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CHAPTER 2

A Framework for Capital Market Analysis

THE purpose of a framework is to provide a systematic, comprehensive, and consistent description and analysis of the facts in order to establish functional relationships that permit us to understand the modus operandi of the capital market. The selection of the specific framework is a matter of choosing among alternatives the one that makes best use of the available data, that embodies the maximum of internal checks against errors and omissions, that is flexible enough to permit multiple analytical uses, that requires the least effort on the part of the user, and that can be most easily adapted to testing the various economic theories of the subject without being indissolubly wedded to any one of them.

The flow-of-funds approach treated as an intrinsic part of a comprehensive system of national accounts seems to come closest to meeting these requirements. It is flexible; it provides safeguards against omissions of relevant transactions; it embodies considerable internal checks on the accuracy of the primary data utilized; and it does not prejudge to a dangerous extent the substantive answers to the questions that may be asked of the figures. Moreover, it supplies an integrated framework for the two basic aspects of the capital market—the flows of capital market transactions and the stocks of capital market instruments—by providing a systematic presentation of transactions in a flow-of-funds statement and of stocks in a balance sheet. It is for these reasons that this report is based on a national accounting framework of the capital market.

A framework is, it must be stressed, an organizing device. In its ideal form, it is a flexible instrument rather than a strait jacket; it

is not, however, an economic or econometric model—a difference to which we shall return later in this chapter. It may help to answer questions, but it does not by itself provide the answers. It is primarily descriptive and an aid to analysis, but not a substitute for theory. It provides the means for testing hypotheses, but is not a device for producing them.

General Characteristics of a National Accounting Framework [1]

Before constructing a statistical framework of the capital market as part of a comprehensive system of national accounts, it is necessary to settle six basic questions, in addition to delimiting its geographical scope and time span: (1) the assets and liabilities [2] to be covered by the framework with respect to stocks (holdings) and to flows (transactions); (2) the classification of these assets; (3) the valuation of the flows and stocks; (4) the entities (economic units) to be covered by the framework; (5) the grouping of these economic units; and (6) the method whereby the transactions and holdings of individual economic units shall be combined into flow and stock accounts for sectors and ultimately for the nation.

Each of these six questions presents difficult problems which are not specific to the statistical framework for capital market analysis, but are common to the entire field of national accounting. Since these problems have been treated quite exhaustively in the literature, it is not necessary to discuss them here. All that is required is an understanding of the framework and its application to the American capital market in the postwar period, which can be provided by a brief summary of the solutions to the six problems that have been adopted in the flow-of-funds statements and the balance sheet underlying this report.[3]

[1] As this section covers a subject very similar to that discussed in Chapter 2 of Goldsmith and Lipsey, *Studies in the National Balance Sheet of the United States* (Princeton for NBER, 1963), I have not hesitated occasionally to borrow from that slightly more detailed treatment.

[2] Liabilities which may algebraically be regarded as negative assets are intended to include net worth items. In future, the term "assets" is used for all three categories in order to avoid unnecessary verbiage and to have a partner to the term "transactions" which applies to flows of assets, liabilities, and net worth items.

[3] Readers interested in the basic problems of national accounting as they refer to flow-of-funds statements and national balance sheets may consult the following publications: Petter Jakob Bjerve and Mikael Selsjord, "Financial Accounting within a System of National Accounts" (*The Measurement of National Wealth,* Income and

SCOPE OF FLOWS AND STOCKS

In accordance with the basic tenet of national accounting to extend the system as far as the "measuring rod of money" reaches, the framework for capital market analysis includes all assets that have a market value which can be expressed in monetary terms. The scope of assets is thus limited to items that can be appropriated under the legal system of the day and place. The framework is not limited, however, to items that actually change hands for a monetary consideration; like national accounting, it includes imputed items, i.e., items that reflect economically relevant events even though they do not give rise to actual money transactions. A prime example is allowances for capital consumption.

CLASSIFICATION OF ASSETS

The arrangement of the many separate types of assets into a relatively small number that can be handled within a system of national accounts depends primarily on the purpose of the system. When it is the analysis of the capital market, two main criteria may be applied: first, the importance of a given asset within the entire flow-of-funds or national balance-sheet picture; and second, homogeneity,

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Wealth Series VIII, London, 1959); *Flow of Funds in the United States, 1939–53* (Washington, Federal Reserve System, 1955, Chapter I); "A Quarterly Presentation of Flow of Funds, Saving, and Investment" (*Federal Reserve Bulletin,* August 1959, pp. 828–849, 1046–1062); Morris A. Copeland, *A Study of Moneyflows in the United States* (New York, NBER, 1952); J. Denizet, "Les Problèmes Téchniques Posés par l'Etablissement des Comptes d'Opérations Financières" (*Studies in Social and Financial Accounting,* Income and Wealth Series IX, London, 1961); Graeme S. Dorrance, "Balance Sheets in a System of Economic Accounts" (*International Monetary Fund Staff Papers,* October 1959); Raymond W. Goldsmith, "The National Balance Sheet of the United States of America, 1900–1949" (*Income and Wealth Series IV,* London, 1955); Goldsmith and Lipsey, *National Balance Sheet* (Chapter 2); William C. Hood, *Financing of Economic Activity in Canada* (Ottawa, 1959, Parts I and VI); M. Hsing, "The Construction of Social Accounting Models" (*Weltwirtschaftliches Archiv,* Vol. 83, 1959); *The National Economic Accounts of the United States: Review, Appraisal, and Recommendations* (New York, NBER, 1958, Chapters XII and XIV); Ingvar Ohlsson, *On National Accounting* (Stockholm, 1953); John P. Powelson, *National Income and Flow-of-Funds Analysis* (New York, 1960, Part III); L. M. Read, "The Development of National Transactions Accounts" (*Canadian Journal of Economics and Political Science,* February 1957); Stanley J. Sigel, "A Comparison of the Structure of Three Social Accounting Systems" (*Input-Output Analysis: An Appraisal,* Studies in Income and Wealth 18, Princeton for NBER, 1955); Stanley J. Sigel, "An Approach to the Integration of Income and Product and Flow-of-Funds National Accounting Systems: A Progress Report" (*The Flow-of-Funds Approach to Social Accounting: Appraisal, Analysis, and Applications,* Studies in Income and Wealth 26, Princeton for NBER, 1962).

i.e., the behavioral similarity of the items combined in one category and their differentiation from other categories.

In applying these principles, it is impossible to rely entirely on a few distinctive characteristics of the whole spectrum of assets (already existing at the beginning of the period or created during the period), such as liquidity, maturity, or age. Rather it is necessary to follow conventional distinctions which are based on the actual operation of the capital market and which use as primary criteria the type of issuer, the nature of the instrument—claim or equity, the maturity, and the object of financing. This leads to the following main primary classification of assets and of transactions in them:

Tangible Assets
Claims
- Cash (currency and checking deposits)
- Other short-term claims against financial institutions
- Short-term claims (not securities) against other sectors, distinguishing claims against consumers and against business
- Claims arising from insurance and pension contracts, distinguishing those against private and government insurance organizations
- Mortgages, separating farm and nonfarm mortgages and residential and nonresidential mortgages
- Debt securities, distinguishing Treasury securities (short- and long-term), state and local government securities, and corporate and other bonds and notes

Equities
- Corporate stock, distinguishing preferred and common stock
- Equities in unincorporated business enterprises
- Equities in nonprofit organizations

In building up balance sheets and flow-of-funds statements, many of these categories are further subdivided and most of these subdivisions are preserved in the tables used in this study, if only in order to permit users to rearrange items to suit their specific purposes.

VALUATION

The valuation of flows generally presents no conceptual problems, although difficulties are encountered in practice because of insufficient basic data. In principle, all flows are entered in the framework at the valuation at which the transactions actually take place. Imputed items are valued as closely as possible to the actual value of identical or

similar transactions. This is one of the reasons why capital consumption allowances, the most important of all imputed items, are valued at replacement cost rather than at original cost, as is customary in business accounting. The same principle calls for a valuation of inventories in which additions and withdrawals are taken into account at current valuation, i.e., a method similar to LIFO. Actually inventory transactions have not been derived from flow figures, but have been obtained as first differences of inventory holdings that are customarily valued at original cost or market value, whichever is lower. However, adjustment for inventory profits provides figures that reflect only the current value of the physical changes in inventories.

The problems are more difficult in the valuation of stocks. The principle adopted here is valuation at current (market) values at balance-sheet dates. Where no market value exists, the closest practical approximation is used. This means replacement cost as is (i.e., taking account of the proportion of useful life expired) for most categories of reproducible tangible assets, and book value for inventories. In the interest of simplicity, face value is used for all claims since the difference between face value and market value or its equivalent is negligible for short-term claims. The difference is substantial and ascertainable only for long-term marketable securities. These, however, constitute only about one-tenth of all claims.[4]

COVERAGE OF ECONOMIC UNITS

In principle all separate decision-making units that participate in the economic process are to be regarded as independent entities having a balance sheet and a flow-of-funds statement of their own. Hence the framework includes the balance sheets and flow-of-funds statements of all households, nonprofit organizations (such as educational institutions, foundations, churches, fraternal organizations, and labor unions), all business enterprises, and all government units. Only business enterprises or government organizations that are owned or controlled by other business enterprises (i.e., majority-owned subsidiaries of corporations) or by other government organizations are denied independent status, i.e., their holdings or transactions are consolidated with those of the controlling unit.

Problems arise, however, in two important cases. First, are unin-

[4] This ratio excludes mortgages, term loans, and privately placed corporate bonds as not subject to regular market price fluctuations, although the price realized on an occasional nonscheduled transaction may not always be the par or book value.

corporated business enterprises (and possibly closely held family corporations) to be regarded as economic units independent of their owners, i.e., sole proprietors, partners, and shareholders? The decision depends on whether or not the enterprise as such can be regarded as a decision-making unit, and hence can be made only the basis of the circumstances of each case. Since usually not enough direct information is available, the following rough general rule has been adopted. All corporations, even if closely held, and all unincorporated nonfarm business enterprises, even sole proprietorships, have been regarded as independent economic units with their own balance sheets and flow-of-funds statements. Consequently, the equity in these enterprises has been treated as an asset of the owners. The operation of a farm, on the other hand, has not been regarded as an independent economic activity, and hence the balance sheets and flow-of-funds statements of farm households include both the household and the farm business assets and transactions.

Secondly, which of the numerous organizations and agencies of the federal government and which of the more than 100,000 other government units enumerated in the Census of Government are to be regarded as economically independent entities with their own balance sheet and flow-of-funds statements? Though partly arbitrary, the answer has been formulated here in such a way as to preserve as far as possible the unity of different sectors of the capital market. This has sometimes required abandoning the principle of consolidating the balance sheets and flow-of-funds statements of all organizations which are under common ownership and control in that they respond to a single set of decisions. Such a separation is probably easiest to justify in the allocation of the Federal Reserve System (as well as other federal monetary funds) to the monetary sector rather than to the federal government sector. More doubtful is the separation of the insurance and pension funds, administered as trustee by the federal, state, and local governments, from the other activities of these governments, and their allocation to the financial sector. In this case the nature of the operations and the identifiability of the beneficiaries were regarded as justifying a violation of the rule against separating the activities of one decision-making unit. The same considerations might have justified separating some of the business-type enterprises of governments and their allocation to the business sector. Such a separation was, however, foregone, first because of the great difficulty in

segregating the assets and transactions connected with these activities, and, secondly, because the management of these activities was less independent of the other activities of the government owners.

SECTORING

In grouping sixty million economic units into the limited number of sectors that can be accommodated within a system of social accounts and for which sufficiently reliable annual data are available, we are theoretically guided by the principle of homogeneity. This principle instructs us, first, to combine in one sector all those units which are similar in behavior, in this case similar in their asset and liability structure and in their reactions to capital market developments. It instructs us, secondly, not to divide assets or transactions under the control of one decision-making unit among two or more sectors. The two instructions unfortunately sometimes conflict in the real world and a choice must be made, often rather arbitrarily. As already indicated in the previous section, the first instruction has been regarded as overriding for nonfarm enterprises and government financial institutions, while the second has prevailed for agriculture and government nonfinancial enterprises. Consequently no distinction has been made between assets and transactions of a business type and those of a household or government type for agriculture and government nonfinancial enterprises, respectively. On the other hand, the business-type assets and transactions of nonagricultural unincorporated enterprises and of government financial institutions have been separated from those of their owners, with only the difference between business-type assets and liabilities (or between investment in and withdrawals from business) shown in the owners' balance sheet or flow-of-funds statement. The framework is, however, flexible enough to let users who disagree with these decisions adopt a treatment more in line with their preferences.

The statistics contained in the basic tables make it possible to treat agriculture in the same way as unincorporated business, i.e., as an intermediary. This means including in the flow-of-funds statement and the balance sheet of agriculture only those items that are connected with business operations, while regarding the net worth in the balance sheet as an asset of the owners and transferring it to the nonfarm household sector, together with the holdings of, and the transactions in, consumer-type assets of agriculture. These assets—farm homes, consumer durables, life insurance, time deposits and U.S. sav-

ings bonds—are now included in the balance sheet or the flow-of-funds statement of agriculture.

We may also go to the other extreme and combine the assets and transactions of the agriculture and unincorporated business sectors with the nonfarm household sector on the grounds that all three sectors are owned and operated by individuals and that any separation of their household and business activities is artificial. In that process, the net worth of nonfarm unincorporated business enterprises disappears, an item that is now shown separately on the right-hand side of the balance sheet of unincorporated business and on the left-hand side of that of nonfarm households.

Table 7 shows the effects of these alternative treatments of agricul-

TABLE 7

EFFECTS OF ALTERNATIVE TREATMENT OF UNINCORPORATED FARM AND NONFARM BUSINESS, 1945 AND 1958
(billion dollars)

	1945			1958		
	A	B	C	A	B	C
TOTAL ASSETS						
1. Nonfarm households	739	623	720	1,851	1,602	1,789
2. Nonfarm unincorporated business	0	53	53	0	138	138
3. Agriculture	0	104	86[a]	0	208	165[a]
4. All households (1+2+3)	739	780	859	1,851	1,948	2,092
5. Nonfinancial corporations	251	251	251	766	766	766
6. All nonfinancial business (2+3+5)	251	408	390	766	1,112	1,069
7. National assets	1,491	1,533	1,611	3,640	3,735	3,881
TOTAL NET WORTH						
1. Nonfarm households	689	592	689	1,613	1,426	1,614
2. Nonfarm unincorporated business	0	41	41	0	97	97
3. Agriculture	0	97	79[a]	0	187	144[a]
4. All households (1+2+3)	689	730	809	1,613	1,710	1,855
5. Nonfinancial corporations	163	163	163	508	508	508
6. All nonfinancial business (2+3+5)	163	301	283	508	792	749
7. National net worth	714	755	834	2,150	2,247	2,392

Source: National Balance Sheet, Vol. II, Table I.

A = both farm and nonfarm business treated as unsegregated part of the activities of nonfarm households.

B = agriculture treated as an ultimate sector and nonfarm business as an intermediate sector. (Same treatment as in basic tables.)

C = both farm and nonfarm business treated as intermediate sectors, the net worth of which is included among the assets of nonfarm households.

[a]Residences, consumer durables, saving deposits, and life insurance reserves of agriculture shifted from line 3 to line 1.

ture and unincorporated business on the assets and total net worth of these three sectors and on the national totals for 1945 and 1958. The flow-of-funds statements of these three sectors, and particularly the calculation of their saving, would be affected similarly by this alternative treatment.

The detailed basic tables also permit transfer of government pension and trust funds from the finance to the government sector. Data are not sufficient for the reverse operation, i.e., the transfer of other government enterprises to the finance and nonfinancial business sectors.

The actual sectoring adopted in this report is a compromise based on the availability of sufficiently reliable annual data throughout the postwar period and the desire to maintain as much continuity and comparability as possible with related bodies of data, primarily the Federal Reserve Board's flow-of-funds statistics, the saving statistics of the Securities and Exchange Commission, the long-range series of *A Study of Saving in the United States,*[5] and the balance sheets of *Financial Intermediaries in the American Economy since 1900.*[6] As a result, the following seven main sectors were distinguished, which means that separate balance sheets and flow-of-funds statements were prepared for each of them for each year:

Nonfarm households
Unincorporated nonfarm business enterprises
Agriculture
Nonfinancial corporations
Financial enterprises
State and local governments
Federal government

In a framework designed specifically for the analysis of the capital market and hence intended to provide as much information as possible on the participants and the transactions in the various segments of that market, sectoring must be more detailed in fields in which capital market activities are concentrated. For this reason, the finance sector, which includes all institutions closely associated with the capital market, was divided into the following subsectors, for which annual balance sheets and flow-of-funds statements were provided:

[5] By Raymond W. Goldsmith, Princeton, 1956.
[6] By Raymond W. Goldsmith, Princeton for NBER, 1958.

Monetary institutions
- Federal Reserve banks and Treasury monetary funds
- Check banks [7]

Nonmonetary depositary institutions
- Credit banks [7]
- Mutual savings banks
- Saving and loan associations
- Credit unions

Insurance and pension funds
- Life insurance companies
- Noninsured pension plans
- Fire and casualty insurance companies
- Other private insurance companies
- Federal government pensions and retirement funds
- State and local government pensions and retirement funds

Other financial institutions
- Investment companies
- Finance companies
- Common trust funds
- Other financial institutions [8]

The main shortcomings of the sectoring used in this report from the point of view of capital market analysis are: (1) the inclusion of

[7] No separate figures exist for "check banks" and "credit banks" since commercial banks do not report separately on these two main activities. Such figures could be derived by allocating demand deposits to "check banks" and time deposits to "credit banks" and matching these deposits with assets from among those held by commercial banks. This theoretically very important and desirable separation could not be made with the resources available for this study.

[8] It may be argued quite cogently that the personal trust departments of commercial banks should also be included in the financial institutions sector. This was not done because there are no reliable figures available before 1959 for the value and composition of personal trust funds administered by these departments. Personal trust funds were, therefore, implicitly included in the holdings of nonfarm households. Rough estimates of the size of personal trust funds administered by commercial banks are, however, shown in *National Balance Sheet,* Volume II, Table III-1a. It is thus possible to shift these funds from the nonfarm household to the financial sector if one is willing to accept the estimates. The amounts involved in such a shift are not negligible—the personal trust departments administered about $50 billion worth of assets in 1959—and are particularly important in comparison to the total holdings in nonfarm households in the case of tax-exempt securities and of corporate stock.

nonprofit organizations in the nonfarm household sector; (2) the lack of separation of the more than fifty million nonfarm households into at least a few groups based on size of assets, net worth, or other characteristics significant for their capital market behavior such as homeowners and renters; (3) the impossibility of separating the holdings and activities of owner operators, absentee owners, and tenants in agriculture; (4) the failure to provide separate balance sheets and flow-of-funds statements for at least the main groups of nonfinancial corporations, such as manufacturing and mining, public utility, trade, services, and real estate, and for closely held (mostly small) and publicly held and financed (mostly large) corporations; and (5) the failure to separate the assets and transactions of business-type activities of the federal, state, and local governments.

Of these shortcomings, the first was partly remedied by providing a rough balance sheet of nonprofit organizations for a few benchmark dates. Since total assets of these organizations now amount to only about 6 per cent of those of nonfarm households, the failure to segregate them obviously is not likely to obscure the activities of nonfarm households, except possibly for a few types of financial assets such as Treasury securities other than savings bonds. Separate flow-of-funds statements for half a dozen groups of nonfinancial groups until 1956 may be found in a monograph being prepared by Eli Shapiro on "The Postwar Market for Corporate Securities and Loans," which forms part of the Postwar Capital Market Study. The material to remedy shortcomings (2), (3), and (5) is not yet at hand. The only thing that could be done would be to separate, on the basis of estate tax returns, the balance sheet of nonfarm households with assets of more than $60,000 for a few benchmark dates.[9]

DEGREE OF NETNESS

Flow-of-funds statements and balance sheets can be drawn up at different degrees of grossness and netness. Three aspects of this difference are relevant in the statistical framework for capital market analysis: first, the use of net sales and purchase balances in lieu of separate figures for purchase and sales flows; second, the offsetting of liabilities against the assets with which they are connected; third, the

[9] Estimates are available, as yet, only for 1953 (Robert J. Lampman, *The Share of Top Wealth-Holders in National Wealth, 1922–56*, Princeton for NBER, 1962), and they would require further study before being fitted into the framework.

degree to which units are consolidated rather than combined in constructing balance sheets or flow-of-funds statements for sectors and subsectors.

In principle, separation of a sector's purchase and sales flows for a given capital market instrument is much to be preferred to the use of only the undivided net purchase or sales balance. Use of the net basis washes out many relevant transactions and makes it much more difficult to explain the movements of net balances as well as of interest rates.[10] Unfortunately, however, separate figures on purchase and sales flows are available only for a few capital market instruments —sales and retirement of corporate securities by their issuers, primary transactions (i.e., borrowing and repayment) in residential mortgages, and incurrence and repayment of consumer debt—and even for these not for all sectors. For this reason all the basic tables in this report are drawn up on a net basis, as is unavoidable when flows must be obtained as first differences of stocks. (In analyzing the individual sectors of the capital market, however, use can be made of data on gross purchase and sales flows whenever they are available.)

In principle, liabilities are not netted against assets with which they may be regarded as connected. Thus policy loans are not deducted from policyholders' equity, or individuals' borrowing on common stock from their holdings of common stock. Similarly, an attempt is made to avoid offsetting a sector's accounts payable against its accounts receivable, except in a few cases where the material is available only in the form of the net excess of receivables or payables. It is obvious that offsets of this type greatly diminish the value of flow data for capital market analysis since the movements in the minuend and subtrahend may differ substantially and may depend on quite different factors.

[10] Home mortgages may be used as an example. The net flow of home mortgages is the result of new loans made and repayments on old loans among which, in turn, two flows may be distinguished: regular (scheduled) amortizations and unscheduled prepayments. While new loans are subject to substantial cyclical and other fluctuations, repayments follow a much more regular course, particularly amortization payments. Obviously much less information on the modus operandi of this segment of the capital market can be obtained if we are limited to one net flow series, which is the result of three heterogeneous gross flows, than from the three or more gross flow series themselves. It would be desirable to analyze separately the series on new loans made, scheduled amortizations, and nonscheduled prepayments, further distinguishing, if possible, flows to and from the main types of financial institutions, and connecting the movements in these series with explanatory variables specifically applicable to them.

In accordance with the principles discussed in the section on coverage above, sectoral balance sheets are gross in that they are the aggregation of the separate balance sheets of all units in the sector without elimination of claims and liabilities, or equity security holdings and issuance, among units that belong to the same sector. Similarly, the national balance sheet or flow-of-funds statement is simply the sum of those for all separate sectors. The use of consolidated rather than combined statements for parents and subsidiaries in the corporate business sector cannot be regarded as an exception since subsidiaries are not independent economic entities in the sense of constituting separate decision-making units. The same argument applies to the consolidation of the accounts of all federal government agencies, insofar as they are left in the federal government sector and not transferred to the financial institution sector.

Unit Equations

BASIC RELATIONS

The stocks and flows of any economic unit that are relevant for the operation and analysis of the capital market can be summarized in three basic expressions: a balance-sheet equation and two forms of a sources-and-uses-of-funds equation. The balance-sheet equation expresses the equality between the sums of all assets, on the one hand, and of all liabilities and net worth, on the other. This expression is an identity which holds under all circumstances (even if varying and inconsistent methods of valuation are used for different assets and liabilities) as long as net worth is defined as the difference between the book value of assets and that of liabilities.

The sources-and-uses-of-funds equation has two forms because a flow can be visualized either as a transfer of an asset (including money) or as the difference in the stock before and after the transfer. In its first (flow) form it reflects the necessary equality of the sum of all sources and all uses of funds, both of which may be limited to cash flows or enlarged by imputed items to serve the purposes of analysis. More specifically, it asserts that the sum of saving (the excess of current income over current expenditure), borrowing, receipts on account of repayments, issuance of equity securities, and sale of assets, on the one hand, equals the sum of lending, repayments, increase in holding

of money, purchase of new equity securities, acquisition of existing assets, and capital expenditures, on the other.[11] The flow version of the sources-and-uses-of-funds equation, expressed above in gross terms, can also be presented in net form. In that case, the left-hand side contains, in one of several possible arrangements, saving, net borrow-

TABLE 8

RELATION OF NET FLOW TO CHANGE IN HOLDINGS: ILLUSTRATIVE EXAMPLE

	Item	Number of Units (1)	Original Cost to Owner (2)	Book Value to Owner (3)	Market Value (4)
1.	Holdings, beginning of period	100	150	200	300
2.	Purchases during period	30	100	100	100
3.	Sales during period, FIFO	15	23	30	55
4.	Sales during period, LIFO	15	50	50	55
5.	Net purchases during period, FIFO	15	77	70	45
6.	Net purchases during period, LIFO	15	50	50	45
7.	Write-ups		0	20	0
8.	Holdings, end of period, FIFO	115	227	290	460
9.	Holdings, end of period, LIFO	115	200	270	460
10.	Change in holdings, FIFO	15	77	90	160
11.	Change in holdings, LIFO	15	50	70	160
12.	Realized capital gains, FIFO		32	25	25
13.	Realized capital gains, LIFO		5	5	5
14.	Unrealized appreciation, beginning of period, FIFO		150	100	100
15.	Unrealized appreciation, end of period, FIFO		233	190	190
16.	Unrealized appreciation, end of period, LIFO		260	210	210
17.	Change in unrealized appreciation, LIFO		83	90	90
18.	Change in unrealized appreciation, FIFO		110	110	110
19.	Flow	15[a]	45[b]	45[c]	45[d]

[a] Line 6.

[b] Lines 10 minus 12 (or 11 minus 13).

[c] Lines 10 minus 12 minus 7 (or 11 minus 13 minus 7).

[d] Lines 10 minus 12 minus 17 (or 10 minus 13 minus 18).

ing (borrowing less repayments made), and net issuance of equity securities, while the right-hand side shows net lending (lending less repayments received), increase in holding of money, net acquisition of existing assets (purchasing less sales), and capital expenditures.

In the second (change-of-holding or balance-sheet-differential) form,

[11] If net transfers (receipts and outlays without economic counter-value such as gifts, bequests, and inheritances) are not included in saving, a separate item must be added on both sides to those listed above.

exactly the same items appear on both sides as in the flow form. However, all items are now expressed as first differences between the value of holdings at the beginning and at the end of the period. They are, therefore, equivalent to net flows rather than gross flows. The values that are required to make this form equivalent to the flow form are not the unadjusted first differences, which are obtained by subtracting the book value at the beginning of the period from that at the end. To fit the equation, the unadjusted first differences must be adjusted for those changes in book value which reflect realized capital gains and losses or other valuation changes (write-ups and write-downs) that have occurred during the period. Specifically, the difference in book (original cost) values must be diminished by net capital gains realized during the period (or increased by realized capital losses) and by write-ups (or increased by write-downs) to become equal to the net purchase balance, i.e., the excess of the cash value of purchases over that of sales. In cases where balance-sheet valuations are based on current market prices rather than on book values, allowance must also be made for the change in unrealized capital gains or losses. The equation then becomes: net purchase balance equals difference in market value of holdings minus realized net capital gains minus net write-ups minus net increase in unrealized capital gains.[12] These relationships are illustrated in a simple numerical example in Table 8, which also shows that the equation is valid irrespective of the method of valuing sales, particularly for both FIFO and LIFO accounting for inventories.

EXPLANATION OF SYMBOLS

The relationships just described can be expressed more precisely and more clearly when translated into simple algebraic symbols. All flows are indicated by small letters and all stocks by capital letters, while small Greek letters are used to indicate ratios, and bars or dots above the symbols differentiate between alternative bases of valuation of stocks and flows. Subscripts, in the form of small letters to the right of the symbol, identify the two parties that take part in a transaction, the first subscript representing the seller or debtor (issuer) and the second the buyer or holder (creditor). In the case of internal transactions, such as saving or capital consumption allowances, the two subscripts are identical. Similarly, in the case of tangible assets and net

[12] All capital gains, realized and unrealized, and valuation changes are calculated on the basis of book values.

worth in the balance sheet, the subscript identifying the owner is repeated.

For simplicity and to preserve a fairly close connection with the statistics actually used in the body of the report, only seven sectors are distinguished: nonfarm households (h); business (b), comprising nonfinancial corporations, unincorporated nonfarm enterprises, and agriculture; monetary institutions (m); other financial institutions (f); state and local governments (l); federal government (t); and the rest of the world (x).

It is more difficult to reduce the numerous types of assets distinguished in the statistics to a number that is small enough to keep the formulae from becoming unwieldy but still preserves the essential economic differences. Similar problems arise in limiting the number of types of transactions to be distinguished symbolically. By way of compromise, the symbols used have been reduced to just over a dozen,

TABLE 9

SYMBOLS FOR ITEMS IN BASIC CAPITAL MARKET EQUATIONS

Item	Flow*			Stock**
	Purchase (1)	Sale (2)	Net (3)	(4)
1. Saving, gross	--	$s + d$	--	$S + D$
2. Saving, net	--	--	s	S
3. Borrowing	r^b	$b + r^b$	b	B
4. Lending	$1 + r^l$	r^l	l	†
5. Cash transactions	$-m$	$+m$	m	M
6. Issuance of money	r^n	$n + r^n$	n	N
7. Acquisition of new equity securities	$e + r^e$	r^e	e	†
8. Issuance of equity securities	r^i	$i + r^i$	i	I
9. Existing financial assets	--	--	f	F
10. New capital expenditures	k	--	$k - d^k$	$K - D^k$
11. Capital consumption allowances	--	--	d	D
12. Existing tangible assets	--	--	j	$T - D$
13. Realized capital gains and losses	--	--	g	--
14. Unrealized capital gains and losses	--	--	v	V
15. Foreign assets	--	--	x	X

*Flows include accounting accruals.

**Stock net of capital consumption but gross of valuation changes unless contrary specifically indicated. Stocks (at market) are not equal to sum of flows.

†Holdings of newly acquired loans and equities are included in F (line 9, col. 4).

Lines 1-2, col. 4: Earned surplus.

Lines 3,4,7,8: Transactions in which original lender or borrower (issuer) is involved.

Lines 4,5,7,9,12, col. 4: On asset side of balance sheet.

Lines 4,7,9,12, col. 4: In the balance sheet no distinction is made between assets acquired during accounting period and those held at start of period.

Line 14, col. 4: Unrealized net appreciation.

Line 15, col. 4: Net foreign balance (foreign assets minus liabilities to foreigners).

which are brought together for easy reference in Table 9. A few additional symbols which occur rarely are explained when first used.

FLOW EQUATIONS

We may then start by expressing in these symbols the first of the four forms of the basic flow-of-funds equation. This may be called the unidentified flow form because it does not identify the other unit (or group of units) which participates in the transaction or, in the case of stocks, acts as creditor (holder) or debtor (issuer). The equation uses net flows for financial assets, f, and existing tangible assets, j, because the statistical data are predominantly in this form, but for the same reason uses gross flows for capital expenditures. The equation [13] then is for any unit j:

$$\underbrace{k_j + j_j + l_j + m_j + e_j + f_j + x_j}_{\text{Uses}} = \underbrace{\underbrace{s_j + d_j}_{\text{Internal}} + \underbrace{b_j + n_j + i_j}_{\text{External}}}_{\text{Sources}}. \qquad (1)$$

For any given unit or period, some of the items may, of course, be equal to zero, either because no transaction of the indicated type has occurred, or because acquisitions and dispositions happened to be equal. The equality is obviously unaffected if saving and capital expenditures are expressed in net instead of gross form, since this simply means substitution of s for $(s + d)$ on the right and of $(k - d)$ for k on the left side.

Equation (1) yields, by a slight readjustment, the formula for one of the two basic estimates of saving, viz., saving calculated from changes in assets and liabilities, the method used by the Securities and Exchange Commission, by the Federal Reserve Board, and in *A Study of Saving:*

$$s_j = (l_j - b_j) + (e_j - i_j) + (m_j - n_j) + f_j + (k_j - d_j) + j_j + x_j. \qquad (1a)$$

Another rearrangement, more relevant to capital market analysis, leads to

[13] Reversing predominant practice, uses are shown on the left and sources on the right side of the equation, in order to preserve the parallelism between flows and stocks, assets (cumulated uses) being traditionally shown on the left—at least in the United States—and liabilities and net worth (cumulated sources) on the right side of the balance sheet.

$$s_j = \underbrace{(l_j + m_j + e_j + f_j + x_j')}_{\text{Gross saving through financial assets}} - \underbrace{(b_j + n_j + i_j)}_{\text{Borrowing}} + \underbrace{(k_j + j_j)}_{\text{Gross saving through tangibles}} - d_j. \quad \text{(1b)}$$

Net saving through financial assets

Net saving through tangible assets

Total net saving

If the other party to the transaction, or the sector to which the other party belongs, is identified, we obtain the second form of the equation, the identified flow form. Even when only seven sectors are distinguished, the equation becomes unwieldly in its general form. In actual application, many of the terms of the equation, of course, are equal to zero and disappear for a given unit and period. Equation (2), which is written in a form that applies to any individual unit in any of the seven sectors, is based on reasonable assumptions about such eliminations.

$$\left.\begin{aligned} & k_{hj} + k_{bj} + k_{mj} + k_{xj} \\ & + l_{hj} + l_{bj} + l_{mj} + l_{fj} + l_{ij} + l_{tj} + l_{xj} \\ & + m_{mj} \\ & + e_{bj} + e_{mj} + e_{fj} + e_{xj} \\ & + f_{hj} + f_{bj} + f_{mj} + f_{fj} + f_{ij} + f_{tj} + f_{xj} \\ & + j_{hj} + j_{bj} + j_{mj} + j_{fj} + j_{ij} + j_{tj} + j_{xj} \\ & + x_{hj} + x_{bj} + x_{mj} + x_{fj} + x_{ij} + x_{tj} \end{aligned}\right\} = \left\{\begin{aligned} & (s + d)_{jj} \\ & + b_{jh} + b_{jb} + b_{jm} + b_{jf} + b_{ji} + b_{jt} + b_{jx} \\ & + n_{jh} + n_{jb} + n_{jm} + n_{jf} + n_{ji} + n_{jt} + n_{jx} \\ & + i_{jh} + i_{jb} + i_{jm} + i_{jf} + i_{jx} \end{aligned}\right. \quad (2)$$

In equation (2), k_{fj}, k_{ij}, and k_{tj} are assumed to be zero since capital expenditures usually consist of purchases from business, households or foreigners but not from other sectors. Similarly the e items can be limited to business sectors—nonfinancial business (b), financial institutions (f), monetary organizations (m), and foreigners (x)—as there are no transferable equities in the three household and government sectors.

In the case of money, the net increase in holdings is treated as limited to one partner—monetary organizations. This treatment deviates from the usual procedure of designating the immediate partner in a transaction by the second subscript. In other words, money flows are treated with a higher degree of netness. The n (issuance of money) line, of course, is applicable only to monetary institutions and disappears for all other units which by definition are not in a position to issue money

CHANGE OF HOLDING EQUATIONS

Before turning to the two alternative forms of the basic equation in which flows during a period are represented by changes in stocks between the beginning and the end of the period, it is necessary to introduce the balance-sheet equation initially in its unidentified form because of the importance it has in its own right in capital market analysis and because it is the fount of the second form of the flow equation.

$$T_j - D_j + M_j + F_j + X_j = B_j + N_j + I_j + S_j \qquad (3)$$

As long as S (surplus) is treated as a residual, the other terms in the equations may use any basis of valuation, even inconsistent ones. Where, as is common in business accounting, all terms are on an original cost basis and no revaluations have taken place, S is equal to earned net worth understood as the sum of past saving (both, however, including net realized capital gains), while I is equal to the sum of contributed capital at original values. If all other terms reflect market or replacement values, then S is no longer equal to accumulated saving (current income less current expenditures), but includes all realized and unrealized net capital gains.

The equation is written in the net unidentified form. In the gross form, T would be substituted for $(T - D)$ and $(S + D)$ for S. Other terms remain unchanged.

The unidentified change-of-holdings form of the basic equation then becomes equation (4), if we use book values throughout and gross values in the case of tangible assets and keep in mind that if assets are carried at book value the change in holdings must be diminished by net realized capital gains and net write-ups to yield the net purchase balance of the flow form.[14]

[14] In case assets are carried at market value, the reported change in holdings must also be adjusted for the change in the net unrealized appreciation in order to equal the net purchase balance of the flow form.

$$\left.\begin{aligned}&\Delta T_j - g^t_j - v^t_j) + (\Delta F_j - g^f_j - v^f_j)\\&+ \Delta M_j + (\Delta X_j - g^x_j - v^x_j)\end{aligned}\right\} = \left\{\begin{aligned}&(\Delta S_j - g^s_j - v^s_j) + (\Delta D_j - g^d_j - v^d_j)\\&+ (\Delta B_j - g^b_j - v^b_j)\\&+ \Delta N_j + (\Delta I_j - g^i_j - v^i_j)\end{aligned}\right. \tag{4}$$

In the identified change-of-holdings form, the subscript for the other party to the transaction usually identifies the ultimate issuer or debtor instead of, as the rules require and as shown in equation (2) for the identified flow form, the party from whom the asset was acquired or to whom it was sold. For instance, a change in holdings of Treasury securities by life insurance companies is indicated by ΔF^t_{ft}, irrespective of the sector from whom the Treasury securities were bought or to whom they were sold.[15] The reason for this deviation from the rule, of course, is the near impossibility of obtaining the required data.

It is possible, however, to set up an identified change-of-holdings form in an alternative way which identifies the immediate partner in the transaction. In that case, to keep to the example just used, net transactions in Treasury securities by life insurance companies with each other sector are entered as a separate item. Then ΔF^t_{hf}, for instance, identifies the net purchase of Treasury securities by financial institutions from nonfarm households.[16] Since the statistical data are practically never available in this detail, this form is not yet in general use, nor would it be of much value unless separate figures for purchases and sales were available, in which case the gross flow rather than any variant of the change-of-holding form of the equation is needed.

For those instruments in which transactions in existing stock are absent, limited to transactions between issuer and different holder groups, or of negligible size, there is no difference between the two versions of the identified change-of-holdings form of the flow equation. These conditions are practically met for instruments like mortgages and trade debt, but are most conspicuously inapplicable to marketable securities and money.

Realized and unrealized capital gains and valuation adjustments

[15] The right-hand superscript t is used to distinguish transactions in outstanding Treasury securities from those in other outstanding financial assets.

[16] This form practically requires separation of all main types of financial assets by type of issuer. Thus Treasury securities would be treated as a separate category (G) and the expression would become ΔG_{jh}.

(write-ups and write-downs), being internal accounting items, are identified by doubling the subscript of the affected unit and by a right-hand superscript indicating the type of asset involved. Thus g^{e}_{hh} is a symbol for net capital gains on corporate stock realized by households.

The identified change-of-holdings form [17] of the basic equation then becomes for any unit j in the gross version which includes D_{jj}:

$$\begin{aligned}
&(\Delta T_{jj} - g^{t}_{j} - v^{t}_{jj}) \\
&+ (\Delta F_{hj} + \cdots + \Delta F_{xj} - g^{f}_{jj} - v^{f}_{jj}) \\
&+ (\Delta M_{hj} + \cdots + \Delta M_{xj}) \\
&+ (\Delta X_{hj} + \cdots + \Delta X_{tj} - g^{x}_{jj} - v^{x}_{jj}) = \\
&= (\Delta S_{jj} - g^{s}_{jj} - v^{s}_{jj}) \\
&+ (\Delta D_{jj} - g^{d}_{jj} - v^{d}_{jj}) \\
&+ (\Delta B_{jh} + \cdots + \Delta B_{jx} - g^{b}_{jj} - v^{b}_{jj}) \\
&+ (\Delta N_{jh} + \cdots + \Delta N_{jx}) \\
&+ (\Delta I_{jh} + \cdots + \Delta I_{jx} - g^{i}_{jj} - v^{i}_{jj})
\end{aligned} \tag{5}$$

where $(F_{hj} + \cdots + F_{xj})$ and similar expressions are abbreviations of

$$(F_{hj} + F_{bj} + F_{fj} + F_{mj} + F_{lj} + F_{tj} + F_{xj}),$$

and realized capital gains or losses are lumped together in one term (g_{jj}) without identifying the other party involved in the transaction giving rise to the gains or losses.

Sector Equations

Sector equations are simply the sum of the unit equations of all the units that belong to the sector, without elimination of intrasector transactions or holdings.

Sector equations also appear in four versions: the unidentified and the identified flow form and the unidentified and the identified change-of-holdings form. It is, therefore, unnecessary to repeat the

[17] It is thus assumed that the immediate partner in the transaction is identified. If the equation is based on the sector of the ultimate issuer or debtor, the number of terms is considerably reduced. In particular, the third line reduces to M_{mj} on the left and N_{jm} on the right side and the terms involving the subscripts h, l, and t disappear in the fourth line.

four equations as they apply to sectors rather than to individual economic units. The only way in which they differ from the unit equations described in the preceding section is that, in the subscripts, sector symbols (*h, b,* etc.) are substituted for the subscript *j,* which was used in the preceding section to identify the unit in any sector for which the equations were drawn up.

Market Equations

If the sectoral equations for all sectors are combined, a system is obtained from which it is possible to derive market equations for any

TABLE 10

REDUCED (UNIDENTIFIED) SEVEN-SECTOR MODEL OF CAPITAL MARKET, FLOW FORM

Sector	Market
1.	$l_h + e_h + m_h + j_h + k_h + f_h = (s+d)_h + b_h +$
2.	$l_b + e_b + m_b + j_b + k_b + f_b = (s+d)_b + b_b + i_b$
3.	$l_l + e_l + m_l + j_l + k_l + f_l = (s+d)_l + b_l +$
4.	$l_t + e_t + m_t + j_t + k_t + f_t = (s+d)_t + b_t +$
5.	$l_f + e_f + m_f + j_f + k_f + f_f = (s+d)_f + b_f + i_f$
6.	$l_m + e_m + m_m + j_m + k_m + f_m = (s+d)_m + b_m + n_m + i_m$
7.	$l_x + e_x + m_x + j_x + h_x + f_x = (s+d)_x + b_x + i_x$
8.	$\Sigma l + \Sigma e + \Sigma m + \Sigma j + \Sigma k + \Sigma f = \Sigma s + \Sigma b + \Sigma n + \Sigma i$

flow, i.e., any capital market instrument, that is separately represented in all the sector equations. The procedure is illustrated in Table 10, which is drawn up in the unidentified flow form. The same procedure can be applied when the unidentified change-of-holdings form is used although the table would be more complicated since, e.g., $(L_h - g^l_h - v^l_h)$ would replace l_h, etc.

The derivation of the market equations from the sector equations is based on the fact that all transactions between two domestic units appear twice with identical value in the sector equations, once in the equation of the sector for which the transaction constitutes a source of funds and again in the equation of the sector for which it represents a use of funds.

Thus the following market equation for new domestic lending can be derived from the reduced seven-sector model of Table 10.[18]

[18] If the equation is to cover all lending and borrowing and not only domestic lending and borrowing, terms must be added for lending to foreigners, i.e., bor-

$$l_h + l_b + l_m + l_f + l_l + l_t = b_h + b_b + b_m + b_f + b_l + b_t \quad (6)$$

This equation is self-evident if it is recalled that each transaction appears once in the form of one sector's borrowing and again as lending by either the same or another sector. Exactly the same relationships obtain for money (m item on the left-hand side and n on the right-hand side of the equation) and for new equity securities (e and i items).

To be practically useful, the equations must generally be drawn up for capital market instruments of narrower scope, e.g., for new mortgage lending or even for new home mortgage lending, or for transactions in outstanding state and local government securities. The form and basic characteristics of the equation, however, are not affected by the lesser or greater number of flows, i.e., capital market instruments, or of sectors distinguished in the system of equations.

The derivation of market equations from the sector equations may become clearer when all items involving flows of the same type, i.e., all transactions in the same instrument, indicated by the symbol j, are brought together in an item flow matrix as is done in Table 11.

In practice, no item matrix will have all its cells filled since none of the assets and liabilities, except money, will in any given period show transactions between each pair of sectors—as well as within sectors —in the seven-sector model forty-nine pairs. Generally the narrower the scope of the item, the shorter the period covered, and the more imperfect the statistics, the larger is the proportion of cells remaining empty. Furthermore, when the matrix relates to transactions in new assets and liabilities (i.e., assets created during the period) rather than to transactions in existing (outstanding) assets and liabilities, it often shrinks to one column. The matrix for new corporate bonds, for instance, is necessarily reduced to one column, that representing the business sector.

Market equations for any given instrument reflect the obvious and necessary equality between the sum of all sales and that of all purchases since the transactions are registered at actual values. To preserve this feature, security transactions must be entered consistently either gross or net of commissions, brokerage fees, etc. If they are en-

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rowing by foreigners (b_x), and for borrowing from foreigners (l_x). The equation, however, now no longer balances since $l_x \neq b_x$. To restore the balance, we must add a term for net lending or borrowing ($l_x - b_x$) on the appropriate side.

TABLE 11

ITEM FLOW MATRIX, SEVEN-SECTOR MODEL

Buying Sector	Selling Sector								
	h	b	f	m	l	t	d*	x	n**
h	j_{hh}	j_{bh}	j_{fh}	j_{mh}	j_{lh}	j_{th}	j_{dh}	j_{xh}	j_{nh}
b	j_{hb}	j_{bb}	j_{fb}	j_{mb}	j_{lb}	j_{tb}	j_{db}	j_{xb}	j_{nb}
f	j_{hf}	j_{bf}	j_{ff}	j_{mf}	j_{lf}	j_{tf}	j_{df}	j_{xf}	j_{nf}
m	j_{hm}	j_{bm}	j_{fm}	j_{mm}	j_{lm}	j_{tm}	j_{dm}	j_{xm}	j_{nm}
l	j_{hl}	j_{bl}	j_{fl}	j_{ml}	j_{ll}	j_{tl}	j_{dl}	j_{xl}	j_{nl}
t	j_{ht}	j_{bt}	j_{ft}	j_{mt}	j_{lt}	j_{tt}†	j_{dt}	j_{xt}	j_{nt}
d*	j_{hd}	j_{bd}	j_{fd}	j_{md}	j_{ld}	j_{td}	j_{dd}	j_{xd}	j_{nd}
x	j_{hx}	j_{bx}	j_{fx}	j_{mx}	j_{lx}	j_{tx}	j_{dx}	--	--
n**	j_{hn}	j_{bn}	j_{fn}	j_{mn}	j_{ln}	j_{tn}	j_{dn}	--	j_{nn}

*All domestic sectors.
**All sectors.
†Empty if all Treasury accounts consolidated.

tered on a net basis, the commissions, etc., are regarded as part of the current income of the sectors providing the service and part of the current expenditure of the sectors acquiring or disposing of the asset. If a gross basis is adopted, commissions, etc., must be treated as capitalizable expenditures and become part of investment in the national accounts.[19]

For illustration, the market equation for new home mortgages made and incurred (symbols b^h and l^h respectively) is shown in flow form, on the fairly realistic assumption that all borrowers belong to the household or unincorporated business sectors while all lenders are part of the household, business, financial, or monetary institutions sectors.

$$\left.\begin{matrix} l^h_{hh} + l^h_{hb} + l^h_{hf} + l^h_{hm} \\ +l^h_{bh} + l^h_{bb} + l^h_{bf} + l^h_{bm} \end{matrix}\right\} = \left\{\begin{matrix} b^h_{hh} + b^h_{hb} + b^h_{nf} + b^h_{hm} \\ +b^h_{bh} + b^h_{bb} + b^h_{bf} + b^h_{bm} \end{matrix}\right. \tag{7}$$

If repayments are included in the equation, because the equation covers all direct transactions between mortgagors and mortgagees, and

[19] Cf. *A Study of Saving*, Vol. II, pp. 59–62.

repayments are indicated separately, the number of terms in the equation is doubled since in principle there is an r^h corresponding to each b^h and l^h. All the basic features of the equation, however, remain unchanged.

It may be worthwhile to return briefly to the last line of Table 10 which is the sum of all sector equations. This line indicates that

$$\Sigma l + \Sigma m + \Sigma e + \Sigma j + \Sigma k + \Sigma f = \Sigma(s + d) + \Sigma b + \Sigma n + \Sigma i. \quad (8)$$

Now on a national basis obviously: (a) $\Sigma l = \Sigma b$; (b) $\Sigma m = \Sigma n$; (c) $\Sigma e = \Sigma i$; (d) $\Sigma j = 0$.

Thus line 8 of Table 10 reduces to $\Sigma k + \Sigma f = \Sigma(s + d)$, where Σk includes Σx. In other words, the sum of the saving of all units within the national territory is equal to the sum of capital expenditures and foreign balance. The equation can, of course, be drawn up either on a gross or a net basis, the difference being the deduction from both sides of the sum of capital consumption allowances (Σd).

The four identities (a) to (d) that were eliminated in consolidating the sector accounts into the final equation $\Sigma k + \Sigma f = \Sigma(s + d)$ represent the market equations for new domestic lending, money, new equity securities, and outstanding assets, respectively. If more types of new and existing assets had been distinguished, the number of terms in each sectoral equation would be larger. So would be the number of identities of the type (a) to (d), and hence the number of market equations. Nothing, however, would be changed in principle, and the final consolidated capital market equation would be the same as before, namely $\Sigma k + \Sigma f = \Sigma(s + d)$.

Exactly the same procedure can be applied to the change-of-holdings form of the equations. In this case we shall end up with a parallel to line 8 in Table 10 in the form:

$$\left.\begin{matrix}\Sigma\Delta M + \Sigma\Delta F + \Sigma\Delta T \\ + \Sigma\Delta X - \Sigma g - \Sigma v\end{matrix}\right\} = \left\{\begin{matrix}\Sigma\Delta S + \Sigma\Delta D - \Sigma g - \Sigma v + \Sigma\Delta B \\ + \Sigma\Delta N + \Sigma\Delta I.\end{matrix}\right. \quad (8a)$$

If we eliminate those items on both sides that are necessarily equal, because they represent the two sides of the same relation, (8a) is reduced to

$$\Sigma\Delta T + \Sigma\Delta X = \Sigma\Delta S + \Sigma\Delta D \quad (8b)$$

on a gross basis, and on a net basis to

$$\Sigma\Delta T - \Sigma\Delta D + \Sigma\Delta X = \Sigma\Delta S. \quad (8c)$$

Implementation of Framework

Since the framework of the unit, sector, and market equations was drawn up with the statistics actually used in this report in mind, the question of implementation, i.e., of substituting numbers for the symbols in the equations, can be dealt with briefly.

The statistical material now available, taken for financial assets primarily from the Federal Reserve Board's flow-of-funds statistics and for tangible assets from the National Bureau's Postwar Capital Market Study, makes it possible to implement the equations for the seven sectors annually for 1946–58 in somewhat greater item detail than in the preceding sections. This implementation is briefly described in the section on the actual framework. Material is also available to implement sector equations quarterly from 1953 on, although somewhat more roughly, by using the Federal Reserve Board's flow-of-funds tabulations.[20] These quarterly figures, however, have not been used in this report chiefly because resources were not available to extend the data back to at least 1950 to bring them in line with the annual data, primarily by the addition of transactions in tangible assets, and to adjust the quarterly data for seasonal variations.

It is thus possible to draw up market equations annually from 1946 through 1958. The tables in Section VIII of Volume II of *National Balance Sheet* provide all the necessary basic data by showing for each year net purchases or sales by each of the seven main sectors and by the subsectors of the financial sector.

The sector or market equations that can be derived from the statistics now available fail, however, to meet the conceptual requirements of the framework on a number of points, some of which are important for analysis of the capital market and some of which are not.

First, the equations constitute a hybrid combination of equations in change-of-holdings form for claims and a few tangible assets with net flow form equations for most tangible assets and for corporate stock. Such a combination has no serious disadvantages from the viewpoint of either accuracy or usability in capital market analysis compared to a framework consisting exclusively of either flow-of-funds or change-of-holdings form equations. The absence of two complete sys-

[20] For 1953–55 use could also be made of the tabulations prepared by Morris Mendelson (*The Flow-of-Funds Through the Financial Markets, 1953–1955,* New York, NBER, 1959).

stems of equations derived from different basic data means, however, the loss of an important accuracy check.

A second and more serious problem was that, in calculating flows from changes in reported holdings, it proved impossible in most cases within the given time and resource limitations to adjust the difference in the book value of holdings at the end and the beginning of the period for net realized capital gains and, less important, for net write-ups and write-downs. Treasury securities are the only capital market instrument for which such adjustments are possible, at least for some important groups of holders.[21] Corporate stock, for which differences in book values of holdings are likely to diverge most widely from net purchase or sales balances, is not affected by this drawback since the flow figures for the most important groups are derived from primary information on the value of purchases and sales. The figures shown in the tables as net purchase or sales balances of claims are thus too high for most groups by net realized capital gains or too low by net capital losses. Since interest rates rose during the postwar period and bond prices fell, this deficiency probably leads to an overstatement of the increase in holdings of financial institutions, which are calculated from differences in the book values of holdings. Net purchases of nonfarm households are, therefore, probably understated (or net sales overstated) because this sector is treated as a residual for virtually all capital market instruments. It is not likely that the errors introduced by this inability to adjust for net realized capital gains or net write-ups has distorted any of the main capital market movements over the period, but it may have done so for some years, some capital market instruments, and some sectors.

Thirdly, most flows are on a net rather than a gross basis. The only important exception is capital expenditures. It would have been possible to use gross figures for several additional flows, primarily the incurrence and repayment of consumer debt and home mortgage debt, but this was not done since it could not be achieved for most other flows and sectors.

The framework should be implemented in the following directions:

1. Primary data are needed on purchases and sales separately to supplement the indirect calculation of flows from changes in reported holdings.

[21] These adjustments are also ignored (except for Treasury securities) in the Federal Reserve Board's flow-of-funds statistics.

2. More information is required on realized capital gains and losses and on write-ups and write-downs, so that changes in reported holdings will approximate more closely true net flow figures when they are not available or can be used more effectively as a check against the available net flow data.

3. The transactions of nonprofit organizations should be separated from those of nonfarm households, and the transactions of nonfarm households thus adjusted should be divided into a few subsectors.

4. Data should be developed to permit a division of the nonfarm business sector into about half a dozen subsectors each with its balance sheet and flow-of-funds statement.

5. Supplementary subsector accounts should be developed for large, small, closely held and financed, and publicly held and financed nonfinancial corporations.

6. In the case of some capital market instruments, particularly Treasury securities and corporate bonds, holdings of and transactions in marketable and nonmarketable instruments should be separated.

7. Full quarterly accounts, comparable with the annual balance sheets and flow-of-funds statements, should be developed both on an unadjusted and a seasonally adjusted basis.

From a National Accounting Framework to a Complete Model of the Capital Market

The unit, sector, and market equations which have been discussed hitherto are descriptive and refer to a period in the past.[22] They do not say anything about the functional or causal relationships that

[22] The equations are equally valid if all terms are interpreted as referring to an identical period in the future, so that each term reflects the planned or expected magnitude, under the constraint for each unit, each sector, and ultimately the nation as a whole, among others, of equality of sources and uses of funds, or of assets and liabilities plus net worth. These conditions are probably met for planned figures since we may assume that the planner takes the constraints into account in his plans. However, they are not met for market equations when the figures are regarded as values anticipated by decision-making units, whether or not they are interpreted as point estimates or as the range of a probability distribution. In either case, the constraints could be met only by a change in anticipations. Even if it were possible to ascertain the values of flows or stocks expected or anticipated by all decision-making units, the resulting sectoral or national equations would show residuals, which might be of great value in process analysis. The possibility of quantifying anticipated values is still so remote for most types of flows and stocks—capital expenditures constitute the most important possible exception—that the specific problems arising in this field need not be discussed here.

may exist among terms of the equation beyond the obvious constraint of equality of both sides. Nor do they indicate the factors which have made the values of each term in the equations what they happen to be. The equations, finally, give no information on the interrelations among sectors and among instruments. This does not mean that the framework is of no help in capital market analysis, either in its empty form or when actual numbers have been substituted for the symbols. All empirical capital market analysis must start from such a framework, or some body of data essentially similar to it.

The objective of capital market analysis, however, is to go beyond the basic equations as they stand, and to explain the relative size of the various items in the equations and the movements in the items over time. This can be done in very different ways: by relying on advanced methods of statistical analysis of equations for a number of periods, or for a number of subsectors; by making use of the tools of economic theory; and by putting emphasis on psychological and institutional explanations. In this respect capital market analysis poses exactly the same problems as the study of any broad topic in applied economics. There is, consequently, not one high road of capital market analysis. Any method that contributes to an understanding of the modus operandi of the capital market is acceptable, and the more it contributes, the more intensively it should be used.

Of the many possibilities of breathing life into a framework, one deserves special attention, if only because it has become prominent in economic analysis in the postwar period—the use of a model of the capital market. A model may in this connection be defined as a set of equations in which each term is expressed as a function of one or more variables, variables which in turn may be endogenous (i.e., contained within the system of equations that make up the framework) or exogenous (not thus contained).[23] Like a framework, a model can be empty (all terms being expressed as algebraic symbols only), full (containing numerical values for all terms), or mixed (combining numerical and symbolic terms).

The difference between model and framework is best illustrated by an example. The market equation for any given period for home

[23] There is sometimes a difference of opinion as to whether a given system of equations is to be treated as a framework or as a model. Input-output tables, for example, are regarded by some skeptics as a framework for interindustry transactions, while others treat them as a model having explanatory value. (Cf. introduction to *Input-Output Analysis*, Studies in Income and Wealth 18, Princeton for NBER, 1955, pp. 4–6.)

mortgages (symbols: l for new mortgages made, b for new mortgages incurred, a and r for repayments made and received, and f for existing mortgages acquired and sold) in the framework looks as follows in the identified flow form, omitting for the sake of simplicity terms likely to be of relatively small size, and assuming the absence of capital gains or valuation changes:

$$l_{hh} + l_{hf} + a_{hh} + a_{hf} + f_{ff} = b_{hh} + b_{hf} + r_{hh} + r_{hf}.$$

For the builder of the framework—at least in its full numerical form —the job is done as soon as he has substituted numbers for the four independent terms [24] in this equation, and has satisfied himself that these numbers are the best the primary data will yield and are not in conflict with other relevant figures. It is at this point that the model builder's work begins. If he is content with an empty (nonnumerical) model, he will indicate in symbolic language the endogenous or exogenous variable on which each term of the equations of the framework depends. He might, to use a very simplified case in our example, assume that the term b_{hf} (nonfarm households' borrowing on home mortgages from financial institutions) depends in some unspecified way on the current volume of home construction and the relationship between current interest rates on home mortgage and prime corporate bonds $(\rho^h - \rho^b)$ symbolically

$$l_{hf} = b_{hf} = f(c;\rho^h - \rho^b).$$

Or he might assume, now introducing exogenous variables from other (earlier) periods, that repayments depend somehow on the volume of mortgage loans outstanding, i.e., made previously (H), and on the difference between original and current home mortgage interest rates $(\rho_t - \rho_{t-n})$. Then

$$r_{hf} = a_{hf} = f(H;\rho_t - \rho_{t-n}).$$

Such a procedure need not be limited to relatively small components of the flow of funds. It can equally well be applied to flows as broad as a sector's or even the nation's total saving. Thus it could be, and has been assumed, that a given year's aggregate personal saving depends on various combinations of independent variables, such as the current year's total or disposable income or possibly nonwage income only, the income of one or more years in the past, future ex-

[24] Only four of the nine terms are independent because $b_{hh} = l_{hh}$; $b_{hf} = l_{hf}$; $r_{hh} = a_{hh}$; $r_{hf} = a_{hf}$; and $f_{ff} = 0$.

pected income, the highest previous income, the stock of liquid assets variously defined or of total assets, and the level of interest rates, present, past, or expected. The latter set of independent variables is particularly relevant since every fund flow is actually associated with an interest rate—exactly as commodity flows are associated with commodity prices—and there is a theoretical presumption that some functional relation exists between the direction and size of fund flows and the absolute and, probably more relevant, the relative level of the associated interest rate.

The model builder may even go one step further, without as yet sullying his hands with statistics, and indicate the general form of the relationship between the term to be explained and the explanatory independent variables. This may be done by indicating—through specification of the sign of the first or higher derivatives of the function or by other mathematical devices—whether the relationship is positive or negative, arithmetic or logarithmic, simultaneous or lagged, periodic or irregular, etc.

The model builder may finally crown his work by substituting numerical values for the symbols, e.g., by stating—using the relation for illustration only—that repayments on home mortgages by nonfarm households to financial institutions in any year are equal to 10 per cent of the volume of such mortgages at the beginning of the year multiplied by unity less two-hundredths of the difference between home mortgage interest rates (in per cent) in the current period and for the average of the preceding ten years, i.e.,

$$r_{hf} = a_{hf} = 0.10H \left[1.00 - 0.02 \left(\rho_t - \frac{1}{10} \sum_{n=t-11}^{t-1} \rho_{t-n}\right)\right].$$

The statistical problems of selecting the explanatory variables, deciding upon the form of the function, selecting the method of deriving the numerical values, and carrying through the calculations, particularly with a substantial number of terms and equations involved, are far from simple or susceptible of mechanical solutions. These problems, however, have been discussed elsewhere [25] and need not concern us here.

[25] See, for example, L. R. Klein, *A Textbook of Econometrics* (Evanston, 1953); L. R. Klein and A. S. Goldberger, *An Econometric Model of the United States, 1929–1952* (Amsterdam, 1955); J. Tinbergen, *Econometrics* (Philadelphia, 1951); G. Tintner, *Econometrics* (New York, 1952); S. Valavanis, *Econometrics* (New York, 1960).

If the capital market framework equations were available for a sufficiently long period, if we could identify the endogenous and exogenous independent variables most appropriate for each term, if we could decide upon the form of the functional relationship, and if we could obtain numerical values for the exogenous variables, modern computers would enable us to solve the system of simultaneous equations and thus provide us with a complete numerical model of the capital market. The difficulties roughly indicated by these "if" clauses are, however, so formidable that no serious attempt to formulate and then to numerically implement a full model of the capital market has as yet been made.[26] Most of the serious attempts at implementation have been limited to selected sectors of the capital market in which either data are relatively plentiful or the selection of independent variables seems fairly obvious, such as the market for home mortgages.[27]

Despite all these difficulties, the development of a complete econometric model of the American capital market in the postwar period is the ultimate goal of capital market analysis. No direct attack has been made on this problem here because of two overriding considerations. First, the construction and testing of such a model requires time, resources, and specialized skill in econometrics well beyond anything available within this project. Secondly, and more importantly, in order to construct a model that not only fits the data for the period from which it is calculated reasonably well but also stands up when applied to earlier and later periods—with appropriate allowances for secular and structural change—several intermediate steps must be taken that are difficult, time-consuming, and expensive in resources.

The first of these is the provision of considerably more detailed, more accurate, systematically arranged, and integrated data on gross capital market flows, asset holdings, and interest rates. This is the field to which the National Bureau's Postwar Capital Market Study

[26] Dawson's system (*American Economic Review,* May 1958, pp. 145–157) is so condensed and is regarded to such an extent by the author as illustrative rather than explanatory as not to invalidate this statement. Gurley's equations (*Liquidity and Financial Institutions in the Postwar Period,* Study Paper 14, Joint Economic Committee, Washington, 1960), although dealing with very broad fund flows, are not intended to constitute a complete economic model of the capital market.

[27] See L. Grebler and S. J. Maisel, "Determinants of Residential Construction: A Review of Present Knowledge," in *Impacts of Monetary Policy,* Commission on Money and Credit, Englewood Cliffs, 1963; and D. Fand, "The Debt-Expenditure Hypothesis and Residential Construction," *Southern Economic Journal,* July 1959.

has tried to make a contribution and to which this report is limited. The second of the intermediate steps is the intensive analysis—not limited to the postwar period—of one, possibly the basic, capital market relationship, namely, the relation between interest rate movements and fund movements. The third step is the development of a theory of finance integrated into the structure of modern general economic theory, but sufficiently specialized to serve as a guide for capital market analysis. Promising steps have been taken in this direction in recent years which have witnessed a remarkable revival of interest in the economic theory of finance—in contrast to the collection of recipes generally known as a textbook on corporate finance.[28] The results of this revival, however, represent as yet only a beginning rather than the final answer to the quest for an economic theory of finance and the capital market.

Actual Framework

In the discussion of the basic problems involved in setting up a statistical framework for capital market analysis, we often have had to make concessions to the limitations of the basic data at our disposal and of the resources available within this project for the rearrangement and refinement of the basic statistics. Within these limitations it has, nevertheless, been possible to set up and implement a framework that, while still far from the ideal, provides most of the basic data needed for an analysis of the main characteristics and structural changes in the American capital market during the postwar period, even if the data are as yet insufficient to permit a close analysis of cyclical fluctuations in the capital market.

SECTORAL BALANCE SHEETS

The core of the framework used in this report is represented by some fifty sectoral balance sheets, each containing annual data for the year-ends 1945 through 1958, which constitute Section III in Volume II of *National Balance Sheet*. These tables comprise balance sheets for the seven main sectors (nonfarm households, agriculture, unincorporated business, nonfinancial corporations, finance, state and local gov-

[28] It may suffice to point to two examples: The efforts of E. S. Shaw and J. G. Gurley culminating for the time being in *Money in a Theory of Finance* (Washington, 1960), and the report of the Radcliffe Committee and the literature which is developing around it.

ernments, and federal government), a national balance sheet (which is the sum of the seven sectoral balance sheets), and balance sheets for two dozen subsectors of the financial sector. The tables use a standard classification for assets (twenty-six items) and liabilities (thirteen items). In principle, the entries are in current values, which actually means replacement cost for reproducible tangible assets, market values or the closest approximation thereto for nonreproducible tangible assets and for corporate stock, and face value for claims and liabilities; net worth is calculated as the difference between the value of assets thus defined and that of liabilities.

The balance sheets of the financial sector, and its subsectors, may be regarded as primary since they are essentially derived from the published statements of these institutions, although some adjustments are occasionally made to conform to the standard classification of assets and liabilities or to substitute current for book values. At the other extreme, the balance sheets of the nonfarm household, farm, and nonfarm unincorporated business sectors are secondary, i.e., the entries for the different asset and liability items are not taken from financial statements of these three sectors, which are not available, but are derived indirectly from the statements of other sectors or from other statistics. The balance sheets of nonfinancial corporations, state and local governments, and the federal government occupy an intermediate position. Most of the assets and liabilities are taken from financial statements, but those for tangible assets, which are unavailable or not in acceptable form in primary statements, are derived from other statistical sources and thus are secondary. Actually, the construction of the sectoral balance sheets from the sources is a rather complicated procedure, which is described in detail in the notes to the tables.

Most of the other tables (included in Volume II of *National Balance Sheet*) can be derived from the Section III tables by rearrangement of entries. However, two additional sources of information are required in the derivation of the tables in Sections V, VI, VII, and VIII. The first of these is estimates of capital expenditures in current prices and of capital consumption allowances, which are derived from statistical sources usually entirely independent of balance-sheet data (described in detail in Appendix B of my *The National Wealth of the United States*[29]). The second additional source is the estimates

[29] Princeton for NBER, 1962.

of new issues of corporate securities and the net purchase or sales balance of corporate stock by different sectors. The derivation of these estimates is explained in the notes to the Section VIII tables.

NATIONAL BALANCE SHEETS

In the tables in Section I of Volume II of *National Balance Sheet,* the sectoral balance sheets for each year from 1945 through 1958 of the tables of Section III are rearranged to produce a national balance sheet for each of the fourteen year-ends of the postwar period. These national balance sheets, which show for a given year the assets, liabilities, and net worth of the nation and of the seven main sectors, are intended to be still pictures permitting a rapid bird's-eye view and an easy comparison of the distribution of the various balance-sheet items among the main sectors.

ITEM STATEMENTS

These tables (Section IV) show for each of the thirty-odd types of assets, liabilities, and net worth the holdings for each of the seven main sectors (and, where appropriate, for the subsectors of the finance sector) for each of the year-ends 1945 through 1958. These tables thus enable us to follow the amounts of the various assets and liabilities outstanding and to study the distribution of these amounts among the different sectors.

From Sections I, III, and IV, which all deal with stocks, are derived Sections V, VII, and VIII, which show flows during each of the years 1946 through 1958. The flows are obtained for claims and liabilities by taking the first differences between the stocks at the beginning and the end of the year. This can be justified by the relatively small importance of valuation changes, including realized capital gains and losses, in most assets and liabilities of this type. This short-cut method is not permissible for items that are subject to substantial price fluctuations, i.e., tangible assets, equity securities, and net worth. For these items, true flow figures have been used, i.e., gross capital expenditures for reproducible tangible assets, net purchase or sales balances for corporate stock, and saving for changes in net worth.

SECTORAL FLOW-OF-FUNDS (SOURCES-AND-USES) STATEMENTS

The tables in Section VII are presented for the seven main sectors, the twenty subsectors of the finance sector, and the nation as a whole.

Each of these statements shows flows for the different assets and liabilities for each year from 1946 through 1958.

NATIONAL ANNUAL FLOW-OF-FUNDS STATEMENTS

These statements (Section V), paralleling the national balance sheets in Section I, show the flows of each asset and liability distinguished for the nation as a whole and for each of the seven main sectors, thus providing a summary view of the flow of funds during a given year.

TRANSACTION ACCOUNTS

The tables in Section VIII are derived from Section IV by differencing, except for capital expenditures and transactions in corporate stock for which true flow figures are utilized. The Section VIII tables show for a given asset or liability the flows during each of the years 1946 through 1958 for each of the seven main sectors, the nation as a whole, and the subsectors of the finance sector where applicable.

Additional basic tables were computed as an aid in analyzing the figures, but were omitted from the printed version because they can easily be derived from the tables in Volume II of *National Balance Sheet.* These supplementary tables, obtained by simple arithmetical operations from the basic set, show annual changes in flows and in balance-sheet items, in absolute and percentage terms; annual percentage distributions of each sector's balance sheets and transactions accounts; and the annual sectoral distribution, in percentages, of the several items in balance sheets, sources-and-uses-of-funds statements, and transactions accounts.

The data discussed are those now available. Unfortunately, as is so often the case in enterprises involving the processing of large masses of statistical data, the construction of the framework and the filling of the empty boxes with actual figures have practically exhausted the time and resources available for the entire project. Indeed, for reasons of economy, not even all the statistical material that has been prepared can be shown in Volume II of *National Balance Sheet,* let alone fully utilized in the text. It has been found possible, however, to include in Volume II all the basic flow and stock data in absolute figures, i.e., Sections I–VIII. Some material from other tables has been utilized in the text.

In addition to presenting the statistical raw material, it has also been found possible to present a summary discussion of some of the

more obvious aspects of the American capital market during the postwar period, and a still more summary comparison of developments during this period with those in earlier periods, particularly 1901–12, 1923–29, and 1934–39. This is done in Chapter 3 for capital expenditures, a flow series basic to much of capital market analysis, and in Chapters 4 and 5 for internal and external financing and their main forms for the period as a whole and for the three cycle averages of 1946–49, 1949–54, and 1954–59. The discussion in the first part of Chapter 4 is based on national aggregates, while in the second part developments are reviewed for each of the seven main sectors.

In all cases, the approach is descriptive rather than analytical. There was no time for econometric experiments with the data or for testing specific theoretical hypotheses. It is hoped that the material, particularly the detailed data presented in Volume II of *National Balance Sheet,* will be used for these purposes later, either within the National Bureau or outside it.