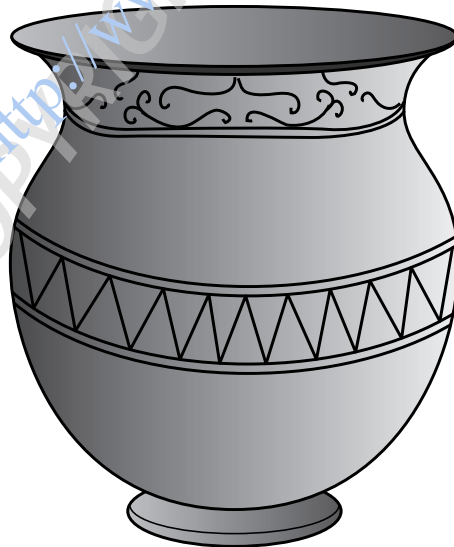


CHAPTER 1

Creating Ledger Accounting

If we set out to create the modern system of accounting, we would start with a goal. Our accounting system is a measuring and monitoring system, so we set as a goal to count the things that matter to a business and report the results in a way that is helpful to the managers. This chapter takes an important first step in providing a systematic way to count and organize business data.

We could start with a primitive counting system using rocks and a clay urn. This is not a history of accounting, but this text will make reference to how primitive record keeping can be used to account for business transactions. The history of accounting is complex, and this text will not try to tell that story. However, these early accounting tools can provide the student with an understanding of why accounting methods evolved.



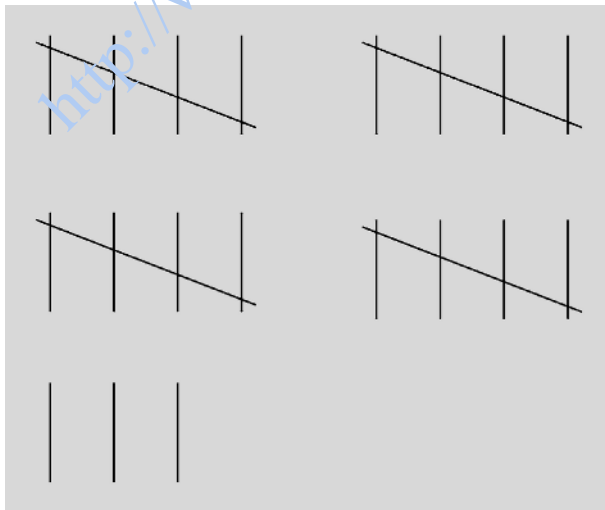
We could use the urn to contain a count of some product our company owns. If our retro business were importing and selling myrrh, we would add pebbles to the urn every time a ship came in from distant lands with a supply of myrrh. Each time we sold some myrrh, we would remove pebbles from the urn. At every point in time, the urn would contain our count of the stock of myrrh on hand.

Of course, our business may buy and sell many different products. We would need another urn for every product we want to count.

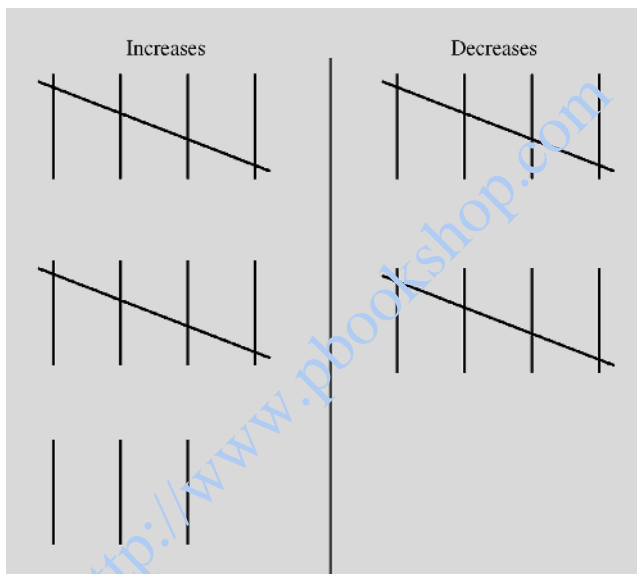
We could also devote an urn to the amount of debt we owe. If our currency were gold coins, we would record one pebble in the urn for each gold coin owed to our lenders. We may need to use smaller pebbles for the debt account, so there is room in the urn. The size of the pebble doesn't matter much because we really have to count the pebbles each time we want to see how much money we owe.

Urn could help the smallest of businesses to keep track of their business, but urns are unwieldy as the number of items we need to count grows. In addition, we do not know the count in the urn at any previous point unless we write down the count somewhere else and preserve the information outside of our counting system. Finally, when we count the pebbles and the thing we are tracking, we have no way to distinguish theft from human error in updating the pebbles in the urn.

We can fix all of these problems by making the count a little differently. If we have the clay to make urns, we might want to build a clay tablet to count our myrrh, our debt, and anything else worth counting. One system would use soft clay tablets and a blunt-tipped stick. Each time we buy more myrrh, we etch a "tally mark" into the clay.



The previous system allowed us to count decreases to our stock of myrrh as easily as increases. Unlike the hard clay urn, this tablet does not easily let us indicate that previous inventory has been sold. If we were using clay urns to count our myrrh, we could pull pebbles out of the urn as we sold myrrh to our customers. To be as useful as a clay urn, we would need to count the number of units of myrrh we acquired and the number we sold. The next drawing shows a representation of how the soft clay tablets can be adapted to count both increases and decreases in the amount of myrrh on hand.



The flat stone covering a tomb or grave is called a ledger (*Random House Unabridged Dictionary of the English Language*, 1966). Perhaps this stone lends its name to the soft clay tablets used to count the assets and liabilities of this old world business. According to the New York State Society of CPAs (www.nysscpa.org), assets are defined as “an economic resource that is expected to be of benefit in the future” and liabilities are defined as the “DEBTS or obligations owed by one entity (debtor) to another entity (creditor) payable in money, goods, or services.”

This clay tablet containing tallies has a couple advantages over rocks and urns. We can indicate our location on the ledger at certain points in time, such as at month-end and year-end. When we fill out a tablet, we

can let it dry in the sun and preserve a record of our counting procedure. In addition, we may be able to count our stock of goods with fewer, more compact resources (tablets are smaller than most clay urns). Also, we can quickly see a running total of these products in our accounting records.

The next improvement over the clay tablet method is to record the tally marks on paper. Today, paper is an inexpensive material and much lighter than clay tablets. It is a small step from etching tally marks in a soft clay tablet to inking tally marks on a piece of paper. Although less durable than clay, we can introduce a second hugely important improvement. Instead of counting the myrrh as one tally per unit of myrrh, we can use numbers to represent quantities. This is important if we are willing to sell anything other than standard units of myrrh. Relying on numbers and paper, we can be much more precise in our counting.

The other feature that a paper ledger permits is to count the assets and liabilities in currency units instead of physical quantities. For certain kinds of assets and liabilities, this is not a change. The liabilities described as the number of gold coins we owe a lender are denominated in currency. If we count the number of oranges we hold and the number of apples, we can't directly compare the count because they are as different as apples and oranges. If we instead describe the value of the apples and the oranges instead of the count, then we can make intelligent comparisons between the apple count and the orange count and we can even accumulate assets into larger subtotals with meaningful results.

Students who are new to accounting may conclude that accountants don't care how many apples or how many oranges we own. Of course, this physical count can be tremendously important, but it doesn't enter into the primary account ledger or standard accounting reports. Modern information systems preserve a tremendous amount of this nonledger information, which doesn't usually appear on published financial statements. However, this text and most other accounting texts focus primarily on the value of the transactions and very little on physical quantities.

COUNT EVERYTHING

So far, it is not clear what assets and what liabilities we should count. The short answer, of course, is that we should count all of them. This is a challenging task, and the bulk of this text describes how accountants keep track of business transactions. It is important to count all assets and all liabilities because we live in a world where there is considerable pressure to disclose financial information to investors and creditors. More fundamentally, if we

TABLE 1.1 Impact of Changes in Asset and Liability Values

Type of Entry	Impact on Equity
Increase assets	Increase equity
Decrease assets	Decrease equity
Increase liabilities	Decrease equity
Decrease liabilities	Increase equity

have accurately counted all our assets and all our liabilities, we can net the two to see “how we are doing.” If assets greatly exceed our liabilities, we have equity (defined as the “residual interest in the assets of an entity that remains after deducting its liabilities” (www.nysscpa.org/prof_library/guide.htm#e)) or net worth in the business. If we don’t (or can’t) count every asset and liability, we can’t really know how much the assets exceed the liabilities (if at all).

So far, we have been counting only assets and liabilities. While it may appear to be unnecessary to count our equity, it certainly would be possible to do so. One way to count the equity is to realize that any increase in assets (all other things being equal) increases our equity or makes us richer by an equal amount. Likewise, a decrease in assets (again, all other things being equal) decreases our equity by the same amount. Similarly, an increase in liabilities makes us poorer (lowers our equity) and a decrease in a liability increases an equity account. A list of some of the combinations appears in Table 1.1.

THE BEGINNINGS OF DOUBLE-ENTRY ACCOUNTING

If we count all the assets and liabilities, accountants can directly measure the benefit of a transaction. Suppose a merchant sells myrrh that costs 5 gold coins in return for 10 gold coins. The currency account increases by 10 gold coins (an asset), so our net worth increases by the same 10 gold coins. Our inventory of myrrh decreases by 5 gold coins, so the net worth declines by 5 gold coins. The net of the two transactions (which actually occur simultaneously) is to increase the firm equity by 5 gold coins.

Of course, as shown in Table 1.1, the imputed matching of transactions with changes in equity is frequently not an actual accounting reality but does offer a perspective on the link among assets, liabilities, and

TABLE 1.2 Some Combinations of Business Transactions

Type of Transaction	Offsetting Transaction	Example
Increase asset	Decrease a different asset	Use cash to acquire an asset
Increase asset	Decrease a different asset	Sell used tools for cash
Increase liability	Increase asset	Borrow money to buy asset
Decrease liability	Decrease asset	Use cash to pay off a debt
Increase liability	Decrease liability	Issue bond to repay bank loan

equity. In the preceding sales transaction, it is also useful to think of the mismatched change in assets (decrease in the value of myrrh in inventory by 5 gold coins versus an increase in currency of 10 gold coins). It is no accident that the mismatched change in assets exactly matches the change in equity.

It will soon be obvious if we commit to count everything (including an explicit account of the equity), that every counting transaction requires at least two entries. In addition to the types of matched transactions in Table 1.2, several other types of transactions are possible. Chapters 3 through 5 will describe these transactions.

Table 1.2 does not contain an exhaustive list of exchanges that are possible. Also, the value of the two transactions does not always match, so there can be a third or more entries required to describe a business transaction. When the values of the transactions do not match, the increase or decrease in the value of the firm absorbs the difference, as with the sale of myrrh discussed earlier.

Double-entry accounting merely recognizes that any need to count some transaction in the business creates the need to count at least one additional offsetting transaction. Further, if all the entries are matched with entries to equity, the offsetting equity amount not only describes the net benefit or detriment to the firm but also quantifies the net entry required to complete the description of the transaction.

Note that modern accounting does follow the pattern of matching each change in asset and liability with a change in equity but in a way that will be described in Chapters 4 and 5. After we add a few more features to our accounting system, the receipt of 10 gold coins will be instead matched with an equal entry called SALES, and the reduction in inventory that cost 5 gold coins will be paired with a 5-gold-coin entry called COST OF GOODS. These are called temporary accounts that will be netted and reclassified as equity at some point in the future.

DOUBLE-ENTRY RECORDING OF BUSINESS TRANSACTIONS

As stated earlier, the value of the company equity can be calculated as the excess value, if any, of the assets of a company over the value of the liabilities, as in Equation 1.1.

It is convenient to rearrange Equation 1.1 to become Equation 1.2 using standard algebra:

$$\text{Assets} - \text{Liabilities} = \text{Equity} \quad (1.1)$$

$$\text{Assets} = \text{Liabilities} + \text{Equity} \quad (1.2)$$

Equation 1.2 demonstrates that the assets of the firm are owned by two groups. The liabilities represent lenders to the company, and the equity holders owned the excess over the value of the liabilities. Equation 1.2 represents the accountant's view of the ownership of the company, and double-entry accounting is a system to count or account for that ownership.

Returning to the system of clay tablets, double-entry can be viewed as a way of keeping track of the equity of the company. Instead of tallies, record numbers that increase the value of equity on the right-hand side of the clay tablet. Record the assets on the left. Record the liabilities on the right-hand side, too, because clay tablets do not accommodate negative numbers or subtraction very well.

Returning to Equation 1.2, the value of assets equals the value of the liabilities and equity. Because this is true both before and after each new transaction, it must also be true of individual transactions. This balance between assets, liabilities, and equity is one of the fundamental constraints of double-entry accounting. While it poses a challenge to the student who is new to accounting, it also provides a valuable cross-check to make sure: (1) that everything has been counted and (2) that they are counted in a way to preserve the match in Equations 1.1 and 1.2.

HANDLING DEBITS AND CREDITS

Using Equation 1.2 as a model, we could set up a clay tablet accordingly. Tallies to asset accounts (entries for assets as they are acquired) would occur on the left column. Tallies to liabilities assumed would be placed on the right-hand column. Similarly, tallies for equity would be placed on the right-hand column. Furthermore, the number of tallies in the asset column must match the number of tallies for liabilities and equity combined.

Following the preceding pattern, a reduction in assets gets tallied separately from increases in assets. So tallies for increases in assets get posted to the left column and tallies for decreases in assets get posted to the right column. Because increases to liabilities get posted on the right, decreases to liabilities get posted on the left column. Similarly, increases to equity get posted on the right, so decreases get posted on the left.

In a double-entry system, transactions are generally recorded in one of two columns. Accountants use the word *debit* to describe an entry on the left column and *credit* to describe an entry on the right column. Just like sailors who use *port* and *starboard* to describe left and right, the two accounting words mean little more than left and right.

The way accountants handle the debits and credits does matter. The paper ledger needs to convey whether a particular transaction increases or decreases the asset, liability, or equity. Several alternatives are possible, but accountants have developed the following rules:

- A debit entry for an asset reports an increase to that account.
- A credit entry for an asset reports a decrease to that account.
- A debit entry for a liability reports a decrease to that account.
- A credit entry for a liability reports an increase to that account.
- A debit entry for equity reports a decrease to that account.
- A credit entry for equity reports an increase to that account.

Using this list of rules, the accountant knows how to accumulate the impact of these accounting transactions. Notice that the assumptions are the same for liabilities and equity but opposite for assets. $\text{Assets} = \text{liabilities} + \text{equity}$ both before and after an individual accounting transaction is included. It follows that any increase (debit) in an asset must be paired with an equal decrease (credit) to another asset (e.g., buying inventory with cash), or an increase (credit) to either a liability or equity account. The size of the debits exactly equals the size of the credits.

The accountant's primary job is to tally the impact of these individual accounting entries for each asset, liability, and equity. However, by defining the meaning of debits and credits according to the list above, the accountant has a cross-check to identify whether all entries appear to have been included in the data correctly. If the sum of the debits equals the sum of the credits, the accounts are "in balance."

If the accounts are "out of balance," debits do not match credits and something is wrong. But if the accounts are in balance, the accounting entries could still be wrong. For example, both a debit and matching credit could be missing. Or both the debit and credit could be incorrectly included in duplicate. Or the wrong account may have been used.

KEEPING TRACK OF DATA

Modern accounting systems do not use clay urns, soft tablets, or even paper ledgers. Instead, companies store accounting inputs in databases that may bear no resemblance to urns, tablets, or ledger paper. Accounting textbooks, however, like to display accounting information in ways that resemble the antiquated technologies.

The T-account chronicles what was placed on a sheet of ledger paper. In paper-based accounting, each account (CASH, INVENTORY, etc.) has a separate sheet of paper with columns for increases and decreases to the account. The columns resemble the earliest method of accounting with clay urns and pebbles, except that the paper can reflect currency.

Following is an example of a merchant who begins with 15 gold coins, buys 10 units of myrrh at 1 gold coin each, and sells 1 unit of myrrh at 2 gold coins in the marketplace. The T-accounts for these transactions are presented in Figure 1.1.

When a computer is used to keep track of the transactions, the T-account is unwieldy. Instead, just the transaction details are recorded. For example, the same transactions are included in the list in Table 1.3.

A MATHEMATICAL DESCRIPTION OF DOUBLE-ENTRY CONVENTIONS

Students new to accounting may find it helpful to think of accounting as a mathematical system. An alternative set of rules for recording transactions appears in Table 1.4.

Under this system, you may post an increase to an asset such as EQUIPMENT together with a decrease in an asset such as CASH (i.e., the company bought the equipment with cash). The entry to EQUIPMENT would be a positive number and the entry to CASH would be a negative number reflecting the same amount of cash. Or you may post an increase to an asset such as EQUIPMENT together with an increase in a liability like ACCOUNTS

Cash	Inventory	Equity
15		15
10	10	
2	1	1

FIGURE 1.1 T-Accounts of Myrrh Transactions

TABLE 1.3 General Journal

Account	Debit	Credit
Cash	15	
Equity		15
Inventory	10	
Cash		10
Cash	2	
Inventory		1
Equity		1

PAYABLE. Under this coding system, the increases in the EQUIPMENT account may be entered as positive numbers, and both the decrease in CASH and the increase in ACCOUNTS PAYABLE could be recorded as a negative. Under this coding system, a complete set of entries describing a transaction would always sum to zero.

In fact, accountants go to great lengths to avoid using negative numbers. Probably bookkeeping conventions were developed so that staff did not need to perform subtraction very often. Accounting software programs generally

TABLE 1.4 An Alternative to the Debit-Credit System for Recording Business Transactions

Conventional	Example	Alternative
Record (positive) asset amounts in the left (debit) column.	A company receives cash.	Record positive asset amounts in a single column.
Record a decrease in asset amounts in the right (credit) column.	The company sells some land it had owned.	Record negative asset amounts in a single column.
Record (positive) liability amounts in the right (credit) column.	The company borrows money from a bank.	Record negative liability amounts in a single column.
Record a decrease in liability amounts in the left (debit) column.	The company repays money to a bank.	Record positive liability amounts in a single column.
Record (positive) equity amounts in the right (debit) column.	The company sells new shares of stock.	Record negative equity amounts in a single column.
Record a decrease in equity amounts in the left (debit) column.	The company pays a dividend.	Record positive equity amounts in a single column.

do not carry debits or credits as negative values. In any case, collapsing the debit and credit columns into one column with positive or negative numbers would be reinventing the double-entry system. In order to understand the way accountants think, it is therefore important to understand how accountants use debits and credits to avoid using negative numbers.

HANDLING INCOME ITEMS

The simple accounting model we have does not yet include accounts like SALES, REVENUES, COST OF GOODS SOLD, or INTEREST EXPENSE. Chapter 4 introduces these accounts. It is still possible to account for all these business transactions, although the method described here would not be acceptable to a modern business for several reasons. The rest of this chapter will describe how this very simple system lays the foundation for a system capable of describing a wide range of transactions. This explanation will also highlight the advantages of adding important features present in a modern accounting system.

We already showed how sales of myrrh could be recorded or journaled as changes in the asset accounts (cash and myrrh inventory) along with equity. The same method could be used for all the revenues and expenses of a business.

DETERMINING PROFIT IN THE SIMPLE ACCOUNTING MODEL

Modern accounting systems do have revenue and expense accounts. Our simple system can reveal whether the company is profitable. Using the counting method employed so far, all the revenues and expenses are instead entered as increases or decreases in net worth or equity. To determine the profit over a period of time such as three months or a year, compare the equity at the beginning of the period with the equity at the end of the period. Of course, if the business has other types of transactions affecting the equity of the company (such as the sale of stock or payment of dividends), the net income would equal the change in equity less the impact of these sources and uses of equity.

PERMANENT ACCOUNTS OVERVIEW

All of the asset, liability, and equity accounts are called permanent accounts. In our primitive accounting system and in modern accounting,

the value in each account reflects the accumulation of all activity. The value of cash in a bank account reflects a zero starting balance (perhaps starting years ago) plus all the deposits and all the withdrawals. So the cash balance at a particular point in time includes the net impact of all activities since the inception of the business.

Although accountants accumulate all the transactions affecting each account, they present the results at a particular point in time. The year-end balance sheet (described in Chapter 3) presents the asset, liability, and equity accounts from the beginning of the company to that year-end date.

TEMPORARY ACCOUNTS OVERVIEW

The preceding method of calculating income works because it is possible to calculate the value of permanent accounts at different points in time. The equity as of the third quarter includes all equity entries from the inception of the company to the end of the third quarter. Similarly, the equity as of the fourth quarter includes all the equity entries from the inception of the company to the end of the fourth quarter. The difference between these two totals equals the entries made to equity during the fourth quarter.

Business managers and investors are interested in results during a quarter or year. In Chapter 4, we introduce temporary accounts that account for revenues and expenses over an interval. These accounts are reset to zero at the end of each accounting period, which is why they are called temporary accounts. In addition to totaling the change in equity over a shorter period, we will also add a number of accounts to measure the reasons for the change in equity. The resulting income statement will provide considerably more information about why the company made money. The revenue and expense accounts such as SALES, INTEREST EXPENSE, RENT, and TAXES are examples of these temporary accounts.

CONCLUSION

Double-entry accounting was developed to count business transactions centuries ago. Accounting techniques evolved as businesses grew and became more complicated, but the same general rules and conventions support modern accounting. The process begins by recording business transactions as debits and credits into a number of accounts. Then, these transactions are combined by account to create the balance sheet and income statements. This process and analysis of the completed statements is described in the chapters that follow.

QUESTIONS

Note: For each of the questions that follow, show how the business transaction would be handled by accountants. In each case, show the accounts that would reflect the transactions, the dollar amount of the transactions the accountants would record, and whether the entry is a debit or credit.

- 1.1. You work for Lavalier Corporation. During the past several years, you have been working with the company to develop new communication technologies. Based primarily on your efforts, the company has acquired several valuable patents. The company has decided that the most attractive way of commercializing these patents is to set up a new company and provide you with a substantial equity stake in the business. Lavalier company lawyers have created a U.S. “C” corporation (the standard U.S. corporate structure) named Lavalier Communications, Inc. (LCI). Late in 20X0, the new company created a board of directors from senior officers in Lavalier Corporation and several independent (outside) directors. On January 2, 20X1, the board of directors met and named you president and chief operating officer (COO) of the new company. The board also named the corporate treasurer of Lavalier Corporation as the chairman and chief executive officer (CEO). The board of directors authorized 5 million shares of common stock (\$1 par value). On January 2, 20X1, Lavalier transferred \$5 million to a newly established bank account at First National Bank in return for 1 million shares of common stock (par value \$1 per share).
- 1.2. On January 2, 20X1, the board of LCI also granted you options to buy 200,000 shares of stock at \$5 per share expiring in five years. The options may be exercised (i.e., you can exchange the options plus \$5 per share for common stock) at any point after three years up to expiration in five years.
- 1.3. Based on prior discussions, the bank immediately moved \$2 million into a 5 percent bond maturing 12/31/X3. The remaining funds remain in a demand deposit account earning a floating rate of interest.

- 1.4. On January 2, 20X1, as agreed in the December Lavalier Corporation board meeting, LCI acquires key patents from Lavalier Bermuda PLC for \$2 million.
- 1.5. On January 16, you lease office space for one year at a nearby office park for \$4,000 per month beginning in February. On January 16, you make a security deposit of one month's rent and pay the first month's rent. Additional rent payments are due on the first day of each month beginning March 1. Show entries through March.
- 1.6. On January 19, you buy miscellaneous office equipment totaling \$45,000. Your vendor expects payment in 45 days to avoid finance charges of $1\frac{1}{4}$ percent per month, so you pay on 2/27/X1.
- 1.7. On January 28, you contract with a multinational custom manufacturer to produce 10,000 new communication devices (NCDs) per month. They will ship you 5,000 in June, then 10,000 per month after that for a net delivered price of \$10 per unit. The manufacturer asks you to make a one-time advance payment for the first three months' supply to provide them with part of the funding for setting up the new manufacturing process.
- 1.8. You receive 5,000 NCDs on June 19.
- 1.9. You receive 10,000 NCDs on July 23.
- 1.10. You receive 10,000 NCDs on August 22.
- 1.11. You receive 10,000 NCDs on September 19. You pay the contract manufacturer 7 days later.
- 1.12. You receive 10,000 NCDs on October 22. You pay the invoice amount (at \$10/unit) immediately.
- 1.13. You receive 10,000 NCDs on November 21. You pay the invoice amount (at \$10/unit) immediately.
- 1.14. You receive 10,000 NCDs on December 21. You pay the invoice amount (at \$10/unit) immediately.