1. Introduction

> The purpose of the history of economic thought is not exclusively to award prizes for the 'correct solution', if there is such a thing, of this or that problem, but to study the genesis of ideas and the evolution of methods.
> (de Roover 1974, p.366)

Overview

Why write a book on the early history of financial economics? One practical reason is the scarcity of secondary sources dedicated to this topic. Compared to other areas of economic analysis, relatively little has been written that is directly concerned with the early history of financial economics. Historians of economic thought tend to focus on what important economists of the day were concerned about and limited attention has been given to purely financial topics by economists writing prior to the modern era. Many of the essential early analytical contributions on topics such as pricing the available securities were made either by applied mathematicians or anonymous merchants involved in related commercial activities. In contrast, classical and pre-classical political economists were concerned more with affairs of state than with explaining day-to-day financial activities.

Yet, there is much more in the early history of financial economics than a pastiche of loosely connected details about who said what and when it was said. Financial economics is a subject that is a modern marriage of two distinct fields, Finance and Economics. While there are superficial similarities in the subject matter of these two disciplines, the historical and philosophical foundations differ substantively. These differences sustain an internal tension in modern financial economics. This tension impacts upon the types of topics studied and the analytical methods used. Not surprisingly, economists are driven to apply 'economic science' to financial topics, producing results such as the theory of rational bubbles or the model of arbitrage-free security market equilibrium. However, these models and theories motivated by economic science typically have a limited cachet outside the academic marketplace.[1]

Academic boundaries in the social sciences are not easily identified. Financial economics is no exception. Subjects that are well within the

purview of one discipline can be adopted by another discipline when interests dictate. Such is the case with financial economics. Consider security pricing, a subject that is at the centre of Finance. The connection between Economics and security pricing is superficially appealing. After all, isn't price determination a fundamental concern of economic theory? Yet, an economist proceeding even a short distance down this seemingly natural path quickly discovers a decided paradigm shift as the vague boundary between Economics and Finance is crossed. In particular, the often superior analytical techniques used in Finance to value securities are derived from a historical and philosophical tradition that is unfamiliar to most economists.

Upon closer examination, the early history of financial economics emerges as an intellectual Pandora's box. Historical questions about the incongruent intellectual development of financial economics and conventional 'economic science' are answered with notions that are not always flattering to the latter. The ghost of Ramist philosophy is found to be haunting the *Wealth of Nations*, the founding work of classical political economy and, ultimately, modern economics. The anecdotal contrast between the curriculum of the 'use-oriented' reckoning school and the 'scholarly' university is instructive. Where reckoning school instruction emphasized commercial arithmetic, the university emphasized rhetoric, logic and grammar. Similarly, where scholastic usury doctrine was concerned with abstractly examining whether financial contracts were licit or illicit, merchants were concerned with the practical problem of devising licit contracts for which interest payments would be legally acceptable.

From its roots in the commercial arithmetic taught in reckoning schools, financial economics evolved along various paths. One of these paths leads directly to the mercantilists. Considerable modern debate has been given to establishing whether mercantilism proposed a cohesive framework for economic policy. Yet, this debate is only incidental to the early history of financial economics. The leading mercantilists were almost exclusively merchants and, as such, usually had intimate knowledge of early financial markets. Many of the, often self-serving, mercantilist policy propositions were formulated as extrapolations from merchants' experiences in the financial markets. This point is apparent in the debates of early mercantilism over foreign exchange controls that evolved, after 1620, into the (later) mercantilist export surplus doctrine.

Being based on analysis of the workings of both foreign exchange and security markets, many mercantilist propositions contain elements that

are of fundamental interest to financial economics. The contrast with the interests of conventional history of economic thought is striking. On balance, the merchant's use-oriented approach to financial calculations did not translate well as a method of devising prescriptions for national economic policy. The result was a mishmash of seemingly self-serving mercantilist arguments that Adam Smith, a moral philosopher and product of the scholarly university system, was later able to efficiently dismantle. Though Smith's work is several steps removed from scholastic economics, the similarity in natural law themes and use of scholarly abstraction is undeniable, for example, Young and Gordon (1996).[2]

Despite attempts by some modern revisionists, mercantilist notions are generally discredited by modern pundits of economic policy. Yet, mercantilist propositions were often based on plausible deductions derived from merchants' intimate knowledge of financial markets. As these markets evolved, the validity of specific propositions required adjustment. Adam Smith wrote at a time where monetary excess due to unwarranted issues of paper currency was an important practical problem. Smith's criticisms of mercantilist propositions such as the export surplus doctrine were made within the context of the conditions prevailing at his own time. Had he written at a time where the supply of money was composed of solely metallic currency, supplemented by trading in 16th century bills of exchange, his abstract policy prescriptions may have been much different. In any event, it is the mercantilist insights about financial markets that are the grist for the early history of financial economics, not their proposals about national economic policy.

Turning to the bigger picture, the role of practical financial knowledge in the development of mercantilist doctrines is only a sideshow in the early history of financial economics, though it does serve as a useful counterpoint for illustrating the use-oriented theme guiding the progress of knowledge in this area. More important theoretical contributions to financial economics were made in the late 17th and early 18th centuries in solving problems of pricing life annuities. Around the middle of the 18th century, this led to a practical breakthrough in the related problem of devising and pricing life insurance. Despite the obvious social and economic importance of this development, it was almost completely ignored in the *Wealth of Nations*. How much different would 19th century economic progress have been if Smith had spent considerable time musing about the applications of insurance techniques to topics such as social security and

bank deposits, instead of pontificating on scholarly problems such as 'value in use' versus 'value in exchange'?

Some areas of early financial economics, such as joint stock and related derivative security trading, are almost devoid of useful primary sources. Even practical information, such as that available in the plethora of merchant's manuals, is scarce. The merchants involved in proprietary activities such arbitraging prices did not leave many clues as to the precise trading mechanics involved. Available sources, such as *Confusion de Confusiones* (1688) or *Jeu d'Actions en Hollande* (1771), are typically descriptive with the writers possessing only a layman's knowledge of the precise trades involved. From a modern perspective, this shortcoming is significant because arbitrage is a fundamental feature of modern financial economics. Historical detective work is required to arrive at even speculative conclusions regarding specific trading activities. The absence of this type of information is further anecdotal evidence of the historical divide separating financial economics from the body of mainstream economics.

The acceptance of financial economics into the mainstream of modern 'economic science' is, arguably, part of a more general process involving the secularization of academia that has accelerated during the second half of the 20th century. Use-oriented subjects, such as engineering and computer science, have gained the upper hand in the academic world, with classical scholarly subjects, such as English and Philosophy, suffering from the various pressures generated by the use-oriented marketplace for university graduates. Subjects such as Economics, with scholarly roots but a use-oriented bent, have adapted to these pressures by incorporating use-oriented subjects such as financial economics and econometrics. In addition, the theoretical contents of mainstream economic subjects, such as macroeconomics, have been adapted to incorporate theoretical techniques borrowed from use-oriented subjects such as engineering, as reflected in time consistency and rational expectations models.

Modern financial economics has been affected by its acceptance into mainstream 'economic science'. Numerous topics of study have emerged within financial economics that are modern innovations, originating from extensions of economic theory to financial subject matter rather than continuing the historical progress of traditional Finance topics such as security analysis. Included in this group of topics are rational bubbles, absence-of-arbitrage security market equilibrium, and expected utility modelling, including the capital asset pricing model and the seemingly endless array of asymmetric

information models. Modern financial economics is progressively being homogenized into an economic science, creating an inherent tension with the historical use-oriented roots of the subject.

The underlying historical tension between scholarly pursuits and practical financial concerns is a constant theme in the period under study. Specific examples include: the progress of scholastic usury doctrine in contrast with the progress of techniques used in commercial arithmetic for calculating interest; the scholar John Locke debating the merchant Josiah Child over legal maximum interest rates; and Adam Smith's scholarly dismantling of the practical musing of the mercantilists. Yet, the history of financial economics extends well beyond this one theme. The early history of financial economics also includes many profound developments. The period under study witnessed the emergence of modern trading in stocks, bonds and derivative securities. The foundation of modern life insurance companies was formulated from contributions by the likes of Abraham de Moivre and Richard Price. This history, and much more, is to be found in the following chapters.

Scope of the Investigation

While it is possible to trace the origins of financial economics back to antiquity, the starting point selected for this study is the publication of the *Treviso Arithmetic* (1478), the earliest known printed mathematics book in the West. The *Treviso* is a commonplace commercial arithmetic, a type of early business school textbook (Swetz 1987). The contents of the *Treviso* are representative of a typical course of instruction offered in the Italian reckoning schools of that era. In addition to developing the requisite arithmetical calculations, much of the *Treviso* is concerned with solving problems arising in medieval and Renaissance commerce: currency exchange, calculating payment for exchanging goods, and determining shares of profit derived from partnerships. The types of problems considered in the early commercial arithmetics, as well as the associated solutions, are an important source of information about business practices of the times.

The early development of financial economics is distinct from more conventional economic theory, such as the theory of value and distribution or international trade theory. This distinctness is reflected in the timing of the contributions. By the early 18th century, substantial theoretical results had been developed for pricing the sometimes complicated financial securities that were available. The

striking discrepancy between the advanced development of certain aspects of financial economics with the rudimentary state of the rest of economic theory is emphasized by selecting the appearance of the *Wealth of Nations* as an ending date for this study. This endpoint permits Adam Smith's often overlooked contributions on topics such as managing joint stock companies, the bill of exchange and stock jobbing to be recognized and discussed.

As may be expected, this book provides an examination of the numerous individuals and problems involved in the early history of financial economics. Much of the material is likely to be unfamiliar to historians of economic thought. In addition, much of the requisite information is not systematically addressed by histories of accounting, mathematics, statistics or science that, understandably, have been more concerned with examining the problems that are of interest to those fields of study. It is *not* an objective of this book to provide a detailed examination of primary sources, though some primary sources are consulted and examined. Rather, the basic approach of the book is pedagogical, to summarize and synthesize the somewhat disparate histories that form the basis of the early history of financial economics. Ample references are provided to guide the interested reader toward further study of particular topics.

A key theme in the early history of financial economics is the fundamental impact that scholastic doctrine and canon law had on financial practices, such as security pricing and the types of financial instruments being traded. In particular, the period being examined involved dramatic evolution of scholastic doctrine on the important issue of usury. The scholastic acceptance of financial vehicles such as forced state loans, the census, the licit partnership, the bill of exchange and the triple contract legitimized the progressive weakening of religious controls on the accumulation of capital. In turn, this contributed directly to changing practices for pricing financial instruments used in both business and government activities. In various instances, changes in scholastic doctrine served to legitimize activities that were already conventional practice in financial markets.

Early contributions to financial economics usually originated from individuals operating outside the scholarly confines of the university, though most had a healthy exposure to some form of advanced education at an earlier time in life. The Renaissance reckoning masters, the commercial algorists such as Nicolas Chuquet (1440?-1500), the royal factor Sir Thomas Gresham (1519-1579), the merchant Gerard de Malynes (1583-1623), the Dutch prime minister Jan de Witt (1625-

What is an algorist?

The origins of the word 'algorist' and the associated word 'algorithm' can be traced back to the 9th century AD and the Islamic scholar al-Khowarizmi. This mathematician, geographer and astronomer wrote a number of important Arabic works on algebra and arithmetic. In the 12th century, these books were translated into Latin using the name 'Algorismus'. The subsequent practice in the Middle Ages and later has been to refer to these texts as 'algorisms' and mathematicians using the methods of these books as 'algorists'. The practice of using 'algorithms' to solve algebraic and arithmetic problems contrasted with the medieval practice of using the abacus in combination with Roman numerals to do calculations. In the modern era, usage of the word algorithm has evolved to depict a method or computational procedure for solving a specific type of problem, and an algorist as someone who develops or uses such algorithms.

1672), and the probabilist Abraham de Moivre (1667-1754) were all actively involved in practical activities when their contributions to financial economics were made. Some important contributions originated from religious individuals operating outside the universities, such as the minister Richard Price (1723-1791), though these contributions were also motivated by practical, as opposed to scholarly, considerations. In contrast, early giants of political economy, such as David Hume or Adam Smith, were almost exclusively scholars, often associated with universities.

While classical political economy originated from the scholarly concerns of moral philosophers, financial economics has always had an intimate relationship with mathematics and related disciples, such as probability and statistics. Over time, as important mathematical techniques were developed, these techniques were applied to solve practical financial problems. The early history reveals considerable interaction between contributions to mathematics and probability theory with applied contributions to problems in security pricing. One significant example is provided by Christian Huygens's (1620-1699) theoretical contribution on mathematical expectation leading to de Witt's

pricing formula for a life annuity. Another example is Chuquet's concern with solutions of compound interest problems appearing in conjunction with his developments in algebraic methods.

The disparate nature of the varied contributions to the early history of financial economics makes even secondary research problematic. In particular, this book originated from a casual search for the answer to a simple question: where did various practices for calculating compound interest originate? An intensive search of relevant sources turned up little information. Even with considerable research, it turns out that the answer to this question is not easy to resolve. In the process of searching the genealogy of compound interest, it became apparent that there were numerous related deficiencies in the information available on other areas of financial economics. How were pricing techniques for joint stocks, options and forward contracts developed? How did contracting methods for fixed income securities develop? How did society provide for life contingencies prior to the emergence of modern life insurance and pension funds? Who were the important individuals involved in the early development of modern financial economics?

Aside from providing an array of interesting and, hopefully, useful details to answer these types of questions, this book also has a number of more ambitious intellectual objectives. One objective is to explore the interaction between social convictions and business practices. For example, despite the social and religious conviction that usury was immoral, various business practices inherently required the payment of a return beyond the simple repayment of principal. As a consequence, methods for pricing securities were developed that disguised interest payments. This particular subject has an immediate connection to areas such as modern Islamic economics that are concerned with designing a financial system where the payment of interest (*riba*) is prohibited. More generally, there is the problem of establishing the ethical or moral validity of modern financial practices. A historical perspective provides some insight into this problem.

While there may be some technical differences, the basic characteristics of the financial securities used in modern markets emerged during the time period under consideration. Considerable intellectual effort was expended in assessing the moral and ethical validity of specific contracting methods. Evaluating whether specific financial contracts were consistent with notions of distributive and commutative justice was a central preoccupation of scholastic economic doctrine. The Schoolmen made detailed moral and ethical judgements on essential elements of financial contracting such as the acceptable

conditions for the payment of interest and the taking of usury, distributing shares in a partnership, the validity of insurance, the distinction between bearing risk and gambling, the use of exchange contracts to disguise usury and the allowable size of payments for default. Many modern financial practices have roots in these scholastic musings.

This book is designed to provide a systematic chronology of the development of ideas in a specific field of study.[3] As such, this book has to address an issue of general importance in intellectual history: how are the origins of ideas attributed to specific individuals? There are various issues involved here. One issue is the subject of plagiarism, of which there are many instances in the early literature. Chuquet, Richard Cantillon, de Moivre and others were all victims of plagiarism, some effort in this book is given to identifying specific instances. The issue of plagiarism is connected to the more abstract issue of identifying how ideas are developed. To what extent are ideas due to the insights of special individuals, or to a progression of thought from a body of individuals?

Closely related to the issue of plagiarism is the problem of assessing the contribution of summarization and synthesis. A useful illustration of this problem is provided by Raymond de Roover's (1951, p.273) opinion of Adam Smith: 'Adam Smith was by no means a pioneer but a voracious reader and a master in the difficult art of synthesis. He used not only the materials contained in the technical treatises of the French physiocrats and the English mercantilists but also the ideas and concepts scattered throughout the great books, philosophical, historical and legal, that are the common heritage of western civilization.' Where does synthesis end and contribution begin? As for Adam Smith, from the perspective of financial economics Smith was far from being an originator. Arguably, some of his notions about financial markets are confused. Compared to his scholarly contributions to value, distribution and trade, Smith has little to contribute to the use-oriented subject of financial economics.

Financial economics has roots that are decidedly different from the rest of economics. This raises a difficult problem: how to identify the origins of this subject? What are the essential theoretical ingredients and who were the seminal idea makers? In the early history of financial economics, the problem of attributing ideas to originators is made even more complicated by the general absence of texts written by innovative financial practitioners. Important topics such as the development of techniques for arbitraging bills of exchange or pricing option and

forward contracts or setting maritime insurance premiums are difficult to examine because the methods used were often deemed proprietary. As a result, identifying individuals making substantive theoretical contributions to financial practices is difficult. It is not until the late 17th and early 18th century that sources become relatively easier to trace.

Some Introductory Pedagogy

What is financial economics? The answer to this question is somewhat elusive. It requires the definition of a subject with boundaries that encompass disciplines with disparate orientations. In particular, financial economics is that body of knowledge which lies in the intersection between the subjects of Finance and Economics. Finance is, overwhelmingly, concerned with practical solutions to problems arising in financial markets, for example, what is a fair price for this security? or, what is the appropriate level of dividend to payout? Economics has a decidedly greater concern with theoretical solutions, for example, are there multiple equilibria? or, is the solution Pareto optimal? Economists seem to perceive financial economics to be a subject where the techniques of economic science are applied to financial subjects. Yet, financial economics could just as readily be taken to be that area of Finance which uses theoretical techniques borrowed from economics. The coverage involved in these two different specifications is not identical.

The emergence of financial economics as a distinct field of study within the university Economics curriculum is a decidedly modern event, for example, Whitley (1986). The initial impetus seemingly came from the success of modern multi-disciplinary Business schools that feature *Finance* as an important component of the curriculum. Yet, the business school has its historical roots in the Renaissance reckoning schools, use-oriented institutions operating outside the realm of the humanist dominated universities. Working from roots such as the scholarly Adam Smith, Economics has a much stronger connection to the humanist approach of university training. Of necessity, Finance has borrowed liberally from other subjects such as Accounting, Economics and actuarial science, where it was required to arrive at solutions to practical problems. While the focus of Finance has historically been practical in scope, modern Business schools are now integral parts of universities and have increasingly adopted university-style curricula.[4]

What is Economics? A seemingly trivial answer to this question is that Economics is what economists do. As many economists are also teachers, Economics can be identified with the content of Economics courses. Yet, the content of Economics is somewhat transitory, dependent on the fashions of the time. While certain issues are at the core of the subject, the focus does change to suit the times. Sometimes the changes are rationalized as theoretical advances, such as the change from the Phillips curve to the Phelps curve in macroeconomics. In other cases, contemporary events dictate, such as the collapse of the fixed exchange rate system leading to flexible exchange rates and, now, monetary unions. Such is the case with financial economics, a once peripheral subject that is now clearly within the mainstream of Economics.

Admitting financial economics into the purview of Economics raises some quandaries for historians of economic thought. An implied bias in the prevailing history is the unspoken claim that the history is a coherent whole. After all, are not Smith, Ricardo and Marshall the fathers of Economics? The 'science' of Economics evolved from the older, now outdated, subject of political economy and has, in the modern era, incorporated techniques borrowed from statistics, mathematics and engineering to motivate theoretical economic analysis. Because the content of Economics is, at least partly, transitory, new fields have been added to address issues that have fallen within the interests of economists. Environmental and financial economics are two such subjects. However, when new subjects are brought within the purview of Economics, the histories of these subjects do not necessarily align with conventional history.

Much of the subject matter of Finance originates with practical business applications arising in financial markets. More precisely, Finance is composed of two, not independent, subject areas: *investment analysis*, which is concerned with the valuation and management of financial instruments, especially stocks, bonds, futures and options; and *corporate finance*, which is concerned with the problems arising in the financial management of corporations, relating primarily to analysis of the sources and uses of corporate funds. Of these two areas, investment analysis is more amenable to Economics. The concern with valuation problems is, at least superficially, familiar to economists. In contrast, in corporate finance the motivation for many considerations arise from Accounting situations, territory that is not as familiar to economists. Hence, financial economics is typically identified with investment

analysis, especially the theoretical analysis and implications of security valuation problems.

The dichotomy of corporate finance and investments does not translate well for a study of the early history. The corporation as a form of business enterprise was only evolving during this period. The partnership was the primary method used for structuring business enterprise. As the insightful discussion by Adam Smith in the *Wealth of Nations* (Bk.V, Ch.1, Pt.III) illustrates, by 1776 joint stock companies were still a subject of debate and misunderstanding. This discussion is further clouded by recognizing that the modern legal concept of limited liability had not yet evolved (Shannon 1931). Consequently, while the evolution of the financial structure of businesses will get some attention, much of the discussion will centre on the valuation of the various types of securities available.[5] This discussion includes the valuation of shares in a partnership. Given the modern focus of financial economics, this bias is consistent with a preference for investment analysis over corporate finance.

Because the modern evolution of Finance involved application of techniques borrowed from Economics, a number of important contributors to the contemporary theory of Finance have been economists. Obvious examples include Paul Samuelson, Franco Modigliani, John Hicks and James Tobin. Similarly, individuals working primarily in Finance have been given significant recognition within mainstream Economics, as evidenced by the awarding of the Nobel Memorial Prize to individuals such as Merton Miller, Myron Scholes, Robert Merton, William Sharpe and Harry Markowitz. This is in sharp contrast to the early history. There are few individuals of importance in the early history of financial economics who are more than minor figures in the conventional history of economics, Richard Cantillon and, possibly, John Law being notable exceptions.

The study of modern financial economics is concerned with the substantial body of knowledge that has developed in the accepted intersection between Finance and Economics. The sizable overlap between Finance and Economics does include some subjects that are important topics in the traditional history of economic thought, such as the theories of interest rates and decision making under risk and uncertainty. However, while the emphasis in, say, macroeconomics is primarily concerned with determining the level of interest rates, financial economics is more concerned about the methods of using interest rates to determine the price of securities. This requires understanding specific features of the relevant securities, especially how

the associated security cash flows are generated. The extension to risk management analysis involving the pooling of securities in portfolios follows naturally by applying techniques borrowed from actuarial science.

This subtle difference in focus between Finance and Economics is reflected in the discussion at various points. For example, in structuring the analysis of interest rate theory, Böhm-Bawerk's *Capital and Interest* (1914), being an important contribution to the more recent history of financial economics, is used to motivate the presentation. This source is concerned with the fundamentals of how the level of interest rates is determined and how interest originates. However, neither this source or other important contemporary sources such as Irving Fisher's *The Rate of Interest* (1907) deal with pricing fixed income securities or fixed income portfolio management in any detail. Many of the early contributions to fixed income security pricing were made by financial practitioners and those academics involved in commercial education, typically operating outside the scholastic realm. These individuals seldom considered questions about the origin of interest or how the level of interest rates (which were often fixed by social convention) was determined.

Outline of the Presentation

Modern financial economics is a large subject area. Many financial topics of contemporary interest, such as investment decision making under uncertainty, portfolio management or the term structure of interest rates, were not well developed or recognized until well beyond the period examined in this study. In addition, much of modern financial economics would have been too academic and, as a result, uninteresting to the early security market participants who were more interested in practical problems, such as devising readily implemented rules for determining security prices. By design, this book focuses on issues that were relevant in the early history. Rather than searching the past for records of specific modern theories, practices of the time are used to motivate the discussion.

This book is *not* intended to provide an in depth discussion of primary sources. At some points, key primary sources are examined but this is only done selectively. The bulk of the discussion is drawn from secondary sources covering a number of subject areas. Because the objective is to examine issues of relevance to the history of economic thought that may be unfamiliar, when an excellent discussion

of the issue is provided elsewhere only a brief discussion of the details will be provided and direction will be given to the relevant secondary sources. Even though the book is intended as an overview, key themes are used to guide the organization of material on specific topics. Selection of specific topics is designed to speak to issues of fundamental and contemporary importance.

It is difficult to appreciate the progress of early financial economics without some essential historical background. A key theme in this book is that central elements of financial economics evolved from the early commercial arithmetics. These texts were typically, though not exclusively, representative of courses of instruction at the Renaissance reckoning schools. To this end, Chapter 2 begins with a discussion of intellectual developments prior to 1478, with specific attention to the important contribution that Fibonacci made with the *Liber abachi* (1202). Some attention is also given to the distinction between prevailing systems of education; the Church schools and universities are contrasted with the reckoning schools. Arguably, the *Liber abachi* qualifies Fibonacci to be considered as the father of commercial arithmetic. However, 1202 is a date far removed from the time period covered by this book and treatment of historical material appearing prior to 1478 is cursory, at best.

The publication of the *Treviso* in 1478 has been selected as the formal starting date for the early history. Remarkable progress in financial markets and the securities traded on those markets originated roughly about this time. Chapter 2 details the development of the various types of securities traded including: the *census*; the Venetian *prestiti*; the triple contract; the bill of exchange; life annuities and tontines; and, of course, joint stocks. Though bourse trading in places such as Bruges had been observed prior to 1478, it was during the 16th century that Antwerp, and to lesser extent Lyons, achieved an almost modern state of development. Following the collapse of Antwerp in the late 16th century, the focus of financial activity was transferred to Amsterdam in the 17th century, where techniques of exchange trading underwent another remarkable transformation. By the time London had surpassed Amsterdam in importance, sometime in the late 17th or early 18th centuries, financial markets had reached a maturity that, in part, has survived to the present day.

What are the ethical foundations for the trading that is observed in modern financial markets? Under what conditions are the gains from gambling considered to be 'ill gotten'? When is the taking of a return on a loan consistent with the principles of Christian charity? These

types of questions were the concerns of scholastic doctrine. Until the late 17th century in northern Europe and much later in southern Europe, scholastic doctrine had an important influence on the Christian conscience. Though this situation was far removed from that of centuries earlier when scholastic doctrine was often reflected in civil laws, there was still a widespread social concern about financial practices that did not at least pay lip service to received Church teachings. Chapter 3 provides some background on the scholastic analysis of relevant topics, such as usury and gambling, needed to develop another key theme of this book: the influence of social convictions on business practices, such as the design of securities.[6]

'The roots of modern financial economics can be traced to the commercial arithmetics of the Renaissance'. As illustrated in Chapter 4, close inspection of the Renaissance commercial arithmetics confirms the intuitive appeal of this statement. Yet, tracing the development of commercial arithmetic into the 18th century leads not to the work of Adam Smith but, rather, to Richard Dodson. The commercial education of the Renaissance reckoning schools evolved over time into the curriculum of the English writing school, where commercial arithmetic often took a back seat to the art of handwriting. The reckoning master was gradually replaced by the accountant. By the 18th century, financial practice had evolved sufficiently that many of the tedious calculations of the reckoning master had been simplified, for example, due to the widespread introduction and use of present value tables during the 17th century to aid in determining fixed income valuations.

Chapter 4 chronicles the intellectual history of the period, starting with the early commercial arithmetics and finishing with the 18th century development of tables for use in valuing life annuities and insurance. This treatment does not permit close attention to be given to the types of problems being examined and the analytical methods used to solve these problems. This is the subject matter of Chapter 5. After a review of fixed income valuation methods and some related mathematical techniques, attention shifts to the types of problems considered in the early commercial arithmetics, such as determining simple interest in partnerships and evaluation of the rate of compound interest. The actual problems considered and the associated solutions are taken from primary texts, including the *Treviso*, Chuquet's *Triparty* and Richard Witt's *Arithmetical Questions*.

Chapter 6 deals with the history surrounding what is, possibly, the most important analytical problem of the time period under

consideration: the valuation of life annuities. This problem attracted the attention of a number of intellectual giants of the 17th and 18th centuries, including Edmond Halley, Abraham de Moivre and Nicholas Bernoulli. Starting with Jan de Witt, the solutions proposed to the life annuity valuation problem represent the beginnings of modern contingent claims analysis. Using only intuition and the much cruder methods of those times, the solutions proposed were outstanding, comparable with the pathbreaking work being done in other intellectual realms during the Enlightenment. The later application of these results to the provision of life insurance and pension funds reaped a social benefit that is largely taken for granted in modern times. Chapter 6 covers both the intellectual history as well as a brief theoretical treatment of the various solutions that were proposed.

The bill of exchange has a history stretching back to antiquity. At various times, it has been the most important security in financial markets, however, it was not a static arrangement. The bill of exchange traded in 16th century Antwerp was substantively different from the 'bill of exchange' that Adam Smith discussed in the *Wealth of Nations*. Recognition of the different stages in the evolution of the bill of exchange contract is a prerequisite to examining various issues in the early history of financial economics, such as the propositions of the early mercantilists. To this end, Chapter 7 deals with foreign exchange and the bill market. Considerable attention is given to detailing the various trading strategies that were used by the merchants involved in bill trading, a topic that is not adequately considered in currently available secondary sources.

Judging from the coverage given to the subject in the modern financial press, the central problem in financial economics is the valuation of common stocks. Yet, modern financial economics has relatively little to offer on this subject. Since the beginning of trade in joint stocks starting in early 17th century Amsterdam, the search for a precise method of valuing stocks has eluded and baffled market practitioners and financial economists. Various rules of thumb and crude valuation principles, gathered under the rubric of 'fundamental analysis', have evolved over time. However, the techniques proposed by fundamental analysis lack the pricing precision of techniques associated with valuing fixed income securities. The inability to value the cash flows being generated by joint stocks contributed significantly to the South Sea and Mississippi Company joint stock bubbles.

The history of joint stock trading has produced many, many tracts dealing with various topics, with the South Sea bubble and the

Mississippi scheme having received particularly intensive study. It was not possible to construct a detailed overview of all of this material. Consequently, Chapter 8 is designed to provide an overview of the various ideas that were advanced about the pricing of joint stocks. Of necessity, this involves the inclusion of a considerable amount of historical material, covering the evolution of joint stocks over the period. Even though the analysis of trade and pricing for joint stocks paled in comparison to the methods devised for pricing fixed income securities, such as life annuities, there still was a number of interesting and lively treatments of the requisite material, *Confusion of Confusions* (1688) by Joseph de la Vega and *Everyman his Own Broker* (1761) by Thomas Mortimer being two particularly noteworthy efforts.

In contrast to the secondary literature on joint stock trading, there is a general absence of contributions on derivative security trading and pricing. The primary and, to some extent, the secondary sources that are available were written by observers not directly involved in the trade. Consequently, there is only cursory treatment of the trading strategies that were being used to execute the various arbitrages associated derivative securities. Chapter 9 aims to fill this void by providing an overview of the use and development of derivative securities. The rudimentary state of pricing theory for these securities is discussed, including the notions of cash-and-carry arbitrage and put-call parity conversion.

Modern financial economics has dedicated a quite phenomenal amount of intellectual effort in an attempt to explain the various asset pricing bubbles that have appeared over time. The 17th and 18th centuries were witness to at least three of the most famous historical bubbles: the tulipmania; the South Sea Bubble; and the Mississippi scheme. Chapter 10 aims to examine these bubbles from an historical perspective, identifying what market participants of the time felt about these events. In addition, this discussion is buttressed with an examination of what certain market participants felt about security market practices, particularly the various techniques that were used to manipulate markets. Modern financial economics has a deep attachment to the assumption of rationality. The concepts of mania and manipulation do not fit well into the modern approach, yet this is what the historical participants, time and again, emphasize in their writings about the market practices of their time.

Following similar developments in Holland, the Glorious Revolution of 1688 ushered in what Dickson (1967) has characterized as 'The Financial Revolution in England'. This financial revolution was

characterized by substantive increases in the size, security and variety of British government debt. Developed financial markets permitted the British government to tap not only the savings of the British landlord and merchant, but also the purses of foreigners, especially the Dutch. The English Revolution in government finance did not take place in a vacuum. There were numerous debates on different aspects of the Revolution. Chapter 11 examines two specific topics in more detail: the debate over the legal maximum for interest rates; and, the debate over the sinking fund. Oddly enough, the issues involved in these debates were, sometimes, more philosophical than technical.

It is difficult for the modern observer to appreciate the incredible intellectual progress that has taken place since the mid-18th century. One of these truly marvellous advances was the emergence of actuarially sound life insurance schemes, starting with the launching of the Equitable Life Assurance Society in 1762. Progress in life insurance roughly paralleled similar institutional progress in maritime insurance, where the emergence of the Lloyd's syndicate of private insurance underwriters was spurred by the restrictions imposed by the Bubble Act of 1720. The natural affinity between financial economics and actuarial science is apparent throughout the early history of financial economics. Numerous topics from commercial arithmetics to life annuities are immediately relevant to both actuarial science and financial economics. Chapter 12 completes this connection by examining the development of various forms of insurance.

What does the early history of financial economics have to offer to the modern observer? This, of course, depends on what the observer is looking for in the history. History is written for different reasons. One of the themes of this book is that the history of financial economics is 'use-oriented', if only because modern financial economics is a use-oriented subject. This leads naturally to a central concern with the pricing of securities, including arbitrage trades involving derivative securities. Sometimes the pricing methods suggested in the early history are extremely intricate, as in the case of life annuities. There is much that has been and, possibly, still can be learned from the works of those involved in this research, including Halley, de Moivre and Price.

In tracing an intellectual history, certain individuals tend to stand out and deserve to be recognized as having made seminal or key contributions. With this in mind, Chapter 13 sets about identifying the founders of financial economics. In the process, a brief summary of the main results contained in the book is provided. The list of names is

quite long and diverse, including one name that stands out above the others, Anonymous. This name recognizes all the unknown merchants who developed pricing and trading techniques that are the essence of trading in modern security markets. At times, this makes the early history difficult to identify, if only because the merchants considered transactions to be proprietary and did not want their activities to be public knowledge. In the end, with a little historical detective work here and there, there is still much that can be said about the early history of financial economics.

Beware of Ethno-Centrism and Other Sources of Bias?

With the exception of a few scattered sections, such as the section on the Japanese rice market in Chapter 9, almost all of the discussion is concerned with European intellectual developments. This leaves the fascinating topic of Asian, Middle Eastern and North African financial economics unexplored. Though little is written about the history of European financial economics, 1478-1776, there is even less on writings originating from other geographical areas. Any attempt to explore the non-European contributions would encounter severe difficulties such as the lack of accessible primary and secondary sources and, where these sources are available, problems of translation and other linguistic barriers. In addition, from a cursory examination of the information that is available, it appears as though the 1478-1776 period was relatively stagnant in terms of non-European contributions.

Within the European literature of the period, considerable attention focuses on the English contributions, particularly for the 17th and 18th centuries. There are a number of reasons for this. One reason has to do with the actual data. Many of the important early contributions in financial economics originated in England. For example, de Moivre was living in England when he developed his results for pricing life annuities. Another reason for the apparent English bias is the accessibility of sources. For example, while there were European writers, such as Antonio Serra, who made important contributions to the early mercantilist debates, the contributions by the English mercantilists, such as Malynes, Mun and Missleden, are similar and more accessible. Because accessibility means that both secondary and primary sources are more readily available, there is more grist for the mill.

The writing of history inherently raises the issue of bias. By imposing currently accepted norms on the past, there is always the tendency for modern writers to misinterpret or reinterpret history.

There is also the tendency for historians to give false impressions about the past through selection-bias. Sometimes, in writing intellectual history, selection-bias is difficult to avoid, due to the lack of accessible primary sources from the (possible) originator of an idea and a plethora of accessible sources from an expounder of the idea. Accessibility can be a function of quantity of sources as well as the availability of translations. In the history of financial economics, the bias problem is compounded by the tendency for users and originators of ideas not to publicize their contributions. For example, while it is apparent that arbitrage strategies were used in 17th and 18th century options markets, there is no source that adequately details precise mechanics of the trades.

The upshot of this discussion is that there is, inevitably, some bias in this history of financial economics. Such bias is inherent in any historical analysis. Ultimately, it is not that important whether this or that individual gets credit for originating a given idea. What is important is the insight that the historical analysis gives about modern financial economics and market practices. In turn, the concerns of modern financial economics have biased the topics selected for historical analysis. In this process, numerous instances arise where writers of the time largely ignored specific financial practices that are now of fundamental concern, for example, arbitrage trading in the bill of exchange market. Hopefully, despite the unavoidable caveats, the end product presented here is a fair assessment, from a modern perspective, of the progress in 'ideas and the evolution of methods' that was made in financial economics from 1478-1776.

Notes

1. Casual inspection of the modern popular print and video media reveals that 'leading financial economists' typically have limited stature as economic scientists. With some notable exceptions, a similar comment applies to top bureaucrats in government agencies concerned with financial matters, for example, Alan Greenspan at the Federal Reserve Board.

2. If attention is given to contributions prior to Smith, such attention usually does not start until the late 17th century English mercantilist debates over setting the legal maximum interest rate, which includes one of the first contributions to 'economic science' by the scholarly John Locke (Letwin 1964). Another favoured starting point is the contributions of William Petty which involved 'political arithmetic' and public finance, subjects which lie outside the mainstream interests of financial economics.

3. The discussion does stop short of being a full-blown epistemology. Little or no attention is given to questions concerning what constitutes knowledge in financial economics.

4. Witness the composition of faculty in modern Business schools which, typically, is heavily weighted to individuals with excellent academic credentials and little or no substantive business experience. One essential implication of having a Business school as an integral part of a university is that fairness requires conformity of the faculty to the general requirements of tenure and promotion imposed throughout the university. While lip service may, or may not, be paid to practical experience in the business world, there will be a decided bias towards academic performance.

5. In addition, the early history of corporate finance has recently been examined in some detail in Baskin and Miranti (1997).

6. To provide a modern reference point for this theme, consider the prohibitions on the trading of commodity options which prevailed in the US until the early 1980s. Other modern examples include laws restricting gambling using randomizers, such as cards or dice, while permitting gambling using financial securities.