extensive study of money flows through agencies that provide consumer credit. The Selden effort fulfilled three primary objectives: (1) to describe the evolution of commercial paper since 1920, (2) to describe the manner in which such debt is used by the principal class of borrowers, finance companies, and (3) to explain, as well as describe, the behavior of commercial paper issuances during business cycle activities.

#### Method

Selden relied mainly on simple graphic analysis of end-of-year balance sheet data furnished the National Bureau of Economic Research, for whom the study was performed, by forty-two sales finance and twentyeight personal loan companies over the period 1946-1960.<sup>1</sup> He performed a similar type of analysis on differential interest rates and aggregate growth in money market instruments from data provided by the Federal Reserve System.

While Selden was concerned with supply and demand characteristics in his effort to explain the behavior of commercial paper during business

<sup>2</sup><u>Ibid</u>., p. 4.

<sup>&</sup>lt;sup>1</sup>Richard T. Selden, <u>Trends and Cycles in the Commercial Paper</u> <u>Market</u>, Occasional Paper 85, (New York: National Bureau of Economic Research, 1963).

cycles, he did not attempt to statistically derive supply and demand functions for the commercial paper market. Instead, he developed rationalizations concerning the behavior of commercial paper in the aggregate, utilizing for the most part deductive reasoning rather than more rigorous inductive statistical analysis.

#### Conclusions

From his analysis of the available data, Selden provides a number of broad generalizations about the relationship which he found to exist between the supply of and demand for commercial paper under varied general aggregate economic circumstances. The more relevant conclusions are outlined below.

<u>Supply</u>. Two generalizations were made about the supply of commercial paper.

(1) Finance companies are the principal suppliers of commercial paper, accounting for about eighty per cent of all commercial paper outstanding at the end of 1960 (sixty-nine per cent of direct paper and eleven per cent of dealer paper).

(2) The elasticity of supply of commercial paper by large direct issuers with respect to differentials between paper rates and bank prime rates is less than that of smaller finance companies using the dealer market. That is, during periods of recession, the quantity of commercial paper supplied decreases in the direct paper market but remains stable in the dealer market.

<u>Demand</u>. Three conclusions were drawn concerning the demand for commercial paper.

(1) Non-financial corporate businesses demand the majority of commercial paper issued directly (sixty-one per cent in 1960) while commercial banks purchase nearly eighty-five per cent of all dealer paper issued (Selden deduced this to be true in the mid-1950's and could see little reason to believe otherwise in 1960).

(2) Direct paper, dealer paper, and treasury bills are close substitutes and a change in yield on any one of these instruments relative to the yields on the other two will result in a shift in the demand for the latter two instruments (positive coefficients of cross elasticity of demand with respect to yield).

(3) While demand for dealer paper tends to be directly correlated with changes in general economic activity, aggregate demand for commercial paper is countercyclical in nature.

> III. COMMERCIAL PAPER AS A SOURCE AND USE OF FUNDS -- THE BAXTER STUDY

### **Objectives**

Nevins D. Baxter<sup>3</sup> examined the nature of the commercial paper instrument and the roles of the issuers, investors, dealers, and banks operating in the commercial paper market. The primary objective of Baxter's effort was to analyze the role played by commercial paper in the overall financing picture of issuing firms as well as the position of commercial paper in the portfolios of both commercial banks and non-financial corporate businesses.

<sup>&</sup>lt;sup>3</sup>Nevins D. Baxter, <u>The Commercial Paper Market</u>, Econometric Research Program Memorandum 69, (Princeton, N. J.: Princeton University, 1964).

A corollary objective was to provide:

... a basis for an econometric analysis of the money markets ... [which] ... would involve specifying formal supply-and-demand relationships in order to explain the level of commercial paper outstanding and the commercial paper rate at any given time. The choice of explanatory variables for these relationships would be largely influenced by the knowledge of the market obtained in the present study.<sup>4</sup>

#### Method

Baxter relied heavily on personal interviewing of ". . . a comprehensive cross-section of participants in the market"<sup>5</sup> in his analysis of the overall workings of present day commercial paper institutions. The remainder of his paper was based on information gained from the results of three questionnaires which were sent to the principal issuers and buyers of commercial paper.

In a questionnaire titled, "Commercial Paper as a Source of Funds,"<sup>6</sup> Baxter asked issuers of commercial paper questions concerning (1) the quantitative importance of commercial paper to the issuer as a debt instrument relative to other alternative forms of debt, (2) the function of commercial paper in the issuer's overall debt structure, (3) the perceived advantages and disadvantages of commercial paper borrowing, (4) the use or disuse of bank lines-of-credit, (5) bankissuer relations, (6) borrower sensitivity to differentials in interest rates on alternative sources of short-term funds, and (7) the reliability of the commercial paper market as a source of funds.

<sup>4</sup><u>Ibid.</u>, p. 136
<sup>5</sup><u>Ibid.</u>, p. 28f.
<sup>6</sup><u>Ibid.</u>, pp. 59-75.

In his second questionnaire on the "Role of Banks in the Commercial Paper Market,"<sup>7</sup> Baxter inquired of banks information concerning (1) the extent of their normal investment in commercial paper instruments, (2) the types of paper they normally hold, (3) their reasons for investing or not investing in commercial paper, and (4) their willingness to substitute other forms of short-term investments for current holdings of commercial paper.

The third questionnaire titled, "Commercial Paper as a Short-Term Investment,"<sup>8</sup> was directed to business corporations. It sought to gain the same type of information from such investors as the bank-related questionnaire did of banks.

The basic difference between Baxter's work and that of Selden is that while Selden relied heavily on his own capacity for deductive reasoning, Baxter went directly to the respective sources of supply of and demand for commercial paper and asked of those sources: "How do you account for your behavior with respect to commercial paper?" Then, based on his analysis of the questionnaire returns where questions were analyzed according to the degree of respondent concurrence, Baxter generalized as to the normal behavior of the various participants with respect to changing conditions in the commercial paper market. However, Baxter did not attempt statistical tests correlating his aggregate generalizations to the real world. In fact, as noted earlier, his study was meant to provide a basis for some future effort in this direction.

> <sup>7</sup><u>Ibid</u>., pp. 76-90. <sup>8</sup><u>Ibid</u>., pp. 91-108.

Conclusions

<u>Supply</u>. The Baxter generalizations about commercial paper supply, based on his sample findings, included the following four comments.

(1) Industrial issuers rely on commercial paper as an instrumentto meet well-defined and anticipated seasonal needs for funds.

(2) While finance companies continually draw upon commercial paper as a permanent part of their total capitalization, seasonal demand for funds is evident in this sector and this seasonal need is supported with the use of both bank financing and open-market borrowing.

(3) A firm's bargaining position with banks concerning credit line usage improves with the size of the firm. Therefore, the larger the firm, the greater its capacity to rely on commercial paper for a substantial portion of its financing needs.

(4) Issuers rely to a greater degree on commercial paper when the cost differential is highest, and vice versa. Baxter points out that this may be due both to interest sensitivity and to monetary restraint.

<u>Demand</u>. Baxter's conclusions concerning the demand for commercial paper contained the following four points.

(1) Demand for commercial paper is sensitive to interest rate differentials and issuers are advised that increasing this differential during slack demand -- even in conditions of tight money -- is likely to improve the market for commercial paper.

(2) Banks purchase commercial paper as a temporary investment when local loan demand is sluggish. Otherwise, such purchases are for customer accounts.

(3) Banks having deposits between \$20 millions and \$100 millions are the most frequent bank purchasers of commercial paper.

(4) Corporate investment in commercial paper depends a great deal on the general level of cash flow relative to current investment in inventories and fixed assets.

> IV. DEMAND AND SUPPLY IN THE COMMERCIAL PAPER MARKET -- THE SCHADRACK STUDY

#### **Objectives**

Frederick C. Schadrack, Jr.<sup>9</sup> presented the first published attempt to statistically derive supply and demand functions for the commercial paper market.

#### Method

Schadrack used a stock adjustment model to describe desired levels of commercial paper held and issued in the market place. He segmented the market into supply of and demand for directly placed finance company paper versus the supply of and demand for dealer placed paper.

> <u>Supply</u>. Schadrack's supply equations were written as:<sup>10</sup> SFC = SFC (RFC,RP,RCB,LFC,SFC\_1) (2.1)

and

$$SDE = SDE (RDE, RP, RCB, LNF, LFC, SDE_1)$$
 (2.2)

where the supplies of finance company paper (SFC) and dealer placed

# <sup>9</sup>Frederick C. Schadrack, "Demand and Supply in the Commercial Paper Market," <u>Journal of Finance</u>, XLII (September, 1970), 837-852.

<sup>10</sup>Ibid., pp. 841-842.

paper (SDE) were considered to be functions of the cost levels on issuing commercial paper (RFC and RDE respectively), on gaining bank loans at prime rates (RP), and on floating long-term issues in the capital markets (RCB), as well as of the level of total finare company liabilities. The supply of dealer paper is also assumed to increase with increases in the liabilities of non-financial corporations (LNF) since this sector issues a significant amount of such paper. In the supply equations, only the endogenous variables (RFC and RDE) were expected to have negative coefficients.

and

 $DDE = DDE (RDE, RFC, RB, RTD, ANF, L/D, DDE_{1})$ (2.4)

where the demands for finance company paper (DFC) and dealer placed paper (DDE) were considered to be functions of the yield levels on finance company paper (RFC), dealer placed paper (RDE), treasury bills (RB), and time deposits at banks (RTD) as well as the level of non-financial business corporations' aggregate financial assets (ANF). Accordingly, DFC was expected to be positively related to RFC and ANF but negatively related to RDE, RB, and RTD, while dealer paper was to be a positive function of RDE but a negative function of RFC. Both were assumed to have a relatively low coefficient of lagged stock (DFC<sub>-1</sub> and DDE<sub>-1</sub>) which would suggest rapid adjustment of actual to desired stock levels.

<sup>11</sup><u>Ibid</u>., p. 840.

Demand for dealer placed paper was also expected to increase with increases in a loan/deposit variable (L/D) for "country" member banks. This was meant to reflect Baxter's suggestion that banks increase their holdings of commercial paper when bank loan activity diminishes. Also, the "country" member bank category most nearly represents Baxter's \$20-\$100 millions deposit requirement for bank participation in the commercial paper market.

The statistical equations outlined above were fitted to quarterly data, not seasonally adjusted, for the period from first quarter of 1954 to the second quarter of 1968. Estimates of the equations were generated by both ordinary and two-stage least squares techniques. However, since the latter provided better results, it alone was presented and discussed in Schadrack's published paper. Virtually all data information was derived from Federal Reserve System publications.

#### Conclusions

Schadrack's paper proves to be a synopsis of the Selden and Baxter concluding generalizations presented above, placed in a framework of explanatory supply and demand equations.

<u>Supply</u>. Some of the more pertinent supply relationships were described as follows.

(1) The supply of directly placed paper is not significantly affected by interest costs, neither its own rate nor that of bank prime loans. Interestingly enough, Schadrack thought this to be at odds with Baxter's results reported earlier and his interpretation caused him much discomfort. In fact, because of his inability to resolve the problem,

Schadrack unnecessarily conceded that his ". . . equation appears to be less than fully specified . . . " $^{12}$ 

The difficulty lay in Schadrack's confusion of Baxter's separate discussions of supply and demand as well as Schadrack's equating supply tendencies in the direct paper market with those of the commercial paper market in general. Baxter performed a simple correlation analysis to see if any association existed between usage of the commercial paper market and relative interest costs.<sup>13</sup> Then to support or contradict the correlation findings, he asked commercial paper issuers whether or not their respective ratios of commercial paper to short-term debt rise when the cost of commercial paper funds fall relative to that of bank loans.<sup>14</sup>

Both the correlation analysis and the survey

. . . indicated that while relative costs are a factor influencing the degree of reliance on commercial paper, they are by no means the only consideration. And both indicated that direct placers should be expected to be somewhat less responsive to interest costs than dealer issuers.<sup>15</sup>

In essence, the supply of commercial paper in general adjusts to changes in rate differentials but this adjustment is somewhat dampened by direct placer unwillingness to give up developed markets for commercial paper.

(2) Schadrack's corporate bond rate provided another unexpected and perplexing result. The supply of commercial paper appears to increase

> <sup>12</sup>Ibid., p. 847. <sup>13</sup>Baxter, <u>op</u>. <u>cit</u>., p. 100. <sup>14</sup><u>Ibid</u>., pp. 71-73. <sup>15</sup><u>Ibid</u>., p. 74.

with decreases in the cost of floating long-term debt. Since Schadrack expected the opposite to be true and could not explain the results, he simply omitted the bond rate variable from further analysis.

(3) As expected, both the supply of and demand for commercial paper are effected directly with changes in the portfolio constraints LFC, LNF, and ANF.

<u>Demand</u>. Explanatory variables on the demand side of the market were equally revealing.

(1) The demand for commercial paper is inversely related to substitute money market instruments, and directly related to commercial paper rates. However, the demand for directly placed paper was not significantly affected by changes in bank time deposit rates. Schadrack explained the latter finding as being possible because maturities on certificates of deposit are greater than thirty days and are, therefore, not good substitutes for direct paper which average less than thirty days in maturity.<sup>16</sup> However, since CD's have a highly organized secondary market, the maturity argument is at least partially, if not totally, negated.

(2) Dealer paper is a better asset substitute for directly placed commercial paper than are treasury bills, and directly placed paper is an equally good asset substitute for dealer paper.

(3) A change in rate differentials is necessary to cause a change in aggregate holdings of commercial paper.

<sup>16</sup>Schadrack, <u>op</u>. <u>cit</u>., pp. 843-844.

(4) There is a one-for-one trade-off between the demand for dealer paper and the demand for direct paper, given a change in rate differentials. Thus, they are perfect substitutes on the demand side.

(5) Schadrack found a more rapid rate alignment with respect to the demand for dealer paper than with the demand for direct paper. This was somewhat unexpected given the shorter average maturity which prevails on directly placed paper.

(6) The loan/deposit ratio (L/D) of "country" member banks also proved to be a significant predictor of changes in the demand for dealer placed paper.

Schadrack incorporated all expected lags in his stock adjustment coefficients (DFC<sub>-1</sub>, DDE<sub>-1</sub>, SFC<sub>-1</sub>, SDE<sub>-1</sub>). These coefficients were expected to be high, reflecting relatively quick adjustment to changes in the independent variable. This should be expected since commercial paper is a short-term, money market instrument purchased and sold by highly sophisticated borrowers and lenders. However, his adjustment coefficients proved to be quite low. In fact, "they indicated that only about 6 per cent to 20 per cent of the discrepancy between the desired stock and the actual stock of commercial paper assets and liabilities is eliminated in a quarter."<sup>17</sup> Schadrack concluded that either the lags must be accounted for more specifically rather than generally in one variable per equation, or the general model is misspecified and must be corrected.<sup>18</sup>

<sup>17</sup><u>Ibid</u>., p. 848. <sup>18</sup><u>Ibid</u>., p. 849.

In summary, the recent literature thus far reviewed presents (1) a general picture of the commercial paper market over time and under varied aggregate economic conditions, (2) specific information relating to the behavior of both issuers and buyers of commercial paper instruments, and finally, (3) a first approximation of supply and demand equations describing the economic and behavioral relationships which exist in the commercial paper market. The fourth principal study to be reviewed offers a second approximation of such behavioral equations describing the commercial paper market.

V. THE MARKET FOR COMMERCIAL

PAPER -- THE JOSS STUDY

#### Objectives

Robert L. Joss<sup>19</sup> presents an investigation and specification of the underlying market structure evident in the commercial paper market during the period including the fourth quarter of 1953 through the first quarter of 1968. Both the time period and objectives of the Joss study are similar to those of the Schadrack article reviewed above. However, the choice of method differs.

#### Method

Like Schadrack, Joss chose to segment the market into dealer versus directly placed issues. Unlike Schadrack, Joss explicitly considered financial system interdependence by including supply and demand

<sup>&</sup>lt;sup>19</sup>Robert L. Joss, "The Market for Commercial Paper." (unpublished Ph.D. dissertation, Stanford University, 1970).

relations for treasury-bill market funds in his commercial paper market model. And while the functional form of all Schadrack supply and demand relationships was additive, that of Joss was multiplicative. That is, the Joss models assume that the value of original data for the dependent variable is the product of the value of the relevant independent variables. The additive model assumes that the value of original data for the dependent variable is the sum of the values of the relevant independent variables.<sup>20</sup> The Joss decision to utilize the multiplicative form reflects his awareness of autocorrelation,<sup>21</sup> a common statistical problem which will be discussed in some detail within Chapter V.

<u>Supply</u>. The Joss supply equations for direct paper, dealer paper, and treasury bill issues, respectively, were structured as follows:<sup>22</sup>

$$FPS = FPS (FPR, FBD, ICR, LDR, BFR, CBR)$$
(2.5)

and

$$DPS = DPS (DPR, DBD, ICR, LDR, BFR, CBR)$$
(2.6)

and

$$TBS = TBS (TBR, BFR, GRE, RTB, TLC)$$
(2.7)

where the supply of direct paper (FPS) and dealer paper (DPS) were hypothesized to be functions of the change in commercial paper rates (FPR and DPR respectively), the differential between bank loan rates and commercial paper rates (FBD and DBD respectively), the change in primary assets of commercial paper borrowers (ICR), the availability of lendable funds

<sup>21</sup>Joss, <u>op</u>. <u>cit</u>., p. 107. <sup>22</sup>Ibid., p. 90.

<sup>&</sup>lt;sup>20</sup>For a discussion of the significance of these differences in assumption, see Ya-Lun Chou, <u>Applied Business and Economic Statistics</u>, (New York: Holt, Rinehart and Winston, 1963), pp. 484-485.

at commercial banks (LDR), the ease of monetary policy (BFR), and the relative level of long-term bond rates (CBR). Accordingly, both FPS and DPS were expected to be positively related to FBD and DBD respectively, and to ICR, LDR, and CBR, but negatively related to FDR and DPR respectively, and to BFR.

Supply of dealer paper was also expected to increase with increases in commercial bank lending rates (BLR). Joss failed to develop a rationale for inclusion of this variable and, in fact, omitted it entirely as a basic hypothesis. However, changes in bank lending rates were incorporated in the Joss empirical work and the implications of BLR were considered when Joss analyzed his overall findings.

The supply of treasury bills (TBS) was assumed to be a negative function of the change in bill rates (TBR), government receipts minus government expenditures (GRE), and an easy monetary policy (BFR), but a positive function of both the relative level of treasury bond rates (RTB), and the operation of the legal interest rate ceiling on treasury bonds (TLC). Note that Joss specified the same treasury bill equation for both direct and dealer commercial paper markets. His specifications on the demand side were dissimilar. Therefore, the <u>a priori</u> interrelationships differed, more or less, depending upon which side of the market Joss chose to consider. The implications of these subtle differences were recognized in Joss's concluding remarks.

<u>Demand</u>. Joss placed his demand equations in the following forms:  $^{23}$ 

$$FPD = FPD (FPR, FTD, EAD, CTH, BFR, LIQ)$$
 (2.8)

<sup>23</sup>Ibid.

and

$$DPD = DPD (DPR, DTD, EAD, LDR, CTH, BFR, LIQ)$$
(2.9)

and

$$TBD = TBD (TBR, FTD, EAD, LDR, BFR, LIQ)$$
(2.10)

and

$$TBD = TBD (TBR, DTD, EAD, LDR, BFR, LIQ)$$
(2.11)

where the demand for direct paper (FPD) and dealer paper (DPD) were considered to be positive functions of the change in commercial paper rates (FPR and DPR respectively), the differential between commercial paper rates and treasury bill rates (FTD and DTD respectively), the availability of lendable funds at non-financial corporations (EAD), and an ease in monetary policy (BFR), but negative functions of the awareness of commercial paper as an investment outlet (CTH), and the relative level of financial liquidity in the economy (LIQ).

Demand for dealer paper was also expected to increase with increases in the availability of lendable funds at commercial banks (LDR). This loan/deposit variable is similar to the one Schadrack used except Joss's measure included all commercial banks, while Schadrack restricted his ratio to "country" member banks alone.

Demand for treasury bills was expected to be influenced in a similar manner to that hypothesized for direct and dealer placed commercial paper within their respective market structures. Therefore, the only specification difference recognized in the treasury bill equations (TBD in equations 2.10 and 2.11 above) was the substitution of bill rate changes (TBR) in lieu of the previously appropriate paper rate changes (FPR and DPR). Otherwise, the specifications were virtually synonymous. It should be observed that the Joss study did not propose to develop a
theory of bill market operations. Treasury bills were chosen as ". . . a logical surrogate for purposes of investigating full interaction in the money markets."<sup>24</sup> Joss wished to determine the extent to which bill market operations influenced paper market operations, or vice versa, whichever most accurately reflected reality.

Fifty-eight quarters of historical data -- from the beginning of the fourth quarter of 1953 through the first quarter of 1968 -- were expressed as natural logarithms and employed to empirically test the behavioral equations outlined above. Most data information was obtained from <u>Federal Reserve Bulletins</u>, with the remainder drawn from <u>Treasury</u> <u>Bulletins</u>, the <u>Survey of Current Business</u>, and the <u>Statistical Bulletin</u> <u>of the Securities and Exchange Commission</u>. A step-wise regression procedure was applied to select the most appropriate equations within each market for two-stage analysis. Estimation results from the latter analysis provided Joss with several interesting conclusions. These conclusions and their implications will be discussed in turn below.

### Conclusions

The Joss contribution represents a reasonably good abstraction of the commercial paper market. While the estimation results are not overwhelmingly conclusive, they coincide closely with those found in the Schadrack study and, therefore, lend support to the findings of both Selden and Baxter.

<u>Supply</u>. Relationships on the supply side of the market were summarized as follows.

24Ibid., p. 78.

(1) The quantity of commercial paper supplied increases as in-- terest rates on such instruments decrease.

(2) The supply of directly placed paper increases with increases in installment credit held by finance companies. And Joss was surprised to find that an inverse relationship exists between these two variables in the dealer paper market.<sup>25</sup> However, such a relationship can be logically explained.

Dealer paper and direct paper are substitutable money market instruments on the demand side of the market. Non-financial corporations purchase both types of issues. On the other hand, finance companies were the sole issuers of direct paper during the 1953-1968 period, and accounted for only a small fraction of total dealer market issues. Finance company reliance on direct paper issues versus dealer paper issues was 7 to 1 for the fourth quarter of 1953 and 6 to 1 for the first quarter of 1968. As installment credit financing increased, finance companies required more of the direct paper market as a source of short-term funds. At the same time, non-financial corporations would have been induced toward the direct paper market as the supply structure for that market changed.

Since non-financial corporate businesses influenced both markets during this time period, accounting for 52 per cent of total demand for commercial paper in the fourth quarter of 1953 and nearly 63 per cent in the first quarter of 1968, portfolio shifts of non-financial corporations were reflected in both market places. As installment credit increased,

<sup>&</sup>lt;sup>25</sup><u>Ibid</u>., pp. 141-142.

demand for dealer paper would soften, leading to upward pressure on dealer paper rates, which would, in turn, lead to a reduction in quantity supplied within the dealer paper market.

(3) The supply of commercial paper increases with increases in the relative level of long-term bond rates. While this conclusion supports Baxter's contentions, Schadrack found a negative relationship to exist between these variables in his empirical analysis. Because a rational explanation for this behavior eluded Schadrack, he omitted the variable from further consideration. However, Joss's evidence supported his <u>a priori</u> notions about the debt management behavior of corporations. According to Joss, the significance of the bond rate level testifies to the importance of timing in funding and refunding long-term debt requirements.<sup>26</sup> If capital market rates were viewed as being temporarily high, commercial paper would be utilized by corporations in the short run until such rates receded. Once the relative level of long-term bond rates began to decline, corporations would revert to their customary practice of floating bonds to meet permanent debt requirements.

(4) The supply of commercial paper is insensitive to the cost of alternative sources of short-term credit. The differential between bank loan rates and commercial paper rates was an insignificant explanatory variable for either market.

These relationships do not support the Joss <u>a priori</u> hypothesis. However, they correspond well with the Schadrack results reported on earlier (see page 19). The researcher in both instances misinterpreted the results of prior studies when developing his respective hypothesis

<sup>26</sup>Ibid., p. 133.

for empirical testing purposes. On the other hand, Joss seems less guilty of error than Schadrack in that Joss did not anticipate a particularly strong relationship in either market. Therefore, the insignificant but positive coefficient given in the dealer market, while regrettable, was at least theoretically acceptable. But the negative <u>and</u> significant relationship found to exist between the supply of direct paper and the differential between bank loan rates and direct paper rates was unexpected.

Joss interpreted these findings as plausible but ". . . rather weak evidence in support of the hypothesis suggested by both Baxter and Selden that dealer market borrowers are more responsive to increases in the cost differential than are direct market borrowers."<sup>27</sup>

<u>Demand</u>. Several interesting results were found on the demand side as well.

(1) The treasury bill market influences operations in the commercial paper markets, but the commercial paper markets do not significantly effect operations within the treasury bill market. More specifically, the demand for commercial paper changes with changes in the yield differential between the two market instruments. However, the treasury bill market does not respect such yield differential changes.

(2) Demand for commercial paper is relatively interest inelastic. That is, variations in own rates do not cause significant fluctuations in the quantity of commercial paper demanded.

<sup>27</sup><u>Ibid</u>., p. 142.

(3) Demand for commercial paper tends to increase as the relative level of financial liquidity in the economy decreases.

(4) Demand for dealer paper is further explained by changes in monetary policy and the availability of lendable funds at commercial banks. The fact that these variables were found to be insignificant when examining the direct placement market is not surprising. The L/D ratio would be meaningful only if excess bank funds were normally channeled through direct issuers. Since large commercial banks are not significant participants in the direct market, changes in such a ratio are unlikely to explain variations in demand for directly issued commercial paper instruments.

Similarly, while free reserves might be an appropriate measure of the direction of monetary policy, the level of free reserves is tied closely to the level of demand deposits at commercial banks. This interrelationship makes the analysis more difficult since both variables could conceivably reflect reactions to the same phenomenon. Should such be the case, both variables may or may not suggest significance.

Joss chose the above possibility as a rational explanation for his findings.<sup>28</sup> However, since both variables indicated significant explanatory contributions in the dealer market -- both quite consistent with <u>a priori</u> hypothesized behavior -- a slight contradiction in reasoning is evident.

Schadrack's L/D variable was significant in the dealer market. However, his ratio was representative of "country" member banks alone, not all commercial banks in the system. Also, while Schadrack omitted

<sup>28</sup>Ibid., p. 138.

the "monetary policy" variable from his specification, the L/D ratio was not tested in the direct placement market. Because of these specification differences, Schadrack's output is not particularly helpful in resolving the discrepancy mentioned above.

(5) The hypothesized relationship between the demand for commercial paper and the availability of lendable funds at non-financial corporate businesses (EAD) could not be accepted. Joss used retained profits of non-financial corporations as a proxy measure for this variable and expressed the opinion that the hypothesis might likely be found tenable were corporate cash flows less fixed investment outlays adopted as the relevant proxy.<sup>29</sup>

#### VI. CONCLUSIONS

This chapter has presented an outline of recent studies concerning the supply of and demand for commercial paper instruments. A number of behavioral hypotheses were offered, with some having been supported through empirical testing. These hypotheses represent basic elements from which a theoretical framework may be drawn for further empirical analysis of the commercial paper market.

Several <u>a priori</u> hypotheses were supportable using two different empirical procedures. However, there were some hypotheses which were not equally acceptable under the two approaches. This fact suggests that there remains a reasonable degree of uncertainty with respect to the true

<sup>29</sup>Ibid.

nature of the commercial paper market. The appropriate specification for a complete explanation of variations evident within the commercial paper market remains unknown.

Each of the four studies outlined above segmented the market into two sub-markets: (1) directly placed commercial paper, and (2) indirectly placed or dealer placed commercial paper. However, both Schadrack and Joss found that confining analysis to these sub-markets alone does not permit a complete yet error free specification of the whole market. Error free specification may not be possible, but more complete approximations of reality are certainly in order. Chapter III is a move toward this end. Each sub-market, direct and dealer respectively, is further defined by sectors of supply and sectors of demand. Such micro-segmentation provides a basis for examining more specific supply and demand interrelationships and reducing the possibilities of both overlapping and counter-balancing effects which were evident in the Schadrack and Joss studies.

#### CHAPTER III

# DEVELOPMENTS IN THE COMMERCIAL PAPER MARKET: 1955-1968

#### I. INTRODUCTION

Chapter II furnished a number of behavioral hypotheses which may be used as a foundation for further empirical work. However, the array of hypotheses is incomplete. Previous studies have segmented supply and demand factors into two commercial paper sub-markets -- directly placed paper and dealer placed paper. The principal purpose of the present chapter is to pursue this segmentation to a more meaningful level -sectors of supply and sectors of demand within the two previously specified markets. An analysis of trends in these supply and demand sectors will be supplemented with a detailed review of the financing and investment practices of such institutions during the period 1955 through 1968.

Commercial paper is an unsecured, short-term instrument, the issuance of which is generally restricted to large corporate entities currently enjoying low-risk credit profiles.<sup>1</sup> Commercial paper is sold most frequently to corporations and financial institutions as an alternative working capital investment.<sup>2</sup>

<sup>&</sup>lt;sup>1</sup>Lee Silberman, "A Run for Their Money," <u>Barrons</u>, July 25, 1966, p. 3.

The very nature of commercial paper restricts the number and type of issuers and, because the average procurement increment is relatively large (ranging from \$25,000 to over \$1 million), identification and categorization of the characteristics of participants on both sides of the market is not difficult.

Four different types of institutions provide a market for commercial paper: (1) non-financial corporations, (2) commercial banks, (3) open-end investment companies (hereafter referred to simply as investment companies), and (4) life insurance companies. On the other hand, only two institutions, non-financial corporations and finance companies, supply the entire commercial paper market. The latter sectors will be discussed first.

#### II. TRENDS IN THE SUPPLY OF COMMERCIAL PAPER

#### Introduction

The modern commercial paper market is the product of a gradual development stretching over a century and a half.<sup>3</sup> However, in terms of dollar volume outstanding, most of this development has occurred since World War II when a strong upward trend was initially established. In fact, during the ten years ending December 1955, commercial paper issues outstanding grew at a compound annual rate of approximately 30 per cent, a remarkable recovery considering the uncertainties of a post-war economy.

<sup>&</sup>lt;sup>3</sup>Several scholars have researched early developments in the commercial paper market. See for example, A. O. Greef, <u>The Commercial Paper</u> <u>House in the United States</u>, (Cambridge: Harvard University Press, 1938); and Roy A. Foulke, <u>The Commercial Paper Market</u>, (New York: The Bankers Publishing Company, 1931).

A more definite idea of the evolvement of the market in recent times is conveyed by Tables 3.1 and 3.2, which present the amounts of commercial paper outstanding for selected years since 1955. Note that during the thirteen years ended in December 1968, total commercial paper outstanding increased \$18.5 billions or by a respectable 20 per cent compound annual rate of growth.

However, summarizing the growth trend in the above manner may be deceiving because much of significance is hidden within the 20 per cent figure. For instance, most of the real growth occurred during the latter three years of the period. The annual compound growth rate for the first ten years averaged only 17 per cent, while commercial paper outstanding increased by 45 per cent in 1966 and continued at an annual rate approaching 25 per cent thereafter (see Table 3.2).

The increased growth rate beginning in 1966 represents a structural change of some consequence within the commercial paper market.<sup>4</sup> Recognition of the change is enhanced with the help of Table 3.1. Note that throughout the post-war period, direct paper has been in a much stronger market than has been dealer paper. This is true both in terms of volume and of consistency in growth. For example, direct paper has accounted for at least 63 per cent of total commercial paper outstanding since 1954, reaching a peak of 79 per cent of the total in 1959. And volume has grown at a rather consistent 18 per cent for most of the duration, with the last three years being the exception (see Table 3.2).

On the other hand, dealer paper grew at an annual compound rate of 23 per cent during the first five years, became nearly stagnant for

<sup>4</sup>See Schadrack, op. cit., p. 849.

COMMERCIAL PAPER OUTSTANDING: 1955-1968 (Money Amounts in Billions of Dollars)

Year End	Dealer Placed	Directly Placed	Total	Direct Paper as Percent of Total
1955	\$ 0.5	\$ 1.5	\$ 2.0	75.2%
1956	0.5	1.7	2.2	76.6
1957	0.6	2.1	2.7	79.3
1958	0.8	1.9	2.7	69.0
1959	0.7	2.5	3.2	79.4
1960	1.4	3.1	4.5	70.7
1961	1.7	3.0	4.7	63.5
1962	2.1	3.9	6.0	65.2
1963	1.9	4.8	6.7	71.4
1964	2.2	6.1	8.4	73.4
1965	1.9	7.2	9.1	78.9
1966	3.1	10.2	13.2	76.7
1967	4.9	11.7	16.5	70.5
1968	7.2	13.3	20.5	64.9

Source: Board of Governors of the Federal Reserve System.

Note: Details may not add to consistent totals due to rounding.

### ANNUAL RATE OF CHANGE IN COMMERCIAL PAPER BY SUB-MARKET: 1955-1968

Year	Rate of Growth in									
	Dealer Paper	Direct Paper	Total Market							
1955 1956 1957 1958 1959	 20.0 33.3 (12.5)	13.3 23.5 (9.5) 31.6	10.0 22.7  18.5							
1960 1961 1962 1963 1964	100.0 21.4 23.5 (9.5) 15.8	24.0 (3.2) 30.0 23.1 27.1	40.6 4.4 27.7 11.7 25.4							
1965 1966 1967 1968	(13.6) 63.2 58.1 46.7	18.0 41.7 14.7 13.7	8.3 45.1 25.0 24.2							

Source: Board of Governors of the Federal Reserve System.

Figures enclosed in curves () denote negative growth or contraction in the market between years. Spaces filled with dashes (-.-) denote zero growth or no change.

five years with a 6 per cent growth, and then commenced to accelerate after 1965 at an annual rate close to 52 per cent.

Furthermore, prior to 1965, peak periods of direct paper dominance within the commercial paper market reflect shifts away from dealer paper toward direct paper issuances. In other words, direct paper accounted for a greater share of the total market during these periods as a result of two market adjustments: (1) increased issuances of direct paper, and (2) decreased issuances of dealer paper. These shifts from one sub-market to another sub-market occurred in 1957, 1959, and again in 1965 (see Table 3.1).

Conversely, throughout post-war years but prior to 1965, dealer paper growth in importance relative to total commercial paper outstanding, was made possible by two occurrences: (1) increased issuances of dealer paper, and (2) decreased issuances of direct paper. Once again, an apparent substitution of one form of commercial paper for another would take place. The effects of such substitutions were realized in 1954, 1958, and, most recently, in 1961.

But these shifts between sub-markets may have changed pattern since 1965.<sup>5</sup> Directly placed commercial paper has realized an uninterrupted increase in year-end volume outstanding in every year since 1961. However, direct paper dominance of the total market has been on the decline since 1965, when such issues reached the previously mentioned peak of approximately 79 per cent of the total market. This decline in

<sup>&</sup>lt;sup>5</sup>Frederick Struble, "The Commercial Paper Boom in Perspective," <u>Monthly Review</u>, The Federal Reserve Bank of Kansas City, (November, 1968), 4.

direct paper importance relative to the total market is not a result of substitution between sub-markets, but is an outgrowth of an increased use of dealer placed paper which began in 1966.

Figure 3.1 demonstrates the growth trend both in total supply of commercial paper and in paper issued by specific institutional categories. Notice the increasing importance of non-financial corporations in the supply market. Interestingly enough, non-financial corporations rely on dealer paper only. This suggests that there may exist a relationship between the increased use of commercial paper by non-financial corporations and the perceived pattern changes within the commercial paper market. If so, consideration of the two sub-markets separately should lend to a better understanding of those factors responsible for this apparent change in supply pattern.

#### Direct Paper Market

**.** .

Finance companies account for an overwhelming percentage of total commercial paper issued during any given period. Reference once again to Figure 3.1 and to Table 3.3 finds support for this contention. Although recent growth in non-financial corporate issues has diminished finance company dominance to some extent, such institutions continue to make up 65 per cent of the total supply market. More importantly, finance companies continue to issue 100 per cent of directly placed commercial paper. This means that an understanding of finance company operations is requisite to an understanding of changes in the supply of direct paper in general.

<u>Finance companies</u>. The term finance company is meant to encompass all of those companies engaged in financing consumers and businesses under







1955	1960	1965	1966	1967	1968
100	100 16	100 18	100 42	100 13	100 15
40 -	43 25	58 12	48 36	39 27	38 42
60 -	57 22	42 -	52 100	61 87	62 50
	1955 100 - 40 - 60 -	$\begin{array}{cccc} 1955 & 1960 \\ 100 & 100 \\ - & 16 \\ 40 & 43 \\ - & 25 \\ 60 & 57 \\ - & 22 \\ \end{array}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1955       1960       1965       1966       1967 $100$ $100$ $100$ $100$ $100$ $100$ $ 16$ $18$ $42$ $13$ $40$ $43$ $58$ $48$ $39$ $ 25$ $12$ $36$ $27$ $60$ $57$ $42$ $52$ $61$ $ 22$ $ 100$ $87$

### ANALYSIS OF DISTRIBUTION OF SUPPLY FOR COMMERCIAL PAPER BY MARKET FOR SELECTED YEARS: 1955-1968

Source: Board of Governors of the Federal Reserve System.

All figures rounded to nearest one percent.

specialized financing plans.<sup>6</sup> There are three categories of finance companies when classified according to principal type of asset employed: (1) sales finance companies, (2) personal finance companies, and (3) business finance companies.

Sales finance companies are engaged primarily in purchasing installment paper which arises from retail sales of passenger automobiles and other consumer goods. The 1200-odd sales finance companies in existence account for about three-fifths of the total assets of all finance companies in the United States.<sup>7</sup>

Personal finance companies account for most personal cash loans provided consumers. Some of the companies, particularly the larger ones, also require notes originating in the retail sale of consumer goods. These companies, measuring some 2500 as recently as 1965, provide onefourth of the total funds held by finance companies.<sup>8</sup>

Business finance companies include commercial finance companies and factors engaged in financing or factoring business accounts receivable, and companies specializing in financing sales of commercial, industrial, and farm equipment. Nearly 600 such companies represent only one-sixth of all the assets of finance companies in general.<sup>9</sup>

As noted above, classification of finance company assets provides for the categorization of such companies into three different types of business organizations, each servicing a distinct sector of the economy.

<sup>7</sup><u>Ibid</u>.
<sup>8</sup><u>Ibid</u>.
<sup>9</sup>Ibid.

<sup>&</sup>lt;sup>6</sup>Raymond W. Goldsmith, <u>Financial Institutions</u>, (New York: Random House, 1968), p. 94.

Differentiating between service functions, in turn, provides for the possibility of defining the extent and purpose to which such institutions make use of the commercial paper market.

For example, Table 3.2 suggests that finance companies account for over 91 per cent of all commercial paper issued in 1965.<sup>10</sup> Furthermore, it is known that such companies issue 100 per cent of all directly placed paper. Although an awareness of these facts is essential to any analysis of commercial paper, consideration of a recent survey completed by the Federal Reserve System provides for a more complete understanding of the market.<sup>11</sup> Sales finance companies alone were shown to account for 72 per cent of all commercial paper issued by finance companies at the time of the survey (mid-year 1965). Furthermore, 84 per cent of all direct paper outstanding was issued by sales finance companies, with the remaining 15 per cent being issued by business finance companies.<sup>12</sup>

This combination of facts and relationships can be placed into focus most effectively through reference to Table 3.4 which provides an analysis of the financial condition of finance companies in the aggregate for selected points in time. The structure of financial assets is of particular interest at this juncture of the analysis. Note that at least 58 per cent of the asset structure of finance companies is generally held

<sup>11</sup>Evelyn M. Hurley, "Survey of Finance Companies, Mid-1965," Federal Reserve Bulletin, LIII (April, 1967), 516.

<sup>12</sup><u>Ibid</u>., p. 538-539.

<sup>10</sup> Supra, p. 37.

### FINANCIAL ASSETS AND LIABILITIES OF FINANCE COMPANIES FOR SELECTED YEARS: 1955-1968 (Money Amounts in Billions of Dollars)

Balance Sheet Items	1955 Dol- Per- lars cent	1960 Dol- Per- lars cent	1965 Dol- Per- lars cent	1966 Dol- Per- lars cent	1967 Dol- Per- lars cent	1968 Dol- Per- lars cent
Financial Assets						
Cash Consumer Credit Business Credit Home Mortgages Total	$ \begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{cccc} 2.1 & 9 \\ 15.4 & 64 \\ 4.9 & 20 \\ \underline{1.6} & 7 \\ 24.1 & 100 \end{array}$	$\begin{array}{cccc} 2.5 & 6 \\ 24.3 & 59 \\ 9.7 & 24 \\ \underline{4.5} & 11 \\ 41.0 & 100 \end{array}$	$\begin{array}{cccc} 2.7 & 6 \\ 26.1 & 60 \\ 10.9 & 25 \\ \underline{3.9} & 9 \\ 43.6 & 100 \end{array}$	$\begin{array}{cccc} 2.9 & 6 \\ 26.7 & 60 \\ 10.6 & 24 \\ \underline{4.3} & \underline{10} \\ 44.5 & 100 \end{array}$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
Liabilities						
Taxes Payable Bank Loans Commercial Paper Corporate Bonds Total	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{rrrr} .3 & 1 \\ 5.7 & 29 \\ 3.7 & 19 \\ 9.9 & 51 \\ 19.6 & 100 \end{array}$	$\begin{array}{rrrr} .3 & 1 \\ 11.7 & 32 \\ 8.3 & 23 \\ \underline{16.1} & \underline{44} \\ 36.4 & 100 \end{array}$	$\begin{array}{rrrr} .2 & 1 \\ 10.3 & 26 \\ 11.7 & 30 \\ \underline{16.9} & \underline{43} \\ 39.1 & 100 \end{array}$	$\begin{array}{rrrr} .2 & 1 \\ 8.3 & 21 \\ 13.5 & 34 \\ \underline{17.9} & \underline{45} \\ 39.9 & 100 \end{array}$	.2 - 10.6 23 16.0 36 <u>18.8 41</u> 45.6 100

Source: Board of Governors of the Federal Reserve System.

Note: Details may not add to 100 per cent due to rounding. Rounding is to nearest one per cent.

in the form of consumer credit. Sales finance companies own approximately 65 per cent of this type of credit, with the remainder being owned by personal finance companies.<sup>13</sup>

Similarly, business credit has become a significant component within finance company asset structures, growing from 14 per cent to 26 per cent of total assets between 1955 and 1968. Business finance companies own most of this type of asset (nearly 63 per cent) but sales finance companies absorb close to 29 per cent, with the two thus accounting for nearly 92 per cent of all business credit outstanding.<sup>14</sup>

These relationships imply that, as goes consumer and business credit, so goes directly placed commercial paper. Unfortunately, the connection between sources and uses of funds is not quite so simple and direct. For example, the ratio of commercial paper issued by finance companies on a direct basis to that of consumer and business credit assets owned by finance companies in general varies from 10.5 per cent to 31.7 per cent over the thirteen year period, 1955-1968 (see Table 3.4). Therefore, while the evidence seems to illustrate a coincidental growth between the one source of funds and the two uses of funds, the precise relationship is far from clear. Reliance on directly placed paper by finance companies has increased far more rapidly than has their total investment in consumer and business credit.

More specifically, much of this rapid growth in reliance on commercial paper seems to be due to a trade-off away from bank loans. Notice from Table 3.4 that, as a source of funds, bank loans have declined

> <sup>13</sup>Goldsmith, <u>op</u>. <u>cit</u>., p. 95. 14Ibid.

significantly relative to all sources found on finance company balance sheets during the thirteen year period. And the same can be said of corporate bonds, although on a considerably smaller scale.

A partial explanation<sup>15</sup> for the occurrence of this trade-off may be derived from an analysis of Figure 3.2, which demonstrates the trend in and relationships between selected money market and capital market interest rates for the thirteen year period ending 1968. Two important observations can be drawn from this chart of rate movements. One is that bank rates on short-term business loans have generally been higher than those on either commercial paper or corporate bonds (the one exception being in 1967 when corporate bond rates exceeded bank prime rates). The second is that finance companies, in the aggregate, tend to adjust their liability structures according to current money and capital market conditions. The latter observation is certainly no surprise, having been recognized from earlier studies concerning the commercial paper market.<sup>16</sup>

## Dealer Paper Market

The supply of dealer placed commercial paper is fairly evenly distributed between finance companies and non-financial corporations, as seen in Table  $3.3^{17}$  However, as noted earlier, growth in finance company related dealer paper has slowed somewhat relative to that of non-financial corporations. As recently as 1965, finance companies accounted for 58

<sup>16</sup>See for example, Joss, <u>op</u>. <u>cit</u>., p. 136.
<sup>17</sup>Supra, p. 41.

<sup>&</sup>lt;sup>15</sup>One explanation which defies graphical or tabular analysis is the pressure on finance companies exerted by bankers during periods of tight money to utilize the commercial paper market more effectively. See Silberman, <u>op</u>. <u>cit</u>., p. 3; and "What Makes the Boom in Commercial Paper," Business Week, November 26, 1966, pp. 76-79.



FIGURE 3.2

SELECTED MONEY AND CAPITAL MARKET RATES FOR SELECTED YEARS: 1955-1968 per cent of all dealer paper issued. By the end of 1968, that market share had diminished to 38 per cent. On the other hand, the overall growth for the thirteen year period was evenly matched at an annual compound rate approaching 23 per cent.

Approximately 75 per cent of all dealer paper placed by finance companies is issued by sales and personal finance companies, with the latter accounting for 56 per cent of the total alone.<sup>18</sup> This means that, just as in the direct paper market, consumer credit expansion and contraction should effect changes in the dealer paper market. And since business finance companies account for 25 per cent of finance company related dealer paper, business credit should also influence the dealer market to some extent.

<u>Non-financial corporations</u>. But the real influence on the supply side of the dealer paper market has been from non-financial corporations, especially since 1965. However, the source of increased reliance on the commercial paper market by such corporations is not altogether clear.

One reason for this uncertainty is that commercial paper is a small, relatively insignificant fraction of the total structure of nonfinancial corporations (see Table 3.5 on the following page). Secondly, commercial paper is not a meaningful source of funds specifically related to a single primary asset, as is the case with finance companies.<sup>19</sup> This general insignificance in relative size leads to difficulty in visually tracing cause and effect relationships between commercial paper debt and

<sup>18</sup>Hurley, <u>op</u>. <u>cit</u>., p. 538.
<sup>19</sup>Supra, pp. 44-45.

#### FINANCIAL ASSETS AND LIABILITIES OF NON-FINANCIAL CORPORATIONS FOR SELECTED YEARS: 1955-1968 (Money Amounts in Billions of Dollars)

Balance Sheet Items	1955 Dol- Per- lars cent	1960 Dol- Per- lars cent	1965 Dol- Per- lars cent	1966 Dol- Per- lars cent	1967 Dol- Per- lars cent	1968 Dol- Per- lars cent
Financial Assets						
Cash Time Deposits Government Bonds Commercial Paper Consumer Credit Trade Credit Other Assets Total	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{ccccccc} 28.2 & 10 \\ 19.2 & 7 \\ 20.0 & 7 \\ 6.5 & 2 \\ 14.1 & 5 \\ 146.0 & 49 \\ 62.1 & 21 \\ \hline 296.1 & 100 \end{array}$	28.9 9 18.6 6 19.8 6 8.5 3 15.3 5 157.3 50 64.9 20 313.3 100	$\begin{array}{ccccc} 29.7 & 9 \\ 21.5 & 7 \\ 16.8 & 5 \\ 10.0 & 3 \\ 16.3 & 5 \\ 165.0 & 50 \\ 70.2 & 21 \\ \hline 329.5 & 100 \end{array}$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
Liabilities Trade Debt Taxes Payable Bank Loans Commercial Paper Finance Co. Loans Other Liabilities Total	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	90.6 24 20.7 5 58.6 15 1.2 - 3.8 1 206.1 55 381.0 100	98.4 24 20.9 5 66.4 16 2.2 1 3.8 1 227.7 53 419.4 100	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

Source: Board of Governors of the Federal Reserve System.

Note: Details may not add to 100 per cent due to rounding. Rounding is to nearest one per cent.

any other working capital item(s) pertaining to non-financial corporations. However, further analysis of Table 3.5 does provide at least two rational hypotheses for the general trend.

First, growth in the current liability position of non-financial corporations closely parallels that realized in such corporations' financial assets. The slight change in their aggregate quick-asset ratio (financial assets divided by current liabilities), which dropped from 1.62 to 1.59 between year-end 1955 and year-end 1968, attests to this fact. Similarly, the rate of growth in the aggregate financial position of non-financial corporations corresponds closely to that of the general economy over the same period. Both grew, on the average, at a 6.5 per cent compound rate per annum.<sup>20</sup> Combining these two facts with the realization that the relative position of commercial paper within the financial structure of non-financial corporations has changed only slightly over the thirteen year period (an increase of only 80 basis points, from 0.5 per cent of total liabilities in 1955 to 1.1 per cent in 1968 -- see Table 3.5) suggests that commercial paper issues of non-financial corporations have grown simply because the aggregate wealth of nonfinancial corporations has grown. In the aggregate, non-financial corporations have utilized various sources of short-term funds in a relatively consistent fashion over the years.<sup>21</sup>

<sup>&</sup>lt;sup>20</sup>Gross National Product (GNP) grew from \$398 billions in 1955 to \$864 billions in 1968. For annual figures on GNP, see various issues of the <u>Federal Reserve Bulletin</u> or the <u>Survey of Current Business</u>.

<sup>&</sup>lt;sup>21</sup>Walter A. Chudson, <u>The Pattern of Corporate Financial Structure</u>, (New York: National Bureau of Economic Research, 1945), p. 4.

Second, non-financial corporations have demonstrated an increased preference for commercial paper from among alternative sources of shortterm financing. More specifically, non-financial corporations are relying more heavily on commercial paper relative to finance company loans and bank loans than was the case in 1955. In fact, while the relative roles of commercial paper and finance company loans have both increased, that of bank loans to businesses has diminished, particularly in recent years (see Table 3.6 for details). Because non-financial corporations have chosen to rely more heavily on their own debt issues, the business credit assets of business finance companies have grown less rapidly than would have been the case otherwise. Consequently, the potential use of dealer placed commercial paper by business finance companies was diminished, thus partially explaining the rapid growth in non-financial corporate issues relative to finance company issues within the dealer paper market.

There has been some conjecture that the recent trend evidenced in non-financial corporate financing activities is an outgrowth of several specific alternative market forces acting in some form of unison, particularly after 1965.<sup>22</sup> For example, it is generally conceded that some degree of cross-elasticity exists between the use of commercial paper and the use of other alternative sources of short-term funds.<sup>23</sup> Appropriately enough, the cost differential between issuing dealer paper and relying on other forms of debt has swelled in favor of commercial paper, especially in recent years.

<sup>22</sup>See Struble, <u>op</u>. <u>cit</u>., pp. 6-9.

<sup>23</sup>"Commercial Paper, 1960-1969," <u>Economic Review</u>, Federal Reserve Bank of Cleveland, (May, 1970), 24.

### RELATIVE POSITIONS OF SELECTED SHORT-TERM LIABILITIES OF NON-FINANCIAL CORPORATIONS FOR SELECTED YEARS: 1955-1968

Year End	Commercial Paper (Per cent)	Finance Company Loan (Per cent)	Bank Loan (Per cent)	Total (Per- cent)
1955	1.89	4.15	93.96	100
1960	2.99	5.74	91.27	100
1965	1.89	5.97	92.14	100
1966	3.04	5.25	91,71	100
1967	4.62	4.37	91.01	100
1968	5.74	5.74	88.52	100

Source: Derived from Table 3.5, page 49.

Note: Details may not add to 100 per cent because of rounding.

A second factor is that the volume and characteristics of the non-financial corporate issuer has changed considerably over the years.<sup>24</sup> Specifically, while the total number of firms issuing dealer paper, including finance companies, has generally averaged just over 370 since 1955, a discernable upward trend in the number did not emerge until after 1965 (see Table 3.7).

More importantly, the composition has shifted dramatically, with a trend toward larger and wealthier firms and non-traditional industries becoming evident. For instance, of the estimated 450 dealer market borrowers for 1968, about 90 were public utilities.<sup>25</sup> Prior to 1966, only eight such borrowers were in the market.<sup>26</sup>

In a related fashion, the trend has been away from the traditional seasonal-type industrial borrower, and toward the more stable financing of established industries such as steels, oils, and electronics.<sup>27</sup> Each of these changes has contributed in a significant way to the growing influence of non-financial corporations within the dealer paper market.

A third factor which is often cited as a source of increased participation in the dealer market by non-financial corporations is the expanding market for commercial paper from the demand standpoint.<sup>28</sup> An ever increasing quantity of commercial paper, particularly dealer paper,

- 27<sub>Ibid</sub>.
- <sup>28</sup>See for example, Silberman, <u>op</u>. <u>cit</u>., p. 3.

<sup>&</sup>lt;sup>24</sup>Joss, <u>op</u>. <u>cit</u>., p. 36.

<sup>&</sup>lt;sup>25</sup>George W. Cloos, "A Larger Role for Commercial Paper," <u>Business</u> <u>Conditions</u>, Federal Reserve Bank of Chicago, (December, 1968), 8.

<sup>&</sup>lt;sup>26</sup>Joss, <u>op</u>. <u>cit</u>., p. 36.

### NUMBER OF COMMERCIAL PAPER ISSUERS WITHIN THE DEALER PAPER MARKET FROM 1955 THROUGH 1968

End of Year	Number of Issuers
1955	417
1956	362
1957	335
1958	376
1959	335
1960	327
1961	349
1962	371
1963	416
1964	378
1965	335
1966	350
1967	391
1968e	450

Source: Joss, op. cit., Table III-3

is being purchased as more and more different institutions become aware of commercial paper as an alternative short-term investment. As a consequence, there is a growing realization among non-financial corporate executives that, even in times of tight money conditions, when commercial banks are generally least approachable, the commercial paper market continues to service most of the immediate needs of non-financial corporations.<sup>29</sup>

#### III. TRENDS IN THE DEMAND FOR COMMERCIAL PAPER

#### Introduction

As mentioned earlier, four different types of institutions provide a market for commercial paper: (1) non-financial corporations, (2) commercial banks, (3) investment companies, and (4) life insurance companies. A time series depicting specific demand relationships between these market participants is shown in Figure 3.3. Two important observations can be drawn from this chart of demand movements. One is that non-financial corporate demand has consistently dominated the total market for commercial paper, with the degree of dominance increasing significantly during the last years of the period under consideration. In fact, non-financial corporate holdings of commercial paper increased over thirteen times between 1955 and 1969, while total commercial paper holdings of all institutions in the market grew by only ten times.

The second observation of some import is that, while commercial banks account for a meaningful portion of the total in any one year, the

<sup>29</sup>Struble, <u>op</u>. <u>cit</u>., p. 10.



FIGURE 3.3

DEMAND FOR COMMERCIAL PAPER BY NON-FINANCIAL CORPORATIONS (NFC), COMMERCIAL BANKS (CB), INVESTMENT COMPANIES (IC), AND LIFE INSURANCE COMPANIES (LIC) FOR SELECTED YEARS: 1955-1968

quantity of commercial paper demanded by commercial banks dropped off significantly during 1968, interrupting a growth trend which began in 1955.

Analysis of these trends is sharpened by reference to Table 3.8, which provides relative demand figures on a selected year basis for the thirteen year period ending December 1968. Notice that the rate of growth in non-financial corporate demand has been somewhat erratic, changing from an average yearly growth rate of 23 per cent for the five year period 1960-1965, dropping to a low in 1967 to an 18 per cent growth, and then spurting by 44 per cent in 1968. Conversely, demand for commercial paper by commercial banks declined after 1966, during which a tremendous single year growth rate of 83 per cent was recorded.

The reasons for such erratical demand for commercial paper by specific institutional sectors are not altogether obvious. However, further reference to Table 3.8 provides enough insight to suggest that forces exogenous to the commercial paper market may play a vital role in determining the quantity of such paper demand by various institutions during any given time period. This may be true because the demand side of the commercial paper market is influenced by a heterogeneous array of institutions. Classification of these institutions according to a primary objective function emphasizes the differences which exist among them with respect to investment parameters, requirements, and policies. For instance, the investment philosophy of investment companies differs markedly from that of commercial banks. Historically, commercial banks have demonstrated a relatively high degree of conservatism with respect

#### RELATIVE DISTRIBUTION OF COMMERCIAL PAPER BY HOLDER FOR SELECTED YEARS: 1955-1968

	19 Perce	55 ent	19 Perc	60 ent	19 Perc	)65 :ent	19 Perc	66 ent	19 Perc	)67 :ent	]9 Pero	968 cent	Annual ( Ra	Growth te
Type* of Holder	of To- ( tal v	** Gro- wth	of To- tal	Gro- wth	1965 to 1968	1955 to 1968								
NFC	55	-	53	17	71	23	64	30	61	18	70	44	30	23
СВ	35	-	38	19	20	1	25	83	30	52	21	(12)	35	16
IC	5	-	2	-	6	37	8	9 <b>9</b>	6	-	6	20	35	22
LIC	5	-	7	28	3	-	3	33	3	25	3	-	18	20
Total	100	-	100	18	100	15	100	48	100	25	100	24	32	20

Source: Board of Governors of the Federal Reserve System.

\* Non-financial corporations (NFC), commercial banks (CB), investment companies (IC), and life insurance companies (LIC).

\*\* All growth rates assume annual compounding with figures rounded to nearest one per cent. Note: Details may not add to 100 per cent because of rounding. to investment policy.<sup>30</sup> On the other hand, investment companies are by nature relatively speculative when determining their respective investment portfolios.<sup>31</sup> Consequently, the purpose for which investment companies purchase commercial paper may not be similar to that recognized by commercial banks. Therefore, the timing of such purchases will likely differ.

While the extent of these differences in investment behavior will be expressed more completely during a later discussion wherein each institutional category is considered independently, the effects of such differences on the total market should be observed at this juncture.

First, the timing of increased commercial paper investment by each institutional category has been parallel in only one year, and that occurred in 1966, when total market growth was a record 48 per cent. Conditions which prevailed during that year apparently differed enough from those of any prior year to warrant a unanimity in reaction among institutional investors with respect to the commercial paper market. While the "credit crunch" of 1966 is the most frequently cited candidate for a common denominator which explains this similarity of investment policy, <sup>32</sup> less obvious yet related events are likely to have stimulated individual policy changes.

<sup>&</sup>lt;sup>30</sup>Stephen M. Goldfield, <u>Commercial Bank Behavior and Economic</u> <u>Activity</u>, (Amsterdam: North-Holland Publishing Co., 1966), p. 15.

<sup>&</sup>lt;sup>31</sup>A comparison of past performances by investment companies relative to the Standard and Poor's market average suggests a high degree of speculation. See Donald E. Vaughn, <u>Survey of Investments</u>, (New York: Holt, Rinehart and Winston, Inc., 1967), pp. 436-437.

<sup>&</sup>lt;sup>32</sup>As examples see, Joss, <u>op</u>. cit., pp. 24-26; and Frederick C. Schadrack and Frederick S. Breimyer, "Recent Developments in the Commercial Paper Market," <u>Monthly Review</u>, Federal Reserve Bank of New York, (December, 1970), 282-286.

Secondly, a single institutional category generally leads the market toward change during any given year. Even in 1966, when all categories registered record increases in commercial paper holdings, commercial banks were particularly evident, increasing their market share by over five percentage points. Conversely, in 1965, when investment company holdings of commercial paper grew by 37 per cent, growth in commercial bank and life insurance company holdings were hardly measurable. Similarly, commercial banks increased their investment in commercial paper again in 1967, this time by 52 per cent, while the other sectors recorded only moderate change. But in 1968, commercial banks reversed themselves, while non-financial corporations increased their purchases by a record 44 per cent.

Differences in institutional frameworks account for a great deal of this lack of retinue in investment behavior. However, the fact that commercial paper is issued in two separate sub-markets (dealer vs. direct) also contributes to total investment volatility within a given institutional category. Since the basic characteristics of the two sub-markets are dissimilar, simultaneous participation in both markets may disjoint the continuity of overall investment behavior. Evidence of these relationships is provided by the tendency for non-financial corporations and commercial banks alike to participate in both sub-markets. Because of this dual involvement with the two commercial paper sub-markets, it is helpful to consider non-financial corporate and commercial bank demand for commercial paper in a general framework before focusing attention upon the separate sub-markets independently.

<u>Non-financial corporations</u>. Corporate managers maintain investments in current assets in recognition that the timing of cash inflows from the sale of goods and services does not correspond to the timing of cash outflows representing expenses incurred during the production process. Indeed, if cash inflows were matched as to both amount and timing with cash outflows, there would be no need for management to consider investing in current assets.

Because cash flows are not only unmatchable but are also relatively unpredictable, some portion of current assets must be held in cash or near cash items. Investment in cash and near cash items enhances the liquidity position of the firm. Such liquidity provides a hedge against adverse variations in net cash flows (cash inflows less cash outflows). Consequently, the degree of liquidity required to maintain an institution as a going concern is a function of the size and frequency of variation in expected net cash flows for that institution. The greater the variation in net cash flows, the greater the required degree of liquidity.

Non-financial corporations have always maintained some degree of liquidity, but Table 3.9 suggests that the structure and extent of liquid assets held by such institutions has changed significantly in recent years. For example, non-financial corporations increased their total dollar commitment to liquid assets (cash, time deposits, government securities, and commercial paper) by 47 per cent between 1955 and 1969, a rate of growth of approximately 3 per cent per year. However, this increased investment in liquidity is not really very impressive because the relative position of such assets to total financial assets held by non-financial corporations diminished considerably during the same
## TABLE 3.9

## RELATIVE POSITION OF SELECTED FINANCIAL ASSETS OF NON-FINANCIAL CORPORATIONS FOR SELECTED YEARS: 1955-1968

	Cash (Pct)	Time Deposits (Pct)		Coml. Paper (Pct)	Total**			
Year End			Govt. Bonds* (Pct)		In Dollars (billions)	As Pct. of Total Fin. Assets		
1955	54.6	1.7	41.7	2.0	58.8	39.0		
1960	54.3	4.7	36.9	4.1	59.3	29.0		
1965	38.1	26.0	27.1	8.8	73.9	26.0		
1966	38.1	24.6	26.1	11.2	75.8	24.0		
1967	38.1	27.6	21.5	12.8	78.0	24.0		
1968	36.2	27.1	20.0	16.7	86.4	25.0		

Source: Derived from Table 3.5, page 49.

\* Government bonds includes all government securities owned by non-financial corporations.

\*\* The dollar total includes only cash, time deposits, government securities, commercial paper holdings. That total is then shown as a per cent of all financial assets shown in Table 3.5, page 49.

Note: Details may not add to 100 per cent because of rounding.

period. While most of the deterioration occurred during the first five years of the period, decline is evident throughout the thirteen years, without a trough until as recently as 1967.

Many alternative explanations have been given in justification for the trend toward reduced liquidity positions by non-financial corporations. Two frequently cited interpretations are that (1) management teams have become considerably more sophisticated with respect to the financial decisions of the firm, and (2) money and capital markets have developed to such an extent that the financing and management of liquidity is far more flexible in current times than was the case a decade or two ago.<sup>33</sup>

The first explanation suggests that contemporary financial managers recognize the time value of money, meaning that a dollar received today is worth more than a dollar to be received one period from the present, simply because of the payment of interest. Accordingly, cash balances are to be minimized, since cash is a sterile asset in terms of dollar return on investment.

Table 3.9 exemplifies an apparent recognition of the above relationships. The relative cash position of non-financial corporations declined by 18 percentage points during the thirteen year period, most of which occurred prior to 1965. The actual dollar drop was nominal, but it is readily apparent that corporate money managers were restricting their investment in cash to an ever increasing extent. An examination of trends in time deposits owned by non-financial corporations relative to

<sup>&</sup>lt;sup>33</sup>Some examples are found in Baxter, <u>op</u>. <u>cit</u>., Chapter 5; Schadrack and Breimyer, <u>op</u>. <u>cit</u>., p. 285; and "Financing Corporate Investment," <u>Federal Reserve Bulletin</u>, LI (December, 1965), 1666.

other liquid assets supports this contention. Time deposits accounted for only 1.7 per cent of all liquid assets held by non-financial corporations in 1955. By the end of 1968, these balances reflected over 27 per cent of such assets. A less remarkable, yet quite significant increase in commercial paper investment is also evident throughout the period.

The notable shifting among interest bearing money and capital market instruments held as a part of non-financial corporate liquid portfolios reflects developments both in money and capital markets, and in management awareness of those markets. Managements' capacity to virtually dictate maturity dates on money market instruments, such as time deposits and commercial paper held within their respective port-folios, provides the possibility for substituting these instruments in lieu of cash.<sup>34</sup> And as conditions within the respective money and capital markets vary, the relative advantage of investing among the various instruments also seems to change. Notice that non-financial corporate investment in commercial paper has frequently grown at the expense, so to speak, of other alternative liquid assets, particularly after 1965. The relative position of both time deposits and government securities dropped in 1966 in an apparent trade-off for increased commercial paper investment. A similar adjustment is evidenced again in 1968.

Previous studies have suggested that an attractive rate of interest is an important factor in influencing the decision of corporations

<sup>&</sup>lt;sup>34</sup>Robert Johnston, "Rebirth of Commercial Paper," <u>Monthly Review</u>, Federal Reserve Bank of San Francisco, (July, 1968), 139-140.

to invest in commercial paper.<sup>35</sup> A visual comparison of Table 3.9 with Figure 3.4 demonstrates the tendency of non-financial corporations to shift funds toward higher yielding marketable securities as relative interest rate levels change within the money markets. Four meaningful observations can be noted from this comparison of interest rate levels. One is that the rate of interest on dealer placed commercial paper always exceeds that on directly placed commercial paper. The reason is that default risk is generally deemed to be higher on dealer issues than on direct issues. Second, treasury bill rates are always lower than those found on either type of commercial paper issue. Once again the difference is explained through the concept of default risk.<sup>36</sup> Treasury bills are viewed by the market as virtually default-risk free money market instruments.

A third observation of note is that, while rate differentials exist between money market instruments, the respective rates tend to move in much the same direction. And fourth, the rate ceiling on time deposits has exceeded the interest rate level of dealer placed paper on only two occasions since 1964 -- 1966 and 1968. On each occurrence, non-financial corporate involvement within the commercial paper market grew in both a relative sense and in an absolute sense during these two periods (refer back to Table 3.8 for the absolute growth figures).

<sup>&</sup>lt;sup>35</sup>Baxter, <u>op</u>. <u>cit</u>., Chapter 8; Schadrack, <u>op</u>. <u>cit</u>., p. 850; and Joss, <u>op</u>. <u>cit</u>., p. 136.

<sup>&</sup>lt;sup>36</sup>Investors generally regard the quality of commercial paper to be just a notch below that of treasury bills (Silberman, op. cit., p.3) but are becoming less convinced that rate differentials are warranted by actual differentials in risk and liquidity (D. P. Jacobs, "The Marketable Security Portfolios of Nonfinancial Corporations, Investment Practices and Trends," Journal of Finance, LXV (September, 1960), 352.



FIGURE 3.4

SELECTED MONEY MARKET RATES: 1955-1968

<u>Commercial banks</u>. A commercial bank is a business, and like any other business enterprise, it is out to make a profit. Yet unlike most other businesses, a bank has a deeper obligation than most enterprises to maintain high standards of safety and soundness in its operations, for a bank's operations involve the acceptance and safekeeping of other people's money. For this reason the investment philosophy of commercial bank management differs measurably from that of non-financial corporate management in general.

The employment of commercial bank funds is based on a well defined four-layer priority system.<sup>37</sup> The highest priority is that of maintaining an adequate level of primary reserves.<sup>38</sup> These reserves consist of cash in vault and deposits at Federal Reserve Banks. The level of primary reserves required to be on hand during any given period is stipulated by the Board of Governors of the Federal Reserve System and is defined as some fraction of deposit liabilities on record. Protective investments in secondary reserves are maintained as a secondary priority to cover remote contingencies of cash needs.<sup>39</sup> The assigned objective of these first two priorities is to provide liquidity, even at the expense of possible profits. Hence, secondary reserves are traditionally held in the form of government securities, a low yielding but risk-free asset.

<sup>&</sup>lt;sup>37</sup>Roland I. Robinson, <u>The Management of Bank Funds</u>, (New York: McGraw-Hill Book Company, Inc., 1962), Chapter 1.

<sup>&</sup>lt;sup>38</sup><u>Ibid</u>., p. 13. <sup>39</sup>Ibid., pp. 14-15.

The third priority of traditional commercial bank management is to meet customer credit demands.<sup>40</sup> Accordingly, customer loans are the principal origin of profits as well as the greatest source of material risk to commercial banking institutions.

Once the commercial bank's priorities concerning liquidity and local loan demands have been satisfied, it can enter the money and capital markets with any remaining funds in anticipation of investment income.<sup>41</sup> Thus, commercial banks make profit oriented purchases of non-government money market instruments only after all traditional investment alternatives have been absorbed.

Given the above set of portfolio priorities, it is not surprising to note from Table 3.10 that commercial paper has never accounted for more than 2 per cent of all commercial bank financial assets within a given year. On the other hand, commercial banks have varied the quantity of their commercial paper holdings significantly from one period to the next. An interesting aspect of the trend in commercial bank assets is that the relative position of commercial paper has stood fairly consistent throughout the 1955-1968 period. A partial explanation for this consistency is that bank management has been willing to substitute government securities for bank loans instead of reducing commercial paper holdings to fulfill accelerating loan requirements. For example, commercial bank involvement in treasury bills was reduced in 1966 to help

<sup>40</sup>Ibid., pp. 16-17.

<sup>41</sup>Ibid., p. 17.

## **TABLE 3.10**

#### FINANCIAL ASSETS AND LIABILITIES OF COMMERCIAL BANKS FOR SELECTED YEARS: 1955-1968 (Money Amounts in Billions of Dollars)

\_

				· · · · · · · · · · · · · · · · · · ·		
Balance Sheet Items	1955 Dol- Per- lars cent	1960 Dol- Per- lars cent	1965 Dol- Per- lars cent	1966 Dol- Per- lars cent	1967 Dol- Per- lars cent	1968 Dol- Per- lars cent
Financial Assets						
Primary Reserves Commercial Paper Treasury Bills Other Investments Mortgages Consumer Credit Bank Loans Misc. Fin. Assets Total	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{ccccccc} 25.3 & 7 \\ 4.5 & 1 \\ 21.2 & 6 \\ 83.9 & 24 \\ 54.0 & 15 \\ 38.3 & 11 \\ 113.2 & 32 \\ \underline{16.1} & 4 \\ 356.6 & 100 \end{array}$	$\begin{array}{cccccc} 27.0 & 7 \\ 7.0 & 2 \\ 26.5 & 7 \\ 97.7 & 24 \\ 58.5 & 15 \\ 40.0 & 10 \\ 120.8 & 31 \\ \underline{19.9} & 4 \\ 397.4 & 100 \end{array}$	$\begin{array}{ccccccc} 29.0 & 7 \\ 5.9 & 1 \\ 28.2 & 6 \\ 108.4 & 25 \\ 65.1 & 15 \\ 44.9 & 10 \\ 136.5 & 31 \\ \underline{23.4} & \underline{5} \\ 441.4 & 100 \\ \end{array}$
Liabilities						
Demand Deposits Time Deposits Misc, Liabilities Total	114.2 67 50.3 29 <u>7.0 4</u> 171.5 100	121.6 59 73.3 35 <u>13.0 6</u> 207.9 100	144.3 46 147.2 47 <u>22.6 7</u> 314.1 100	144.5 44 159.3 48 <u>28.0 8</u> 331.8 100	157.5 42 183.1 49 <u>30.4 9</u> 371.0 100	170.9 41 203.7 49 <u>38.7 10</u> 413.3 100

Source: Board of Governors of the Federal Reserve System.

Note: Details may not add to 100 per cent because of rounding.

finance an expanding interest in bank loans, while commercial paper holdings were increased enough to leave their relative balance sheet position unchanged.

The trade-off between government securities, particularly treasury bills, and commercial paper is an outgrowth of an interest rate differential which exists between the two types of instruments.<sup>42</sup> This relationship is made more apparent from a simultaneous inspection of Table 3.10 and Figure 3.4. Note that commercial paper interests of commercial banks have increased as the rate differential between commercial paper and treasury bills has expanded (see years 1960, 1966, and 1967). Conversely, as the differential became smaller, growth in commercial paper ownership by commercial banks either slowed or became negative (see years 1965 and 1968).

These trends in commercial bank investment practices reflect a less conservative and more sophisticated strain of management philosophy than was apparent in prior years. Although traditional priorities continue to govern bank investment decisions, a wider degree of flexibility with respect to risk and return would seem to be in evidence. Another example of this flexibility is shown from the fact that the commercial banking industry has demonstrated a declining interest in secondary reserve investments relative to other asset alternatives in recent years. For instance, secondary reserves declined as a fraction of bank assets from a high of 44 per cent in 1955 to a near low of only 32 per cent by

<sup>&</sup>lt;sup>42</sup>For an empirical testing of the proposition that commercial bank responses to market forces determine their portfolio behavior, see Leonall Anderson and Albert E. Burger, "Asset Management and Commercial Bank Portfolio Behavior: Theory and Practice," <u>Journal of Finance</u>, XXIV (May, 1969), 207-222.

years end 1968. Throughout this same period, commercial bank loans outstanding were increasing relative to their total deposit liabilities at a rate of 3 per cent per year (from 46 per cent in 1955 to 65 per cent in 1968). But these trends should not be explained away as "management behavior" alone, for additional factors come into play when discussing the aggregate banking community. For example, a general trend during the 1960's of increasing demand for bank loans by the public sector as a whole, supported by a policy of relative monetary ease on the part of the Federal Reserve authorities a so provided impetus to much of the change registered on commercial bank balance sheets.<sup>43</sup>

#### Direct Paper Market

Demand for directly placed commercial paper is derived primarily from the non-financial corporate sector. Commercial banks and life insurance companies also participate in the direct market, with the latter group entering the market for the first time in a measurable way as recently as 1954.

Table 3.11 helps to demonstrate general market behavior with respect to directly placed paper over the thirteen year period ending December 1968. Notice that while non-financial corporations have generally purchased over 70 per cent of all directly placed paper, growth in such purchases nearly came to a halt in 1967. During the same year, commercial banks and life insurance companies increased their

<sup>&</sup>lt;sup>43</sup>For continuing analysis and updating of commercial bank portfolio behavior, see the "Quarterly Survey of Changes in Bank Lending Practices" which is published within the <u>Federal Reserve Bulletin</u>.

## TABLE 3.11

#### ANALYSIS OF DISTRIBUTION OF DEMAND FOR DIRECTLY PLACED COMMERCIAL PAPER BY SECTOR FOR SELECTED YEARS: 1955-1968

Type of Market Sector	1955	1960	1965	1966	1967	1968
Non-Financial Corporations	<u></u>	·				
Volume (\$ billions) Percent of Total Annual Growth Rate	1.1 73.0 	2.1 68.0 14.0	6.2 86.0 25.0	8.0 79.0 29.0	8.2 70.0 3.0	11.3 85.0 38.0
Commercial Banks						
Volume (\$ billions) Percent of Total Annual Growth Rate	.3 20.0 	.7 23.0 19.0	.7 10.0 	1.8 18.0 157.0	2.9 25.0 61.0	1.5 11.0 (48.0)
Life Insurance Companies						
Volume (\$ billions) Percent of Total Annual Growth Rate	.1 7.0 	.3 11.0 25.0	.3 4.0 	.4 4.0 33.0	.5 5.0 25.0	.5 4.0 
Total Direct Paper						
Total Volume Annual Growth Rate	1.5 	3.1 16.0	7.2 18.0	10.2	11.6 14.0	13.3 15.0

Source: Board of Governors of the Federal Reserve System.

Note: Details may not add to 100 per cent because of rounding. Rounding is to nearest one per cent.

respective purchases significantly, with commercial banks accounting for 25 per cent of the direct market for the first time within the 1955-1968 period.

Life insurance companies. Life insurance companies are one of the most important types of financial intermediaries in the United States.<sup>44</sup> Their total financial assets have grown from \$88 billions in 1955 to \$183 billions at the end of 1968 (see Table 3.12), for an annual rate of 6 per cent.

The investment practices of life insurance firms are shaped by financial considerations of safety, liquidity, diversification, maximization of income, and by regulatory commissions and public interests.<sup>45</sup> For example, most of the investment activity of life insurance companies is centered on capital-market rather than money-market investments because the principal liabilities of life insurance companies are of a longer term nature. Similarly, investments in long term securities must return at least the cost of providing insurance coverage and must be secure enough to provide a reasonably accurate expected cash flow into the institution throughout the life of the investment.

Given this emphasis on long-term, low-risk commitments, life insurance companies have a limited need for commercial paper issues other than normal liquidity requirements. And since life insurance companies

<sup>&</sup>lt;sup>44</sup>Herbert E. Dougall, <u>Capital Markets and Institutions</u>, (2nd ed.; Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1970), p. 48.

<sup>&</sup>lt;sup>45</sup>Ibid., pp. 48-49.

## **TABLE 3.12**

#### FINANCIAL ASSETS OF LIFE INSURANCE COMPANIES FOR SELECTED YEARS: 1955-1968 (Money Amounts in Billions of Dollars)

Asset Type	1955 Dol- Per- lars cent	1960 Dol- Per- lars cent	1965 Dol- Per- lars cent	1966 Dol- Per- lars cent	1967 Dol- Per- lars cent	1968 Dol- Per- lars cent	
Cash	132	131	15 1	15 1	16 1	171	
Gov. Secs.	10.6 12	10.1 9	8.6 6	7.9 5	7.4 4	7.6 4	
Commercial Paper	.1 -	.3 -	.3 -	.4 -	.5 -	.5 -	
Corporate Shares	3.6 4	5.0 4	9.1 6	8.8 5	11.8 7	13.2 7	
Corporate Bonds	37.0 42	48.2 42	61.1 40	63.5 39	67.3 39	71.2 39	
Mortgages	29.4 33	41.7 36	60.0 39	64.6 40	67.5 39	70.0 38	
Misc. Fin. Assets	5.9 7	9.3 8	<u>13.5 8</u>	<u>15.1 10</u>	16.9 10	18.6 11	
Total	87.9 100	115.9 100	154.1 100	161.8 100	173.0 100	182.8 100	

Source: Board of Governors of the Federal Reserve System.

1

Note: Details may not add to 100 per cent because of rounding.

have reduced their liquidity levels considerably over the years, their total demand for commercial paper has continued to be below one per cent of their aggregate asset structure.

When life insurance companies change the level of commercial paper held within their portfolios, the change generally reflects a shift in relative interest rate levels between government issues and directly placed commercial paper issues (for verification of this comment, compare rate differentials illustrated in Figure 3.4 with changes in life insurance company assets shown in Table 3.12). The restriction of life insurance company participation to the direct paper market may reflect an overriding concern for safety, especially with respect to liquid assets. Apparently the higher return offered on dealer paper does not compensate sufficiently for the additional risk life insurance companies perceive to be in evidence with respect to dealer paper issues.

#### Dealer Paper Market

Commercial banks traditionally purchased the majority of dealer placed commercial paper until 1967 when non-financial corporations began to invade the market in more earnest. Table 3.13 highlights the growth patterns of both institutional investors during the 1955-1968 period. Note the 240 per cent increase in dealer paper demanded by non-financial corporations between 1966 and 1967. By 1968, non-financial corporations were buying more dealer paper than were commercial banking institutions, although the latter group continued to expand at a yearly rate exceeding 32 per cent.

## TABLE 3.13

## ANALYSIS OF DISTRIBUTION OF DEMAND FOR DEALER PLACED COMMERCIAL PAPER BY SECTOR FOR SELECTED YEARS: 1955-1968

Type of Market Sector	1955	1960	1965	1966	1967	1968
Non-Financial Corporations				····	·,	
Volume (\$ billions) Percent of Total Annual Growth Rate	.1 20.0 	.3 21.0 25.0	.4 21.0 6.0	.5 17.0 25.0	1.7 35.0 240.0	3.1 43.0 83.0
Commercial Banks						
Volume (\$ billions) Percent of Total Annual Growth Rate	.3 60.0 	1.0 71.0 28.0	1.0 53.0 	1.5 50.0 50.0	2.2 45.0 42.0	2.9 40.0 32.0
Investment Companies						
Volume (\$ billions) Percent of Total Annual Growth Rate	.1 20.0 	.1 7.0 	.5 26.0 33.0	1.0 33.0 100.0	1.0 21.0 	1.2 17.0 20.0
Total Dealer Paper						
Total Volume Annual Growth Rate	.5 	1.4 23.0	1.9 6.0	3.0 58.0	4.9 63.0	7.2 47.0

Source: Board of Governors of the Federal Reserve System.

Note: Details may not add to 100 per cent because of rounding. Rounding is to nearest one per cent. But non-financial corporations and commercial banks are not the whole story in the dealer market, as was the case with the direct market.<sup>46</sup> Investment companies, or more specifically, mutual funds have accounted for as much as 33 per cent of total quantity demanded at a given point in time (see 1966 in Table 3.13). Investment company interests within the commercial paper market have grown remarkably since 1965, when their total holdings were \$500 millions. By 1968, mutual funds held \$1.2 billion, a 120 per cent increase over the three year period.

<u>Investment companies</u>. The fundamental objective of an investment company is to accumulate the funds of a large number of investors for centralized management purposes.<sup>47</sup> This centralization of the investment activities of a wide variety of investors offers a potential investor with the opportunities of both diversification and professional counsel, all in one package. This, in turn, is supposed to provide the investor with a higher expected profit with each dollar invested than would otherwise be the case.

Since the principal function of investment companies is to seek profit from operating within the money and capital markets, they differ considerably from the insurance company or the commercial bank. A capital structure based solely on equity is under different financial obligations than is one based mostly on debt. For example, the liquidity requirements of the latter case would be far more stringent than those of the former.

<sup>46</sup>Supra, p. 71.

47Dougall, op. cit., p. 78.

Given these differences in capital structures, it is not surprising to note that investment companies operate almost solely in the capital markets. Mutual funds, which have been the fastest growing as well as the largest investment company sector in postwar years,<sup>48</sup> invest 95 per cent of their capital in the longer term markets, most of which is in common stock. The combined balance sheets of mutual funds and their relative proportions at selected year-ends are shown in Table 3.14. Mutual funds differ from other investment companies in that their shares are not traded in a secondary market but are continuously offered for sale. Investors wishing to convert back to cash simply ask for a redemption from the mutual fund based on the investor's share of the fund's current asset value.

Investment companies do not rely heavily on commercial paper instruments in fulfilling their portfolio needs because of their emphasis on capital market investments. As a general rule, when stock prices become bearish, "excess" cash inflows are channeled through the bond markets. However, in recent years, many funds have increased their cash and near cash positions during market transition periods in anticipation of future capital market activity.<sup>49</sup> This was true in 1966 when the dollar amount of commercial paper holdings of mutual funds doubled, while the value of their corporate share investments was declining by over \$1 billion.

> <sup>48</sup>Ibid., p. 80. <sup>49</sup>Ibid., p. 84.

## TABLE 3.14

#### FINANCIAL ASSETS OF OPEN-END INVESTMENT COMPANIES FOR SELECTED YEARS: 1955-1968 (Money Amounts in Billions of Dollars)

Asset Type	1955	1960	1965	1966	1967	1968
	Dol- Per-	Dol- Per-	Dol- Per-	Dol- Per-	Dol- Per-	Dol- Per-
	lars cent	lars cent	lars cent	lars cent	lars cent	lars cent
Cash Gov. Secs. Commercial Paper Corporate Shares Corporate Bonds Total	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$ \begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$ \begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{rrrr} .7 & 2 \\ .9 & 2 \\ 1.0 & 2 \\ 39.2 & 88 \\ \underline{2.9} & 7 \\ 44.7 & 100 \end{array}$	$ \begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$

Source: Board of Governors of the Federal Reserve System.

Note: Details may not add to 100 per cent due to rounding.

#### IV. CONCLUSIONS

Previous empirical works concerning the supply of and demand for commercial paper have sought to explain dealer and direct market behavior with single equation models, thus aggregating the behavior of all participants within a given sub-market.<sup>50</sup> For example, on the supply side, variables are usually included for both finance company and nonfinancial corporation behavior. Because of this aggregation, it is conceivable that the existence of interrelationships between the several variables chosen would weaken the explanatory capacity of a given model.<sup>51</sup> To the extent that this is true, segmenting the dealer market into two sub-markets -- non-financial corporate supplied paper and finance company supplied paper -- would reduce, if not totally eliminate the problem. Because of this favorable possibility, the latter approach will be applied in the present study.

Similarly, previous studies have employed explanatory variables reflecting non-financial corporate behavior within their respective empirical models of demand for commercial paper. However, the specifications outlined within these studies have differentiated only slightly between the two types of market issues, directly placed paper and dealer placed paper.<sup>52</sup> This may be an oversimplification, since the degree of

<sup>52</sup>Schadrack, <u>op</u>. <u>cit</u>.; and Joss, <u>op</u>. <u>cit</u>.

<sup>&</sup>lt;sup>50</sup>See Schadrack, <u>op</u>. <u>cit</u>., pp. 838-842; and Joss, <u>op</u>. <u>cit</u>., pp. 89-94.

<sup>&</sup>lt;sup>51</sup>This comment finds support in W. H. Anderson, <u>Corporate</u> <u>Finance and Fixed Investment</u>: <u>An Econometric Study</u>, (Boston: Division of Research Graduate School of Business Administration, Harvard University, 1964), p. 92.

market dominance by non-financial corporations varies between the two markets in a significant manner. For example, the marked increase in total quantity of commercial paper demanded by non-financial corporations, as referenced earlier, occurs primarily within the dealer market during 1967 but within the directly placed market for both 1966 and 1968 (see Tables 3.11 and 3.13).

Secondly, non-financial corporate dominance of total commercial paper demand has been relevant only in the direct market throughout the period under consideration. In fact, non-financial corporations accounted for as little as 17 per cent of all commercial paper sold in the dealer market as recently as 1966. However, this trend changed somewhat by 1968, when non-financial corporations purchased 43 per cent of all dealer placed paper.

Third, the decline in commercial bank demand for commercial paper during 1968 occurred within the direct paper market only, although the rate of growth in quantity demanded by commercial banks continued to decline in the dealer market as well.

The above observations serve to accentuate differences between behavioral characteristics of both non-financial corporations and commercial banks with respect to the two commercial paper markets. In view of these behavioral differences, acceptance of similarly specified, single equation models for explanation of variations in the two markets is suspect to oversimplification and, most likely, unnecessary statistical error (the problem of multicolinearity will be discussed in some detail within Chapter V). An alternative specification approach will be

outlined and implemented empirically within Chapter V in an attempt to gain further understanding of the commercial paper market.

Finally, investment and life insurance companies, as a group, have accounted for as much as 11 per cent of all commercial paper demanded at one point in time. However, these institutions operate in two different markets, investment companies buying dealer paper and life insurance companies purchasing directly placed paper. Therefore, while life insurance companies seldom account for more than 4 per cent within the direct market, investment companies general'y acquire over 20 per cent of all dealer paper sold, a significant influence in any market. Interestingly enough, prior studies have not considered these sources of demand within their respective empirical presentations. Omission of such information, especially with respect to investment companies and the dealer market, leaves a meaningful void for the present study to fill.

Recognition of trends in the market place is the first step in any analysis of a given market. However, analysis of supply and demand alone does not tell the complete story. Trends have a bad habit of changing, and while a given change in direction may be meaningful in itself, the "why" of the occurrence may be left in doubt. The expressed purpose of this study is to shed light on the "why" of change on both sides of the commercial paper market. Accordingly, Chapter IV develops a relevant theoretical framework from which structural models may be specified for each commercial paper sub-market.

#### CHAPTER IV

#### THEORETICAL FRAMEWORK

#### I. INTRODUCTION

The expressed purpose of this study is to examine past behavior of participants within the commercial paper market and, from this examination, to explain variations in the supply of and demand for these money market instruments. Crucial to any behavioral analysis is the <u>ex ante</u> acceptance of a proper conceptual framework from which <u>a priori</u> hypotheses may be developed for empirical testing.<sup>1</sup> Accordingly, this chapter presents an underlying theory of working capital management<sup>2</sup> from which several behavioral hypotheses concerning the supply of and demand for commercial paper are logically derived.

<sup>&</sup>lt;sup>1</sup>For a more complete discussion of this point, see Carl F. Christ, <u>Econometric Models and Methods</u> (New York: John Wiley and Sons, Inc., 1966), p. 7.

<sup>&</sup>lt;sup>2</sup>While the basic elements of a theory of working capital management have existed within the literature for a number of years, clear identification of the theory is a relatively recent occurrence. Included among the early precursors are Virginia L. Bean and Reynolds Giffith, "Risk and Return in Working Capital Management," <u>Mississippi</u> <u>Valley Journal of Business and Economics</u>, I (Fall, 1966), 28-48; William Beranek, <u>Working Capital Management</u>, (Belmont, California: Wadsworth Publishing Company, Inc., 1966); Wilford J. Eiteman and James N. Holtz, "Working Capital Management," in Essays on Business Finance, ed. by Karl A. Boedecker, (4th ed.; Ann Arbor, Michigan: Masterco Press, 1963); Colin Park and John W. Gladson, <u>Working Capital</u> (New York: The Macmillan Company, 1963); James C. Van Horne, "Risk-Return Analysis of a Firm's Working Capital Position," <u>Engineering Economist</u>, XIV (Winter, 1969), 71-89; and Ernest W. Walker, "Towards a Theory of Working Capital, "<u>Engineering Economist</u>, IX (January - February, 1964), 21-35.

# II. THE UNDERLYING THEORY OF WORKING CAPITAL MANAGEMENT

#### Introduction

The term working capital generally refers to a firm's investment in short-term assets -- cash, securities, accounts receivable, and inventories. Working capital management involves decisions relating to the investment in and financing of current assets. These decisions involve a trade-off between risk and profitability. The risk involved with various levels of current assets and current liabilities must be evaluated in relation to the profitability associated with those levels. The discussion which follows concerns the financing of current assets and the level of those assets that should be maintained from a broad theoretical standpoint.

## The Investment Decision<sup>3</sup>

The profit objective. If the return on fixed assets exceeds the return on current assets, then the higher the level of current assets relative to that of fixed assets, the less profitable a firm's total asset structure. Therefore, all other things remaining constant, management will tend to decrease current assets in favor of fixed asset investment when seeking to maximize profits.

<sup>&</sup>lt;sup>3</sup>This section and the next rely heavily on James C. Van Horne, <u>Financial Management and Policy</u>, (2nd ed,; Englewood Cliffs, N. J.: Prentice-Hall Inc., 1971), pp. 383-403.

Similarly, if liquid assets (cash and marketable securities) are viewed as offering less profit than alternative types of assets, then management will tend to minimize investment in liquid assets when seeking to maximize profits.

<u>The risk factor</u>. However, as indicated earlier, investment in current assets involves a trade-off between profitability and risk. Minimization of current assets in an effort to maximize profits suggests a policy of maintaining a minimum level of liquidity, where liquidity refers to an ability to convert a given asset or group of assets into cash, the most liquid of all assets. One of the more frequently used guides to liquidity is the quick, or acid test ratio, where cash, marketable securities, and accounts receivable (quick assets) are divided by current liabilities. The higher the ratio, the greater the firm's ability to pay its bills. Conversely, the lower the ratio, the more likely the firm will become technically insolvent -- unable to meet its current cash obligations.<sup>4</sup> This risk of technical insolvency, then, increases with decreases in quick assets when current liability levels remain constant.

Hence, the trade-off between profitability and risk becomes evident within the construct of working capital management. An increase in quick assets leads to a decrease in both profitability and risk while a decrease in quick assets tends to increase both profitability and risk when liability size and structure remain unchanged. But what if these liability characteristics do change? Surely the structure and level of liabilities tend to vary as financing requirements vary.

<sup>&</sup>lt;sup>4</sup>James E. Walter, "Determination of Technical Solvency," Journal of Business, XXX (January, 1959), 30-43.

#### The Financing Decision

The profit objective. If the cost of short-term liabilities is less than the cost of long-term liabilities as alternative sources of funds, management will tend to rely more heavily on short-term credit when financing its working capital needs, assuming all other considerations to be constant. This is true since the lower the cost structure of debt, the higher the profitability of the firm, ceteris paribus.

The risk factor. On the other hand, the shorter the term structure of debt, the more frequent the firm must provide cash outlays for both principal and interest on outstanding debt. And in conjunction with these cash payments, the firm must enter money and capital markets more frequently than under longer term debt structures, thus placing management at the mercy of market conditions more frequently. In essence, the shorter the term structure of debt, the more risk of technical insolvency, since higher levels of cash will be required to support the relatively frequent principal payments. Therefore, the trade-off between profitability and risk is as evident when considering financing working capital needs as when considering investment in working capital assets.

## The Working Capital Decision<sup>5</sup>

The interrelationships. A review of the preceding section suggests a necessity to consider working capital decisions simultaneously. While a low relative level of liquid assets may be most

<sup>&</sup>lt;sup>5</sup>The development of this section draws in part upon Raymond G. and Robert E. Schulz, <u>Basic Financial Management</u>, (2nd ed.; Scranton, Pa.: Intext Educational Publications, 1972), pp. 112-130.

compatible with high profit objectives, <u>ceteris paribus</u>, such asset structures may not be equally compatible with relatively high yielding, short-term oriented debt structures. Because of these interrelationships, management must often seek a compromise solution. To the extent that the profit trade-off between a lower current asset investment and a longer term oriented debt structure is positive, management will finance any fixed portion of current asset investment with long-term debt or equity capital, thus reducing the need for liquidity with any given current asset level. Using this "profit trade-off" assumption, the following sections outline a conceptual approach to working capital management.

Motives for liquid balances. In 1936, J. M. Keynes<sup>6</sup> introduced three motives for holding cash balances: (1) the transactions motive, (2) the precautionary motive, and (3) the speculative motive. In a sense, these three motives express different degrees of liquidity requirements and, as such, correlate well with the present discussion.

In fact, working capital management may be placed into a three component framework similar to the Keynesian demands for liquid balances. Transactions demand for liquid balances is a function of ordinary future purchases which are expected in the course of normal day-to-day or year-to-year household and business life. These balances resemble the fixed portion of working capital which is required to handle normal operations.

<sup>&</sup>lt;sup>6</sup>John M. Keynes, <u>The General Theory of Employment, Interest and</u> <u>Money</u>, (New York: Harcourt, Brace Jovanovich, Inc., 1936), pp. 170-174.

Precautionary demand for liquid balances is a function of future purchases which are expected but whose nature and timing cannot be foreseen because they may arise from emergency situations. Such balances correspond with the variable or temporary portion of current assets which are held in quantities sufficient only to meet seasonal or extraordinary needs.

Speculative demand for liquid balances are dependent upon purchases that may occur as a corollary of future speculative opportunities. Speculative working capital balances are those in excess of all normal business needs but which are maintained by the firm to permit immediate investment in unusual business opportunities.

In short, the Keynesian transaction-precautionary-speculative framework may be translated into the fixed, variable, and excess components of working capital assets.

<u>Segmentation of assets</u>. Segmentation of working capital assets into three components -- fixed, variable, and excess -- offers management several advantages. From the investment point of view, segmentation requires management to recognize both the function performed by each working capital asset and, correspondingly, the relationships which must exist between investment in such assets and the level of expected net cash flows for the firm.

Recognition of the latter is imperative because the average required investment in working capital assets becomes larger the greater the variation in net cash flows. This is true because of the increased risk of technical insolvency when cash flows are relatively unpredictable.

It is the variable portion of working capital investment which changes with variations in expected net cash flows, and management would seek to finance such short-term requirements in a different manner than the more permanent fixed and excess portions of working capital balances. Accordingly, a second advantage to segmentation of working capital assets becomes apparent when considering the financing decision.

Financing alternatives are generally defined according to maturity characteristics -- short-term, long-term, and permanent. Or, alternatively, according to typical balance-sheet jargon -- current liabilities, long-term liabilities, and equity capital.

Financing variable working capital requirements with long-term or permanent sources is inefficient. During periods of low "variable" needs, an interest cost burden is realized unnecessarily. Therefore, while financing some working capital assets with relatively permanent funds is necessary, management must consider which assets are to be financed with which source of funds. Segmentation of assets into fixed, variable, and excess provides a meaningful rationale for this aspect of the financing decision.

Figures 4.1 and 4.2 present graphic illustrations of the segmentation concept and its application to the financing decision of the firm given a stationary position in time and a growth situation over time, respectively. Three interesting facets of the segmentation concept, as applied to working capital management, become evident from consideration of these illustrations. First, as shown in Figure 4.1, financing cost levels are presumed to be closely matched with asset



0

DOLLAR AMOUNT



SEGMENTATION OF WORKING CAPITAL ASSETS WITHIN A STATIC FRAMEWORK



.

## FIGURE 4.2

SEGMENTATION OF WORKING CAPITAL ASSETS WITHIN A DYNAMIC FRAMEWORK yield levels. While this might not be a primary objective of financial management, it is often a logical outgrowth of management efforts to minimize unnecessary financing costs.

Earlier comments have inferred that short-term debt might be less expensive than long-term debt, and, more often than not, such is the case if short-term debt refers only to bank loans and commercial paper issues. However, when trade debt is included as a source of short-term funds, Figure 4.1 may become more relevant. While the importance of trade debt relative to total short-term liabilities of nonfinancial corporations has diminished over the last decade, this source of funds continues to account for over half of all short-term financing negotiated by such corporations.<sup>7</sup> Therefore, since the implicit cost of trade debt may significantly exceed that of long-term financing, the weighted average cost of all short-term financing (trade debt, bank loans, and commercial paper) could surpass that of long-term financing, even when capital market rates eclipse those evident in the money market.

The second characteristic of working capital segmentation to be noted is the classification of marketable securities into two categories -- variable working capital and excess working capital. While most other working capital assets have dual classifications, special emphasis on the marketable security classification is of particular importance to this study because of its concern with commercial paper, a significant money market security.

All excess working capital is assumed to consist of marketable securities and to be supported by long-term financing. However, some

<sup>7</sup>Supra, Table 3.5, p. 49.

portion of a firm's marketable security holdings is considered to provide precautionary liquidity. As such, this variable contingent is financed through short-term sources. Since the cost of acquiring short-term funds generally exceeds the expected yield from money market issues, a loss would be realized in the process of insuring an additional degree of liquidity. Because of this loss, precautionary investment in marketable securities would be minimized.

The third aspect of working capital segmentation of some import refers to the dynamic situation (Figure 4.2) where growth is assumed to occur in each area over some period of time. The direction or source of growth is the factor of interest.

The variable portion of working capital is the first to realize "real" growth over time. Figure 4.2 offers some differentiation between seasonal growth in variable working capital levels and "real," longterm growth. The short, erratic portion of the line signifies seasonal variations due to changes in expected cash flows. The size and frequency of wave is inversely related to the predictability of cash flows. The relatively smooth over-all trend line depicts real growth which arises primarily from two sources: (1) the general rate of inflation and (2) the over-all growth of the firm. As the costs per unit input of factors of production increase, total working capital requirements rise. Similarly, as the total productive effort expands (total dollar commitment on the one hand and gross cash outflow on the other), working capital support will, of necessity, grow larger.

Initially, management might not be sure what fraction of this new working capital requirement is to be permanent and what fraction is

to be temporary. Therefore, variable working capital and, hence, shortterm financing would expand. As new fixed levels of working capital requirements are recognized, more permanent financing would be negotiated. At this juncture, the level of variable working capital would diminish and fixed working capital would begin to rise and then stabilize.

Excess working capital levels are more likely to grow with some degree of stability relative to those of variable working capital and fixed working capital assets. This might be true because speculative demand for liquid funds is contingent upon perceived investment possibilities in the future. Therefore, the dollar size of speculative liquidity would grow as the dollar amount and numerical volume of investment alternatives expand. Growth in the latter would derive stimulus in whole or in part from some combination of three factors: (1) inflation, (2) technological advancement, and (3) development and growth of the general economy.

# III. WORKING CAPITAL MANAGEMENT AND THE COMMERCIAL PAPER MARKET

#### Introduction

The business enterprise becomes committed to purchase commercial paper instruments only after first going through a series of interrelated decisions. For example, the decision to invest some given fraction of total assets in the form of current assets; the decision to maintain a given level of liquid asset investment; and, finally, the decision to hold some portion of liquid assets in the form of marketable securities. While the commercial paper decision is an immediate

outgrowth of the latter consideration, the level of commercial paper held by a given enterprise will reflect some, if not all, of the above determinants. Similarly, the issuance of commercial paper by finance companies and by non-financial corporations reflects a multiple of considerations with respect to capital structures, term structures of debt, and short-term financing alternatives.

Therefore, the theoretical framework upon which working capital decisions are based also provides a logical foundation for rationalizing participation in the commercial paper market by a given enterprise or institutional sector. In fact, the commercial paper market may be viewed as a reflection of the recognition and acceptance of a portfolio of trade-offs between risk and profitability, which constitutes the essence of working capital management.

More specifically, a general rule of working capital management is that excess cash above some minimum level will be invested in marketable securities. But the decision to invest this excess cash involves not only the amount to invest but also the type of security in which to invest. In the final analysis, the choice of purchasing commercial paper versus an alternative money or capital market instrument centers on the risk-return trade-off with respect to each type of issue, as well as on the relative trade-off between alternatives. Default-risk and expected return are likely to be the two principal considerations.

Theoretically, then, management's preferences for marketable securities are assumed to be based upon a two-parameter utility function consisting of (1) the expected return from the investment and (2) the risk involved in holding it. The choice of a particular security will depend upon management's perception of the security's risk-return

relationship to alternative securities and to management's utility preferences, where utility is used to describe the ability of an asset to satisfy management's wants.<sup>8</sup> The general expectation is that utility will be an increasing function of return and a decreasing function of risk. Those securities offering risk-return combinations which maximize management's level of satisfaction will be chosen for purchase. The quantity of securities purchased will depend upon the cash management decision referenced earlier.

The supply of commercial paper involves a less direct dichotomy of risk and return. Default-risk is more apt to be a consideration relevant to the term structure of debt rather than to the specific choice among short-term debt alternatives. The possibility of default is not frequently altered by choice of short-term debt sources, assuming the alternative sources require similar maturity structures and issuance and maintenance costs. However, the cost minimization principle remains directly relevant because the least costly short-term source of funds is generally preferable when all other considerations are set aside.

#### Assumptions Concerning Collateral

#### Issues in the Theory of Finance

Two assumptions have been implied in the process of adopting a theoretical framework based upon working capital management. The first assumption involves the theory of asset choice and is most relevant to

<sup>&</sup>lt;sup>8</sup>For a good explanation of this concept as it relates to asset management, see Basil J. Moore, <u>An Introduction to the Theory of Finance</u>, (New York: The Free Press, 1968), pp. 35-40.

the demand side of the commercial paper market. The second assumption pertains to capital structure theory and, hence, to the supply of commercial paper. These assumptions will be discussed in order.

<u>The theory of asset selection</u>.<sup>9</sup> Portfolio theory deals with the selection of a specific asset combination and is concerned primarily with the task of portfolio analysis. To place this into correct perspective it is useful to think of portfolio choice as a three stage decision-making process.<sup>10</sup> First, one must analyze the alternative assets available with respect to risk and expected return, where investors are assumed to associate risk with the dispersion of the probability distribution of possible returns as measured by the standard deviation. Second, an analysis is required to determine the effect of various alternative asset combinations on the over-all risk and return format to the investor. At this stage risk of an individual security in a portfolio context depends not only upon the dispersion of its probability distribution of possible returns, but also upon the correlation of returns for that security with those for other assets in the portfolio. Therefore, an investor is assumed to be able to reduce the dispersion

<sup>&</sup>lt;sup>9</sup>While the literature is replete with discussions of portfolio theory, the most complete presentations of the essential elements are to be found in Eugene F. Fama and Merton H. Miller, <u>The Theory of Finance</u>, (New York: Holt, Rinehart and Winston, 1972); William H. Jean, <u>The Analytical Theory of Finance</u>, (New York: Holt, Rinehart and Winston, 1970); and William F. Sharpe, <u>Portfolio Theory and Capital Markets</u>, (New York: McGraw-Hill Book Company, 1970). For what is perhaps the most readable presentation, see Keith V. Smith, <u>Portfolio Management</u>, (New York: Holt, Rinehart and Winston, 1971).

<sup>&</sup>lt;sup>10</sup>William F. Sharpe, "Portfolio Analysis," <u>Journal of Financial</u> and Quantitative Analysis, II (June, 1967), 76-85.
of the probability distribution of possible returns relative to the expected value of return by diversifying into securities with less than perfect correlation with each other. Third, a single asset combination must be chosen which is compatible with the investor's risk-return preference characteristics.

The second stage of this three stage process encompasses what is perhaps the most important concept in portfolio theory -- the concept of diversification. The basic objective of portfolio management is to select that combination of assets which, through diversification, provides the highest possible level of returns conducive with the least possible degree of risk.

Accordingly, James C. Van Horne, recognizing the limitations in the use of diversification, suggests that the management of a firm's portfolio of marketable securities is considerably different from the management of a portfolio of common stock.<sup>11</sup>

While diversification of the short-term marketable security portfolio of a firm might be desirable, there is far less opportunity for such diversification than there is with a portfolio of common stocks. Diversification usually is defined as the reduction of the dispersion of possible returns from a portfolio relative to the expected return from the portfolio. This reduction is achieved by investing in securities not having high degrees of covariance among themselves. Unfortunately, there is a high degree of correlation in the price movements of money-market instruments over time. Consequently, they are ill-suited for purposes of diversification. As a result, the objective of most firms is to maximize overall return subject to maintaining sufficient liquidity to meet cash drains.<sup>12</sup>

<sup>11</sup>Van Horne, <u>op</u>. <u>cit</u>., p. 430.
<sup>12</sup><u>Ibid</u>.

Since money-market securities are viewed as being ill-suited for diversification, portfolio theory is assumed to be an improper framework upon which to base an empirical analysis of the commercial paper market.

<u>The optimum capital structure</u>.<sup>13</sup> An earlier reference to those factors which govern the issuance of commercial paper by an individual firm included consideration of the firm's capital structure. The conventional first step in the identification of an optimum financing pattern is to abstract financing sources down to two classes -- debt and equity. The optimal capital structure then is one in which the marginal real cost of debt and the marginal real cost of equity are the same. In theory, the firm should seek an optimal capital structure and finance future investment projects in those proportions.

Because a great deal of controversy has developed recently over the theoretical aspects of the capital structure decision and since the practical difficulties of estimating the implicit costs of nonequity financing continue to defy resolution, incorporation of capital structure theory into an analysis of the commercial paper market is assumed to be potentially inconsistent and, for the most part, inappropriate. The working capital decision is viewed as operating within the confines of a preconceived capital structure and the optimality of such a

<sup>&</sup>lt;sup>13</sup>For a good exposition, see Glen A. Mumey, <u>Theory of Financial</u> <u>Structure</u>, (New York: Holt, Rinehart and Winston, 1969). Critical reviews of alternative theories are also to be found in Myron J. Gordon, <u>The Investment, Financing and Valuation of the Corporation</u>, (Homewood, <u>III.: Richard D. Irwin, Inc., 1962</u>); Eugene M. Lerner and Willard T. Carleton, <u>A Theory of Financial Analysis</u>, (New York: Harcourt, Brace & World, Inc., 1966); and Ezra Solomon, <u>The Theory of Financial Management</u>, (New York: Columbia University, 1963).

structure is assumed to be beyond the scope of working capital management and, more specifically, the decision to finance with commercial paper instruments.<sup>14</sup>

#### Specification of Behavioral Hypotheses

This chapter has considered the underlying theory of working capital management as it relates to a study of the commercial paper market. By combining an awareness of recent developments within the commercial paper market with an understanding of these theoretical underpinnings, it is possible to suggest four broadly defined decision parameters which may govern both the supply of and demand for commercial paper: (1) the primary function of the market sector and the relationship between that function and the sector's working capital requirements; (2) the profit objectives of the market sector; (3) the risk preferences of the market sector; (4) the degree of certainty attached to funds flowing through the market sector.

These decision parameters, in turn, provide a general framework for composing an array of behavioral hypotheses. Such postulates will constitute the integral parts of a theory of the structure of the commercial paper market.

The supply of commercial paper. The supply of commercial paper is hypothesized to be:

 a function of the change in working capital requirements (flow levels) of a market sector as dictated by the primary function of the sector. The direction of relationship may vary by market sector.

<sup>14</sup>Van Horne, <u>op</u>. <u>cit</u>., p. 385.

- (2) a negative function of the cost of commercial paper.
- (3) a positive function of the cost of alternative sources of short-term funds.
- (4) a negative function of the degree of variation in internal funds flow of the market sector.

The demand for commercial paper. The demand for commercial

paper is hypothesized to be:

- a function of the change in working capital requirements (flow levels) of a market sector as dictated by the primary function of the sector. The direction of relationship may vary by market sector.
- (2) a positive function of the return on commercial paper.
- (3) a negative function of the return on alternative shortterm investments.
- (4) a positive function of the degree of variation in internal funds flow of the market sector.

Notice how the above postulates recognize the interdependencies which exist between working capital financing decisions and working capital investment decisions. For example, the uncertainty of funds flow reflects potential risk of technical insolvency, where the risk increases with increases in the degree of variation in funds flow. However, reaction to this variable is expected to differ between market sides. The supply of commercial paper is expected to decrease as the degree of variation in funds flow increases in an effort to reduce the perceived increase in risk. Longer term debt is expected to be preferable during such periods of uncertainty. On the other hand, demand for liquid assets, such as commercial paper, will increase under these circumstances because of the increased need for liquidity, assuming other relationships remain constant. Similar relationships are recognized to exist among the remaining variables listed above. The conceptual variables outlined in this chapter form a foundation from which structural models may be specified for each commercial paper sub-market. Accordingly, models will be developed and empirically tested within Chapter V.

#### CHAPTER V

### EMPIRICAL RESULTS

#### I. INTRODUCTION

This chapter begins with specification of the functional form of each equation to be estimated empirically. Then, after identifying specific data and data sources used within the test procedure, limitations are placed on the forthcoming estimates due to several common statistical problems. Lastly, the empirical results are presented in tabular form, with descriptive comment limited to highlights of the statistical content, rather than to behavioral implications. The final phase of any empirical research, that of interpreting the results and assessing their implications, will be undertaken in Chapter VI.

#### II. SPECIFICATION OF STATISTICAL MODELS

The implicit functional form used to express the causal relation between the dependent variable  $(Y_{kt})$  and the independent variables  $(Z_i)$ of each economic sector participating within the commercial paper market may be written as:

$$Y_{kt} = f(Z_1, Z_2, Z_3, Z_4)$$
(5.1)  
k = 1,2,3...n and t = 1,2,3...T

where n equals number of economic sectors and T equals number of periods. The dependent variable  $(Y_{kt})$  represents quantity of commercial paper

supplied or demanded by a specific economic or market sector operating within a given commercial paper sub-market. The independent variables represent, in turn, measures of working capital requirements (financial condition)  $(Z_1)$ ; levels of profitability (cost) offered on commercial paper instruments  $(Z_2)$ ; levels of profitability (cost) offered on alternatives to commercial paper instruments  $(Z_3)$ ; and degrees of financial risk  $(Z_4)$ .

The explicit functional form required for estimation purposes varied according to market sector. Ideally, theory specifies unambiguously which functional form to choose. Unfortunately, only rarely is there basis for expecting a particular mathematical relationship, particularly in the social sciences,<sup>1</sup> which can be expressed in a given type of equation. Under these circumstances, functional forms other than linear equations must be considered.<sup>2</sup>

A three stage procedure was used in this study for determining the appropriate functional form. In stage one, data plottings were performed, where each independent variable was related to the appropriate dependent variable in a progressive fashion.<sup>3</sup> Stage two included regression of the several alternative functional forms partially dictated by the data plottings and performing the necessary adjustments for

<sup>&</sup>lt;sup>1</sup>Mordecai Ezekiel and Karl A. Fox, <u>Methods of Correlation and</u> <u>Regression Analysis</u>, (New York: John Wiley & Sons, Inc., 1959), p. 80.

<sup>&</sup>lt;sup>2</sup>Potluri Rao and Roger LeRoy Miller, <u>Applied Econometrics</u>, (Belmont, California: Wadsworth Publishing Company, 1971), p. 106.

<sup>&</sup>lt;sup>3</sup>For different types of equations and the practical procedures for fitting curves, see Ezekiel and Fox, <u>op</u>. <u>cit</u>., pp. 70-101.

comparability.<sup>4</sup> The final stage was to choose the functional form yielding the minimum residual sum of squares as the empirically appropriate functional form for a given market sector.<sup>5</sup>

The statistical models found to be most appropriate for each market sector are presented on the immediately following pages, according to sub-market.

The Direct Market

$$\ln Y_1 = a_1 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + e_1$$
(5.2)

$$\ln Y_2 = a_2 + b_5 X_5 + b_6 \ln X_2 + b_7 X_6 + b_8 X_7 + e_2$$
(5.3)

$$Y_{3} = a_{3} + b_{9}X_{8} + b_{10}X_{2} + b_{11}X_{6} + b_{12}X_{9} + e_{3}$$
(5.4)

$$\ln Y_4 = a_4 + b_{13}X_{10} + b_{14} \ln X_2 + b_{15}X_6 + b_{16}X_{11} + e_4$$
(5.5)

which represent finance company supplied commercial paper (5.2), commercial paper held by non-financial corporations (5.3), by commercial banks (5.4), and by life insurance companies (5.5).

## The Dealer Market

$$\ln Y_{5} = a_{5} + b_{17}X_{1} + b_{18}X_{12} + b_{19}X_{3} + b_{20}X_{4} + e_{5}$$
(5.6)

$$\ln Y_{6} = a_{6} + b_{21}X_{13} + b_{22} \ln X_{12} + b_{23}X_{3} + b_{24}X_{7} + e_{6}$$
(5.7)

<sup>&</sup>lt;sup>4</sup>For a good discussion of the procedure for comparing two regression equations with different dependent variables, see Rao and Miller, <u>op. cit.</u>, pp. 108-111.

$$\ln Y_7 = a_7 + b_{25}X_5 + b_{26} \ln X_{12} + b_{27}X_6 + b_{28}X_7 + e_7$$
(5.8)

$$Y_8 = a_8 + b_{29}X_8 + b_{30}X_{12} + b_{31}X_6 + b_{32}X_9 + e_8$$
(5.9)

$$\ln Y_9 = a_9 + b_{33}X_{14} + b_{34}X_{12} + b_{35}X_6 + b_{36}X_{15} + e_9$$
(5.10)

which represent finance company supplied commercial paper (5.6), nonfinancial corporation supplied commercial paper (5.7), commercial paper held by non-financial corporations (5.8), by commercial banks (5.9), and by open-end investment companies (5.10); and where:

- Y<sub>1</sub> = dollar level of directly placed commercia! paper issued by finance companies.
- Y<sub>2</sub> = dollar level of directly placed commercial paper held by non-financial corporations.
- Y<sub>3</sub> = dollar level of directly placed commercial paper held by commercial banks.
- Y<sub>4</sub> = dollar level of directly placed commercial paper held by life insurance companies.
- $Y_5$  = dollar level of dealer placed commercial paper issued by finance companies.
- Y<sub>6</sub> = dollar level of dealer placed commercial paper issued by non-financial corporations.
- Y<sub>7</sub> = dollar level of dealer placed commercial paper held by non-financial corporations.
- Y<sub>8</sub> = dollar level of dealer placed commercial paper held by commercial banks.
- Y<sub>9</sub> = dollar level of dealer placed commercial paper held by open-end investment companies.

and:

$$X_1$$
 = dollar level of finance company total financial assets.

- X<sub>2</sub> = average rate per quarter on directly placed commercial paper, 3 to 6 months.
- X<sub>3</sub> = average rate per quarter on short-term business loans of New York City banks.
- X<sub>4</sub> = dollar level of consumer installment credit repaid to finance companies, expressed as the number of standard deviations from a mean level based on the observation period.
- X<sub>5</sub> = dollar level of non-financial corporation total current liabilities.
- $X_{c}$  = average rate per quarter on treasury bills, 3 months.
- X<sub>7</sub> = dollar level of gross internal fund flows to non-financial corporations, expressed as the number of standard deviations from a mean level based on the observation period.
- $X_{g}$  = dollar level of country member bank loans outstanding.
- X<sub>9</sub> = dollar level of country member bank demand deposits, expressed as the number of standard deviations from a mean level based on the observation period.
- X<sub>10</sub> = dollar level of life insurance company payments to policyholders and beneficiaries in the United States.
- X<sub>11</sub> = dollar level of total life insurance premiums collected by life insurance companies, expressed as the number of standard deviations from a mean level based on the observation period.
- $X_{12}$  = average rate per quarter on dealer placed paper, 4 to 6 months.
- X<sub>13</sub> = dollar level of non-financial corporation total financial assets.
- X<sub>14</sub> = dollar level of open-end investment company total financial assets net of new share issues.
- X<sub>15</sub> = dollar level of net share issues by open-end investment companies, expressed as the number of standard deviations from a mean level based on the observation period.

and:

e<sub>i</sub> = error terms.

 $b_i$  = regression parameters, interpreted as the partial derivatives of  $Y_{kt}$  with respect to  $X_i$ .

ln = natural log.

### III. DATA AND SOURCES

#### Nature of Data

The data used in this study are quarterly time series between the first quarter of 1955 and the fourth quarter of 1968, a total of 56 observations. The major data series are presented in the appendix to the study.

#### Sources of Data

Three sources provided all the data required for testing the behavioral hypothesis outlined earlier. The Federal Reserve System supplied necessary unpublished information for measuring all the dependent variables  $(Y_{kt})$  and many of the independent variables  $(X_i)$ , including  $X_1$ ,  $X_5$ ,  $X_7$ ,  $X_{13}$ , and  $X_{15}$ .<sup>6</sup>

The independent variables  $X_2$ ,  $X_3$ ,  $X_6$ ,  $X_8$ ,  $X_9$ , and  $X_{12}$  were developed from published accounts of the <u>Federal Reserve Bulletin</u>. All measures of remaining variables ( $X_4$ ,  $X_{10}$ ,  $X_{11}$ , and  $X_{14}$ ) were extracted from various monthly issues of the Department of Commerce's <u>Survey of</u> Current Business.

<sup>&</sup>lt;sup>6</sup>A number of unpublished flow-of-funds series from the Federal Reserve's <u>Flow of Funds Accounts</u> were made available for the present study through the courtesy of Stephen Taylor, Chief, Flow of Funds and Savings Section.

#### Uses of Data

<u>Measures of working capital requirements</u>. The variables  $X_1$ ,  $X_5$ ,  $X_8$ ,  $X_{10}$ ,  $X_{13}$ , and  $X_{14}$  were used to represent working capital requirements of the various market sectors. That is, the ability of finance companies and non-financial corporations to absorb more short-term debt was assumed to be directly related to the level of their liquid assets (current assets - inventories), as measured by  $X_1$  and  $X_{13}$ , respectively. An increase in liquid assets would permit more short-term debt from a risk standpoint, and would suggest greater use of the less costly shortterm funds from a profitability point of view.

Measuring the working capital requirements of market sectors operating on the demand side of the two sub-markets was not so straightforward. This was true because of the varied operations of the four sectors involved. Non-financial corporations were assumed to prefer more commercial paper as the level of current liabilities increased. The reasoning was similar to that just discussed. An increase in current obligations, <u>ceteris paribus</u>, increases risk of technical insolvency, thus pressing the need for an increase in liquid assets. Similarly, the lower cost short-term source of funds may permit a build-up of liquid assets without measurably affecting over-all profitability of the firm.

Life insurance companies are assumed to react in a similar fashion with respect to their current liabilities. However, meaningful measures of life insurance company current obligations are not readily available. Most published information reflects insurance "reserve" accounts which are not synonymous with the concept of current obligations

as used here. The measure chosen to represent life insurance company working capital requirements, then, was payments to policyholders  $(X_{10})$ , which adequately satisfies the need for an available proxy with frequent and consistent observations over a long period of time. However,  $X_{10}$ represents a peculiar flow concept. Hence, interpretation of the relationship must be adjusted. Payment reflects an outflow and, simultaneously, a reduction in current obligations. An increase in payments, then, would likely have two effects: (1) liquid assets would be absorbed in the payment process and (2) risk of technical insolvency would be reduced permitting a lower liquid reserve requirement. An inverse relationship is therefore assumed to be appropriate given  $X_{10}$  as a measure of life insurance company working capital requirements.

Commercial banks are assumed to adjust their short-term investments to changes in bank loan opportunities. The investment philosophy of commercial bank management was described in Chapter III at some length and need not be reiterated here. However, a point worth reemphasizing is that working capital loans offer commercial banks the greater profit potential and are on a higher priority plane than money market instruments. Therefore, as bank loan opportunities expand, bank willingness to invest in money market instruments is assumed to diminish. Since earlier researchers have found that country member banks, more than any other type of bank, operate in the commercial paper markets,  $X_8$  represents country member bank loans outstanding as a measure of commercial bank working capital requirements.

Lastly,  $X_{14}$  represents the working capital requirements of openend investment companies. The current obligations of open-end investment companies are twofold: (1) to make continuous but timely investments in

the money and capital markets (primarily the latter) and (2) to refund outstanding shares on request. The magnitude of open-end investment company liquidity requirements is best viewed net of new share issues, since the volume of such issues is likely to depend on how well the sector performs with a given level of assets. Because virtually all open-end investment company assets are financial assets, changes in the level of net total financial assets are assumed to demonstrate changes in working capital needs. An increase in this level suggests a greater over-all need for liquid assets in anticipation of profit taking by prior investors and as a temporary absorption of recently received investment funds.

<u>Measures of cost and profitability</u>. Suppliers of commercial paper are assumed to have at least three rational alternatives when financing working capital requirements: (1) the use of some form of commercial paper, (2) the use of bank credit, and (3) some combination of (1) and (2). Variables  $X_2$ ,  $X_3$ , and  $X_{12}$  measure the cost of directly placed commercial paper, dealer placed commercial paper, and short-term bank credit, respectively. These costs are simply those reported by finance companies, dealers, and banks, and are averages of daily offering rates adjusted to quarterly figures. The bank rates used were those reported by New York City banks, since paper issuers are assumed to be large institutions having working capital requirements too great to be supported by banks of smaller communities. The transactions cost appropriate to a specific sector are not explicitly computed. These measures are similar to those used by earlier researchers of the commercial paper

market.<sup>7</sup> A market sector is assumed to prefer the lower cost source of funds, <u>ceteris paribus</u>, and is assumed to adjust to changes accordingly.

Those market sectors interested in commercial paper as a shortterm investment are expected to seek the most profitable alternative available within their respective frames of reference. Variables  $X_2$ ,  $X_6$ , and  $X_{12}$  measure those alternatives, where  $X_6$  reflects the noncommercial paper instrument (treasury bills). The rate on new issues was used because the commercial paper alternative is not sold in a secondary market and therefore always competes as a new issue.

<u>Measures of financial risk</u>. When the cash flows of a market sector are uncertain, as is most often the case in the real world, the possibility of technical insolvency is enhanced, other considerations remaining unchanged. And the greater the dispersion of the probability distribution of possible net cash flows, the greater the margin of safety that a given management team will likely wish to provide. Hence, suppliers of commercial paper instruments are assumed to reduce such issues during periods of high cash flow variance, and increase their use of short-term credit when cash flows approach "normal." This is expected because of the higher risk involved with short-term financing.

On the other hand, buyers of commercial paper instruments move toward liquid assets during periods of high cash flow variance to build up margins of safety and, hence, reduce their risk of technical insolvency.

<sup>7</sup>For example, see Joss, <u>op</u>. <u>cit</u>., p. 96.

The measure of cash flow variance used in this study was the standard unit, which is the number of standard deviations a given observation lies from a mean of the observed data.<sup>8</sup> The higher the standard unit, the greater the variance from normal expectations.

Ideally, gross internal cash flows would be used as a basis for determining standard units within each market sector. However, such information was available only for the non-financial corporate sector  $(X_7)$ . Since consumer installment credit accounts for the majority of finance company investments (see Chapter III), the account of such credit repaid  $(X_4)$  was assumed to be a fairly consistent indicator of the level of internal cash flows for this market sector during the period under study. Similarly, the level of life insurance premiums collected  $(X_{11})$  were used to reflect cash flows entering the life insurance sector, and the amount of net shares issues  $(X_{15})$  by open-end investment companies was assumed to account for the majority of funds flowing through the open-end investment company sector. The latter assumption is based on the findings of previous studies which suggest that growth in open-end investment companies hinges on the ability of such entities to continuously issue more new shares than they redeem.<sup>9</sup> The measure used to represent inflows of cash to commercial banks was demand deposit levels  $(X_0)$ . It was difficult to justify the use of any other measure given the nature of published data available.

<sup>8</sup>Refer to most any text on elementary statistics for a discussion of the standard unit as a measure of relative variance. For example, see J. E. Freund, <u>Statistics: A First Course</u>, (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1970), p. 183.

<sup>&</sup>lt;sup>9</sup>See H. E. Dougall, <u>Capital Markets and Institutions</u>, (2nd ed.; Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1970), p. 82.

#### IV. STATISTICAL PROBLEMS AND QUALIFICATIONS

One assumption of the classical linear regression model is that there are no exact linear relations holding among the observed values of the regressors. In practice an exact linear relationship is highly improbable, but the general interdependence of economic phenomena may easily result in the appearance of approximate linear relationships in time series of regressors. This phenomena is known as multicollinearity or intercorrelation.

Similarly, models fitted to economic time series data almost always evidence some degree of stochastic dependence between successive values of the error term  $(e_i)$ . When the effects due to particular chance disturbances, omitted variables, or methods of data collection and reporting tend to persist through several data collection periods, another of the basic assumptions of the classical linear regression model has been violated and autocorrelation is said to be evident.

Simultaneous occurrence of these two common regression problems, which would seem to be inevitable given time-series analysis, introduces an interesting dichotomy with respect to interpretation of empirical results. Multicollinearity may produce <u>large</u> standard errors of the coefficients such that while the  $R^2$  may be very high, no coefficient tests to be significantly different from zero. Autocorrelation, on the other hand, tends to produce standard errors of the coefficients which are <u>underestimates</u> and disposes the researcher to accept too frequently the hypothesis that a given coefficient is significantly different from zero. When combined, one error may or may not dampen the effects of the other error. In the final analysis, the investigator is faced with a series of decision problems.

First, theoretical considerations suggest that all relevant variables be included in the empirical model. Omission of any one variable may lead to specification bias. But when high correlation between two or more sets of independent variables is evident (a sufficient but not necessary condition for the existence of multicollinearity), the standard errors of one or more of the variables included in the model may be exaggerated.<sup>10</sup>

On the other hand, the problem of multicollinearity does not usually arise when large samples are used unless the relationship between a set of independent variables is fixed in the sense that one variable will not logically exist without the other. Since high correlation between variables does not require this "fixed" relationship, a researcher should not use simple correlation as a basis for ruling out estimation of any regression equation.<sup>11</sup> What the researcher can do, and what is recommended by many practitioners, is test for the effects of multicollinearity as new variables enter the regression equation. Approaching the problem in this manner requires acceptance of some decision criteria <u>a priori</u> because the possibilities for misinterpreting the test results are limited only by the researcher's imagination. At least two such decision criteria are available from contemporary econometric literature: (1) maximization of an R<sup>2</sup> which is adjusted for degrees of freedom, and (2) maximization of the equation's F value.<sup>12</sup> Any detailed

 $<sup>^{10}{\</sup>rm For}$  a good explanation of the reason for this phenomena, refer to Rao and Miller, <u>op</u>. <u>cit</u>., pp. 48-52.

<sup>&</sup>lt;sup>11</sup>Ibid.

<sup>&</sup>lt;sup>12</sup>For particularly succinct discussions of these two approaches to the multicollinearity problem, see Aigner, <u>Basic Econometrics</u>, pp. 97-99; and Rao and Miller, <u>Applied Econometrics</u>, pp. 49-50.

discussion of these two parameters is beyond the scope of this study. However, the basis for each criteria is the minimization of the equation's error of estimation. Standard step-wise regression analysis (STRAP) provides for these tests.<sup>13</sup>

Since each of the nine models discussed in this chapter contained high simple correlation between one or more sets of independent variables, the step-wise procedure was undertaken to test for possible effects of multicollinearity. Results of these tests are not illustrated here since the purpose of their use was simply to determine the extent to which general interpretation of any one model might be affected from these results. No one estimator changed significants, although in most instances, those variables which were insignificant at the stated confidence level did reduce over-all efficiency of the model. These results will be referenced as the empirical results of each equation are discussed.

Evidence of autocorrelation presents a different type of problem. The Durbin-Watson statistic,<sup>14</sup> a commonly used criteria for recognizing the existence of autocorrelation, was computed for each regression model. The hypothesis of autocorrelation could not be rejected for five of the nine equations tested. However, several outliers or extreme observations were found to be evident within the residuals of each regression result. Some authors suggest that under these circumstances the

<sup>&</sup>lt;sup>13</sup>Step-wise regression analysis is presented in detail in Norman Draper and Harry Smith, <u>Applied Regression Analysis</u>, (New York: John Wiley & Sons, Inc., 1966), pp. 171-172 and pp. 178-195.

<sup>&</sup>lt;sup>14</sup>J. Durbin and G. S. Watson, "Testing for Serial Correlation in Least Squares Regression II," <u>Biometrika</u>, XXXVIII (June, 1951), 159-178.

Durbin-Watson statistic may lead the researcher to incorrectly (and indirectly) accept the hypothesis of first order autocorrelation.  $^{15}$ 

A frequently used approach to correcting for the problem of autocorrelation is to base regression estimators on first-difference transformations. However, employment of this technique may be hazardous. It has been shown that a substantial amount of precision can be gained by resisting the temptation to estimate parameters from the first-difference estimate, particularly when the independent variables have high autocorrelation, which is generally the case with economic time-series data and which is assumed to be the case in this study.<sup>16</sup>

The existence of multicollinearity and autocorrelation and the implications of their presents were recognized in this study. However, all notions to eliminate or reduce the problem through data transformation or any other manipulation of the empirical models were repressed. The potential detrimental effects of erroneously adjusting for autocorrelation or of eliminating variables because of multicollinearity far outweighed any perceived merit in experimentation.

## V. THE DIRECT MARKET FOR COMMERCIAL PAPER

Tables 5.1 through 5.4 illustrate the results of ordinary least squares analysis (OLS) of all supply and demand equations for the direct paper market. The format of these tables is consistent throughout the present chapter. The first five columns of the first row of each table contain estimated coefficients of the independent variables entering a

<sup>&</sup>lt;sup>15</sup>Rao and Miller, <u>op</u>. <u>cit</u>., p. 123.
<sup>16</sup><u>Ibid</u>., p. 75.

given equation. The remaining columns of the first row in each table reflect the equation's coefficient of determination  $(R^2)$ , the overall F value, the Durbin-Watson statistic (d), and those coefficients having t values below a stated level of significance.

The second row of each table contains the t value for each coefficient while the last row of each table indicates the <u>a priori</u> signs of the coefficients as hypothesized in Chapter IV.

## Supply Estimations

<u>Finance companies</u>. Estimation results for the supply of commercial paper placed directly by finance companies are shown in Table 5.1. This structural equation represents a reasonably good abstraction of the finance company market sector based upon the high  $R^2$  (.98), the high degree of significance demonstrated by three of the four independent variables entered into the equation ( $X_1$ ,  $X_2$ , and  $X_3$ ), and the theoretically correct signs of each variable.

The only non-significant variable in the equation was  $X_4$ , which measured the financial risk position of finance companies. Although the coefficient fell below the .05 level of significance, the sign was theoretically correct. The insignificance of this risk variable was most

## ORDINARY LEAST SQUARE ESTIMATE OF THE SUPPLY OF DIRECTLY PLACED COMMERCIAL PAPER BY FINANCE COMPANIES, BASED ON THE DATA PERIOD 1955-1968 INCLUSIVE (Dependent Variable: ln Y<sub>1</sub>)

	Constant	x <sub>1</sub>	Independen <sup>*</sup> 2	t Variable X <sub>3</sub>	X <sub>4</sub>	R <sup>2</sup>	F*	d	t  < 1.68*
Regression Coefficient	9103	+.0635	1055	+.1885	0559	.98	649	1.56	X <sub>4</sub>
t Value		(6.20)	(-3.39)	(3.20)	(35)				
<u>a priori</u> Sign of Coefficient		+	-	+	-				

\* An estimation based on 4 variables and 56 observations with F > 3.73 is significant at the .01 confidence level.

likely due to statistical error rather than to specification inappropriateness, where statistical error is assumed to contain measurement rather than theoretical problems.<sup>17</sup>

### Demand Estimations

<u>Non-financial corporations</u>. Table 5.2 illustrates the empirical results of equation (5.3). The attractive .92  $R^2$  value was supported by the fact that all four variables had the appropriate signs and three of the four had statistically significant coefficients. The commercial paper rate variable was the only variable with an insignificant regression coefficient.<sup>18</sup>

<u>Commercial banks</u>. Variations in the quantity of directly placed commercial paper demanded by commercial banks was at least partially explained by equation (5.4). An  $R^2$  of .51 was somewhat disappointing (Table 5.3) but significant at the .01 level of confidence nevertheless. All variables demonstrated correct signs and X<sub>8</sub> had the only t value below 1.68.<sup>19</sup>

 $^{18}$ The correlation between commercial paper rates on direct paper (X<sub>2</sub>) and treasury bill rates (X<sub>6</sub>) was relatively high (r=.97). STRAP rejected X<sub>2</sub> at an F level of .05 without measurably changing either the equation's R<sup>2</sup> or the coefficients of the included variables.

<sup>19</sup>STRAP accepted all variables at an F level of .05 even though several variables demonstrated high degrees of intercorrelation.

 $<sup>^{17}\</sup>text{A}$  step-wise regression analysis program (STRAP) was applied using the same four independent variables in a test for effects of multi-collinearity. Variable X\_4 did not enter the equation at an F level of .05 and omission of this variable did not significantly change either the equation's R<sup>2</sup> or the coefficients of the included variables. Since the correlation between X\_1 and X\_4 was relatively high (r=.98), inclusion of only X\_1 suggests that the effects of multicollinearity significantly reduces the precision of an equation including both variables X\_1 and X\_4. For a discussion of the latter point, see Aigner, <u>op. cit.</u>, pp. 92-99.

## ORDINARY LEAST SQUARE ESTIMATE OF THE DEMAND FOR DIRECTLY PLACED COMMERCIAL PAPER BY NON-FINANCIAL CORPORATIONS, BASED ON THE DATA PERIOD 1955-1968 INCLUSIVE (Dependent Variable: ln Y<sub>2</sub>)

	Constant	X <sub>5</sub>	Independen In X <sub>2</sub>	t Variable <sup>X</sup> 6	X7	R <sup>2</sup>	F*	d	t  < 1.68*
Regression Coefficient	0017	+.0083	+.4638	3030	+.5029	.92	152	.92	×2
t Value		(3.52)	(1.23)	(-2.23)	(4.87)				
<u>a priori</u> Sign of Cœfficient		+	+	-	+				

\* An estimation based on 4 variables and 56 observations with F > 3.73 is significant at the .01 confidence level.

TABLE	5.	3
-------	----	---

## ORDINARY LEAST SQUARE ESTIMATE OF THE DEMAND FOR DIRECTLY PLACED COMMERCIAL PAPER BY COMMERCIAL BANKS, BASED ON THE DATA PERIOD 1955-1968 INCLUSIVE (Dependent Variable: Y<sub>3</sub>)

	Independent Variable								
	Constant	×8	×2	× <sub>6</sub>	X9	R <sup>2</sup>	F*	d	t  < 1.68*
Regression Coefficient	+3.6083	0842	+1.4751	-1.3293	+1.6418	.51	14	.84	x <sub>8</sub>
t Value		(-1.65)	(3.58)	(-3.08)	(1.86)				
<u>a priori</u> Sign of Coefficient		-	+	-	+				

\* An estimation based on 4 variables and 56 observations with F > 3.73 is significant at the .01 confidence level.

\*\* Variables with |t| > 1.68 have regression coefficients which are significantly different from zero at the .05 confidence level.

,

<u>Life insurance companies</u>. The results of equation (5.5) are shown in Table 5.4. Each variable entered the equation with a high degree of significance and with appropriate signs.

VI. THE DEALER MARKET FOR COMMERCIAL PAPER

Tables 5.5 through 5.9 present the results of OLS estimates of each supply and demand equation for the dealer paper market. The format of these tables is identical to that used for illustration of direct market results.

#### Supply Estimations

<u>Finance companies</u>. Equation 5.6 is shown to be a reasonably good estimator of finance company supply habits with respect to dealer placed commercial paper (see Table 5.5). Although the  $R^2$  of .94 was slightly lower than that obtained in the direct market, all variables had correct signs and were easily significant at the .05 level.

<u>Non-financial corporations</u>. Equation (5.7) (Table 5.6) explained approximately 92 per cent of the variation in commercial paper placed through dealers by non-financial corporations during the 1955-1968 period. Each coefficient was significant at the .05 level and all signs agreed with <u>a priori</u> hypothesis outlined in Chapter IV.

### Demand Estimations

<u>Non-financial corporations</u>. Table 5.7 shows the results of estimating demand for dealer paper by non-financial corporations using equation (5.8). Working capital requirements  $(X_5)$  and treasury bill rates  $(X_6)$  were both significant explanators of demand variance.

## ORDINARY LEAST SQUARE ESTIMATE OF THE DEMAND FOR DIRECTLY PLACED COMMERCIAL PAPER BY LIFE INSURANCE COMPANIES, BASED ON THE DATA PERIOD 1955-1968 INCLUSIVE (Dependent Variable: $\ln Y_A$ )

	Cons tant	x <sub>10</sub>	Independent In X <sub>2</sub>	Variable X <sub>6</sub>	XII	R <sup>2</sup>	F*	d	t  < 1.68*
Regression Coefficent	+1.3177	-2.2746	+1.5655	8055	+1.4679	.72	34	1.64	
t Value		(-2.73)	(2.41)	(-3.64)	(5.97)				
<u>a priori</u> Sign of Coefficient		-	+	-	+				

\* An estimation based on 4 variables and 56 observations with F > 3.73 is significant at the .01 confidence level.

## ORDINARY LEAST SQUARE ESTIMATE OF THE SUPPLY OF DEALER PLACED COMMERCIAL PAPER BY FINANCE COMPANIES, BASED ON THE DATA PERIOD 1955-1968 INCLUSIVE (Dependent Variable: 1n Y<sub>5</sub>)

		I	ndependent						
	Constant	x <sub>1</sub>	× <sub>12</sub>	×3	×4	R <sup>2</sup>	F*	d	t  < 1.68*
Regression Coefficient	-4.9166	+.1136	4913	+.6580	5508	.94	208	.73	
t Value		(5,57)	(-7.49)	(5.38)	(-1.72)				
<u>a priori</u> Sign of Coefficient		+	-	+	-				

\* An estimation based on 4 variables and 56 observations with F > 3.73 is significant at the .01 confidence level.

## ORDINARY LEAST SQUARE ESTIMATE OF THE SUPPLY OF DEALER PLACED COMMERCIAL PAPER BY NON-FINANCIAL CORPORATIONS, BASED ON THE DATA PERIOD 1955-1968 INCLUSIVE (Dependent Variable: ln Y<sub>6</sub>)

	Constant	×13	Independent ln X <sub>12</sub>	Variable <sup>X</sup> 3	X7	R <sup>2</sup>	F*	d	t  < 1.68*
Regression Coefficient	-4.6817	+.0176	-1.6239	+.5246	3867	.92	152	. 76	
t Value		(6.15)	(-6.93)	(4.16)	(-2.55)				
<u>a priori</u> Sign of Coefficient		+	-	+	-				

\* An estimation based on 4 variables and 56 observations with F > 3.73 is significant at the .01 confidence level.

### ORDINARY LEAST SQUARE ESTIMATE OF THE DEMAND FOR DEALER PLACED COMMERCIAL PAPER BY NON-FINANCIAL CORPORATIONS, BASED ON THE DATA PERIOD 1955-1968 INCLUSIVE (Dependent Variable: 1n Y<sub>7</sub>)

	Constant	и Х <sub>5</sub>	ndependent In X <sub>12</sub>	Variable X <sub>6</sub>	X <sub>7</sub>	R <sup>2</sup>	F*	d	t  < 1.68*
Regression Coefficient	-7.4161	+.0135	+.4647	6738	4633	.85	70	1.20	× <sub>12</sub>
t Value		(6.97)	(0.58)	(-2,56)	(-1.76)				
<u>a priori</u> Sign of Coefficient		+	+	-	+(?)				

\* An estimation based on 4 variables and 56 observations with F > 3.73 is significant at the .01 confidence level.

However, the commercial paper rate coefficient failed the test of significance while the financial risk variable  $(X_7)$  was significant but carried an inappropriate sign. Results of the own rate estimator were consistent with those realized from the non-financial corporate direct market model. However, the risk variable was both significant and correctly signed in that market. The significance of this divergence in behavior by a market sector between sub-markets will be discussed in Chapter VI.

<u>Commercial banks</u>. Equation (5.9) explained 91 per cent of the variance in demand for dealer paper by commercial banks. All variables were significant at any level (see Table 5.8) and each variable carried the correct sign.

<u>Open-end investment companies</u>. Table 5.9 illustrates the results of estimating the demand for dealer paper by open-end investment institutions using equation (5.10). Only one variable, working capital requirements ( $X_{14}$ ), was found to be significant although all variables demonstrated theoretically correct signs.

These results will be analyzed in the final chapter and related to the institutional environment of each market sector as well as to the commercial paper market in general. A brief outline of alternative elasticity coefficient derivations is provided before proceeding to the final chapter because of the concept's usefulness in analyzing empirical results.

## ORDINARY LEAST SQUARE ESTIMATE OF THE DEMAND FOR DEALER PLACED COMMERCIAL PAPER BY COMMERCIAL BANKS, BASED ON THE DATA PERIOD 1955-1968 INCLUSIVE (Dependent Variable: Y<sub>8</sub>)

		Ir							
	Constant	× <sub>8</sub>	×12	× <sub>6</sub>	X <sub>9</sub>	R <sup>2</sup>	F*	d	t  < 1.68*
Regression Coefficient	+5.5996	0887	+.4670	6972	+2.4242	.91	134	. 89	
t Value		(-3.47)	(2,68)	(-3.84)	(5.44)				
<u>a priori</u> Sign of Coefficient		-	+	-	+				

\* An estimation based on 4 variables and 56 observations with F > 3.73 is significant at the .01 confidence level.

## ORDINARY LEAST SQUARE ESTIMATE OF THE DEMAND FOR DEALER PLACED COMMERCIAL PAPER BY OPEN-END INVESTMENT COMPANIES, BASED ON THE DATA PERIOD 1955-1968 INCLUSIVE (Dependent Variable: ln Y<sub>Q</sub>)

		I	ndependent	2					
	Constant	× <sub>14</sub>	x <sub>12</sub>	Х <sub>б</sub>	×15	R <sup>2</sup>	F*	d	t  < 1.68*
Regression Coefficient	-3.3788	+.0473	+.5475	4555	+.1517	•55	16	2.02	x <sub>12</sub> , x <sub>6</sub> , x <sub>15</sub>
t Value		(2.33)	(.85)	(-,70)	(.81)				^15
<u>a priori</u> Sign of Coefficient		+	+	-	+				

\* An estimation based on 4 variables and 56 observations with F > 3.73 is significant at the .01 confidence level.

\*\* Variables with |t| > 1.68 have regression coefficients which are significantly different from zero at the .05 confidence level.

# VII. DERIVATION OF ELASTICITY COEFFICIENTS<sup>20</sup>

Consider the explicit functional form:

$$Y = a + bX$$
 (5.11)

where elasticity of the function with respect to variable X is the ratio of the proportional change in Y to the proportional change in X:

$$n_{0} = \frac{dY/Y}{dX/X} = dY/dX \cdot X/Y$$
 (5.12)

In this instance, since

$$dY/dX = b \tag{5.13}$$

then

$$n_1 = b \cdot X/Y \tag{5.14}$$

where  $n_1$ , the elasticity coefficient, is independent of the units in which the variables are measured. This is true because elasticity is defined here in terms of proportional changes.

When the logarithmic derivative of a function is being considered, the procedure for derivation of the elasticity of the function must be modified. For example, the explicit form:

$$\ln Y = a + bX$$
 (5.15)

has an elasticity coefficient with respect to variable X which is dependent upon unit changes in X. This can be shown as:

$$d/dX$$
 (ln Y) =  $d/dX$  (a +bX) (5.16)

<sup>&</sup>lt;sup>20</sup>For a good discussion of the theoretical implications of elasticity, see James E. Hibdon, <u>Price and Welfare Theory</u> (New York: McGraw-Hill Book Company, 1969), pp. 24-32. For more detail on the mathematical derivation of the concept, see Jean Draper and Jan Klingman, <u>Mathematical</u> <u>Analysis</u> (New York: Harper & Row, Publishers, Inc., 1967), pp. 223-234.

$$1/Y \cdot dY/dX = b$$
 (5.17)

therefore

and

$$dY/dX = bY$$
(5.18)

recalling equation (5.12) and substituting equation (5.18) the elasticity coefficient becomes:

$$n_2 = bY \cdot X/Y \tag{5.19}$$

so that

$$n_2 = bX$$
 (5.20)

A third explicit functional form requiring a dissimilar derivation procedure of elasticity with respect to X is:

$$\ln Y = a + b \ln X$$
 (5.21)

Equation (5.21) describes a log-linear relationship wherein the ratio of the logarithmic derivative of Y to the logarithmic derivative of X determines the elasticity of the function. That is:

$$\frac{d \ln Y}{d \ln X} = b \tag{5.22}$$

such that the estimated coefficient (b) provides a direct measure of elasticity. Each of the three functional forms described above was used in this study.

#### CHAPTER VI

## SUMMARY AND CONCLUSIONS

### I. INTRODUCTION

The commercial paper market has been growing both in size and complexity at a rapid rate, particularly since 1960. This study has reviewed and analyzed these developments from two standpoints. The total market was first divided into two sub-markets (direct and dealer). Then each sub-market was, in turn, analyzed by market sector. The trends and general behavior of each market sector were considered individually and as a member of a sub-market. This analytical approach was meant to aid in the development of empirical models which would most appropriately explain the behavior of each market sector. Previous studies had grouped market sectors together thus hiding any heterogeneity of behavior within a given sub-market. Consequently, the true nature and complexity of each sub-market may have been concealed from those prescribing policies which influence money market activity.

After completing this first stage of investigation, and upon acceptance of a logical theoretical framework, empirical models were developed and tested using ordinary least squares analysis (OLS). The test results were presented in Chapter V. The purpose of this chapter is to interpret those results and to suggest possible policy implications.
## II. INTERPRETATION OF EMPIRICAL RESULTS

The principal objective of this study was to establish the major determinants of buying and issuing of commercial paper instruments for each ownership and issuing market sector. The empirical results reported in Chapter V suggest that the theory of working capital management was an effective framework for accomplishing the specific objectives. All equations were statistically significant at the .05 level of confidence and approximately 78 per cent of the 36 variables tested had coefficients which were significantly different from zero. Only one variable carried an inappropriate sign and that occurred in a single equation.

Correct as they may be, these notes of optimism must be tendered with one of caution. The frequently encountered statistical problems of multicollinearity and autocorrelation are evident throughout the empirical results.<sup>1</sup> The implication being that interpretation of those results is precarious and should be approached accordingly.<sup>2</sup> However, the consistency demonstrated by each market sector with respect to <u>a priori</u> signs, structure, and content is taken as sufficient evidence that appropriate specifications were employed.

 $<sup>^{1}\</sup>mbox{See}$  section IV of Chapter V for a discussion of these common statistical problems.

<sup>&</sup>lt;sup>2</sup>Such qualifications are not uncommon in financial literature where empirical work is undertaken.

The remainder of this section offers an interpretation of the empirical findings beginning with the direct paper market. The final section suggests several policy implications.

## The Direct Paper Market

<u>Supply estimations</u>. The finance company market sector was the only supplier of direct paper during the 1955-1968 period, and Table 5.1 shows the results of estimating behavior within that sector. The primary determinants of direct paper supply were: (1) changes in total financial assets of finance companies, (2) changes in the level of commercial paper rates, and (3) changes in the level of bank loan rates. The coefficient of each variable was significantly different from zero at the .05 level of confidence.

The significance of the working capital requirement variable  $(X_1)$  is not surprising since financial assets make up nearly all finance company assets. Finance companies seem to react in a manner consistent with the hypothesis that a firm finances a significant portion of its changes in current asset levels with short-term obligations.

Finance companies issuing direct paper were found to be relatively insensitive to interest rate changes on commercial paper or bank loan rates. That is, while the interest rate estimators were significant and correctly signed, their elasticity coefficients were relatively small (n < 1), indicating price inelasticity and weak substitutability, respectively. This finding is consistent with Baxter's contention that direct paper is a primary source of funds to finance company issuers and bank loans are but a substitute.<sup>3</sup> The necessity of this relationship is

<sup>3</sup>Baxter, <u>The Commercial Paper Market</u>, p. 62.

made obvious by the definition of directly placed paper. Maintenance of a market presumes continuous usage. But since reliance on one source of funds increases financial risk, bank loans would of necessity be sustained at some reasonable level. Hence, the ability of finance companies to trade one source of funds for another as changes in interest rates arise would be restricted in the direct paper sub-market. The empirical results suggested that finance companies reacted this way for most of the study period. However, the cross-elasticity coefficient for bank loan rates became relatively high (n > 1) after interest rate levels exceeded the 5 per cent level (from 1966 through 1968). One interpretation of this result is that finance companies in the direct market relied more on their primary source of funds (commercial paper) during periods of relatively high interest rate levels. The fact that finance companies remained inelastic with respect to commercial paper rates throughout the period studied suggests that this sector may have reacted to changes in the commercial paper market relative to choice of shortterm funds. This supports the feelings demonstrated by several financial market analysts during the 1966-1968 period when interest rates were rising due to strict credit rationing.<sup>4</sup> This point has been ignored in earlier research and is an important analytical finding.

The only behavioral hypothesis which could neither be confirmed nor denied concerned the extent to which finance companies react to risk, as measured by variations in internal funds flow. At least three

<sup>&</sup>lt;sup>4</sup>Many analysts contended that bank managers were influencing (asking) commercial paper issuers to rely more heavily on the commercial paper market during those periods of tight money. See "What Makes the Boom in Commercial Paper," <u>Business Week</u>, November 26, 1966, p. 76.

possibilities exist. First, as mentioned in Chapter V, high intercorrelation was evident between variables  $X_1$  and  $X_4$  which may have prevented  $X_4$  from entering the equation in a significant fashion. Second, the choice of proxy measure may be inappropriate. The amount of consumer installment credit repaid accounts for only a fraction of the funds inflow, without considering outflow. The preferable measure would consider both directions of flow. Third, the hypothesis may be inappropriate. The latter possibility is at least questionable as investigation of the remaining market sectors should support.

<u>Demand estimations</u>. Estimation results (Tables 5.2, 5.3, and 5.4) suggest that the demand for direct paper is influenced by (1) the immediate working capital requirements of potential buyers, (2) the return on direct paper, (3) the return on alternative money market instruments, and (4) the perceived risk of technical insolvency by market participants.

Changes in the level of expected cash outflows by non-financial corporations, life insurance companies, and commercial banks as measured by variables  $X_5$ ,  $X_{10}$ , and  $X_8$ , respectively, were significant at the .10 level or above. This implies a strong sensitivity on the part of direct paper buyers to the underlying need for liquidity as generated by changes in current cash obligations, whether in the form of increases in current liabilities (as in the case of non-financial corporations and life insurance companies) or in the form of decreases in primary investment opportunities (as in the case of commercial banks). The high elasticity and significance of these liquidity variables (particularly with respect

to non-financial corporations and life insurance companies) lends support to the hypothesis that commercial paper buyers value its liquidity.

The hypothesis of downward sloping demand curves could not be rejected in the commercial bank and life insurance company market sectors, where both indicated significant commercial paper rate coefficients with proper <u>a priori</u> signs. The non-financial corporate estimate was inconclusive, in that while the correct sign was indicated, the coefficient lacked significance.

Each of the market sectors displayed a willingness to substitute treasury bills for commercial paper purchases. This cross-elastic relationship was stronger with commercial banks and life insurance companies than with non-financial corporations at all levels of interest rates. The latter finding is consistent with the fact that non-financial corporations dominate the direct placement market, thus demonstrating a rather strong preference relative to other institutions for the instrument. Previous studies have overlooked this heterogeneity of behavior because of a tendency to describe demand relationships with but one equation per sub-market. Investigation of the dealer market should reinforce this conclusion.

Risk of technical insolvency, as measured by degree of variance in internal cash flows was a significant cause of changes in demand for direct paper. Each market sector demonstrated a tendency to increase purchases of commercial paper as the degree of variance in cash flows increased. This supports the hypothesis that a market sector perceives an increased need for liquidity the more uncertain its expected cash flows become.

#### The Dealer Paper Market

<u>Supply estimations</u>. The dealer paper sub-market is supplied by non-financial corporations and finance companies. Empirical results (Tables 5.5 and 5.6) suggest that the behavioral characteristics of these two sectors are similar. Both increase issuances of dealer paper as their respective total financial asset position grows. This supports the hypothesis that supply sectors finance with commercial paper to meet working capital needs.

The hypothesis of an upward sloping supply curve could not be rejected for either market sector. The commercial paper rate was significant for both sectors with elasticity coefficients relatively high (n > 1) at all interest rate levels. Similarly, the bank loan rate was significant in each sector with cross-elasticity coefficients indicating high degrees of substitutability between dealer paper issuance and bank loans.

All of these findings are consistent with <u>a priori</u> expectations and help clarify several points raised by previous students of the commercial paper market. First, the significance of both working capital variables differs from an earlier study which attempted to treat each sub-market as a homogeneous unit.<sup>5</sup> Consumer installment credit, which represents the greater part of finance company financial assets, provided a reasonable estimator of direct paper supply but gave an incorrect sign when applied to the dealer sub-market. If changes in consumer installment credit paralleled changes in business credit held by finance companies, use of this variable in the non-financial corporation supply

<sup>5</sup>See Chapter V of Joss, <u>op</u>. <u>cit</u>., pp. 84-108.

equation would likely measure the trade-off between two financing alternatives. This is true since much of the consumer installment credit held by finance companies was purchased from non-financial corporations. Therefore, by combining the two market sectors (non-finance corporations and finance companies), as Joss did, consumer installment credit is likely to indicate a significant negative relationship since non-financial corporations dominate issuances in the dealer paper sub-market. By dividing the sub-markets into market sectors, as was done in this study, more appropriate specifications were possible. Changes in the receivables of finance companies, as measured by their total financial assets, affected behavior in the dealer paper sub-market. And, similarly, changes in the receivables and liquid assets of non-financial corporations lead to changes in dealer supplied paper.

A second point of interest relevant to earlier studies of the commercial paper market deals with the sensitivity of finance companies to interest rate changes. The empirical results suggested that, while direct supply of commercial paper was relatively interest inelastic, the supply of dealer paper was most sensitive to changes in interest rate levels. This difference in sub-market behavior was not unexpected, although earlier studies had been unable to explicitly define the relationship. One explanation for dealer supplier sensitivity to interest rate changes is that such institutions are not required to maintain an ongoing market. That burden is placed on the dealer. This, in turn, may free dealer issuers to play the market to their best advantage, something that direct issuers are not at liberty to do.

The fourth variable entering the two equations, the risk variable, was significantly different from zero for both market sectors. This was in contrast to the direct sub-market where the risk variable was insignificant although correctly signed. This finding may reflect differences in operating profit margins between participants in the two sub-markets. Direct suppliers of commercial paper are considered to be better credit risks than are dealer suppliers, although the margin of risk difference remains undefined. The sensitivity to variance in internal funds flow displayed by dealer suppliers is consistent with the viewpoint that the tighter the operating margins, the higher the risk of technical insolvency when all other considerations are held constant.

Demand estimations. Equations estimating variances in the demand for dealer paper were less successful than those developed for the direct paper sub-market. Two of four variables tested in the nonfinancial corporation market sector were insignificant and only one variable passed the test of significance in the open-end investment sector (see Tables 5.7 through 5.9). Be that as it may, several interesting results were obtained.

Changes in working capital requirements influenced the quantity of dealer paper demanded by each of the three market sectors, non-financial corporations, commercial banks, and open-end investment companies, respectively. Non-financial corporations were highly sensitive to changes in their current obligations. An increase in those obligations lead to a greater than proportionate increase in the amount of commercial paper purchased by that sector throughout the period studied. Similarly, increases in the quantity of country member bank loans lead to a

more than proportionate decrease in the quantity of dealer paper purchased by the commercial bank sector. This finding supports two <u>a priori</u> hypotheses. First, country member banks play a significant role in the dealer paper market, an assumption which could not be substantiated (with 95 per cent confidence) in the direct paper market. This difference in degree of participation by commercial banks between sub-markets was not unexpected. Many commercial banks operating in the direct market were known to be representing accounts of customers, not those of the institution. The empirical findings suggested that customer account activity may have dominated direct market participation by the commercial bank sector.

Second, country member banks are sensitive to the position of their primary investment portfolios -- buying commercial paper during slack periods of loan demand, but withdrawing from the market when loan demand becomes heavy.<sup>6</sup>

Net total financial assets  $(X_{14})$  entered the open-end investment company equation in a significant manner. This confirms the hypothesis that open-end investment companies tend to increase their purchases of dealer paper during periods of financial prosperity. That is, when the industry is doing well in the market, as measured by the current value of its financial assets net of new share issues, open-end investment company management converts profits to near cash, anticipating new investments and share redemptions. While this behavior is assumed to be continuous, the sums involved become larger with growth in profit

<sup>&</sup>lt;sup>6</sup>Joss used a loan-to-deposit ratio to demonstrate this relationship. See, <u>ibid</u>., p. 144.

levels. The relatively high (n > 1) elasticity coefficient obtained for this variable at all levels of financial assets lends support to the latter assumptions.

All interest rate variables had correct signs in each market sector, but the commercial paper rate was a significant influence in the commercial bank sector alone. Treasury bill rates were significant estimators in the non-financial corporation and commercial bank sectors.

The general reaction by non-financial corporations to changes in interest rate levels was similar between sub-markets, and the interpretations hold equally well for both markets. The commercial bank sector was not quite as consistent. The signs and significant levels were similar between markets, but the elasticity coefficients were weaker in the dealer market. The demand for dealer paper was price elastic up to 1966 interest rate levels. Thereafter, commercial bank demand was interest inelastic. Similarly, the cross-elasticity coefficient for treasury bills became weak in the commercial bank sector (n<1) after 1966, suggesting a declining degree of substitutability between the two instruments. These results are consistent with earlier interpretations of the bank loan variables ( $X_8$ ). During periods of "high" interest rate levels, the quantity of dealer paper purchased by commercial banks diminished. This relationship may be reflected in commercial bank sensitivity to interest rate levels existing in the money markets.

Uncertainty of expected cash flows was not a strong influence in the dealer sub-market on the demand side. The commercial bank sector had the only equation containing a "significant" risk variable which also carried a theoretically correct sign. As in the direct paper market, variation in levels of demand deposits at country member banks

influenced the quantity of dealer paper held by such institutions. More specifically, increases in the <u>degree</u> of variance in demand deposit levels (whether increases or decreases) which were high relative to the norm, lead to more than proportionate increases in the quantity of dealer commercial paper held by country member banks. The implications are that country member banks responded to unusual variances in demand deposit levels as though the banking sector was uncertain about the current demands on its assets. Commercial paper holdings may have provided a protective hedge (additional liquidity) in light of such uncertainties. These results were consistent with a priori hypothesis.

Non-financial corporations operating in the dealer market did not react consistently with their counterparts in the direct market with respect to the risk variable. Degrees of variance in internal funds flow variable  $(X_7)$  entered the non-financial corporation equation significantly but with an improper sign. That is, a priori hypothesis called for a positive relationship between uncertainty in internal funds flow and dealer paper held by non-financial corporations. Differences in risk preference may account for this disparity between markets. Nonfinancial corporations operating in the dealer market may ignore the risks of an uncertain world. But the negative relationship suggests a polar view, virtual inclination toward risk; and such a behavior is contrary to rational economic thought. A more plausible explanation holds that the negative relationship found in this study is consistent with risk aversion. During periods of funds flow uncertainty, non-financial corporations move away from a more risky dealer market instrument toward a less risky direct market instrument. Since the measure of

variable  $X_7$  was uniform for non-financial corporations in both sub-markets, non-financial corporation response to that measure between markets is in agreement with this latter interpretation of the perceived relationship. This interrelationship between markets is also consistent with the conventionally held viewpoint, and is therefore a meaningful analytical finding.<sup>7</sup>

The working capital requirement variable  $(X_{14})$  was the only estimator entering the open-end investment company model which had a coefficient significantly different from zero, so that the remaining hypothesis could be neither confirmed nor denied.

#### Summary

The structural supply and demand equations estimated using behavior models formulated in this study appear to have yielded reasonably good descriptions of market sectors operating in commercial paper submarkets during the sample period. The consistent and plausible nature of these estimators contributes to their tenability.

### **III. POLICY IMPLICATIONS**

The possibility of drawing strong policy implications from this study is rather remote due to the study's tentative nature. However, certain relations seem to be sufficiently pervasive as to warrant some comment on their implications for policy.

<sup>7</sup>Baxter, <u>op</u>. <u>cit</u>., pp. 100-102.

## Suppliers

Those sectors supplying commercial paper should note that buyers are interest rate conscious. Increases in the commercial paper rate should initiate increased purchases of commercial paper instruments. On the other hand, increases in treasury bill rates will draw down demand for commercial paper instruments.

Institutions which are considering the use of commercial paper as a source of short-term financing should be aware that during periods of uncertain economic activity competition by other issuers is likely to be reduced, thus providing for less expensive financing, <u>ceteris paribus</u>. At the same time, demand will likely increase because of an increasing desire for liquidity by most sectors in the market.

#### Buyers

Buyers of commercial paper should be mindful of movements in consumer installment credit. Sharp changes may initiate changes in commercial paper rates. But buyers should be aware of sudden drops in issuances of commercial paper as well, especially in the dealer market. Such reductions may indicate periods of increasing risk, due to uncertainty in the funds flow of issuers. This interpretation is most appropriate when the decrease in issuances coincides with decreasing commercial paper rates. Normally, issuers move into the market when rates are declining.

### Money Market Managers

The close relationship between treasury bill rates and commercial paper rates in both markets suggests that the commercial paper market is

influenced on the demand side of the market by monetary policy. With the close ties between bank loan rates and commercial paper rates equally evident, monetary policy is assumed to effect the supply side as well. Controls directed toward consumer installment credit, coincidental to normal open-market operations, would have multiple results. Awareness of these interrelations is paramount to good monetary management.

## Researchers of the Money Markets

Sector analysis provides closer scrutiny of a market's behavior structure than does the conventional aggregation approach. It is known, as a result, that unqualified generalizations about market participants are precarious. For example, basing anticipation of increases in dealer paper issuances on growth in consumer installment credit held by finance companies may lead to frustrating experiences. Non-financial corporations may be reflecting the same phenomena by reducing their reliance on commercial paper as a source of working capital funds.

## APPENDIX

					Denend					
Peri	od	۲ <sub>۱</sub>	<sup>Y</sup> 2	۲ <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	<sup>Y</sup> ab Texx <sup>Y</sup> 6	۲ <sub>7</sub>	Y <sub>8</sub>	Y <sub>9</sub>
1955	1	1.521	1.092	.354	.075	.258	.423	.113	.477	.091
	2	1.739	1.298	.371	.070	.257	.315	.097	.400	.075
	3	1.705	1.251	.369	.085	.257	.307	.071	.395	.098
	4	1.525	1.079	.356	.100	.206	.304	.089	.357	.064
1956	1	2.024	1.465	.390	.169	.262	.298	.027	.392	.141
	2	1.989	1.497	.377	.115	.241	.235	.077	.333	.066
	3	1.966	1.511	.371	.084	.210	.339	.054	.384	.111
	4	1.677	1.240	.348	.089	.186	.320	.074	.354	.078
1957	1	2.207	1.654	.421	.132	.192	.297	.045	.342	.102
	2	2.009	1.487	.429	.093	.186	.268	.031	.318	.105
	3	2.067	1.386	.474	.207	.194	.307	.049	.351	.101
	4	2.121	1.370	.533	.218	.192	.359	.052	.386	.113
1958	1	2.634	1.706	.652	.276	.244	.618	.097	.603	.162
	2	2.419	1.486	.711	.222	.284	.681	.085	.676	.204
	3	2.200	1.225	.782	.193	.272	.686	.124	.671	.163
	4	1.911	.961	.859	.091	.278	.562	.221	.588	.031
1959	1	2.396	1.219	1.054	.123	.331	.552	.181	.618	.084
	2	2.689	1.178	1.297	.214	.354	.375	.146	.510	.073
	3	2.590	.933	1.458	.199	.331	.527	.109	.601	.148
	4	2.525	.940	1.469	.116	.362	.315	.140	.474	.063
1960	1	3.589	2.071	1.379	.139	.479	.427	.167	.634	.105
	2	3.512	2.185	1.151	.176	.568	.547	.201	.781	.133
	3	3.367	2.277	.841	.249	.579	.782	.229	.953	.179
	4	3.139	2.081	.763	.295	.589	.769	.312	.951	.095
1961	1	3.553	2.112	1.081	.360	.902	.623	.274	1.068	.183
	2	3.476	2.122	1.030	.324	.734	.726	.338	1.022	.100
	3	3.145	1.827	.986	.332	.713	1.017	.326	1.211	.193
	4	2.975	2.484	.298	.193	.617	1.094	.512	1.198	.001

# ORIGINAL DATA USED IN ESTIMATION\*

APPENDIX (	(continued)

					Depend	dent Vai	riable**	ł		
Peri	od	Y	Y <sub>2</sub>	Y <sub>3</sub>	Ÿ <sub>4</sub>	Y <sub>5</sub>	Υ <sub>6</sub>	¥7	Ч <sub>8</sub>	۲ <sub>9</sub>
1962	1	3.937	3.040	. 384	.513	.745	1.131	.282	1.313	.281
	2	3.987	3.067	. 399	.521	.786	1.092	.336	1.315	.227
	3	4.349	3.270	. 435	.644	.865	1.363	.414	1.560	.254
	4	3.912	3.173	. 391	.348	.890	1.198	.372	1.462	.254
1963	1	4.816	3.734	.481	.601	1.046	1.214	.391	1.582	.287
	2	5.190	4.181	.518	.491	1.062	.987	.399	1.434	.216
	3	5.063	3.933	.505	.625	.987	1.111	.536	1.364	.198
	4	4.819	3.950	.482	.387	.960	.968	.447	1.253	.228
1964	1	5.699	5.003	.182	.514	1.090	.948	.543	1.325	.170
	2	6.088	5.171	.609	.308	1.059	.889	.436	1.266	.246
	3	6.224	5.745	.096	.383	1.139	1.081	.696	1.443	.081
	4	6.138	5.265	.614	.259	1.098	1.125	.771	1.334	.118
1965	1	7.007	5.819	.701	.487	1.223	.847	.520	1.242	.308
	2	7.405	6.070	.741	.594	1.238	.727	.435	1.179	.351
	3	7.498	6.006	.750	.742	1.268	.926	.504	1.316	.374
	4	7.155	6.133	.711	.311	1.106	.797	.401	1.047	.455
1966	1	8.666	7.207	1.158	.301	1.246	.820	.496	1.136	.434
	2	8.679	6.908	1.538	.233	1.229	.861	.315	1.150	.625
	3	9.005	7.563	1.130	.312	1.307	1.466	.153	1.525	1.095
	4	10.190	7.994	1.802	.394	1.467	1.622	.541	1.545	1.003
1967	1	11.674	9.018	2.092	.564	1.683	2.677	1.317	2.180	.863
	2	11.216	8.342	2.000	.874	1.692	3.242	1.488	2.467	.979
	3	11.096	7.960	1.990	1.146	1.860	3.264	1.677	2.562	.885
	4	11.634	8.266	2.881	.487	1.867	3.034	1.733	2.205	.963
1968	1	12.655	10.075	1.947	.633	2.350	3.482	.854	2.624	2.354
	2	12.976	10.652	1.650	.674	2.422	3.400	1.715	2.620	1.487
	3	12.527	10.991	.774	.762	2.809	4.928	3.092	3.082	1.563
	4	13.296	11.352	1.486	.458	2.657	4.544	3.081	2.880	1.240

APPENDIX (continued)

					Independ	dent Vari	able**		
Peri	od	× <sub>1</sub>	×2	×3	×4	× <sub>5</sub>	× <sub>6</sub>	×.7	×8
1955	1	13.928	1.4566	3.29	-1.0674	108.916	1.2563	-1.2285	21.629
	2	15.232	1.8100	3.30	-1.0250	109.754	1.5143	8638	22.374
	3	16.107	2.0566	3.54	9837	118.939	1.8613	-1.0535	23.213
	4	17.104	2.5966	3.76	9202	127.097	2.3486	-1.1391	24.077
1956	1	17.448	2.8800	3.75	8062	125.111	2.3793	-1.1304	24.649
	2	17.593	2.9766	3.97	7546	125.731	2.5966	-1.0027	25.434
	3	17.582	3.0266	4.20	5462	131.966	2.5966	-1.0588	25.861
	4	17.818	3.3766	4.22	6951	138.274	3.0636	-1.1668	26.311
1957	1	18.107	3.3800	4.23	6424	136.136	3.1717	-1.0556	26.522
	2	18.424	3.4133	4.23	6172	135.332	3.1570	8464	27.155
	3	18.659	3.6933	4.69	5777	139.819	3.3823	9202	27.755
	4	18.944	3.7400	4.71	5570	140.784	3.3433	-1.0242	28.020
1958	1	18.775	2.4233	4.29	5691	135.026	1.8380	-1.3474	28.047
	2	18.366	1.4500	3.88	5811	134.527	1.0177	-1.1005	28.606
	3	17.661	1.7667	4.00	5765	139.817	1.7107	9317	29.034
	4	18.210	2.8533	4.29	5513	147.421	2.7877	8041	29.789
1959	1	18.905	3.0900	4.29	5233	147.547	2.8003	8361	30.223
	2	19.790	3.4866	4.71	4688	151.750	3.0193	3660	31.747
	3	20.126	4.0666	5.14	4265	155.000	3.5330	6160	32.805
	4	21.086	4.6333	5.19	3806	160.110	4.2993	6580	33.543
1960	1	22.240	4.5600	5.18	3388	161.418	3.9430	6854	34.172
	2	23.356	3.6200	5.19	2649	163.105	3.0923	5204	35.664
	3	23.460	3.0166	4.74	2432	164.847	2.3903	6350	36.387
	4	24.121	2.9966	4.77	2466	166.686	2.3607	8106	36.751
1961	1	23.650	2.7300	4.75	2861	165.801	2.3767	9535	36.631
	2	23.859	2.5800	4.75	2684	167.948	2.3247	4837	37.582
	3	23.812	2.6066	4.75	2449	171.462	2.3247	4974	38.339
	4	25.135	2.8200	4.77	2048	161.412	2.4750	3548	39.110
1962	1	25.317	3.0233	4.78	1750	163.274	2.7390	2629	39.543
	2	26.271	3.0200	4.79	1126	165.747	2.7160	.0185	40.952
	3	26.582	3.1500	4.77	0639	171.670	2.8580	0714	42.025
	4	27.602	3.0933	4.78	0227	174.928	2.8033	0288	43.560
1963	1	28,251	3.1533	4.80	.0386	176.417	2.9090	1589	44.341
	2	29,562	3.1766	4.78	.0798	181.127	2.9413	.1851	46.057
	3	30,080	3.5166	4.81	.1514	185.713	3.2807	.1733	47.342
	4	31,719	3.7700	4.76	.1944	190.347	3.4993	.0911	48.972

APPENDIX (continued)

. .

					Independ	lent Varia	able**	- ,,,	
Peri	od	XJ	×2	Х3	X <sub>4</sub>	× <sub>5</sub>	Х <sub>6</sub>	×7	X <sub>8</sub>
1964	1	32.616	3.8033	4.77	.2820	188.309	3.5380	.3545	49.713
	2	34.256	3.8133	4.74	.3588	191.526	3.4813	.7776	51.498
	3	34.725	3.7733	4.72	.3983	196.950	3.5040	.6864	52.604
	4	35.608	3.9266	4.77	.4464	202.783	3.6850	.5451	54.425
1965	1	36.672	4.1400	4.74	.5380	206.730	3.8996	.7917	55.502
	2	38.404	4.2500	4.74	.6199	212.052	3.8790	1.1715	58.146
	3	39.158	4.2500	4.76	.7196	219.112	3.8596	1.0934	59.777
	4	40.963	4.4333	5.08	.7729	230.352	4.1586	1.1986	61.776
1966	1	41.798	4.9066	5.41	.9080	233.722	4.6306	1.1566	62.894
	2	42.759	5.3400	5.65	.9372	239.290	4.5973	1.5729	65.214
	3	42.054	5.6033	6.13	.9905	245.381	5.0476	1.3826	66.480
	4	43.583	5.8600	6.16	1.0117	254.298	5.2460	1.5632	67.660
1967	1	43.654	5.2333	5.86	1.0649	253.657	4.5336	1.2434	68.446
	2	43.786	4.4600	5.67	1.1675	254.991	3.6573	1.5411	70.844
	3	43.606	4.7400	5.66	1.2706	259.749	4.3446	1.4486	72.083
	4	44.464	5.1866	5.71	1.2843	268.617	4.7873	1.5352	73.591
1968	1	45.308	5.3700	6.14	1.5804	271.634	5.0646	1.1158	74.397
	2	47.333	5.8766	6.60	1.6497	277.661	5.5100	1.7516	76.930
	3	47.674	5.7900	6.67	1.7517	286.583	5.2263	1.6949	79.396
	4	49.923	5.7333	6.40	1.7895	297.589	5.5806	1.5196	81.884

··· ..

- <del></del>			In	depender	it Variabl	e**	· · · · · · · · · · · · · · · · · · ·
Period	1 X <sub>9</sub>	<sup>X</sup> 10	× <sub>11</sub>	× 12	× <sub>13</sub>	×14	×15
1955 1	-1.1873	.4981	-1.466	1.6133	136.869	6.326	9342
2	-1.1780	.4449	-1.629	1.9666	140.331	7.037	-1.0821
3	-1.1486	.4212	-1.612	2.3266	148.830	7.012	7952
4	-1.0945	.5557	-1.042	2.8333	155.434	7.550	6681
1956 1	-1.1156	.5082	-1.309	3.0000	151.493	8.250	6178
2	-1.0956	.4660	-1.369	3.2633	151.935	8.417	-1.5609
3	-1.0811	.4250	-1.346	3.3500	157.438	8.232	7095
4	9789	.5909	763	3.6300	162.654	8.726	5734
1957 1	-1.0404	.5757	-1.049	3.6300	160.889	8.785	5734
2	-1.0037	.5156	-1.161	3.6833	161.970	9.425	7450
3	9704	.4969	-1.039	3.9533	166.906	8.739	7450
4	9054	.6812	528	3.9933	169.291	8.385	5468
1958 1	9465	.6415	767	2.8166	164.366	9.134	5468
2	8828	.5792	926	1.7166	167.950	10.192	2836
3	8743	.5778	860	2.1300	176.364	11.558	8337
4	7173	.7462	559	3.2133	183.273	12.790	1860
1959 1	7555	.6740	602	3.3033	184.189	13.645	0796
2	7242	.6359	747	3.6033	190.418	14.665	6119
3	6826	.6045	716	4.1933	195.805	14.338	3132
4	6374	.8142	205	4.7600	200.616	15.284	.0594
1960 1	6610	.7702	549	4.8666	199.297	14.807	0264
2	6330	.6729	625	4.0733	201.033	15.788	6060
3	5827	.6333	561	3.3733	204.173	15.342	6415
4	4913	.8537	.521	3.2700	206.667	16.646	3960
1961 1	5056	.7967	384	3.0133	205.649	19.003	2274
2	4651	.7392	395	2.8600	211.900	19.700	6267
3	4075	.6734	466	2.8966	216.649	20.546	1565
4	2870	.9675	125	3.0566	221.285	22.176	.5473
1962 1	2761	.8308	140	3.2433	222.262	22.148	1.1417
2	2156	.7496	270	3.2033	226.679	17.986	1890
3	1357	.7546	270	3.3333	233.147	18.836	7775
4	.0023	.9941	.136	3.2633	238.166	21.029	8041
1963 1	.0031	.8850	.145	3.3100	239.408	22.257	6592
2	.0812	.8249	.102	3.3167	245.537	23.542	-1.0762
3	.1449	.7985	.147	3.6966	251.989	24.174	5675
4	.2683	1.0830	.500	3.9066	257.328	24.750	1476

	APPENDIX	(continued)
--	----------	-------------

	Independent Variable**							
Period	X <sub>9</sub>	×10	x <sub>11</sub>	×12	× <sub>13</sub>	× <sub>14</sub>	<sup>X</sup> 15	
1964 1	.2754	.9380	.433	3.9500	255.614	26.584	6415	
2	.3201	.9174	.388	3.9333	260.578	27.252	2481	
3	.3819	.8823	.369	3.9100	266.451	28.729	3339	
4	.5447	1.1793	.830	4.0633	271.516	26.412	.6834	
1965 1	.5839	1.0592	.647	4.3000	273.749	29.731	.6479	
2	.6741	.9502	.605	4.3800	280.737	29.473	.1452	
3	.7517	.9542	.636	4.3800	287.195	32.117	.5710	
4	.9294	1.2463	1.167	4.4700	296.142	34.109	1.7657	
1966 1	.9924	1.1395	.922	4.9700	298.184	34.864	2.3512	
2	1.0715	1.0811	.950	5.4266	304.041	34.668	.7307	
3	1.1175	1.0220	.964	5.7900	308.573	31.580	.5858	
4	1.2258	1.3098	1.511	6.0000	313.260	33.892	1.2423	
1967 1	1.2954	1.2368	1.230	5.4500	311.778	38.667	.7750	
2	1.4458	1.1375	1.342	4.7166	312.911	40.490	6178	
3	1.5558	1.1188	1.273	4.9733	319.540	43.088	0500	
4	1.7554	1.3734	1.853	5.3033	329.454	43.720	1.3813	
1968 1	1.8270	1.2784	1.609	5.5800	333.172	40.600	3.8357	
2	1.9510	1.1272	1.683	6.0800	340.314	47.902	.0298	
3	2.0763	1.1623	1.753	5.9633	349.528	50.198	.9406	
4	2.3622	1.5069	2.271	5.9633	357.310	51.138	3.0314	

\* Original data were coded before input to express all variables in approximately the same order of magnitude.

\*\* For a description of each variable, see Chapter V.

#### BIBLIOGRAPHY

#### BOOKS

- Aigner, Dennis J. <u>Basic Econometrics</u>. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1971.
- Anderson, W. H. <u>Corporate Finance and Fixed Investment: An Econometric</u> <u>Study</u>. Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1964.
- Baxter, Nevins D. <u>The Commercial Paper Market</u>. Econometric Research Program Memorandum 69. Princeton, N. J.: Princeton University, 1964.
- Beranek, William. <u>Working Capital Management</u>. Belmont, California: Wadsworth Publishing Company, Inc., 1966.
- Chou, Ya-Lun. <u>Applied Business and Economic Statistics</u>. New York: Holt, Rinehart and Winston, 1963.
- Christ, Carl F. <u>Econometric Models and Methods</u>. New York: John Wiley & Sons, Inc., 1966.
- Chudson, Walter A. <u>The Pattern of Corporate Financial Structure</u>. New York: National Bureau of Economic Research, 1945.
- Dougall, Herbert E. <u>Capital Markets and Institutions</u>. 2nd ed. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1970.
- Draper, Jean, and Jan Klingman. <u>Mathematical Analysis</u>. New York: Harper & Row, Publishers, Inc., 1967.
- Draper, Norman, and Harry Smith. Applied Regression Analysis. New York: John Wiley & Sons, Inc., 1966.
- Eiteman, Wilford J., and James N. Holtz. "Working Capital Management." <u>Essays on Business Finance</u>. Edited by Karl A. Boedecker. 4th ed. Ann Arbor, Mich: Masterco Press, 1963.
- Ezekiel, Mordecai, and Karl Fox. <u>Methods of Correlation and Regression</u> <u>Analysis</u>. 3rd ed. New York: John Wiley & Sons, Inc., 1959.

- Fama, Eugene F., and Merton H. Miller. <u>The Theory of Finance</u>. New York: Holt, Rinehart and Winston, 1972.
- Foulke, Roy A. <u>The Commercial Paper Market</u>. New York: The Bankers Publishing Company, 1931.
- Freund, J. E. <u>Statistics: A First Course</u>. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1970.
- Goldfield, Stephen M. <u>Commercial Bank Behavior and Economic Activity</u>. Amsterdam: North-Holland Publishing Co., 1966.
- Goldsmith, Raymond W. <u>Financial Institutions</u>. New York: Random House, 1968.
- Gordon, Myron J. <u>The Investment, Financing, and Valuation of the Cor</u>poration. Homewood, Ill.: Richard D. Irwin, Inc., 1962.
- Greef, A. O. <u>The Commercial Paper House in the United States</u>. Cambridge: Harvard University Press, 1938.
- Hibdon, James E. <u>Price and Welfare Theory</u>. New York: McGraw-Hill Book Company, 1969.
- Jean, William H. <u>The Analytical Theory of Finance</u>. New York: Holt, Rinehart and Winston, 1970.
- Keynes, John M. <u>The General Theory of Employment, Interest, and Money</u>. New York: Harcourt, Brace Jovanovich, Inc., 1936.
- Lerner, Eugene M., and Willard T. Carleton. <u>A Theory of Financial Analy</u>sis. New York: Harcourt, Brace & World, Inc., 1966.
- Moore, Basil J. <u>An Introduction of the Theory of Finance</u>. New York: The Free Press, 1968.
- Mumey, Glen A. <u>Theory of Financial Structure</u>. New York: Holt, Rinehart and Winston, 1969.
- Park, Colin, and John W. Gladson. <u>Working Capital</u>. New York: The Macmillan Company, 1963.
- Rao, Potluri, and Roger LeRoy Miller. <u>Applied Econometrics</u>. Belmont, California: Wadsworth Publishing Company, 1971.
- Robinson, Roland I. <u>The Management of Bank Funds</u>. New York: McGraw-Hill Book Company, Inc., 1962.
- Schulz, Raymond G., and Robert E. Schulz. <u>Basic Financial Management</u>. 2nd ed. Scranton, Pa.: Intext Educational Publications, 1972.

- Selden, Richard T. <u>Trends and Cycles in the Commercial Paper Market</u>. Occasional Paper 85. New York: National Bureau of Economic Research, 1963.
- Sharpe, William F. <u>Portfolio Theory and Capital Markets</u>. New York: McGraw-Hill Book Company, 1970.
- Smith, Keith V. <u>Portfolio Management</u>. New York: Holt, Rinehart and Winston, 1971.
- Solomon, Ezra. <u>The Theory of Financial Management</u>. New York: Columbia University, 1963.
- Van Horne, James C. <u>Financial Management and Policy</u>. 2nd ed. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1971.
- Vaughn, Donald E. <u>Survey of Investments</u>. New York: Holt, Rinehart and Winston, 1967.

## PERIODICALS

- Anderson, Leonall, and Albert E. Burger. "Asset Management and Commercial Bank Portfolio Behavior: Theory and Practice." <u>The Journal</u> of Finance, XXIV (May, 1969), 207-222.
- Bean, Virginia L., and Reynolds Giffith. "Risk and Return in Working Capital Management." <u>Mississippi Valley Journal of Business and</u> <u>Economics</u>, I (Fall, 1966), 28-48.
- Cloos, George W. "A Larger Role for Commercial Paper." Business Conditions, Federal Reserve Bank of Chicago, (December, 1968), 8.
- "Commercial Paper, 1960-1969." <u>Economic Review</u>, Federal Reserve Bank of Cleveland, (May, 1970), 24.
- Durbin, J., and G. S. Watson. "Testing for Serial Correlation in Least Squares Regression II." <u>Biometrika</u>, XXXVIII (June, 1951), 159-166.
- "Financing Corporate Investment." <u>Federal Reserve Bulletin</u>, LI (December, 1965), 1657-1666.
- Hurley, Evelyn M. "Survey of Finance Companies, Mid-1965." <u>Federal</u> <u>Reserve Bulletin, LIII (April, 1967), 516-541.</u>
- Jacobs, D. P. "The Marketable Security Portfolios of Nonfinancial Corporations, Investment Practices and Trends." The Journal of <u>Finance</u>, XV (September, 1960), 341-352.

- Johnston, Robert. "Rebirth of Commercial Paper." Monthly Review, Federal Reserve Bank of San Francisco, (July, 1968), 130-140.
- Schadrack, Frederick C. "Demand and Supply in the Commercial Paper Market." The Journal of Finance, XLII (September, 1970), 837-852.
- \_\_\_\_\_, and Frederick S. Breimyer. "Recent Developments in the Commercial Paper Market." <u>Monthly Review</u>, Federal Reserve Bank of New York, (December, 1970), 280-291.
- Sharpe, William F. "Portfolio Analysis." <u>The Journal of Financial and</u> <u>Quantitative Analysis</u>, II (June, 1967), 76-85.
- Silberman, Lee. "A Run for Their Money." Barrons, July 25, 1966, p. 3.
- Struble, Frederick. "The Commercial Paper Boom in Perspective." <u>Monthly Review</u>, Federal Reserve Bank of Kansas City, (November, 1968), 4.
- Van Horne, James C. "Risk-Return Analysis of a Firm's Working Capital Position." Engineering Economist, XIV (Winter, 1969), 71-89.
- Walker, Ernest W. "Towards a Theory of Working Capital." <u>Engineering</u> <u>Economist</u>, IX (January-February, 1964), 21-35.
- Walter, James E. "Determination of Technical Solvency." <u>The Journal</u> of Business, XXX (January, 1959), 30-43.
- "What Makes the Boom in Commercial Paper." <u>Business Week</u>, November 26, 1966, pp. 76-79.

#### UNPUBLISHED MATERIALS

Joss, Robert L. "The Market for Commercial Paper." Unpublished Ph.D. dissertation, Stanford University, 1970.

.