GLOBAL EDITION

Multinational Business Finance

FOURTEENTH EDITION

David K. Eiteman • Arthur I. Stonehill • Michael H. Moffett

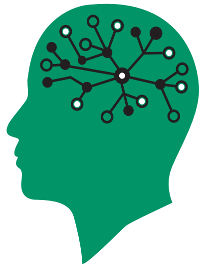
ALWAYS LEARNING

PEARSON

Prepare, Apply, and Confirm with MyFinanceLab™

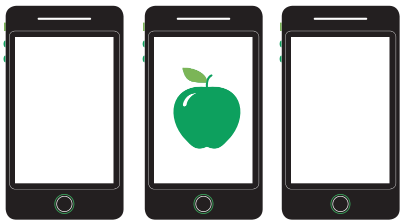
- **eText Features**—Keep students engaged in learning on their own time, while helping them achieve greater conceptual understanding of course material through author-created solutions videos and animations.

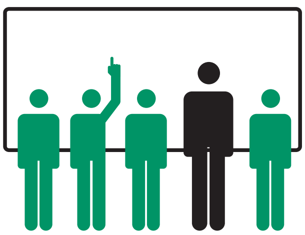
- **Dynamic Study Modules**—Work by continuously assessing student performance and activity, then using data and analytics to provide personalized content in real time to reinforce concepts that target each student's particular strengths and weaknesses.



- **Hallmark Features**—Personalized Learning Aids, like Help Me Solve This, View an Example, and instant feedback are available for further practice and mastery when students need the help most!

- **Learning Catalytics**—Generates classroom discussion, guides lecture, and promotes peer-to-peer learning with real-time analytics. Now, students can use any device to interact in the classroom.

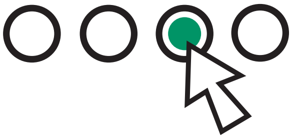




- **Adaptive Study Plan**—Assists students in monitoring their own progress by offering them a customized study plan powered by Knewton, based on Homework, Quiz, and Test results. Includes regenerated exercises with unlimited practice and the opportunity to prove mastery through quizzes on recommended learning objectives.

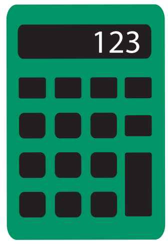
Prepare, Apply, and Confirm with MyFinanceLab™

- **Worked Solutions**—Provide step-by-step explanations on how to solve select problems using the exact numbers and data that were presented in the problem. Instructors will have access to the Worked Solutions in preview and review mode.



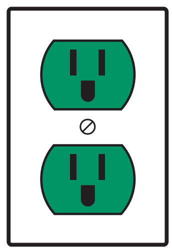
- **Algorithmic Test Bank**—Instructors have the ability to create multiple versions of a test or extra practice for students.

- **Financial Calculator**—The Financial Calculator is available as a smartphone application, as well as on a computer, and includes important functions such as cash flow, net present value, and internal rate of return. Fifteen helpful tutorial videos show the many ways to use the Financial Calculator in MyFinanceLab.



- **Reporting Dashboard**—View, analyze, and report learning outcomes clearly and easily. Available via the Gradebook and fully mobile-ready, the Reporting Dashboard presents student performance data at the class, section, and program levels in an accessible, visual manner.

- **LMS Integration**—Link from any LMS platform to access assignments, rosters, and resources, and synchronize MyLab grades with your LMS gradebook. For students, new direct, single sign-on provides access to all the personalized learning MyLab resources that make studying more efficient and effective.



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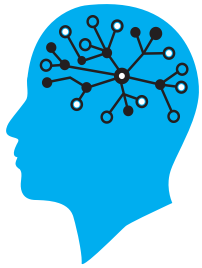

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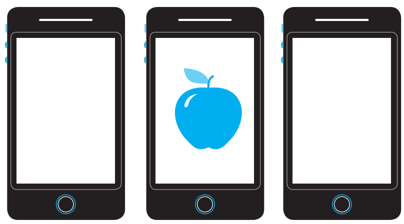

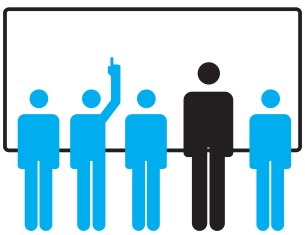

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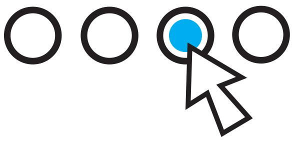

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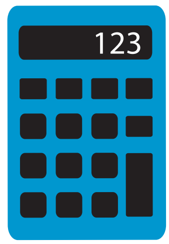

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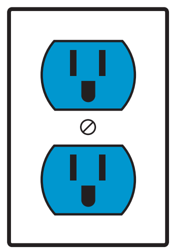

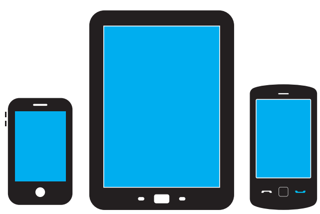

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Preface

Multinational Business Finance, Fourteenth Edition, continues to evolve as the global business and financial environment it describes evolves. Institutions, markets, and business itself are changing rapidly, challenging many long-held assumptions of financial management. We have chosen to design the content of this edition along three points of emphasis.

- **Organizations of All Kinds.** Multinational enterprises (MNEs) applies to organizations of all kinds—the publicly traded, the privately held, the state-run, the state-owned organizations—all forms that permeate global business today.
- **Role of Emerging Markets.** Firms from all countries and all markets are looking to the economic drivers of the global economy today, the emerging markets, and the many new roles they play in terms of competition and opportunity. These markets present a multitude of specific risks and challenges for multinational business and finance.
- **Financial Leadership.** The leaders of MNEs face numerous foreign exchange and political risks. These risks can be daunting but they also present opportunities for creating value if properly understood. These opportunities and risks are most effectively understood in the context of the global business itself, and the ability of management to integrate the strategic and financial challenges that business faces.

New in the Fourteenth Edition

The theme for this Fourteenth Edition could in some ways be considered an emerging market strength, weakness, opportunity, threat (SWOT) analysis. A world in which the developed or industrialized countries see slower growth, poorer job opportunities, and a growing insecurity over their competitiveness in the global marketplace, but emerging markets offer promise and risk.

A short overview of the features in the Fourteenth Edition can be segmented into structure and teaching, content and theoretical structures, and new Mini-Case offerings.

Book Structure and Teaching

- All chapters are structured around a series of pedagogical *Learning Objectives* aligned with the **MyFinanceLab** platform for *Multinational Business Finance*'s teaching.
- An increased focus is placed on how multinational firms financially operate similarly/differently across industrial markets and emerging markets.
- A new chapter, Chapter 8, is devoted solely to interest rate risk and interest rate risk management, with a focus on the use of interest rate and cross-currency swaps.
- A multitude of new Mini-Cases explore the current global financial market's many challenges.
- End-of-chapter questions and problems are revised throughout, aligned with **MyFinanceLab**, and cover the gamut of the increasing complexity of how multinational enterprises—for profit and not-for-profit—operate and compete globally.

Content and Theoretical Structures

- Two-level chapter structure is offered with primary chapter content focused on critical components of multinational corporate finance.
- Selected second-level complexity of chapter content is delivered in appendices devoted to topics such as algebraic derivation of international parity conditions, foreign currency option pricing theory, advanced topics in transaction exposure hedging, foreign subsidiary funding and capitalization, among others.
- Use of fundamental theoretical foundations is expanded like that of the foreign currency/interest rate box diagram and the triangular structure of the Impossible Trinity.
- Selected business and industry practices are delivered in *Global Finance in Practice* boxes in each chapter that both support and on occasion oppose theoretical principles in international finance.

New Chapter Mini-Cases

Nine of the 18 chapter Mini-Cases in the fourteenth edition are new:

- Chapter 1 on Multinational Financial Management: *Crowdfunding Kenya*
- Chapter 2 on the International Monetary System: *Iceland: A Small Country in a Global Crisis*
- Chapter 5 on the Balance of Payments: *Global Remittances*
- Chapter 7 on Foreign Currency Futures and Options: *KiKos and the South Korean Won*
- Chapter 8 on Interest Rate Derivatives and Swaps: *Argentina and the Vulture Funds*
- Chapter 9 on Exchange Rate Determination: *Russian Ruble Roulette*
- Chapter 10 on Transaction Exposure: *China Noah Corporation*
- Chapter 15 on Multinational Tax Management: *Apple's Global iTax Strategy*
- Chapter 18 on Multinational Capital Budgeting and Cross-Border Acquisition: *Elan and Royalty Pharma*

A final note on style. International finance is a subject of sophistication, constant change, yet rich in history. We have tried to bridge the past and future with a mix of currency notations and symbols throughout the book, using both the increasingly common three-letter currency codes—USD, CNY, EUR—with the currency symbols of the past—$, ¥, £, €—which live on in modern media.

Audience

Multinational Business Finance, Fourteenth Edition, is aimed at university-level courses in international financial management, international business finance, international finance, and similar titles. It can be used at either the undergraduate or graduate level as well as in executive education and corporate learning courses.

A prerequisite course or experience in corporate finance or financial management would be ideal. However, we review the basic finance concepts before we extend them to the multinational case. We also review the basic concepts of international economics and international business.

Over many years and many editions, as language translations and sales have expanded, we have observed a widening global audience for this book. We continue to try to service this greater global audience with multicountry companies and markets in theoretical applications, examples, Mini-Cases, and *Global Finance in Practice* features, as seen in the business and news press (including anecdotes and illustrations).

Organization

Multinational Business Finance, Fourteenth Edition, has a number of new subjects, but is also shorter. This has been accomplished by integrating a number of previous topics along financial management threads. The book is in five parts, the parts unified by the common thread of the globalization process by which a firm moves from a domestic to a multinational business orientation.

- Part 1 introduces the global financial environment
- Part 2 explains foreign exchange theory and markets
- Part 3 analyzes foreign exchange exposure
- Part 4 explores the financing of the global firm
- Part 5 analyzes foreign investments and operations

Pedagogical Tools

To make *Multinational Business Finance*, Fourteenth Edition, as comprehensible as possible, we use a large number of proven pedagogical tools. Again, our efforts have been informed by the detailed reviews and suggestions of a panel of professors who are recognized individually for excellence in the field of international finance, particularly at the undergraduate level. Among these pedagogical tools are the following:

- A student-friendly writing style is utilized combined with a structured presentation of material, beginning with learning objectives for each chapter, and ending with a summarization of how those learning objectives were realized.
- A wealth of illustrations and exhibits provide a visual parallel to the concepts and content presented.
- A running case on a hypothetical U.S.-based firm, Trident Corporation, provides a cohesive framework for the multifaceted globalization process, and is reinforced in several end-of-chapter problems.
- A Mini-Case at the end of each chapter illustrates the chapter (18 in all) content and extends it to the multinational financial business environment. And as noted, 9 of the 18 Mini-Cases in the Fourteenth Edition are new.
- *Global Finance in Practice* boxes in every chapter illuminate the theory with accounts of actual business practices. These applications extend the concepts without adding to the length of the text itself.
- The power and resources of the Internet are leveraged throughout the text in a variety of applications. Every chapter has a number of end-of-chapter exercises requiring the use of the Internet, while a variety of Internet references are dispersed throughout the chapters in text and exhibits.
- A multitude of end-of-chapter questions and problems, which assess the students' understanding of the course material, are included. All end-of-chapter problems are solved using spreadsheet solutions. Selected end-of-chapter problem answers are included at the back of the book.

A Rich Array of Support Materials

A robust package of materials for both instructor and student accompanies the text to facilitate learning and to support teaching and testing.

MyFinanceLab. *Multinational Business Finance*, Fourteenth Edition, is now available with **MyFinanceLab**. **MyFinanceLab**, a fully integrated homework and tutorial system, solves one of the biggest teaching problems in finance courses: providing students with unlimited practice homework problems along with a structured blueprint for studying the material. **MyFinanceLab** offers:

- Textbook problems online
- Algorithmically generated values for more practice
- Partial credit
- Personalized study plans
- Extra help for students
- Online gradebook

End-of-chapter Questions and Problems that provide assessment and practice opportunities, are available in **MyFinanceLab**. Internet exercises, glossary flash cards, and Web links are also available in **MyFinanceLab**.

Online Instructor's Resource Manual. The Online Instructor's Resource Manual, prepared by the authors, contains complete answers to all end-of-chapter questions, problems, and chapter Mini-Cases. All quantitative end-of-chapter problems are solved using spreadsheets, which are also available online.

Online Test Bank. The Online Test Bank, prepared by Rodrigo Hernandez, Radford University, College of Business and Economics, contains over 1,200 multiple-choice and short-essay questions. The multiple-choice questions are labeled by topic and by category-recognition, conceptual, and analytical types.

Computerized Test Bank. The Test Bank is also available in Pearson Education's TestGen Software. Fully networkable, it is available for Windows and Macintosh. TestGen's graphical interface enables instructors to view, edit and add questions; transfer questions to tests; and print different forms of tests. Search-and-sort features enable the instructor to locate questions quickly and arrange them in a preferred order. The TestGen plug-in allows the instructor to administer TestGen tests in CourseCompass QuizMaster, working with your school's computer network, automatically grades the exams, stores the results on a disk, and allows the instructor to view and print a variety of reports.

Online Mini-Case PowerPoint Presentations. A significant addition to the instructor's resources in this new Fourteenth Edition, each of the 18 Mini-Cases has a stand-alone PowerPoint presentation available online.

Online PowerPoint Presentation Slides. The extensive set of PowerPoint slides, prepared by Sonya Britt of Kansas State University, provides lecture outlines and selected graphics from the text for each chapter.

All of the teaching resources are available online for download at the Instructor Resource Center at www.pearsonglobaledition.com and on the catalog page for *Multinational Business Finance*.

International Editions

Multinational Business Finance has been used throughout the world to teach students of international finance. Our books are published in a number of foreign languages including Chinese, French, Spanish, Indonesian, Portuguese, and Ukrainian.

Acknowledgments

The authors are very thankful for the many detailed reviews of previous editions and suggestions from a number of colleagues. The final version of *Multinational Business Finance*, Fourteenth Edition, reflects most of the suggestions provided by these reviewers. The survey reviewers were anonymous, but the detailed reviewers were:

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Honolulu, Hawaii A.I.S.

Glendale, Arizona M.H.M.

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PART 1

Global Financial Environment

CHAPTER 1
Multinational Financial Management: Opportunities and Challenges

CHAPTER 2
The International Monetary System

CHAPTER 3
The Balance of Payments

CHAPTER 4
Financial Goals and Corporate Governance

CHAPTER 1

Multinational Financial Management: Opportunities and Challenges

The objects of a financier are, then, to secure an ample revenue; to impose it with judgment and equality; to employ it economically; and, when necessity obliges him to make use of credit, to secure its foundations in that instance, and for ever, by the clearness and candor of his proceedings, the exactness of his calculations, and the solidity of his funds.

—Edmund Burke, *Reflections on the Revolution in France*, 1790, p. 467.

LEARNING OBJECTIVES

- Understand the complexity of risks associated with financial globalization
- Explore how global capital markets are critical for the exchange of products, services, and capital in the execution of global business
- Consider how the theory of comparative advantage establishes the foundations for the justification for international trade and commerce
- Discover what is different about international financial management, and which market imperfections give rise to the multinational enterprise
- Examine how imperfections in global markets translate into opportunities for multinational enterprises
- Consider how the globalization process moves a business from a purely domestic focus in its financial relationships and composition to one truly global in scope

The subject of this book is the financial management of multinational enterprises (MNEs)—multinational financial management. MNEs are firms—both for-profit companies and not-for-profit organizations—that have operations in more than one country and conduct their business through *branches*, foreign subsidiaries, or joint ventures with host country firms. That conduct of business comes with challenges as suggested by the following news release from Procter & Gamble Co. (P&G), an American multinational consumer goods company:

> *"The October–December 2014 quarter was a challenging one with unprecedented currency devaluations," said Chairman, President and Chief Executive Officer A.G. Lafley. "Virtually every currency in the world devalued versus the U.S. dollar, with the Russian Ruble leading the way. While we continue to make steady progress on the strategic*

transformation of the company—which focuses P&G on about a dozen core categories and 70 to 80 brands, on leading brand growth, on accelerating meaningful product innovation and increasing productivity savings—the considerable business portfolio, product innovation, and productivity progress was not enough to overcome foreign exchange."

—P&G News Release, January 27, 2015.

P&G is not alone. New MNEs are appearing all over the world every day, while many of the older and established ones (like P&G) are struggling to survive. Businesses of all kinds are seeing a very different world than in the past. Today's MNEs depend not only on the emerging markets for cheaper labor, raw materials, and outsourced manufacturing, but also increasingly on those same emerging markets for sales and profits. These markets—whether they are emerging, less developed, or developing, or are *BRIC* (Brazil, Russia, India, and China), BIITS (Brazil, India, Indonesia, Turkey, South Africa, which are also termed the Fragile Five), or MINT (Mexico, Indonesia, Nigeria, Turkey)—represent the majority of the earth's population and, therefore, the majority of potential customers. And adding market complexity to this changing global landscape is the risky and challenging international macroeconomic environment, both from a long-term and short-term perspective. The global financial crisis of 2008–2009 is already well into the business past, and capital is flowing again—although both into and out of economies—at an ever-increasing pace.

How to identify and navigate these risks is the focus of this book. These risks may all occur on the playing field of the global financial marketplace, but they are still a question of management—of navigating complexity in pursuit of the goals of the firm.

Financial Globalization and Risk

Back in the halcyon pre-crisis days of the late 20th and early 21st centuries, it was taken as self evident that financial globalization was a good thing. But the subprime crisis and eurozone dramas are shaking that belief. . . . what is the bigger risk now—particularly in the eurozone—is that financial globalization has created a system that is interconnected in some dangerous ways.

—"Crisis Fears Fuel Debate on Capital Controls,"
Gillian Tett, *Financial Times*, December 15, 2011.

The theme dominating global financial markets today is the complexity of risks associated with financial globalization—far beyond whether it is simply good or bad, but how to lead and manage multinational firms in the rapidly moving marketplace. The following is but a sampling of this complexity of risks.

- The international monetary system, an eclectic mix of floating and managed fixed exchange rates, is under constant scrutiny. The rise of the Chinese *renminbi* is changing much of the world's outlook on currency exchange, reserve currencies, and the roles of the dollar and the euro (see Chapter 2).
- Large fiscal deficits, including the current eurozone crisis, plague most of the major trading countries of the world, complicating fiscal and monetary policies, and ultimately, interest rates and exchange rates (see Chapter 3).
- Many countries experience continuing balance of payments imbalances, and in some cases, dangerously large deficits and surpluses—whether it be the twin surpluses enjoyed by China, the current account surplus of Germany amidst a sea of eurozone deficits, or the continuing current account deficit of the United States, all will inevitably move exchange rates (see Chapter 3).

- Ownership, control, and governance vary radically across the world. The publicly traded company is not the dominant global business organization—the privately held or family-owned business is the prevalent structure—and goals and measures of performance vary dramatically between these business models (see Chapter 4).
- Global capital markets that normally provide the means to lower a firm's cost of capital, and even more critically, increase the availability of capital, have in many ways shrunk in size and have become less open and accessible to many of the world's organizations (see Chapter 2).
- Today's emerging markets are confronted with a new dilemma: the problem of first being the recipients of capital inflows, and then of experiencing rapid and massive capital outflows. Financial globalization has resulted in the ebb and flow of capital into and out of both industrial and emerging markets, greatly complicating financial management (Chapters 5 and 8).

This first chapter is meant only as an introduction and a taste of the complexity of risks associated with financial globalization. The Mini-Case at the end of this first chapter, *Crowdfunding Kenya*, is intended to push you in your thinking about how and why money moves across the globe today.

The Global Financial Marketplace

Business—domestic, international, global—involves the interaction of individuals and individual organizations for the exchange of products, services, and capital through markets. The global capital markets are critical for the conduct of this exchange. The global financial crisis of 2008–2009 served as an illustration and a warning of how tightly integrated and fragile this marketplace can be.

Assets, Institutions, and Linkages

Exhibit 1.1 provides a map of the global capital markets. One way to characterize the global financial marketplace is through its assets, institutions, and linkages.

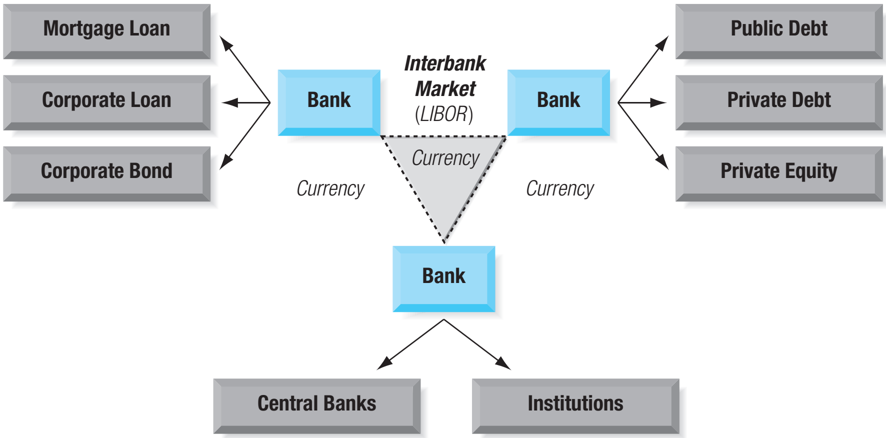
Assets. The assets—financial assets—at the heart of the global capital markets are the debt securities issued by governments (e.g., U.S. Treasury Bonds). These low-risk or risk-free assets form the foundation for the creation, trading, and pricing of other financial assets like bank loans, corporate bonds, and equities (stock). In recent years, a number of additional securities have been created from existing securities—derivatives, the value of which is based on market value changes of the underlying securities. The health and security of the global financial system relies on the quality of these assets.

Institutions. The institutions of global finance are the central banks, which create and control each country's money supply; the commercial banks, which take deposits and extend loans to businesses, both local and global; and the multitude of other financial institutions created to trade securities and derivatives. These institutions take many shapes and are subject to many different regulatory frameworks. The health and security of the global financial system relies on the stability of these financial institutions.

Linkages. The links between the financial institutions—the actual fluid or medium for exchange—are the interbank networks using currency. The ready exchange of currencies in the global marketplace is the first and foremost necessary element for the conduct of financial trading, and the global currency markets are the largest markets in the world. The exchange of currencies, and the subsequent exchange of all other securities globally via currency, is the

EXHIBIT 1.1 **Global Capital Markets**

The global capital market is a collection of institutions (central banks, commercial banks, investment banks, not-for-profit financial institutions like the IMF and World Bank) and securities (bonds, mortgages, derivatives, loans, etc.), which are all linked via a global network—the *Interbank Market*. This interbank market, in which securities of all kinds are traded, is the critical pipeline system for the movement of capital.



The exchange of securities—the movement of capital in the global financial system—must all take place through a vehicle—currency. The exchange of currencies is itself the largest of the financial markets. The interbank market, which must *pass-through* and exchange securities using currencies, bases all of its pricing through the single most widely quoted interest rate in the world—LIBOR (the London Interbank Offered Rate).

international interbank network. This network, whose primary price is the London Interbank Offered Rate (LIBOR), is the core component of the global financial system.

The movement of capital across currencies and continents for the conduct of business has existed in many different forms for thousands of years. Yet, it is only within the past 50 years that these capital movements have started to move at the pace of an electron in the digital marketplace. And it is only within the past 20 years that this market has been able to reach the most distant corners of the earth at any moment of the day. The result has been an explosion of innovative products and services—some for better and some for worse. And as illustrated by *Global Finance in Practice 1.1*, conditions and markets can change—often quickly.

The Market for Currencies

The price of any one country's currency in terms of another country's currency is called a foreign currency exchange rate. For example, the exchange rate between the U.S. dollar ($ or USD) and the European euro (€ or EUR) may be stated as "1.0922 dollar per euro" or simply abbreviated as $1.0922/€. This is the same exchange rate as when stated "EUR1.00 = USD1.0922." Since most international business activities require at least one of the two parties in a business transaction to either pay or receive payment in a currency that is different from their own, an understanding of exchange rates is critical to the conduct of global business.

Currency Symbols. As noted, USD and EUR are often used as the symbols for the U.S. dollar and the European Union's euro. These are the computer symbols (ISO-4217 codes) used today on the world's digital networks. The field of international finance, however, has a rich history of using a variety of different symbols in the financial press, and a variety of different

GLOBAL FINANCE IN PRACTICE 1.1

The Rocketing Swiss Franc

The Swiss franc has been fighting its appreciation against the European *euro* for years. While it is not a member of the European Union and while its currency has been one of the world's most stable for over a century, Switzerland is an economy and a currency completely encased within the Eurozone.

In 2011, in an attempt to stop the Swiss franc from continuing to grow in value against the euro (to stop its *appreciation*), the Swiss Central Bank announced a "floor" on its value against the euro of 1.20 Swiss francs to one euro. To preserve this value, the Bank would intervene in the market by buying euros with Swiss francs anytime the market exchange rate threatened to hit the floor. As illustrated in Exhibit A, the Bank had to intervene only a few select times in the past three years—until early 2015.

In early 2015, the markets continued to apply upward pressure on the Swiss franc's value against the euro (which means pushing its exchange value to less than 1.20 Swiss francs per euro). The Swiss Central Bank continued to intervene, buying euros with Swiss francs and accumulating more and more euros in its reserves of foreign currency. The Bank also set central bank interest rates at negative levels—yes, *negative*. This meant that the Bank charged depositors to hold Swiss franc deposits, an effort to dissuade investors from exchanging any currency, including the euro, for Swiss francs.

But the European Union's economies continued to struggle in 2014, and early reports of economic activity in 2015 were showing further slowing. Investors wished to exit the euro fearing its future fall in value. The European Central Bank added to investor anxiety when it announced that it would be undertaking expansionary government debt purchases—quantitative easing—(expansionary monetary policy) to kick-start the sluggish EU economy.

On the morning of January 15, 2015, the Swiss Central Bank shocked the markets by announcing that it was abandoning the 1.20 floor and cutting interest rates further (more negative). It had concluded that with the forthcoming monetary expansion from the ECB, there was no longer any way to keep the flood gates closed. The Swiss franc, as illustrated in Exhibit B, appreciated against the euro within minutes. For two of the world's major currencies, it was a very eventful day.

EXHIBIT A Swiss Franc–Euro Exchange Rate

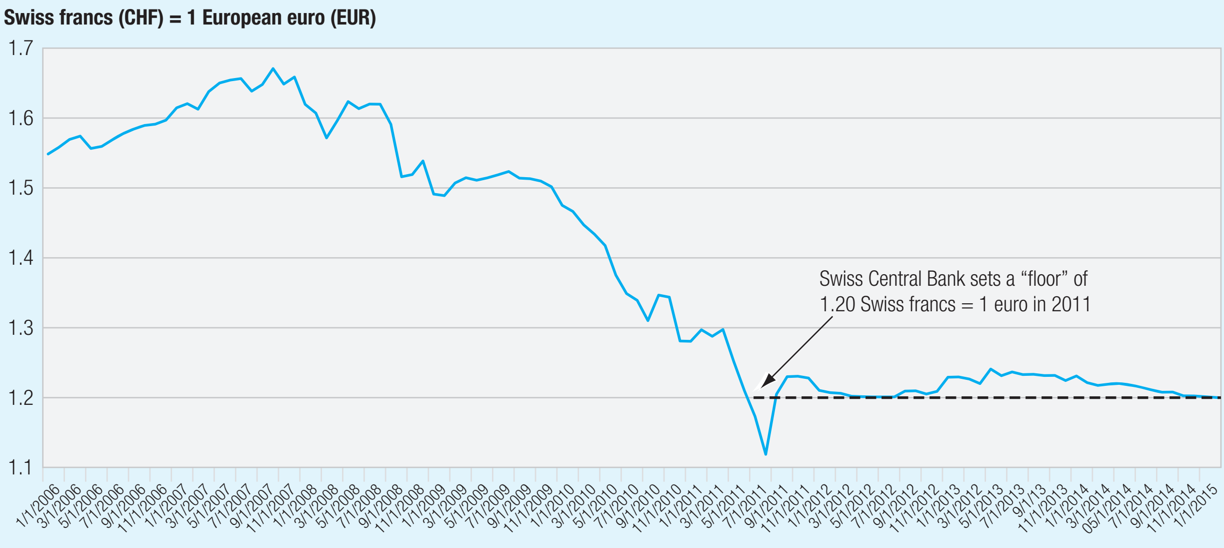
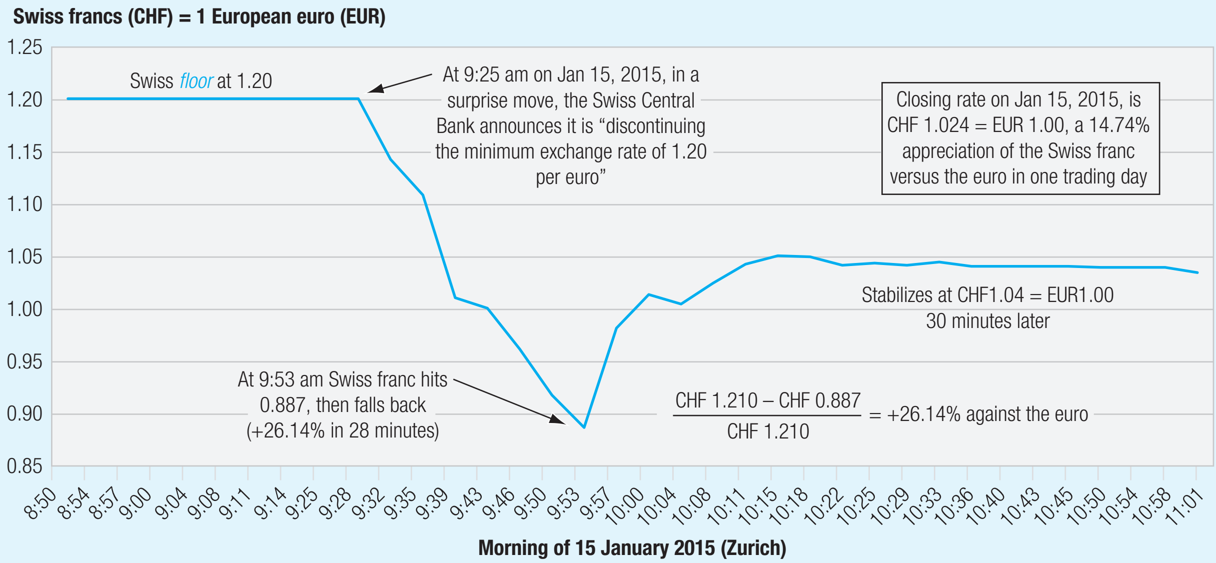


EXHIBIT B **Swiss Franc's Appreciation by the Minute . . . January 2015**



abbreviations are commonly used. For example, the British pound sterling may be £ (the pound symbol), GBP (Great Britain pound), STG (British pound sterling), ST£ (pound sterling), or UKL or UK£ (United Kingdom pound). This book uses both the simpler common symbols—the $ (dollar), the € (euro), the ¥ (yen), the £ (pound)—and the three letter ISO codes throughout. And as *Global Finance in Practice 1.2* describes, this would include BTC, the three-letter digital code for Bitcoin.

GLOBAL FINANCE IN PRACTICE 1.2

Bitcoin-Cryptocurrency or Commodity?

The difference is that established fiat currencies—ones where the bills and coins, or their digital versions, get their value by dint of regulation or law—are underwritten by the state which is, in principle at least, answerable to its citizens. Bitcoin, on the other hand, is a community currency. It requires self-policing on the part of its users. To some, this is a feature, not a bug. But, in the grand scheme of things, the necessary open-source engagement remains a niche pursuit.

—"Bits and bob," *The Economist*, June 13, 2011.

Bitcoin is an open-source, peer-to-peer, digital currency. It is a *cryptocurrency*, a digital currency that is created and managed using advanced encryption techniques known as cryptography. And it may be the world's first completely decentralized digital-payments system. But is Bitcoin a true currency?

Bitcoin was invented in 2009 by a man calling himself Satoshi Nakamoto. Nakamoto published, via the Internet, a nine-page paper outlining how the Bitcoin system would work. He also provided the open-source code needed to both produce the digital coins (*mine* in Bitcoin terminology) and trade Bitcoins digitally as money. (Nakamoto is not thought to be a real person, likely being a *nome de plume* for some relatively small working group.)

Mining of Bitcoins is a mathematical process. The *miner* must find a sequence of data (called a *block*) that produces a particular pattern when the Bitcoin hash algorithm is applied to it. When a match is found, the miner obtains a bounty—an *allocation*—of Bitcoins. This repetitive guessing, conducted by increasingly complex computers, is called hashing. The motivation for mining is clear: to make money.

The Bitcoin software system is designed to release a 25-coin reward to the miner in the worldwide network who succeeds in solving the mathematical problem. Once solved, the solution is broadcast network-wide, and competition for the next 25-coin reward begins. The system's protocol is designed to release a new block of Bitcoins every 10 minutes until all 21 million are released. The difficulty of the search continually increases over time with mining. This causes increasing scarcity over time, similar to what many believe about gold when gold was the basis of currency values. But ultimately the Bitcoin system is limited in both time (every 10 minutes) and total issuance (21 million). Theoretically the last of the 21 million Bitcoins would be mined in 2140. Once mined, Bitcoins are considered a *pseudonymous*—nearly anonymous—cryptocurrency. Owners can buy things with Bitcoins or sell Bitcoins to non-miners who wish to use digital currency for purchases or speculate on its future value.

Ownership of each and every coin is verified and registered through a digital chain timestamp across the thousands of network nodes. Like cash, this prevents double spending, since every Bitcoin exchange is authenticated across the decentralized Bitcoin network (currently estimated at 20,000 nodes). Unlike cash, every transaction that has ever occurred in the Bitcoin system is recorded in terms of the two public keys (the transactors, the Bitcoin addresses) in the system. This record, called the *block chain*, includes the time, amount, and the two near-anonymous IP addresses (public keys are not tied to any person's identity).

Traditional currencies are issued by governments, which regulate the growth and supply of the currency, while implicitly guaranteeing the currency's value. Bitcoin has no such guarantor, no insurer, and no *lender-of-last-resort*. A gold standard like that used in the first part of the twentieth century, is a system based on *specie*; it has some fixed link to a scarce metal of some intrinsic value. Bitcoins have no intrinsic value; they are not composed of a precious metal; they are nothing more than digital code. Their value reflects the supply and demand by those in the marketplace who believe in their value. This makes Bitcoin a *fiat currency* similar to major currencies today. Their value has been quite volatile.

The ability of Bitcoin to bypass authorities has led to concerns about the potential use of Bitcoin for illicit trade, the laundering of money associated with illegal drugs and other illegal business activity globally. One low was seen when Bitcoin became the primary currency for sales on Silk Road, an underground Web site for illegal drug trafficking. Although eventually shut down by the U.S. government, Bitcoin's potential use for illegal activities has impacted the public's perception of its potential. Others, however, see promise.

Exchange Rate Quotations and Terminology. Exhibit 1.2 lists currency exchange rates for December 31, 2014, as would be quoted in New York or London. The exchange rate listed is for a specific country's currency—for example, the Argentina peso is Peso 8.7851 = 1.00 U.S. dollar, is Peso 9.5990 = 1.00 Euro, and Peso 13.1197 = 1.00 British pound. The rate listed is termed a "mid-rate" because it is the middle or average of the rates at which currency traders buy currency (*bid rate*) and sell currency (*offer rate*).

The U.S. dollar has been the focal point of most currency trading since the 1940s. As a result, most of the world's currencies have been quoted against the dollar—Mexican pesos per dollar, Brazilian real per dollar, Hong Kong dollars per dollar, etc. This quotation convention is also followed against the world's major currencies, as listed in Exhibit 1.2. For example, the Japanese yen is commonly quoted against the dollar, euro, and pound, as in ¥119.765/$, ¥130.861/€, and ¥178.858/£.

Quotation Conventions. Several of the world's major currency exchange rates, however, follow a specific quotation convention that is the result of tradition and history. The exchange rate between the U.S. dollar and the euro is always quoted as "dollars per euro" or $/€. For example, $1.0926 listed in Exhibit 1.2 under "United States." Similarly, the exchange rate between the U.S. dollar and the British pound is always quoted as "dollars per pound" or $/£. For example, $1.4934 listed under "United States" in Exhibit 1.2. In addition, countries that were formerly members of the British Commonwealth will often be quoted against the U.S. dollar, as in U.S. dollars per Australian dollar or U.S. dollars per Canadian dollar.

EXHIBIT 1.2 **Selected Global Currency Exchange Rates**

March 23, 2015 Country	Currency	Symbol	Code	Currency Equal to 1 Dollar	Currency Equal to 1 Euro	Currency Equal to 1 Pound
Argentina	peso	Ps	ARS	8.7851	9.5990	13.1197
Australia	dollar	A$	AUD	1.2744	1.3924	1.9032
Brazil	real	R$	BRL	3.1610	3.4538	4.7206
Canada	dollar	C$	CAD	1.2516	1.3676	1.8691
Chile	peso	$	CLP	625.98	683.97	934.84
China	yuan	¥	CNY	6.2160	6.7919	9.2830
Czech Republic	koruna	Kc	CZK	25.0240	27.3424	37.3710
Denmark	krone	Dkr	DKK	6.8243	7.4566	10.1915
Egypt	pound	£	EGP	7.6301	8.3369	11.3948
Euro	euro	€	EUR	0.9152	1.0000	1.3668
India	rupee	Rs	INR	62.2650	68.0336	92.9870
Indonesia	rupiah	Rp	IDR	13,019.50	14,225.70	19,443.41
Israel	shekel	Shk	ILS	3.9655	4.3329	5.9221
Japan	yen	¥	JPY	119.765	130.861	178.858
Kenya	shilling	KSh	KES	91.90	100.41	137.24
Malaysia	ringgit	RM	MYR	3.6950	4.0373	5.5181
Mexico	new peso	$	MXN	14.9583	16.3441	22.3387
New Zealand	dollar	NZ$	NZD	1.3120	1.4335	1.9593
Nigeria	naira	₦	NGN	199.700	218.201	298.233
Norway	krone	NKr	NOK	7.8845	8.6149	11.7747
Philippines	peso	₱	PHP	44.7900	48.9396	66.8897
Poland	zloty	—	PLN	3.7600	4.1084	5.6153
Russia	ruble	R	RUB	58.7450	64.1875	87.7302
Singapore	dollar	S$	SGD	1.3671	1.4938	2.0416
South Africa	rand	R	ZAR	11.9100	13.0134	17.7865
South Korea	won	W	KRW	1,114.65	1,217.92	1,664.63
Sweden	krona	SKr	SEK	8.5016	9.2892	12.6963
Switzerland	franc	Fr.	CHF	0.9669	1.0565	1.4440
Taiwan	dollar	T$	TWD	31.4350	34.3473	46.9452
Thailand	baht	B	THB	32.5450	35.5601	48.6029
Turkey	lira	YTL	TRY	2.5477	2.7837	3.8048
United Kingdom	pound	£	GBP	0.6696	0.7316	1.0000
Ukraine	hrywnja	—	UAH	22.6500	24.7484	33.8257
Uruguay	peso	$U	UYU	25.5300	27.8952	38.1267
United States	dollar	$	USD	1.0000	1.0926	1.4934
Venezuela	Bolivar fuerte	Bs	VEB	6.2935	6.8766	9.3988
Vietnam	dong	d	VND	21,525.00	23,519.23	32,145.66
Special Drawing Right	—	—	SDR	0.7199	0.7867	1.0752

Note that a number of different currencies use the same symbol (for example, both China and Japan have traditionally used the ¥ symbol, yen or yuan, meaning round or circle). All quotes are mid-rates, and are drawn from the *Financial Times*.

Eurocurrencies and LIBOR

One of the major linkages of global money and capital markets is the eurocurrency market and its interest rate, LIBOR. *Eurocurrencies* are domestic currencies of one country on deposit in a second country for a period ranging from overnight to more than a year or longer. Certificates of deposit are usually for three months or more and in million-dollar increments. A eurodollar deposit is not a *demand deposit*—it is not created on the bank's books by writing loans against required fractional reserves, and it cannot be transferred by a check drawn on the bank having the deposit. Eurodollar deposits are transferred by wire or cable transfer of an underlying balance held in a *correspondent bank* located within the United States. In most countries, a domestic analogy would be the transfer of deposits held in nonbank savings associations. These are transferred when the association writes its own check on a commercial bank.

Any *convertible currency* can exist in "euro" form. Note that this use of "euro" prefix should not be confused with the European currency called the euro. The eurocurrency market includes eurosterling (British pounds deposited outside the United Kingdom); euroeuros (euros on deposit outside the eurozone); euroyen (Japanese yen deposited outside Japan) and eurodollars (U.S. dollars deposited outside the U.S.). Eurocurrency markets serve two valuable purposes: (1) eurocurrency deposits are an efficient and convenient money market device for holding excess corporate liquidity; and (2) the eurocurrency market is a major source of short-term bank loans to finance corporate working capital needs, including the financing of imports and exports. Banks in which eurocurrencies are deposited are called eurobanks. A *eurobank* is a financial intermediary that simultaneously bids for time deposits and makes loans in a currency other than that of its home currency. Eurobanks are major world banks that conduct a eurocurrency business in addition to all other banking functions. Thus, the eurocurrency operation that qualifies a bank for the name eurobank is, in fact, a department of a large commercial bank, and the name springs from the performance of this function.

The modern eurocurrency market was born shortly after World War II. Eastern European holders of dollars, including the various state trading banks of the Soviet Union, were afraid to deposit their dollar holdings in the United States because those deposits might be attached by U.S. residents with claims against communist governments. Therefore, Eastern European holders deposited their dollars in Western Europe, particularly with two Soviet banks: the Moscow Narodny Bank in London and the Banque Commerciale pour l'Europe du Nord in Paris. These banks redeposited the funds in other Western banks, especially in London. Additional dollar deposits were received from various central banks in Western Europe, which elected to hold part of their dollar reserves in this form to obtain a higher yield. Commercial banks also placed their dollar balances in the market because specific maturities could be negotiated in the eurodollar market. Such companies found it financially advantageous to keep their dollar reserves in the higher-yielding eurodollar market. Various holders of international refugee funds also supplied funds.

Although the basic causes of the growth of the eurocurrency market are economic efficiencies, many unique institutional events during the 1950s and 1960s contributed to its growth.

- In 1957, British monetary authorities responded to a weakening of the pound by imposing tight controls on U.K. bank lending in sterling to nonresidents of the United Kingdom. Encouraged by the Bank of England, U.K. banks turned to dollar lending as the only alternative that would allow them to maintain their leading position in world finance. For this they needed dollar deposits.
- Although New York was "home base" for the dollar and had a large domestic money and capital market, international trading in the dollar centered in London because of that city's expertise in international monetary matters and its proximity in time and distance to major customers.