VALUE OF FLOAT

The single most important aspect of the U.S. payment system when considering cash management is the existence of **float** on mailed checks. From the payor's perspective, float refers to the delay in value transfer from the time a check is written until it finally is charged to the payor's account. The cash manager can apply the valuation approach to calculating the value of float. Once again, we can use the cash flow timeline to illustrate a realistic situation and how to anchor the dates for our calculation appropriately.

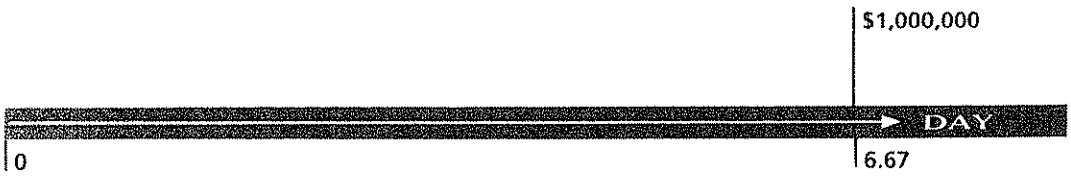
We set up a cash flow timeline in the example that follows, illustrating changes in float and their value effect. We use a simple interest present value calculation for a company considering using newly available bar coding of ZIP codes, which leads to less mail time due to reduced Postal Service handling.

EXAMPLE Crown Corporation collects $1,000,000 daily. It is presently considering investing in a machine that will both bar code ZIP + 4 on outgoing envelopes and presort by destination. The Postal Service has already shown the cost savings for the machine in terms of reduced postage (about three cents per first-class item). Management wonders if there is a significant additional savings from the one-third day savings in mail float the Postal Service guarantees for companies doing the bar coding. Collection float at present is three days mail float, two days processing float, and two days availability float. Assume Crown's cost of capital is 10 percent per year.

The cash flow timeline at present is graphed as follows:

How much value can be gained by Crown due to the reduced mail float?

SOLUTION The revised cash flow timeline appears as follows:



Two approaches can be used to see the value effect of the reduced float: the first gives the present value of one day's collections, and the second uses that result to calculate the total effect.

Calculate the PV of One Day's Collections under Both Mail Float Situations

The simple interest discounting formula presented in Chapter 3 (Equation 3.2) is reproduced here as Equation 8.1.

$$PV = \frac{CF}{1 + (i)(n)} \tag{8.1}$$

Substituting for the present situation of a 7-day wait until cash is received gives us the present value of the collection float.

$$PV = \frac{\$1{,}000{,}000}{1 + (0.10/365)(7)}$$
$$= \$998{,}085.86$$

The present collection float of seven days has a present dollar value to the corporation of $998,085.86. To see if the present value would increase on adoption of the new terms, we make the same calculation for the proposal. Based on the anticipated collection float of 6.67 days, we have

$$PV = \frac{\$1{,}000{,}000}{1 + (0.10/365)(6.67)}$$
$$= \$998{,}175.94$$

With the proposal, the collection float reduction to 6⅔ days results in a present value of daily collections of $998,175.94. Thus, Crown would gain about $90 *per day's* collections on a present value basis. This first calculation simply indicates the value effect of one day's transactions. To find the total value effect, assuming the savings will last into the indefinite future, we need to calculate the present value of a perpetuity of such flows.

Calculate the NPV of a Perpetual Stream of Daily Collections

The procedure for determining the present value in total of a daily perpetuity is presented in the appendix at the end of the text and is reproduced here as Equation 8.2. In words, we take one day's cash flow and divide it by the daily equivalent of the nominal interest rate.

$$PV = \frac{CF}{i} \tag{8.2}$$

Because we have the difference in daily cash flow ($90.077272) from the reduced mail float, we can get the present value of the reduced float bar coding and presorting proposal as follows:

$$PV = \frac{\$90.077272}{0.10/365}$$
$$= \$328{,}782.04$$

The system is worth $328,782 to the company, on a present value basis. Notice that there is an implicit assumption that the difference in float is permanent. If we had reason to expect that three years from now float would drop to 6.67 days regardless of company preprocessing, we would discount the daily cash flow as a 3-year daily annuity.[1]

To determine if the proposal should be adopted, we would compare the present value of the benefits, roughly $329,000, plus the reduced mailing costs, to the installed cost of the bar coding and presorting system. If the combined cost is less than $329,000, the proposal would have a positive net present value (NPV) and should be implemented. We present a more advanced present value analysis in our discussion of disbursement systems in Chapter 11, in which we compute the value effect of paying suppliers electronically instead of by check.

[1] An approximation formula for the annual benefit of the days saved is Annual benefit = (Days saved) × (Daily cash flow) × (k), where k is the annual interest rate. The intuition here is that the product of the first two terms gives an amount that may be continuously invested over time. In our example, the annual interest benefit would be $33,333: $33,333 = (0.33333 × $1,000,000 × 0.10). This simplified formula ignores the compounded effect of daily savings throughout the period over which the total value effect is computed. If the effects of a proposal will last only one year, this approximation will be fairly accurate.

U.S. PAYMENT SYSTEM

The two components of the U.S. payment system are the banking system (which includes the Federal Reserve System) and the set of payment mechanisms.[2] This system is unique in that most other countries have only a handful of banks and use the postal system to assist in collecting and depositing payments. The U.S. payment system is the backbone of our banking and financial markets, which in turn facilitate the growth and stability of our economy. In this section, we survey the major types of depository financial institutions, explain the payment responsibilities of the Federal Reserve System, and identify the means by which most payments are processed through the payment system.

Financial Institutions

The financial institutions that participate in the economy's payment process are commercial banks, savings and loan associations, mutual savings banks, and credit unions. All four of these depository institutions, which we simply refer to as banks, are involved in handling checks as well as electronic payments. Commercial banks continue to dominate the banking industry. Roughly 7,800 commercial banks continue to operate in the United States, compared with 1,425 savings and loan associations, 489 stock or mutual savings banks, and 10,000 credit unions. Because so many of a company's cash management activities are linked to banks and banking regulation, the regulatory environment is a key component of the payment system. We subdivide our remaining discussion of financial institutions into product differences, geographic restrictions, and safety considerations.

PRODUCT DIFFERENCES Each type of financial institution has a slightly different thrust. Commercial banks are more oriented toward corporate services, savings and loan associations toward real estate development and mortgage finance, mutual savings banks toward mortgage finance, and credit unions toward consumer loan and deposit services. These institutions are becoming more like one another. The ability of savings and loan, mutual savings banks, and credit unions to operate more like commercial banks has come as a result of the passage of the **Depository Institution Deregulation and Monetary Control Act of 1980**. The major product-related provisions of that act are summarized in Exhibit 8–1.

It is essential to note that business firms (except sole proprietorships) are prohibited by law from receiving interest on bank checking accounts; this Federal Reserve **Regulation Q** provision limits them to using demand deposit accounts for transactions and disqualifies them from holding negotiated order of withdrawal (NOW), SuperNOW, or **money market deposit accounts (MMDAs)**. One of the most important principles of cash management, that of minimizing idle cash balances, is premised on the opportunity cost of forgone interest linked to this legislation. Businesses with deposit account balances large enough to justify the fixed monthly cost use daily transfers into "**sweep accounts**" to get paid overnight interest on deposit balances. Small businesses able to keep very small deposit balances, particularly those not requiring bank loans, may keep most of their transaction balances in money market mutual funds. Because these funds are not covered by deposit insurance, some cash managers use money funds investing exclusively in government securities.

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[2] Lewis and Davis (1987) distinguish between cash and noncash payment systems, formally defining a noncash system as a mechanism by which there is (1) a transfer of ownership of claims (a check representing a claim to cash), (2) conversion of those claims to a preferred form, and (3) settlement of debts incurred by asset exchanges between the claims issuers. Our discussion centers on checking and electronic noncash payment systems because they account for most nonretail corporate payment and collection transaction.

Exhibit 8–14

Account Analysis Statement Example

BANK ONE

Bank One, NA

CAP N N Z 01-07-2004

Account No:

Page 1 of 3

B **DEC 1 through DEC 31, 2003**

External

A Contact:
Phone:

Account Analysis Statement

C Account No: DEMAND DEPOSIT ACCOUNT

Balance Analysis

				This Period	Average Year To Date
D	Average Ledger Balance			7,597,307.76	6,954,741
E	Less Average Float			-6,019,317.30	-6,208,912
F	Average Collected Balance			1,577,990.46	745,828
G	Avg Positive Collected Balance			1,577,990.46	757,320
H	Less Reserve Requirement	Rate:	10.000	-157,799.04	-75,732
I	Average Investable Balance			1,420,191.42	681,588
J	Less Balance Required			-367,889,112.21	307,079,271
K	Excess(Deficit) Invest Bal			-366,468,920.79	306,397,682
L	Reserve Adjustment-Collected			-40,718,768.97	-34,044,186
M	Net Collected Balance Position			-407,187,689.76	340,441,869
	Service Charge Calculation				
N	Earnings Credit Allowance	Rate:	.300	361.85	181
O	Total Charge For Services			-93,736.13	-81,395
P	Net Charge For Services			-93,374.28	-81,213
	Service Charge Amount			**93,374.28**	

Exhibit 8–14 (continued)

Account Analysis Statement Example

BANK ONE

Bank One, NA

CAP N N Z 01-07-2004

Page 2 of 3

DEC 1 through DEC 31, 2003

Account No: DEMAND DEPOSIT ACCOUNT

Service Analysis

Service	Number Of Units	Unit Price	Charge For Service	Balance Required
Account Services				
FDIC Assessment	3,877,878	3.8500	128.56	504,563.44
Account Maintenance	1	18.0000	18.00	70,645.16
DDA Statement Print Additional	1		0.00	
Depository Services				
Credits Posted	832	0.4000	332.80	1,306,150.53
Dep Cks On-Us	83,909	0.0450	3,775.91	14,819,431.72
Dep Cks Local City	1	0.0600	0.06	235.48
Dep Cks Local RCPC	1	0.0600	0.06	235.48
Dep Cks National Frb Other	19,721	0.1000	1,972.10	7,739,962.36
Dep Cks Encoding	1	0.0400	0.04	156.98
Dep Cks MICR Reject Repair	532	0.2500	133.00	521,989.24
Dep Return-Items Returned	9,133	5.0000	45,665.00	179,222,849.46
Dep Return Redeposit Reclear	9,982	4.0000	39,928.00	156,706,666.66
Dep Return Detail Reporting	19,115		0.00	
Proof Corrections	25	5.0000	125.00	490,591.39
Disbursement Services				
Debits Posted	137	0.1600	21.92	86,030.10
Funds Transfer Services				
FT Voice Outgoing Rep Transfer	22	14.0000	308.00	1,208,817.20
FT Voice Outgoing Non-Rep Trfr	22	17.0000	374.00	1,467,849.46
Information Services				
TOC Prev Day Maintenance	1	55.0000	55.00	215,860.21
TOC Intraday Maintenance	1	65.0000	65.00	255,107.52
TOC Prev Day BAI Maintenance	1	55.0000	55.00	215,860.21
TOC Intraday BAI Maintenance	1	65.0000	65.00	255,107.52
TOC Special Report Maintenance	1	35.0000	35.00	137,365.59
BAI2 File Transmsn-Per Acct	2	50.0000	100.00	392,473.11
BAI2 File Transmsn-Per Item	673	0.0600	40.38	158,480.64
TOC Prev Day Accounts	3	11.0000	33.00	129,516.12
TOC Prev Day Items	454	0.1000	45.40	178,182.79
TOC Intraday Accounts	3	16.5000	49.50	194,274.19
TOC Intraday Items	105	0.1500	15.75	61,814.51
TOC Prev Day BAI Accounts	4	11.0000	44.00	172,688.17
TOC Prev Day BAI Items	1,624	0.1000	162.40	637,376.34

continued

Exhibit 8–14 (continued)

Account Analysis Statement Example

BANK ONE

Bank One, NA

CAP N N Z 01-07-2004

Page 3 of 3

DEC 1 through DEC 31, 2003

Account No: DEMAND DEPOSIT ACCOUNT

Service Analysis

Service	Number Of Units	Unit Price	Charge For Service	Balance Required
TOC Intraday BAI Accounts	4	16.5000	66.00	259,032.25
TOC Intraday BAI Items	815	0.1500	122.25	479,798.38
Total Charge For Services			**93,736.13**	**367,889,112.21**

A Bank One Relationship Manager, Account Officer, or Banking Center.

B Beginning/ending date.

C The account(s) to which statement applies.

D The sum of the daily positive and negative ledger balances for the month divided by the number of days in the month. Balances for the last preceding business days are used for weekends and holidays.

E The difference between the average ledger balance and the average collected balance for the month. Bank One assigns float item based on our published availability schedule.

F The sum of the daily positive collected balances for the month divided by the number of days in the month.

G The portion of the positive balances Bank One must keep on deposit at the Federal Reserve. This amount, therefore, is not available to offset service charges.

H The sum of the average positive collected balances less reserve requirements, as defined by Federal Reserve. (Less loan compensating balances, if applicable.)

I The total balances required for services rendered.

J The sum of average investable balance less balances required for services.

K Reserves not used for deposit services are added back to the Excess (Deficit) Investable Balance. For deficit balances, this is the additional reserves required to support deposit services.

L The collected balance position adjusted for credit commitments and other services used. These funds are available to your company to meet other corporate obligations. For deficit balances, this is the additional collected balances required to offset all service charges.

M The dollar credit on the average positive investable balances maintained. If there are negative balances at any time during the month, the applicable bank rate for short-term commercial borrowing will be assessed as a Negative Colleced Balance Fee in the itemized services section of your Account Analysis Statement.

O The total charge for services rendered.

P The amount remaining in dollars after service charges have been deducted from the earnings credit allowance. If negative, this line will show the net charge for services.

Source: Reprinted with permission of Bank One (Louisville, KY).

31). Bank One converts each service charge line item to the equivalent balances necessary to cover those charges by applying Equation 8.5.

$$RCMP = \frac{SC}{\left(\frac{ecr}{365}\right)n} \tag{8.5}$$

Where:

$RCMP$ = Required compensating balances
SC = Service charges for the month
ecr = Earnings credit rate (annual)
n = Number of days in month

Equation 8.5 would be modified slightly for banks not distinguishing between the average collected balance and the average investable (available) balance, with the adjustment being made in the denominator to reflect the required reserve ratio (rr). Because the required balances must cover required reserves as well as fees, it seems that the balances will be higher. In practice, the bank adjusts the ecr upward to make the two approaches equivalent. Equation 8.6 gives us the required compensating balances in light of the reserve ratio.

$$RCMP = \frac{SC}{(1 - rr)\left(\frac{ecr}{365}\right)n} \tag{8.6}$$

Given the company's total service charges owed of $93,736.13 for December, the Total Charge For Services at the bottom of the second schedule (using Equation 8.5) indicates a required balance of $367,889,112.21.

$$\$367{,}889{,}112.21 = \frac{\$93{,}736.13}{\left(\frac{0.0030}{365}\right)31}$$

This represents how much in available balances the company would have had to average during July to avoid paying fees for bank services rendered. Returning to the top schedule in Exhibit 8–14, we see $367,889,112.21 inserted as the Balance Required (M).

The Excess Investable Balance (K) is then computed as the Average Investable Balance minus the Balance Required. At this point, Bank One recognizes that some additional balances may need to be held during the month as compensating balances required to support loans. Item (L) is therefore subtracted from the Excess Investable Balance to arrive at the Net Collected Balance Position (M) of ($407,187,689.76). The company has held much smaller balances in its checking account than those necessary to compensate for fees and to serve as loan compensating balances.

But what if the company would rather compensate the bank by paying a fee each month? The remainder of the schedule compares the earnings credit applied to the company's balances to the total service charges incurred. Be careful; the Earnings Credit Allowance computation (N) below the Net Collected Balance Position is found by multiplying the Average Investable Balance of $1,420,191.42 (I) by the monthly ecr (0.003/12). The company has "earned" $361.85 based on its account balances (N), versus the Total Charge For Services (see bottom of Balance Analysis schedule) of $93,736.13 (O). The difference of $93,374.28 (P) is an amount due, which is often invoiced or directly debited from the account. When the company has a net service average, or credit, the amount might be carried into future months to offset months when balances are inadequate to cover service charges. If the company would rather compensate the bank by holding larger balances, it may be given several months to make up for a shortfall. Settlement periods over which credits or shortfalls are cumulated might be quarterly, semiannual, or annual (calendar year). Charges would be made on the cumulative shortfall at the period's end.

USES OF THE ACCOUNT ANALYSIS STATEMENT In addition to serving as an invoice for bank services rendered, the cash manager can use the account analysis to get an overall view of the company's balance levels and bank activity. Two impediments to interbank comparisons based on account analyses are the lack of uniform presentation formats (which are gradually becoming more standard) and the variety of cutoff times and availability schedules making up banks' float calculations. Despite growing acceptance of the uniform account analysis format developed by the AFP, cash managers complain that many banks have been slow in adopting the voluntary standard. Consequently, cash managers are forced to either manually adjust different banks' statements to compare them or use third-party software that automatically reformats them to a uniform statement.

How Banks Charge for Services

To maximize value from the company's banking relationships, one must understand how compensating balances work and the relative merits of paying for bank services by balances versus fees. We begin by illustrating the required compensating balance computation for cash management services.

CALCULATING COMPENSATING BALANCES Compensating balances are minimum or average deposit amounts required by banks as a means of charging for cash management or lending services. Banks formerly required customers to maintain a demand deposit account balance of 10 percent of the credit line or loan principal amount, but competition has forced this figure lower. For large corporations, balances show good will rather than being required. When required on lending arrangements, companies must maintain the balances as well as pay interest on amounts borrowed.

As compensation for each cash management service, the bank will compute the charges for a month's activity, then use a formula to compute the equivalent amount of balances. The formula will look like Equation 8.5 or Equation 8.6. Illustrating, a company being charged \$150 for direct sends during the month would have to have \$150/0.004438356 = \$33,796.30 in compensating balances, assuming a required reserve ratio of 10 percent and an *ecr* of 6 percent (using Equation 8.6).

$$\text{Compensating balances} = \frac{\$150}{(1 - 0.10)\left(\frac{0.06}{365}\right)30}$$

$$= \frac{\$150}{0.004438356}$$

$$= \$33{,}796.30$$

At the time of this writing, most banks have a small FDIC insurance premium assessed—in the Bank One schedule the FDIC charge that is shown is \$128.56. However, S&Ls and mutual savings banks have larger assessments. Financial institutions that pass along assessments are either including a fee on the service charge schedule or, by further multiplying the denominator of the above formula by (1 − FDIC assessment rate), driving the compensating balance dollar amount even higher.

Pros and Cons of Balances versus Fees

Banks have generally favored compensating balances over fees as the method of remuneration for services performed, even though a recent survey indicated that just more than half of corporations are paying by fees. Bankers cite the following advantages of compensating balances: