



FINANCIAL MARKET RATES AND FLOWS

FIFTH EDITION

JAMES C. VAN HORNE

F I F T H E D I T I O N

Financial Market Rates and Flows

James C. Van Horne

Stanford University



Prentice Hall, Upper Saddle River, New Jersey 07458

Acquisitions Editor: Paul Donnelly
Assistant Editor: Gladys Soto
Editorial Assistant: MaryBeth Sanok
Editorial Director: James Boyd
Marketing Manager: Patrick Lynch
Production Editor: Mollie Pfeiffer
Associate Managing Editor: David Salierno
Production Coordinator: Ivy Azoff
Managing Editor: Dee Josephson
Manufacturing Buyer: Kenneth J. Clinton
Manufacturing Supervisor: Arnold Vila
Manufacturing Manager: Vincent Scelta
Cover Design: Bruce Kenselaar
Composition: Omegatype Typography, Inc.
Cover Art/Photo: Mark Romine



Copyright © 1998, 1994, 1990, 1984, 1978 by Prentice-Hall, Inc.
A Simon & Schuster Company
Upper Saddle River, New Jersey 07458

All rights reserved. No part of this book may be reproduced, in any form or by any means, without written permission from the Publisher.

Library of Congress Cataloging-in-Publication Data

Van Horne, James C.

Financial market rates and flows / James C. Van Horne. —5th ed.
p. cm.

Includes bibliographical references and index.

ISBN 0-13-889460-4

1. Interest rates. 2. Flow of funds. 3. Capital market.
4. Hedging (Finance) I. Title.

HB539.V35 1997

332.8—dc21

97-27905

CIP

Prentice-Hall International (UK) Limited, London
Prentice-Hall of Australia Pty. Limited, Sydney
Prentice-Hall Canada, Inc., Toronto
Prentice-Hall Hispanoamericana, S.A., Mexico
Prentice-Hall of India Private Limited, New Delhi
Prentice-Hall of Japan, Inc., Tokyo
Simon & Schuster Asia Pte. Ltd., Singapore
Editora Prentice-Hall do Brasil, Ltda., Rio de Janeiro

Printed in the United States of America

10 9 8 7 6 5 4 3 2

Preface

This book is about interest rates and financial risk management. Issues addressed include such things as why interest rates and interest-rate differentials exist, what causes them to change, why financial innovation comes about, and how risk can be shifted through various hedging devices in a global financial arena. The book is also about financial markets and the arbitrage equilibration between markets. We investigate how the cash flows and risk from a primary security can be reconfigured into derivative securities. This permits a richer understanding of how forward contracts, futures contracts, option contracts, currency contracts, swaps, and mortgage derivatives can be used to shift risk. We will see also that embedded options in a bond, like the call feature, can be valued and option-adjusted spreads determined. Finally, this book is about fixed-income investment management and the quest for excess returns.

Throughout, a rich body of theory is examined as is the empirical evidence that bears on the theory. The first half of the book is devoted to the foundations for understanding interest-rate behavior: market equilibration, the mathematics of bond interest and money market yields, inflation, maturity, coupon rate, default risk, and bond price volatility. The remaining chapters use these foundations to explore a variety of derivative securities and their uses, the influence of taxes on interest-rate differentials, and the social allocation of capital in society. The institutional backdrop is presented in conjunction with concepts, not abstractly as separate chapters. I believe this approach is more lively than the chapter-by-chapter treatment seen in most texts.

This edition represents a substantial revision. By chapter, the important changes follow. Chapter 2 on the flow of funds has been updated and streamlined for easier comprehension. Chapter 4, Prices and Yields for Bonds and Money Market Instruments, is new and it lays the mathematical foundation for much of what follows. The treatment of inflation and interest rates in chapter 5 has been reworked to bring in new empirical evidence, and there is a new section on inflation indexed bonds. The section on modeling the term structure of interest rates in chapter 6 has been redone, and the section on the empirical evidence has been made more of an overview.

In chapter 7, the sections on duration and convexity have been rewritten, giving examples of the sensitivity of price to interest-rate changes for semiannual coupon bonds. Also, the management of convexity in a bond portfolio is emphasized. Moderate changes occur as well in the sections dealing with immunization effectiveness and arbitrage efficiency between coupon and zero-coupon bond markets. Chapter 8, which

deals with default risk, includes the following changes: the section on empirical evidence brings in a number of additional studies, the junk bond section has been rewritten and brought up to date, and the event risk section has been improved. Concerning futures contracts in chapter 9, there is a new section on the principles of hedging and hedge ratios.

Chapter 10, on options, has been placed before the interest-rate swap chapter to better facilitate discussion of swaps. The section on convertible securities has been reworked, with additional explanation of features and the valuation of the bond-value floor. The chapter on interest-rate swaps, now chapter 11, includes a new section on value-at-risk (VAR) analysis and improvements occur in the overall treatment of credit risk. The chapter on embedded options in the previous edition has been split into two chapters. The first, chapter 12, deals with the call feature and the sinking fund. The chapter begins with a new section on option-adjusted spreads, and this technique is applied to the call provision.

Chapter 13 is a newly written separate chapter on mortgage securities and prepayment risk. Much more attention is devoted to these important and rather unique securities. There also is increased attention to the prepayment option. As to currency risk in a bond portfolio, chapter 14 has a revised treatment of interest rate parity and extensive revisions of the sections on currency swaps and on the percentage of a bond portfolio to hedge. There is an entirely new treatment of the taxation of capital gains for a bond in chapter 15, going from original issue discounts to taxable coupon bonds to the De Minimis rule to tax timing options. Also in this chapter is an extensive revision of the tax issues surrounding municipal bonds and the valuation of tax exemption. Throughout, the book has been thoroughly reviewed and updated. Only the more substantive changes are mentioned here.

Financial Market Rates and Flows can be used as a foundation text or as a supplement for courses in money and capital markets, money and banking, bond markets, investments, financial risk management, and financial institutions. In addition, it is useful to those in the financial community, in business, and in government who are concerned with investing in or issuing fixed-income securities and with the flow of funds through financial markets.

James C. Van Horne
Palo Alto, California

Contents

Preface xi

CHAPTER 1 The Function of Financial Markets 1

Savings-Investment Foundation	1
Efficiency of Financial Markets	2
<i>Stages of Efficiency</i>	3
<i>Financial Assets</i>	3
<i>The Role of Financial Intermediaries</i>	5
<i>Disintermediation and Securitization</i>	8
<i>Country Efficiency</i>	9
Financial Innovation	9
<i>The Catalyst for Change</i>	10
<i>Types of Innovations</i>	11
The Implications of Savings	11
<i>Degrees of Moneyness</i>	13
<i>Interest Rates and Arbitrage Efficiency</i>	14
Summary	15
Selected References	15

CHAPTER 2 The Flow-of-Funds System 17

The Structure of the System	17
<i>Sectoring</i>	18
<i>Source and Use Statements</i>	18
<i>The Preparation of a Matrix and Its Use</i>	20
Federal Reserve Flow-of-Funds Data	21
<i>Credit Flows</i>	23
<i>Implications of Analysis</i>	25
Summary	27
Selected References	28

CHAPTER 3 Foundations for Interest Rates	29
The Interest Rate in an Exchange Economy	29
<i>The Individual Choice</i>	29
<i>Optimum with Exchange</i>	31
<i>Combined Effect</i>	33
<i>Market Equilibrium</i>	35
Interest Rates in a World with Risk	39
<i>Behavior of Individual Economic Units</i>	39
<i>Utility for Financial Assets</i>	40
<i>Utility for Financial Liabilities</i>	42
<i>Utility for Other Assets</i>	42
Market Equilibrium	43
<i>Maximizing Utility for the Economic Unit</i>	44
<i>The Action of All Economic Units</i>	45
Summary	46
Appendix: The Equilibrium Prices of Financial Assets	47
<i>Market Equilibrium: Two Economic Units</i>	50
<i>Market Equilibrium: Multiple Financial Assets</i>	51
Selected References	53
CHAPTER 4 Prices and Yields for Bonds and Money	
Market Instruments	55
Review of Present Values	55
<i>Annuities</i>	56
<i>Present Value When Interest Is Compounded More Than</i>	
<i>Once a Year</i>	56
<i>Continuous Compounding</i>	57
The Price of a Bond	57
<i>Coupons and Principal Payments</i>	57
<i>Price When Next Coupon Payment Is Less Than Six</i>	
<i>Months Away</i>	58
<i>Zero-Coupon Bonds</i>	60
Yield Calculations for Bonds	60
<i>Implicit Reinvestment Rate Assumption</i>	61
<i>Current Yield</i>	61
<i>Holding Period Return</i>	61
<i>Yield-to-Maturity for Zero-Coupon Bonds</i>	62
<i>Yield for Perpetuities</i>	62
Money Market Instrument Returns	63
<i>Bank Discount Rate</i>	63
<i>Implications</i>	64
Summary	64
Selected References	65
CHAPTER 5 Inflation and Returns	66
The Historical Record in Brief	66

The Nature of Inflation Premiums	69
<i>Unanticipated Inflation</i>	70
<i>The Fisher Effect</i>	72
Nominal Interest Rates and Inflation, Theoretically	73
Empirical Evidence on Nominal Interest Rates	74
<i>Problems in Empirical Testing</i>	74
<i>Testing for the Effect of Inflation</i>	75
<i>The Fisher Effect More Directly</i>	77
<i>A Summing Up</i>	77
Nominal Contracting Effects	77
<i>Debtor-Creditor Claims</i>	78
<i>Depreciation</i>	78
<i>Inventories</i>	78
<i>Corporate Value</i>	79
<i>Empirical Testing</i>	79
Inflation Indexed Bonds	79
<i>The Mechanics</i>	79
<i>Other Aspects</i>	80
Summary	80
Selected References	81
CHAPTER 6 The Term Structure of Interest Rates	83
Definition of Term Structure	83
The Pure Expectations Theory	84
<i>Forward Rates of Interest</i>	85
<i>Substitutability of Maturities</i>	86
<i>Technical Problems</i>	87
<i>Arbitrage and Market Efficiency</i>	88
Uncertainty and Term Premiums	89
Market Segmentation	90
Cox-Ingersoll-Ross Theory	92
<i>General Equilibrium Notions</i>	92
<i>Term Structure Implications</i>	92
Other Models of the Term Structure	93
<i>Multifactor Models</i>	94
<i>Lattice-Type Models</i>	95
Empirical Evidence	97
Summary	97
Selected References	98
CHAPTER 7 Price Volatility, Coupon Rate, and Maturity	101
The Coupon Effect	101
<i>Sensitivity of Price to Various Properties</i>	102
The Duration Measure and Its Changing Behavior	103
<i>Relationship between Duration and Maturity</i>	105

■ vi Contents

<i>Relationship between Duration and Coupon Payment</i>	106
<i>Relationship between Duration and Changes in Interest Rates</i>	106
<i>Volatility Duration</i>	108
<i>Modified Duration Formula</i>	109
Convexity	109
<i>The Convexity Measure</i>	110
<i>Illustration of Price-Change Estimates Using Modified Duration and Convexity</i>	111
<i>Further Observations on Convexity</i>	112
Immunization of Bond Portfolios	113
<i>Immunization with Coupon Issues</i>	114
<i>An Illustration</i>	114
<i>Fisher-Weil Duration</i>	116
<i>Mapping the Stochastic Process</i>	116
<i>Testing for Immunization Effectiveness</i>	117
<i>Additional Immunization Considerations</i>	118
Equilibration between Coupon and Noncoupon Bond Markets	118
<i>Coupon Stripping</i>	119
<i>Term Structure of Pure Discount Bonds</i>	120
<i>Arbitrage Efficiency between the Markets</i>	120
Summary	122
Selected References	123
CHAPTER 8 The Default-Risk Structure of Interest Rates	125
Promised, Realized, and Expected Rates	125
<i>Distribution of Possible Returns</i>	126
Empirical Evidence on Default Losses	128
Credit Ratings and Risk Premiums	131
<i>Some Studies of Bond Ratings</i>	132
Cyclical Behavior of Risk Premiums	133
The Market Segmentation Effect	135
Speculative-Grade (Junk) Bonds	137
<i>Development of the Market</i>	137
<i>Issuers and Use in Acquisitions</i>	137
<i>Risk versus Return</i>	138
Event Risk	139
Risk Structure and the Term Structure	141
<i>Empirical Evidence</i>	141
Summary	143
Selected References	144
CHAPTER 9 Derivative Securities: Interest-Rate Futures	146
Introduction to Contract	146
Features of Futures Markets	148
<i>Money Market Instruments</i>	148

<i>Margin Requirements</i>	148	
<i>Marking-to-Market and Price Movements</i>	149	
<i>Longer-Term Instruments</i>	149	
<i>Quality Delivery Options</i>	149	
Hedging and Speculation	151	
<i>Some Hedging Fundamentals</i>	151	
<i>Futures and Spot Prices</i>	152	
<i>Long Hedges</i>	152	
<i>Hedge Ratios</i>	154	
<i>Short Hedges</i>	155	
Basis Risk	155	
<i>More on Basis Risk</i>	156	
<i>Sources of Basis Risk</i>	158	
Market Efficiency	158	
<i>Possible Reasons for Deviation of Forward and Futures Rates</i>	159	
Summary	160	
Selected References	161	
CHAPTER 10 Derivative Securities: Options	163	
Option Valuation	163	
<i>Expiration Date Value of an Option</i>	164	
<i>Valuation Prior to Expiration</i>	165	
<i>Hedging with Options</i>	168	
<i>Black-Scholes Option Model</i>	169	
Debt Options	172	
<i>Features of Futures Options</i>	172	
<i>Use of Debt Options</i>	173	
<i>Caps, Floors, and Collars</i>	174	
<i>Valuation of Debt Options</i>	175	
Yield Curve Options	177	
Convertible Securities	179	
<i>Conversion Price/Ratio</i>	179	
<i>Debt Plus Option Characteristic</i>	179	
<i>Value of Convertible Securities</i>	180	
<i>Premiums</i>	181	
<i>Other Reasons for Premiums</i>	183	
Summary	183	
Appendix A: Put-Call Parity	184	
Appendix B: Application of Option Pricing Concepts to Valuing Convertible Securities	186	
Selected References	190	
CHAPTER 11 Derivative Securities: Swaps	192	
Swap Features	192	
<i>An Illustration</i>	193	

■ viii Contents

Valuation Issues	194
<i>Comparative Advantage</i>	194
<i>Completing Markets</i>	195
<i>Default Risk</i>	195
<i>Skirting Tax Laws and Regulations</i>	196
<i>Swap Valuation: A Summing Up</i>	197
Credit Risk, Maturity, and Systemic Risk	197
<i>Default Provisions</i>	198
<i>Value at Risk</i>	199
Secondary Market Values	200
Swaptions	201
Summary	201
Selected References	202
CHAPTER 12 Embedded Options and Option-Adjusted Spreads	203
Option-Adjusted Spreads	203
<i>The Basic Methodology</i>	204
<i>An Illustration</i>	204
<i>Some Caveats</i>	205
The Nature of the Call Feature	205
<i>Forms of the Provision</i>	206
<i>Redemption versus Callability</i>	207
<i>Putable Bonds</i>	207
The Call Feature's Valuation	208
<i>Interest-Rate Expectations</i>	209
<i>The Call Feature and Convexity</i>	210
<i>Valuation in an Option Pricing Context</i>	211
<i>Empirical Evidence on Call Valuation</i>	212
The Sinking Fund	212
<i>Characteristics of the Provision</i>	213
<i>Value of the Sinking Fund</i>	214
<i>Empirical Evidence</i>	215
Summary	215
Selected References	216
CHAPTER 13 Mortgage Securities and Prepayment Risk	217
Some Features of Mortgages	217
Mortgage Pass-Through Security	218
<i>Agency Pass-Throughs</i>	218
<i>Nonagency Pass-Throughs</i>	219
Mortgage Derivatives	219
<i>Collateralized Mortgage Obligations (CMOs)</i>	220
<i>Planned Amortization Class (PAC) and Targeted Amortization Class (TAC) Securities</i>	221

<i>Stripped Mortgage-Backed Securities</i>	221
<i>Floaters and Inverse Floaters</i>	221
Prepayment Option and Its Valuation	222
<i>Prepayment and Convexity</i>	222
<i>Measures of Prepayment</i>	223
<i>Coupon Rate and Age</i>	224
<i>Additional Factors Explaining Prepayment</i>	225
<i>Modeling Prepayment Experience</i>	226
<i>Option-Adjusted Spread Approach</i>	227
Prepayment Behavior of Certain Derivatives	227
<i>Planned Amortization Class Securities</i>	227
<i>Interest Only (IOs), Principal Only (POs), and Residual Class Securities</i>	228
<i>Other Asset-Backed Securities</i>	230
Summary	230
Selected References	231
CHAPTER 14 Controlling Currency Risk	233
Risk and Return from Foreign Investment	233
Exchange Rate Risk Management	234
<i>Forward Exchange Market</i>	235
<i>Illustration of Spot and Forward Exchange Rates</i>	236
<i>A Single European Currency (Euro)</i>	236
Underlying Relationships	238
<i>The Law of One Price</i>	238
<i>Purchasing Power Parity</i>	238
<i>Interest-Rate Parity</i>	240
<i>Covered Interest Arbitrage</i>	242
<i>Interest-Rate Parity Approximation</i>	242
<i>Empirical Evidence Concerning Interest-Rate Parity (IRP)</i>	243
Other Ways to Shift Risk	244
<i>Currency Futures</i>	244
<i>Currency Options</i>	244
Currency Swaps	245
<i>Currency/Interest-Rate Swaps</i>	246
<i>Valuation Implications</i>	246
The Amount to Hedge	248
<i>A Free Lunch?</i>	248
<i>The Cost of Currency Hedging</i>	248
<i>Black's Universal Hedging</i>	249
<i>Closing Thoughts</i>	249
Some Institutional Characteristics	250
<i>Euro and Foreign Bonds</i>	250
<i>Currency-Option and Multiple-Currency Bonds</i>	250
Summary	251
Selected References	252

CHAPTER 15	The Influence of Taxes	254
	Tax Treatment of Capital Gains	255
	<i>Original Issue Discount (OID) Bonds</i>	255
	<i>Capital Gains Treatment for Taxable Coupon Bonds</i>	256
	<i>The De Minimis Rule</i>	257
	<i>Capital Gains Treatment for Municipal Bonds</i>	257
	<i>Tax Timing Options</i>	257
	Municipal Bonds and the Taxation of Interest Income	258
	<i>Taxable versus Tax-Exempt Yields</i>	259
	<i>The Nature of the Municipal Market</i>	259
	Value of the Tax Exemption Feature	261
	<i>Variation of Implied Tax Rate</i>	262
	<i>The Effect of Tax Reform and Supply</i>	263
	<i>Implied Tax Rate and Maturity</i>	263
	Preferred-Stock Tax Effects	264
	<i>Straight Preferred-Stock Investments</i>	264
	<i>Auction-Rate Preferred Stock</i>	265
	Summary	266
	Selected References	266
CHAPTER 16	The Social Allocation of Capital	268
	The Issues Involved	268
	Ceilings on Borrowing Costs	269
	<i>The Effect of Usury Laws</i>	270
	<i>The Negatives of Interest-Rate Ceilings</i>	271
	Government Guarantees and Insurance	272
	<i>The Transfer of Underlying Risk</i>	273
	<i>Option-Pricing Valuation</i>	274
	Interest-Rate Subsidies	274
	<i>The Effect of the Subsidy</i>	274
	<i>Effectiveness of the Subsidy</i>	275
	Financial Intermediation Through Borrowing and Relending	276
	<i>The Situation Illustrated</i>	277
	<i>The Effect of Government Intermediation</i>	278
	Regulations Affecting Investor and Borrower Behavior	278
	<i>The Effectiveness of This Approach</i>	279
	<i>The Costs to Society</i>	279
	Qualification for Tax-Exempt Financing	280
	<i>Benefits, Costs, and Externalities</i>	281
	Policy Implications	281
	Summary	283
	Selected References	284
Index		285

The Function of Financial Markets

In this book, the underlying structure of financial markets is examined, as is the price mechanism, which brings about a balance between supply and demand. Our purpose is not to describe specific money or capital markets or the institutions involved in these markets; this information is available elsewhere. Rather, this book provides a basis for understanding and analyzing interest rates and funds movements in financial markets. The instruments studied are financial assets. Unlike real, or tangible, assets, a **financial asset** is a paper claim on some other economic unit. It does not provide its owner with the physical services that a real asset does. Instead, financial assets are held as a store of value and for the return that they are expected to provide. The holding of these assets, with the exception of equity securities, indicates neither direct nor indirect ownership of real assets in the economy.

SAVINGS-INVESTMENT FOUNDATION

Financial assets exist in an economy because the savings of various economic units (current income less current expenditures) during a period of time differ from their investment in real assets. In this regard, an economic unit can be (1) a household or partnership, (2) a nonprofit organization, (3) a corporation (financial or nonfinancial), or (4) a government (federal, state, or local). For a number of reasons, economic units invest more than they save or save more than they invest over an interval of time. These reasons include the present income of the economic unit, expected future income, costs of goods and services, personal tastes, age, health, education, family composition, and current interest rates, as well as others.

Assume for the moment a closed economy in which there are no foreign transactions. If savings equal investment for all economic units in that economy over all periods of time, there would be no external financing and no financial assets. In other words, each economic unit would be self-sufficient; current expenditures and investment in real assets would be paid for out of current income. A financial asset is created only when the investment of an economic unit in real assets exceeds its savings, and

it finances this excess by borrowing, issuing equity securities, or issuing money (if the economic unit happens to be a monetary institution).¹ Of course, for an economic unit to finance, another economic unit or other units in the economy must be willing to lend. This interaction of the borrower with the lender determines interest rates. For identification, economic units whose current savings exceed their investment in real assets are called **savings-surplus units**. Economic units whose investment in real assets exceeds their current savings are labeled **savings-deficit units**.² In the economy as a whole, funds are provided by the savings-surplus units to the savings-deficit units. This exchange of funds is evidenced by pieces of paper representing financial assets to the holders and financial liabilities to the issuers.

If an economic unit holds existing financial assets, it is able to cover the excess of its investments in real assets over savings by means other than issuing financial liabilities. It simply can sell some of the financial assets it holds. Thus, as long as an economic unit holds financial assets, it does not have to increase its financial liabilities by an amount equal to its excess of investment over savings. The purchase and sale of existing financial assets occur in the **secondary market**. Transactions in this market do not increase the total stock of financial assets outstanding. It is possible, although unlikely, for a substantial number of savings-deficit units to exist in an economy over a period of time and for little change to occur in the total financial assets outstanding. For this to happen, however, savings-deficit units must have sufficient financial assets to cover the excess of their investment in real assets over savings and, of course, must be willing to sell these assets.

EFFICIENCY OF FINANCIAL MARKETS

The purpose of financial markets is to allocate savings efficiently in an economy during a period of time—a day, a week, a month, or a quarter—to parties who use funds for investment in real assets or for consumption. In this section, we regard financial markets in a broad sense as including all institutions and procedures for bringing buyers and sellers of financial instruments together, no matter what the nature of the financial instrument. If those economic units that saved were the same as those that engaged in capital formation, an economy could prosper without financial markets. In modern economies, however, the units in the economic sector most responsible for capital formation—nonfinancial corporations—invest in real assets in an amount in excess of their total savings. The household sector, on the other hand, has total savings in excess of total investment. Therefore, a balance is *not* achieved. The more diverse the pattern of desired savings and investment among economic units, the greater the need for efficient financial markets to channel savings to ultimate users. Their job is to allocate savings from savings-surplus economic units to savings-deficit units so that the highest

¹A financial asset may be created for the purpose of financing consumption in excess of current income. Although it is possible for investment in real assets for a period to be zero, that investment would still exceed the negative savings of the economic unit.

²These labels correspond to those given by Raymond W. Goldsmith, *The Flow of Capital Funds in the Post-war Economy* (New York: National Bureau of Economic Research, 1965).

level of want satisfaction can be achieved. These parties should be brought together, either directly or indirectly, at the least possible cost and with the least inconvenience.

Stages of Efficiency

Efficient financial markets are essential to assure adequate capital formation and economic growth in a modern economy. To appreciate this statement, imagine an economy without financial assets other than money.³ In such an economy, each economic unit could invest in real assets only to the extent that it saved. Without financial assets, then, an economic unit would be greatly constrained in its investment behavior. If it wanted to invest in real assets, it would have to save to do so. If the amount required for investment were large in relation to current savings, the economic unit simply would have to postpone investment until it had accumulated sufficient savings. Moreover, these savings would have to be accumulated as money balances, there being no alternatives. Because of the absence of financing, many worthwhile investment opportunities would have to be postponed or abandoned by economic units lacking sufficient savings.⁴

In such a system, savings in the economy would not be channeled to the most promising investment opportunities; accordingly, capital would be less than optimally allocated. Those economic units that lacked promising investment opportunities would have no alternative except to accumulate money balances. Likewise, economic units with very promising opportunities might not be able to accumulate sufficient savings rapidly enough to undertake the projects. Consequently, inferior investments might be undertaken by some economic units, while very promising investment opportunities would be postponed or abandoned by others. Capital is misallocated in such a system, and total investment tends to be low relative to what it might be with financial assets. In this situation, growth in the economy is restrained, if not stagnant, and the level of economic want satisfaction is far from optimal.

The preceding discussion has been confined to the private sector of the economy. With money, however, the federal government is able to finance its purchases of goods and services by printing money. If the federal government increases the supply of money in keeping with increases in the demand for money by other economic units, purchases of goods and services by the government increase. To the extent that the federal government centralizes investment and channels it into promising opportunities, capital formation in the economy is efficient. However, if the government is a cumbersome bureaucracy that is unresponsive to market conditions, government decisions are unlikely to result in efficient capital formation.

Financial Assets

We turn now to the situation where there are financial assets as well as money in the economy, but no financial institutions. With financial assets, investment in real assets by an economic unit is no longer constrained by the amount of its savings. If the economic

³In a barter economy, without money or financial assets, each economic unit must be in balance with respect to savings and investment. It must invest in real assets in an amount equal to its savings. No economic unit could invest more than it saved.

⁴The development of this section draws on John G. Gurley and Edward S. Shaw, *Money in a Theory of Finance* (Washington, DC: The Brookings Institution, 1960).

unit wants to invest more than it saves, it can do so by reducing the amount of its money balances, by selling financial assets, or by increasing its financial liabilities. When an economic unit increases its financial liabilities, it issues a **primary security**. For this to be done, however, another economic unit or other units in the economy must be willing to purchase it. In a developing economy, these transactions between borrower and lender usually take the form of direct loans. The ability of economic units to finance an excess of investment over savings greatly improves the allocation of savings in a society. Many of the problems cited earlier are eliminated. Individual economic units no longer need to postpone promising investment opportunities for lack of accumulated savings. Moreover, savings-surplus units have an outlet other than money balances for their savings—an outlet that provides an expected return.

Still there are degrees of efficiency. A system of direct loans may not be sufficient to assemble and “package” large blocks of savings for investment in large projects. To the extent that a single savings-surplus economic unit cannot service the capital needs of a savings-deficit unit, the latter must turn to additional savings-surplus units. If the need for funds is large, users may have considerable difficulty in locating pockets of available savings and in negotiating multiple loans. For one thing, their information network is limited. Consequently, there is a need to bring together ultimate savers and investors in a more efficient manner than through direct loans between the two parties.

To service this need, various loan brokers may come into existence to find savers and bring them together with economic units needing funds. Because brokers are specialists who are continually in the business of matching the need for funds with the supply, they are usually able to perform more efficiently and at a lower cost than are the individual economic units themselves. One improvement is that they are able to divide a primary security of a certain amount into smaller amounts more compatible with the preferences of savings-surplus economic units. As a result, savers are able to hold their savings in a diversified portfolio of primary securities; this feature encourages savers to invest in financial assets. The resulting increased attractiveness of primary securities improves the flow of savings from savers to users of funds. In addition to performing the brokerage function involved in selling securities, investment bankers may underwrite an issue of primary securities. By underwriting, investment bankers bear the risk of selling the issue. They buy the primary securities from the borrower and resell them to savers. Since they pay the borrower for the security issue, the latter does not bear the risk of not being able to sell the securities. This guaranteed purchase makes it easier than otherwise for savings-deficit economic units to finance their excess of investment in real assets over savings.

Another innovation that enhances the efficiency of the flow of savings in an economy is the development of secondary markets, where existing securities can be either bought or sold. With a viable secondary market, a savings-surplus economic unit achieves flexibility when it purchases a primary security. Should it need to sell the security in the future, it will be able to do so because the security is marketable. The existence of secondary markets encourages more risk taking on the part of savings-surplus economic units. If, in the future, they want to invest more than they save, they know that they will be able to sell financial assets as one means of covering the excess. This flexibility encourages savings-surplus economic units to make their savings avail-