Preface

The world economy has grown rapidly since World War II. The most remarkable example is Japan, which grew annually at more than 10% during the 1950s and 1960s. One of the reasons that Japan could grow so fast is that Japan could learn necessary technologies from advanced countries, mainly the United States, during the catch-up process. This is consistent with the growth theory literature that predicts global convergence among nations in terms of per capita gross domestic product (GDP). That is, the richer the country is, the more slowly it grows. However, the experience in the 1990s tells a different story. Figure 1 shows the United State's real GDP growth rate since the 1960s.

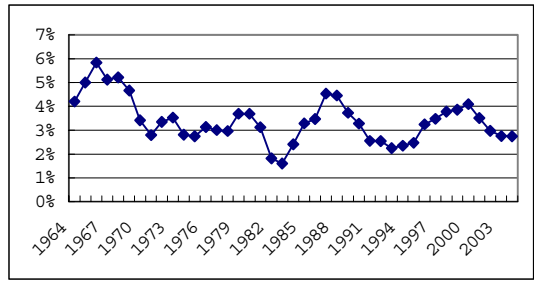
The United States has been the richest country since World War II and it had been expected to grow more slowly than before. However, the U.S. economy has a strong foundation because the IT sector is strong. Actually, for the period from 1970 to the mid-1980s, the United State's annual growth rates, approximately only 3%, were not so high. However, the United State's growth rates increased around 2000. Furthermore, Table 1 shows that other developed countries also recorded high economic growth rates around 2000. It is often said that the development of information technology (IT) contributed to these high growth rates. Some argue that after the IT revolution, the "new economy" came into being.

Now, IT is used in diverse business areas. For example, because firms can manage their inventory in real time by using a point-of-sale system, they do not accumulate dead stock. Financial companies can offer a new product that requires tremendous calculations of risks. So, IT has a significant effect on most advanced countries.

Although many developed countries lack natural resources, they have accumulated tremendous human capital. In the IT world, knowledge and wisdom are key resources for steady economic growth and a bright future. Therefore, because IT relies little on natural resources but heavily upon the "brain assets" of wisdom and intelligence, the advanced economies have a comparative advantage in the development of new IT.

However, Japan in the 1990s is a striking exception, as shown in Table 1. Of course, as we discuss in this book, Japanese companies and banks have developed and adopted various information technologies. In spite of their efforts, Japan recorded very low, sometimes negative, growth rates in the late 1990s. The main reason was its fragile financial system. In particular, huge, non-performing loans prohibited Japanese banks from investing sufficient funds in IT. Therefore, Japanese banks were said to be a few years behind U.S. and European banks. A main reason for big bank mergers since 2000 in Japan was that Japanese banks had to ensure enough funds for developing information technologies. Therefore, IT has a large impact on the Japanese economy.

Figure 1. U.S. real GDP growth rate (5-year moving average) (Source: 2005 Economic Report of the President)



All figures are forecasts as published by International Monetary Fund. For United States, advance estimates by Department of Commerce show real GDP grew 4.4% in 2004. Source: 2005 Economic Report of the President

What are the reasons behind this lack of development? Where do we stand? Where should we go? This book addresses these issues and future options for growth and development relative to conditions in the world's countries.

Unfortunately, IT in the area of finance is underdeveloped even though financial institutions have worked to improve and upgrade their systems. Of course, almost all of the financial institutions have adopted IT for many aspects of their businesses. Another point is that IT has made it possible to process high-volume trading. Finally, only IT can accommodate processing the large volumes of files needed to store information and data.

But the revolution is not limited to customer service. Efficient management systems and high quality analysis using IT have been adopted and developed further in recent years. Financial derivatives, for example, are not possible without the support of IT. Modern financial theory and financial engineering have rapidly developed. This, combined with IT in the 1980s, greatly changed the character of finance business. The necessity of developing risk management can and should be pointed out. Instead of taking a statistical approach to credit risks, financial institutions used to evaluate risks based on experience. This caused an outbreak of bad debt problems for banks in some countries.

IT has introduced very interesting aspects. Financial alliances have appeared all over the world. The IT revolution has made it possible for financial enterprises to ally with each other, and moreover, to increase efficiency and profit as well as to develop more fruitful business concepts and practices. Along with the IT revolution, alliances have become indispensable and necessary.

Some readers are unfamiliar with the situation of the world financial system and of the spreading use of IT. In fact, there seem to appear to be numerous areas of misunderstanding. To clear up the misconceptions, this book addresses customer service, the interface between IT and other fields, and efficiency and quality improvements that can

Table 1. Growth rates in real GDP, 1986-2004 (Percent Change of Annual Rate)

Area and country	1986-1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
World	3.3	4.1	4.2	2.8	3.7	4.7	2.4	3	3.9	5
Advanced Economies	3.0	3.0	3.4	2.7	3.5	3.9	1.2	1.6	2.1	3.6
United States	2.9	3.7	4.5	4.2	4.5	3.7	0.8	1.9	3	4.3
Japan	3.1	3.5	1.8	-1.2	0.2	2.8	0.4	-0.3	2.5	4.4
United Kingdom	2.5	2.8	3.3	3.1	2.9	3.9	2.3	1.8	2.2	3.4
Canada	2.3	1.6	4.2	4.1	5.5	5.2	1.8	3.4	2	2.9
Germany	2.7	0.8	1.4	2	2	2.9	0.8	0.1	-0.1	2
France	2.1	1	1.9	3.6	3.2	4.2	2.1	1.1	0.5	2.6
Italy	2.1	1.1	2	1.8	1.7	3	1.8	0.4	0.3	1.4
				Regional Groups:						
Africa	1.9	5.7	3.2	3.1	2.7	2.9	4	3.5	4.3	4.5
Central and Eastern Europe	0.8	4.8	4.2	2.8	0.4	4.9	0.2	4.4	4.5	5.5
Commonwealth of Independent States		-3.9	1.1	-3.5	5.1	9.1	6.4	5.4	7.8	8
Russia		-3.6	1.4	-5.3	6.3	10	5.1	4.7	7.3	7.3
Developing Asia	7.7	8.2	6.5	4.1	6.2	6.7	5.5	6.6	7.7	7.6
China	9.9	9.6	8.8	7.8	7.1	8.0	7.5	8.3	9.1	9
India	5.7	7.5	5	5.8	6.7	5.4	3.9	5	7.2	6.4
Middle East	2.7	4.6	5.3	3.8	2.4	5.5	3.6	4.3	6	5.1
Western Hemisphere	2.8	3.7	5.2	2.3	0.4	3.9	0.5	-0.1	1.8	4.6
Brazil	2.5	2.7	3.3	0.1	0.8	4.4	1.3	1.9	-0.2	4
Mexico	1.6	5.2	6.8	5	3.6	6.6	-0.2	0.8	1.3	4

All figures are forecasts as published by International Monetary Fund. For United States, advance estimates by Department of Commerce show real GDP grew 4.4% in 2004. Source: 2005 Economic Report of the President

be garnered by introducing IT functions. Each chapter includes a general view. The book also addresses implications for future growth that are engendered by alliances between IT and financial fields, and examines the related situations in the world.

The content of this book is ultramodern and ambitious. However, the content is also original and very basic. We can easily imagine that that the progress of IT brings about changes in financial institutions. Financial alliances are a natural outgrowth of IT progress. In most developed nations, mergers and acquisitions and partnerships of financial institutions are emerging, and the progress of IT is considered one of the causes. However, neither the academic literature nor the popular press has addressed the relationship between IT and financial enterprise alliances to any depth. Therefore, readers will find this strange situation while examining some kinds of databases. The importance of and interest in the topic, as well as this scarcity of literature on the topic, is the main incentive behind the publication of this book.

All of the authors in this book deserve our attention and our praise. Some of them have published many books. Others have published manuscripts in highly reputable, international journals. The authors are well known and deserve their fine reputations in each field. We are deeply grateful for their contributions to this project.

Scholars in diverse fields (economics, IT, business/marketing), policy makers and business persons are the target audience for the book.

This book is organized into 17 chapters. The following briefly describes each of the chapters.

Section I: Financial Institutions, Alliances, IT, and Economic Growth

Over time, a large variety of tools have appeared that have added value to traditional financial functions, such as financial intermediation (deposit and lending) and settlement. Banks will find that these added values are destined to dwindle. The volumes of financial intermediation and settlements are not increasing. Banks are therefore trying to produce new value by forming alliances with other banks, financial institutions and industries. During this process, IT plays an important role and becomes an effective weapon.

Chapter I: Investment in IT and the Business Performance of Financial Companies. The purpose of this chapter is to empirically investigate the relationship between investment in IT and the business performance of financial companies. IT and competitive financial alliances are helping to remake business circumstances. IT and well-functioning financial markets play a crucial role in increasing economic growth and prosperity. The author uses a vector autoregressive (VAR) model to test two hypotheses: (Hypothesis 1) Spending on IT improves financial performance, and (Hypothesis 2) High financial performance increases spending on IT — with the assumption that stock price returns can provide an adequate measure of financial performance. The analysis includes control variables for general business cycle conditions. The results show that the greatest benefits from increases in technology accrue to insurance and other financial companies. Managers of these companies may increase their business performance by using strategic investment and IT.

Chapter II: Recent Development of Information Technology in Japanese Banks. Leading international banks have spent a great deal of money on information technology since the 1990s. For example, the largest commercial banks in the United States are estimated to spend as much as 25% of their total expenses on IT. Although Japanese banks have suffered from huge, non-performing loans since the burst of the bubble, they have also invested a huge amount of money on their information facilities. Japanese banks are expected to spend $11.9 billion on technology in the 2004 fiscal year. This chapter discusses in detail recent developments in IT in Japanese banks. First, it provides a brief explanation of the current Japanese banking environment. Then, the chapter discusses how Japanese financial institutions have dealt with new IT. This chapter is unique in providing a detailed discussion on new Internet banks and the Internet banking services of existing banks. Because information investment has an external effect, government assistance is necessary, and this chapter also discusses what the government has done to encourage IT usage in financial services.

Chapter III: Payment Systems of Financial Institutions: Current State and Future Prospects. Economic activity is always accompanied by payment. Payment systems, which are the subject of much recent discussion, are an indispensable part of the infrastructure that supports the entire economy. Of recent interest are issues of increasing payment risk and the severe situations of financial institutions in some developed countries. The costs associated with setup and operation of payment systems is high, and market participants expect efficiency. Many problems are associated with bond payments. The spread of delivery-versus-payment (DVP) systems and IT-based transactions are also impacting payment systems. Links between payment systems are also important and have prompted concerns about systemic risk if time-designated net settlements coexist with real-time gross settlements (RTGSs), which can alter outcomes, thereby increasing systemic risk. If RTGSs and the net payment system are not operated by a single rule, this problem worsens. Unification of settlement systems, rules and dealings custom is critical. Financial alliances are urgent problems. The complex legal frameworks that govern payment activity would benefit from structural revisions.

Chapter IV: Financial Innovation and Economic Growth: Some Further Evidence from the UK, 1900-2003. This chapter assesses the contribution of financial development to savings and economic growth in the UK in the 20th century. Financial development has grown by leaps and bounds along with a number of infamous crashes. Using annual time-series data for the whole century, this chapter finds that financial growth has helped savings and economic growth in the UK throughout the 20th century. The unprecedented increase in money holdings in the 1960s and various forms of financial innovation and liberalization initiated in the 1980s raised both the level and the rate of economic growth. There are long-run and unique cointegrated relations of GDP with productivity of capital and financial depth in the 20th century. The financial crash known as Black Monday in 1987 upset equilibrium relations and led to a negative money-stock elasticity of economic growth.

Section II: Financial Markets in the IT Age

Changes in business processes and systems will eventually contradict existing management styles. Eventually, old styles will transform themselves into new management systems. IT is one typical example that has affected financial markets greatly. New needs will be generated, which will lead to adopting the next IT solution. In return, these solutions will generate changes to financial systems. The linkages among financial markets have tied very closely. Of course, although these linkages have good aspects, there are also bad aspects. Large capital movements occur in a short time. Exchange rates and other stock prices fluctuate greatly. Recently, we could not prevent the Asian currency crisis and its spread. Alliances of various kinds are needed to solve such problems more effectively.

Chapter V: Malliavin Calculus for the Estimation of the U.S. Dollar/Euro Exchange Rate When the Volatility is Stochastic. The tendency of exchange rates to fluctuate sharply and regularly is often referred to as currency market volatility. The extent of currency market volatility is a major element of market risk. For financial transactions,

volatility is a source of both profits and costs. Increased currency market volatility implies higher currency option premiums and, therefore, higher hedging costs for investors and importers/exporters. However, interestingly for banks and other investment houses dealing in options, an increase in option prices may contribute to higher profits. It has been well documented that the volatility of exchange rates varies over time. In recent years, the literature has proposed various stochastic volatility models that try to capture the dynamics of exchange-rate volatility. In turn, several methods have been developed to estimate the parameters of such stochastic volatility models, with varying results. This chapter proposes another method for parameter estimation of an exchange rate function when the volatility follows a stochastic process, using a geometric Brownian motion to represent stochastic volatility. Using Malliavin calculus, this chapter presents an explicit expression for the likelihood function of the observations. Numerical integration methods (Monte-Carlo simulations) and numerical optimization methods (generic algorithms) enable us to find an estimate for the unknown parameters and the volatility. Using weekly U.S. dollar/Euro exchange rates, the calculation obtains estimates of the parameters of the U.S. dollar/Euro exchange rate function (i.e., the constant of the drift) and the assumed stochastic volatility model (i.e., the constants of the diffusion process). Application of the estimated model to out-of-sample data for the U.S. dollar/Euro exchange rate shows a significantly high accuracy of the proposed method.

Chapter VI: Evolution of the Euro and Currency Competition in the Global ICT Age. This chapter investigates competition of the key currencies as foreign exchange vehicles, which has a character of the network externality. After January 2002, the Euro has been used in our daily lives, with significant competition between the Euro and the U.S. dollar as the dominant international currency. The author presents the currency competition model with a decreasing transaction cost that reflects the character of the ICT network externality, to investigate the competition between the Euro and the dollar. The findings suggest that the impact of the Euro's introduction may cause competition for the Euro to emerge as the key currency in international settlements. Further, the author indicates the importance of policy coordination between the U.S. and the Euro area in terms of ensuring stable international capital flows, exchange rates and a key currency regime.

Chapter VII: Co-Integration of the International Capital Markets with the Use of Information Technology: The Case of Europe. The purpose of this study is to analyze the "revolution" that was caused by the rapid spread of IT in terms of the development and integration of financial markets, especially capital markets. The main issue is that IT progress and facilities enabled efficient transactions in capital markets, and this phenomenon resulted in the ability to offer investors a variety of investment options. This chapter focuses from a theoretical and practical framework on the European capital markets and the impact of IT on important activities implemented by the capital markets: the structure of the trading platforms, the cross-border cooperation of the markets and the financial intermediaries.

Chapter VIII: International Capital Movements, Currency Crisis and ICT Innovation. This chapter investigates the effects generated by the currency crisis. The countries that have experienced currency turmoil have confronted financial crisis, economic deterioration and increased unemployment. This chapter empirically examines the effect of currency depreciation on the real GDP and the unemployment rates in those coun-

tries by using the Structural Vector Autoregressive Model, which attempts to clarify whether identified supply or demand shocks can be caused by exchange rate depreciation. This study suggests currency crisis might generate demand shock, resulting in harmful impacts to the real economy in those countries that may be deemed negative effects of information and communication technology (ICT) innovation.

Chapter IX: Volatility Spillover Structure of Stock and Foreign Exchange Market between Korea, Japan and Hong Kong. IT can be a source of volatility spillover between markets located in other countries. In this chapter, the author investigates the interrelationship between stock returns in North East Asian countries and the effect of foreign exchange rate volatility on the relationship between stock returns. This chapter elucidates simultaneous interrelationship between stock return and foreign exchange volatility. Focusing on the covariance of each asset return, if foreign exchange rate volatility is not taken into account, the portfolio risk might be undervalued. The analysis shows that foreign exchange market turbulence might be accompanied by an increase in covariance between stock returns. Just after the Asian Currency Crisis, the relationship between stock returns and foreign exchange turbulence may have changed. For managing international portfolio risk during the age of IT, foreign exchange risk and structural change in covariance between stock returns should be considered.

Section III: Financial Innovations and IT

The lack of progressive dynamism in financial systems in some fields has been serious. On the contrary, recently innovation has been rapid. Since the 1980s, innovative movements in finance have grown rapidly and continuously. The source of added value depends on innovation. Some innovative changes have arisen from IT, which has introduced much innovation into our daily lives and into the business world. IT has gradually changed financial institutions, job descriptions and alliances among institutions. Technology is cumulative in some fields such that it is difficult to catch up with more aggressive competitors. These changes also suggest the formation of new kinds of alliances in the near future.

Chapter X: Trade Liberalization and International Performance of Australian Manufacturing Industries and ITs. Trade liberalisation has played a pivotal role in improving the export orientation of the various Australian manufacturing industries. IT is not an exception. However, those industries subjected to industry-specific assistance measures (e.g., textiles, clothing, footwear and the machinery and equipment industries) have exhibited a superior export-oriented performance. The important lesson emanating from this result for the IT sector is that although it is subjected to these measures, their expansion can help alleviate the weak and stagnant export performance in IT-related goods, thereby helping to combat the projected large balance-of-trade deficit. Moreover, stronger output and employment growth will occur because of the significant contributions of these goods to the economy.

Chapter XI: Recent Developments of Digital Cash Projects in Japan. In this chapter, the authors examine the factors involved in the recent spread of digital cash and the problems with digital cash projects in Japan that still remain to be solved. In the 1990s, many Japanese banks and other non-bank enterprises have conducted forward-looking

projects despite their financial difficulties. One of these projects has been to develop digital cash technology and promote its usage. Efforts to establish digital cash projects made discernible progress in the early 2000s, and digital cash is more commonly used now in Japan than in other IT-advanced countries. This chapter provides an overview of the recent development of digital cash projects in Japan and discusses the issues involved in the further growth of digital cash usage.

In this chapter, the authors first took into account the history of digital cash projects in Japan during the past decade, ranging from the initial experiments to the recent commercialization efforts. Then they discuss what factors led to remarkable progress in digital cash usage in the early 2000s. They find that cooperation between the government and private companies has been the most important factor leading to the recent diffusion of digital cash. At the same time, the authors point out that the manufacturing costs of smart cards were significantly reduced through expansion of IC-card markets and technological improvements. Furthermore, the other important factors for diffusing the digital cash are (1) increasing convenience of digital cash usage, (2) expansion of available districts of digital cash, (3) innovations in ID technologies, and (4) close cooperation between the public and private sectors. Finally, the chapter describes the remaining issues that must be addressed to enable further growth of digital cash usage.

Chapter XII: Money is What Money Does: Prospects for an Electronic Money Payment System in Japan. Contrary to expectations, digital money has not been spreading. Despite the amazing progress in IT that has occurred in recent years, electronic money failed to live up to expectations and has made little headway into payments systems. The gap between expectations and reality is especially pronounced in Japan. The author compares the cases of Japan and Germany. The reason behind the failure of electronic money in Japan is two-fold. First, typical use of electronic money is in general rather limited as long as conventional money is required as a unit of account and a store of value for the official operation. Second, Japanese financial institutions chose a very limited standard for their electronic money systems and these could not compete with the near-monopolistic positions that credit card companies enjoy in cashless payment markets. On the contrary, Germany adopted a broad standard that fully utilizes the advantages of electronic money as a medium of payment.

Chapter XIII: Investment in IT Stocks by Japanese Life Insurers. Insurance companies have introduced IT from the early stages. This chapter analyzes the relationship between Japanese life insurers' investment in IT stocks and conventional financial statistics, such as return on return on equity (ROE) and dividend yield. The analysis shows that Japanese life insurers do not necessarily formulate their portfolios based on recent data. In particular, insurers who invested in low-ROE stocks tended to be financially unstable. These findings confirm that even after the Japanese financial crisis of the late 1990s, the primary objective of stock investment by Japanese life insurers continued to be the maintenance of business relationships with client firms, and not the maximization of investment performance.

Chapter XIV: The Roles of IT in the Conduct of Modern Monetary Policy. This chapter reviews the roles of IT from two perspectives. First, from the macroeconomic perspective, the IT revolution induced output growth and new financial innovations such as asset-backed securities and electronic money. However, these phenomena complicate the conduct of monetary policy, but they do not totally diminish its effectiveness. Second, from the operational level, IT applications are currently used to enhance op-

erational efficiency, bolster the decision-making process, and increase the innovative practices of monetary authorities in central banks throughout the world. The degree of implementation of IT applications in the conduct of monetary policy, in turn, may become another determinant of monetary policy frameworks in the future.

Chapter XV: The Role and Future of Local Currency and IT. The use of local currency, introduced by non-governmental organizations (NGOs) or other organizations in particular regions of some countries, has spread gradually since the 1990s in many countries. In countries around the world, nonprofit organizations (NPOs) and other similar groups have introduced local currencies. Recently, one local currency related to preventing environmental problems has appeared, and local currencies have also been implemented in the protective and nursing industries. In some countries, expectations for economic recovery have been supported by the introduction of a local currency. Various problems are involved with the spreading use of local currencies. It is important, however, to promote the spread. Given a good relationship among users, the advantages of local currencies are considerable. Use of local currency does not create major obstacles to interfere with other economic activity as long as the sizes of transactions do not increase greatly, so governments and financial authorities have little reason to prohibit its use unless the currency issue authority in the country is seriously threatened. The use of IT is an important point. The merits from introducing IT into a local currency are quite large. Linkages and alliances are important.

Section IV: Security, Law, and IT

It is a fact that the Internet originated as a network for the military. After that, it evolved into an academic field and then transformed into a business network. Financial institutions are also heavy users. However, a lot of serious problems are occurring. We cannot ignore this fact. Not only policy makers but also financial institutions should make concerted efforts to prevent these issues. Alliances are much needed to solve these problems.

Chapter XVI: Integrity and Security in the E-Century. E-commerce offers an enormous range of solutions to payment and settlement problems. However, e-commerce also poses a myriad of regulatory issues. Understanding the issues regarding technology, taxation and economic institutions posed by e-commerce that impact the ability to provide such services aids in comprehending the vast integrity and security issues surrounding this innovation. This chapter examines the effect of this technological innovation in the light of theories of regulation that postulate a struggle between attempts to control innovation and further innovation and regulation. To illustrate how regulation of e-commerce may be counterproductive, the chapter introduces a case study of the evolution of regulation of derivatives to test a hypothesis concerning social and avoidance costs. The author then examines a comparative case study of regulation of e-commerce to suggest a policy approach using a private-sector solution within a public policy matrix that is similar to the system used for private deposit insurance.

Chapter XVII: Legal Concerns Against Auctions and Securities Conventions: A Japanese Perspective. This chapter introduces the two newly emerging issues in the C2C and B2B areas in Japanese IT law: antifraud measures in Internet auctions and treatment of the Hague Securities Convention. The author discusses the law in some countries and areas. The liability of auction providers for a tenant's fraud beyond the freedom of contracts is not clear. If consumers bear the risks, adequate disclosure should be promoted. In addition, because this issue is complex, several measures, including advertisement regulations against small business consumers and development of escrow payment techniques, should be promoted. Regarding the Hague Securities Convention, the United States has pushed other countries to ratify it, but the EU has hesitated to conform. This chapter proposes that the ratification of the Hague Convention regarding unification of conflicting laws and the UNIDROIT Convention for unification of the substantive laws should be done simultaneously to avoid some side effects.