

SMALL EUROPEAN SECURITIES MARKETS

**A study of trading volume and institutional factors in the evolution
of selected European markets**

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**A thesis submitted for the degree of Doctor of Philosophy
of the University of London**

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ABSTRACT

The thesis examines selected small national securities markets in western and central Europe under the influence of change in the structure of world financial market practice and increased information flows. Markets studied in detail and visited on one or more occasions are those of Denmark, Austria, Portugal, Hungary, The Netherlands, Belgium and two German regional exchanges, Hamburg and Bremen. Data on the German market as a whole is studied for its relevance to neighbouring small national exchanges. The formation of new markets in the Czech Republic and Slovakia is observed based on information about, and visits to, Prague and Bratislava.

Market institutions, mechanisms and participants, particularly banks and brokers, are examined for their contribution to the viability and validity of each market and the realisation of development potential. The literature of price discovery, returns generation, asymmetrical information, market microstructure and investor behaviour is reviewed, as is the history of national exchanges for determinants of their present-day form and behaviour. Structured, questionnaire-based interviews with market participants, other fieldwork information and the considerable volume of contemporary press and periodical material relating to market reforms constitute the main body of evidence. Market-by-market analysis is conducted to support conclusions based on initial hypotheses about the function and purpose of small national markets and formal models of investor, borrower and broker behaviour.

Trading volume is separately analysed over the longest practicable period, using time-series econometric methods for evidence of ability to reveal information about market behaviour and reliability as an

income generator to sustain market-dependent broking populations and market institutions.

Institutional factors are found to determine the volume of trading in the medium term and hence, via the level of income generated, to induce virtuous and vicious circles of development. In the short term, trading volume is determined by exogenous shocks and short-run market dynamics.

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PART ONE

CHAPTER 1: OBJECTIVES, STRUCTURE AND SCOPE OF THE STUDY

INTRODUCTION

This thesis concerns the contemporary development of small national securities markets in Europe, as represented by six established national and two regional markets in western Europe and four new or re-established exchanges in the part of central Europe formerly under the influence of the now-defunct Soviet Union. The focus of the research is upon institutional factors and the development of trading volume. The first aspect is mainly seen through the eyes of market participants, principally banks and brokers, with perspectives on turnover, viability, validity and potential for development. The second is pursued by means of econometric modelling of turnover volume in a smaller subset of markets over a long period to establish the determinants of volume and the internal dynamics of each market. Both lines of research are directed to explaining the continued existence of small national and some regional securities markets and identifying factors important for their success.

This chapter outlines the aims, structure and scope of the thesis, and explains the methodologies and logistics of the empirical research in Part II. Hypotheses are stated and related definitions outlined in preparation for more detailed discussion in the rest of Part I.

Section 1.1: Objectives and structure of the thesis

As stated, the thesis seeks to explain the contemporary evolutionary path being followed by smaller national securities markets in Europe in terms of their institutional structure and trading dynamics. Of special interest are markets which have undergone major reforms or have recently been created or revived following economic liberalisation of the former communist world.

The objectives of the thesis are, accordingly:

1. to understand the rationale for the continued existence of smaller national and regional securities markets and the continued formation of new ones in a world increasingly characterised by competing large financial centres.
2. to establish criteria for assessing the medium term validity, viability and development potential of national markets as well as the nature of net benefits delivered to the national economy.
3. to identify the structures and trading practices most likely to favour growth and the stability of market institutions in the medium term.
4. to examine in detail the rôle of securities turnover volume:
 - (a) as an aid to efficient price discovery, to greater transactional and informational efficiency, and to the generation of information externalities, and
 - (b) as an income source to maintain a viable market with a varied fauna of market participants and provide funds for the development of stable market institutions.

The thesis is divided into three parts, as outlined below:

Part I: Theoretical and empirical background to the study

The discussion under this heading deals first with the general direction of evolution of world stock markets in a context of relevant postwar economic and financial developments, with the objective of defining the main lines of enquiry appropriate to a study of smaller securities markets under the influence of these broad trends.

Criteria are next developed for justifying the existence of smaller markets and evaluating their worth, followed by an exposition of, and

commentary upon, two conventional approaches to justifying the formation and promotion of national securities markets. The classic 'developing country' and economic efficiency arguments advanced respectively by Antoine van Agtmael [1984] and William Baumol [1966] are reviewed against the evidential background which has accumulated since their work was published, including the evidence collected for this study. The cited authors' assertions are contrasted with the experience of a number of national markets over the last two decades.

Previous theoretical and empirical analysis and research is next reviewed, concentrating on three topics, namely, turnover volume, the structure of the securities broking industry and informational considerations. The hypotheses and chosen focus of the present study are also discussed in relation to the existing securities market literature, which has concerned itself to a great extent with large, efficient, transparent markets using the abundant data emerging from their operation and concerning itself largely with factors relating to price formation and the generation of returns. The process of reviewing this literature is therefore largely one of filtering out what may be useful for the present thesis.

Part II: The empirical research

The empirical research consists, briefly, of:

1. the design, conduct and analysis of structured interviews with market participants in selected markets,
2. a multi-country review of existing research and other literature, information supplied by national exchanges, regular monitoring of contemporary press, periodical and other material in accessible languages (English, German, French) throughout the research period and the pursuit of references to earlier relevant material.

3. econometric analysis of the evolution of market volume in two markets, with comparative data from a third, an influential neighbour, over a 23 year period to end-1993, using data supplied by the exchanges and national regulatory authorities.

Sections 1.3 and 1.4 below explain the choice of markets for study and the projects and methodologies involved. The econometric results are presented and analysed in chapter 6. Research results for the interviews and associated work are presented and discussed in chapters 7-10 for individual markets.

Part III: Towards a modern national securities market

Evidence of contemporary market phenomena and the research results are analysed together in a single chapter with a view to defining the market organisation and behaviour that a small modern securities market should be capable of supporting. Derivative markets are an important part of modern market development, but are dealt with in a summary manner, in terms of facilities that need to be provided, rather than in terms of the phenomena that occur within them.

Section 1.2 Hypotheses

The hypotheses underpinning the research are that:

1. There are economic benefits to be identified as a consequence of establishing and promoting viable, valid securities markets in even the smallest independent sovereign states. They include financial and business infrastructure improvements and the creation of information externalities.

The main determinant of viability is the maintenance of self-supporting levels of turnover. Validity is measured by net benefit generated. A third component, development potential, can also be

defined: this is the gap between actual and potential net benefit available from expansion. The three terms used are further discussed and receive closer definitions in Chapter 2, Section 2.2.

2. The structure of many existing securities markets has evolved to channel trading gains and market share to controlling groups, notably banking and credit institutions, rather than allowing it to be spread evenly among a number of market participants. This is held to operate to the detriment of the economy in general and the viability and validity of the securities markets in particular. As such it constitutes a public policy opportunity to improve the general welfare by identifying ways to encourage or require reforms to improve income distribution as well as the transparency, efficiency and stability of national securities markets.
3. Improvements in securities markets may be achieved through the removal of barriers to the entry of new, small, market dependent participants, reduction in scope for corrupt or restrictive practices, increased availability of trade information and reduced transactions costs. A balanced fauna of market participants can be specified, offering a model capable of ensuring the supply of financial resources, technical expertise and qualified, experienced entrepreneurial individuals.
4. Effective stock market reforms generate only short-term increases in turnover volume. They do not necessarily create durable, improved volume and structure. One-time reform is useful for its own sake to generate increased public awareness as well as

increasing the income and funding for future market development. Continued or repeated reform is required to increase the probability of an improvement in structure and breadth of participation. A continuous response is nowadays also required to competitive pressure from other centres which diverts turnover and threatens the viability of even a strictly national market.

5. There exists a spatial perception of national or regional identity among issuers, investors and traders in equity (but not, in general, of debt) that justifies the encouragement of national markets through the possibility of mobilising savings and allocating capital not otherwise readily available to firms from small savers, private investors and institutions influenced by national or regional considerations. Issuers may also prefer domestic investors and a listing on a familiar market.
6. Market processes may be operated by specified institutions, but are better not embodied in or monopolised by them. Institutions whose governance may fall into the hands of a restricted group of market participants will tend to act in the interest of that group. Open processes, available to all qualified to gain access to them, are to be preferred to closed institutions to whom all rights of service provision have been vouchsafed. This includes the provision of entire securities market sectors or tiers as well as support services such as settlement and custody.

Section 1.3 The choice of markets for empirical study

The present research arose out of work on economic institutions in smaller European countries and was further motivated after 1989 by the prospect of new economic entities emerging from the control of the former Soviet Union. Two classes of small national securities market were therefore selected for study, namely existing markets attempting to survive competitive and other pressures and newly established centres faced with a choice among existing models. The two groups are linked by this consideration, the basic research aim being to reveal and evaluate features of existing markets in order to inform the design and development of new ones. Enquiries to all known European stock exchanges revealed that most were in process of internal reform, rendering any conclusions from a large scale survey dubious. The choice was therefore made to study a small number of carefully selected markets in depth, supplemented by a less intensive examination of others to expose salient features not present in the primary group. Three markets were settled upon for intensive study. Two represent directions of development for the transition economies while the third, Portugal, has already witnessed a radical economic transformation not unlike that of eastern Europe. The two established markets were selected as opposite poles within a conventionally preferred class of European markets based on bond rather than equity trading (von Rosen, 1990), a universal banking environment on the German model and no major international aspirations. The first, Copenhagen, was of interest for its vigorous espousal of reform and new technology. The second, Vienna, had failed to reform effectively, but remained viable at most times in spite of being the preserve of a traditional banking clique. Both markets trade large volumes of securities and appeared to be efficient in terms of price discovery and information flow. Copenhagen is, furthermore, an open market with

comprehensive reporting requirements while Vienna is a remainder market, most trading being done directly between banks. Both border the large German economy and its regionalised stock market structure. The remaining markets were chosen for specific parameters of interest. Brussels was trying to remain an international market and a major instrument of deficit finance for the Belgian government at the same time. Its broker numbers were plummeting under the influence of government-induced reform, a process of forensic interest whose outcome was uncertain. Amsterdam was an equity-based market with international aspirations, wilting under competitive pressure from London. Reform was under way and of interest to follow to its conclusion in order to measure success. Budapest was the only emerging market with sufficient infrastructure to study in any depth, while Prague (and, at the time, Bratislava) offered the opportunity to observe the same process at an earlier stage, driven by a different process, namely mass privatisation. Finally the German regionals were of interest for the likelihood of their surviving as small exchanges without status as national institutions. It was, finally, necessary to test the validity of the models chosen for intensive study for their efficient functioning as markets. The means selected was an econometric examination of the structure and evolution of trading volume over a long period of time, before, during and after reform. Lisbon data proved too volatile to model. The proximity of the large German market to the others required that this potential influence be controlled for. The German market was therefore included in the econometric study in spite of not being closely examined in other respects. Finally, having selected markets, three factors combined to indicate a structured interview approach in conduct of the institutional side of the study. First, in every centre, it was hard to establish the exact position of individual broking firms in the

banking-broking nexus, in particular whether they were dependent upon the market or independent of it in their behaviours, without close personal contact. Second, market-dependent brokers were all happy to talk or to provide readily available information: none were interested in completing questionnaires and many were unreliable in correspondence. Bank executives were more forthcoming, but this asymmetry itself introduced bias. Third, the enormous variety of market structures, instruments, trading specialisms and practices to be covered would have resulted in a complicated and forbidding postal questionnaire, inviting rejection. As a result, a simpler questionnaire was devised and administered orally at interview, using the interview process both to mediate complexities and generate a systematic set of responses, aided by copious open and numerically encoded notes for later analysis of respondents' viewpoints and observations. Confidentiality was an important element of the discussion: emphasis on it appeared to yield useful confidences. Small numbers of participants in some markets made identification of individuals too easy however. For both reasons, synthesis of views was preferred to extensive citation as the means of communicating results. Moderate difficulty was experienced in obtaining interviews as required. No Dutch bank and no small Belgian broker was willing to be interviewed. Other limitations encountered were an actual lack of active small brokers in Vienna, the dubious ownership status of several broking firms in Lisbon and Budapest and the logistics of fieldwork trips which often constrained appointments. The two German regional exchanges visited were chosen for logistic reasons. Hamburg may be considered representative and Bremen, the smallest German exchange, particularly vulnerable. London brokers and others, with the exception of the Austrian bond specialist discussed in Chapter 9, were selected on the basis of personal acquaintance or a search for factual

information and are considered incidental to the main investigation. The accompanying Table 1. summarises the membership of the main exchanges visited, together with response rates to interview requests and correspondence. Interviewees are characterised as market-dependent (MD), market-independent (MI) or market authorities (MA). A tabular summary of the interview responses is to be found in the Introduction to Part (II), preceding discussion of individual markets. Interviews were conducted in German, French and English, as required.

Table 1.

LEVEL CENTRE	EXCHANGE MEMBERSHIP		APPROACHED /ACCEPTED			TOTALS	
	TOTALS BY CATEGORY		FOR FORMAL INTRERVIEW			FIRST VISIT (1992)	CORRESPONDENCE AND SUBSEQUENT VISITS (1994-95)
	MI	MD	MI	MD	MA		
2 AMSTERDAM	44	68	6/0	1/1	1/1	(1)	(2)
2 BREMEN				1/1		(1)	
2 BRUSSELS	12	52	6/3/	8/0	1/2	(5)	
2 BUDAPEST	28	12	3/1	6/4	1/1	(2)	(4)
1 COPENHAGEN	21	10	8/5	5/4	1/1	(9)	(1)
2 HAMBURG					1/1	(1)	
1 LISBON	14	3	10/2	2/2	1/1	(8)	
2 LONDON						(8)	
1 VIENNA	79	6	8/6	6/1	1/1	(8)	
TOTALS				43		7	

Level 1 markets

The above factors, then, led to the choice of two markets, Denmark (the Copenhagen Stock Exchange) and Austria (the Vienna Bourse) for intensive study, coupled with econometric analysis of their trading volume. These two markets may be characterised as mature, with stated ambitions to remain regionally significant, and either recently reformed or undergoing reform. Copenhagen has a long-standing reputation as a financial centre of excellence, while Vienna has an acknowledged poor reputation which it is attempting at present to redress. Visits were paid to each centre and interviews carried out, supported by correspondence and the collection of published and

unpublished material. After the interviews informal discussion was conducted, and results noted, according to interests and specialisms of respondents. The third market chosen for intensive study, Portugal, is influenced by Spain, but not in the sense of being dominated by a large regional economic power. The Portuguese market has been strongly marked by recent political and economic history and may be considered to have passed through many of the development phases now being undergone by the newly liberalised countries of central and eastern Europe. It is therefore a suitable place to examine the problems and opportunities that securities markets in many of these countries may face: re-establishment; capital flight and shortage; inflation and low national income and productivity; privatisation; competitive pressure from abroad; bank influence; reform of trading principles and systems, and so on. The list of points of comparison with the former eastern Europe is considerable (Webb, 1995).

Level two markets

The principal objective of the second level studies was to obtain a sound basis for comparison with the exchanges studied in greater detail and to assess the effect of increasing competitive and reform pressure on the broking community. Fewer interviews were conducted but the standard questionnaire was used wherever possible. Amsterdam, Bremen, Brussels, Budapest, Hamburg and London were examined at level two. Amsterdam and Budapest were visited twice and three times respectively. In the German regional exchanges the continued existence of the market was the main topic of discussion. London was 'present' continuously through informal professional contacts and enquiries, published material and time spent gaining experience on the dealing desk of a specialist bond broker with Austrian connections. The structure of the London market as such is not considered explicitly however. The new markets of liberalised central and eastern Europe are

still at a formative stage and were included for study to the extent that their experience is long and varied enough to reveal a structural and dynamic response to events. Only the Budapest Stock Exchange, the longest established of the group, was studied in detail.

Level three markets

The markets identified in this section were studied at a low level of resolution, mainly on the basis of published material. They are Bratislava, Prague and Warsaw. Only Prague and Bratislava were visited and discussions held with actual and potential market participants. There is reason to believe that events in securities trading as well as major changes in privatisation and economic liberalisation policy may overtake these markets in their present form and deflect their direction of development. Warsaw is included to the extent of its price statistics over the first three years of its existence. In all the markets studied the principal influences at work seem to be a move from 'institution' to 'process' as the main determinant of the form of market mechanism adopted; the parallel development of derivatives markets and the increasing flow of liquidity from foreign institutional investors.

Section 1.4 Methodology

Four distinct methodologies have been employed in the study, apart from reviewing and analysing the relevant academic literature:

1. Visits were made to selected markets to conduct structured, questionnaire-based interviews with market participants and carry out formal and informal interviews with the market authorities, supplemented by correspondence and analysis of published material supplied by exchange authorities, broking firms and banks. Markets were categorised into three levels of intensity of examination as already described.

2. Econometric analysis of trading volume statistics over an extended period for selected exchanges was carried out.
3. Existing theoretical models were extended and new ones developed to examine (a) the determinants of securities market trading volume and (b) the behaviour of market participants and institutions.
4. Analysis of contemporary business press and periodical literature reporting the ongoing process of development and reform in all the markets studied, plus others where relevant to the argument, was carried out.

These methodological approaches are described in more detail in the following subsections.

1.4.1 Awareness of current developments and the economic background

The study was conducted during a period of turbulence and structural change in the world economy that continues to affect nearly every business sector in all of the countries examined. In addition financial market institutions, trading methods and instruments have themselves have been undergoing a long-running, fundamental worldwide transformation which pre-dates the current cycle of economic instability. This rendered current awareness and intelligence about developments a matter of prime importance. Continuous awareness of contemporary developments in the markets selected for study has been maintained by daily monitoring of two newspapers (The Financial Times and Die Welt), by frequent scanning of other European press in German and French and by collecting short series of local newspapers and other publications during fieldwork in specific countries. All these sources were used to extend an existing press cuttings library dating from 1986. Bank reviews and specialist economic publications, from Switzerland, Austria, Hungary, the Czech Republic and Poland, supplied material in areas poorly served by press coverage.

The economic background for a large number of countries was furnished from the same sources in the form of a cuttings library, partly collected for other purposes, and a database of longer-run economic statistics on European countries maintained current in files suitable for processing by econometrics software as described below.

1.4.2 National securities markets

Basic information about market organisation was requested from every known European stock exchange. All exchanges responded and most furnished information in English, French or German. The high (100%) response rate was itself significant, reflecting concern for the propagation of information and an interest in promoting the exchange. Most material featured a mix of market and exchange statistics, descriptions of trading and regulatory practices, promotional material aimed at investors and the annual reports of the exchange authorities themselves. A high proportion of exchanges referred to recent reforms.

1.4.3. Broking firms

Certain visits yielded important information about the history and current organisation of broking firms, their strategy in the markets in which they operated and activities which were significant for securities broking in other national or regional markets. These contacts were expanded by further correspondence and, in some cases, further visits. Although the research was concentrated on smaller, new or transforming markets, much was to be learned from certain activities in larger, conventionally more liquid and efficient centres, in four areas:

1. Specialist dealing and services relating to private investors, provincial broking, small and/or illiquid lines of stock, local fundamentals research, stock location, private placement and preparation for introduction.
2. International dealing capable of being carried on from any centre.

3. Operations in small national markets for clients in large centres.
4. The determinants of trading volume on a daily basis.

Relevant expertise was found in larger centres, notably London, with evidence of its transfer to brokers in the national markets studied. Interviews, informal contacts and working arrangements were therefore set up with specialist brokers and dealers for the purpose of identifying techniques, practices, organisational and trading arrangements that are relevant and transferable to smaller national markets. In particular, three working days were spent on a bond broking dealing desk in London to observe detailed trading activity.

1.4.4. Public information from and about financial markets

In connection with the hypotheses concerning information generated from and about financial markets, efforts were made to collect material and solicit the views of respondents about the growth of 'financial' coverage in the news media and periodicals. Language limitations often proved a barrier but it was possible to obtain useful insights into depth of cover by puzzling out headlines, noting the length and content of articles and the volume of listings and tables. Respondents were able to give a view about the strength of recent public information developments and the standing of various titles among professionals. Their responses were analysed to test the hypotheses (a) that information generated by financial markets can act as surrogate for otherwise nonexistent or inaccessible economic and business information and (b) that data and analysis generated by journalistic, academic and other enterprise for consumption by private and institutional investors, creates positive spillovers in the form of information that improves general economic efficiency.

1.4.5. Market structure models

A model to support the hypothesis concerning the population dynamics of the securities broking community was written in QUICKBASIC and

tested against a variety of assumptions about the size, cost structure, operating efficiency and profitability of a hypothetical securities brokerage 'industry'. A model was also written to simulate a traditional two-period equilibrium model (Huffman [1992]) continuously through time to expose the implications of changing risk preferences of investors through their lifetime and the volume of securities trading likely to be generated. A sub-model was written for the gearing level choices of firms, with the same objective.

1.4.6. Data sources and analysis of bond volume and share turnover

The econometric work for this study was carried out using PC- GIVE version 8.0 (Doornik and Hendry [1994]). The sources for ancillary statistical material were highly disparate and are credited where appropriate below. The length of the series required (23 years at monthly intervals) and the need to use a wide variety of sources, demanded a great deal of comparison, verification, splicing and other preliminary treatment. Data had finally to be in appropriate form for presentation to PC-GIVE in the form of fixed and equal-length series.

Statistics for the Lisbon and Oporto Exchanges are drawn from the Annual Report of the Bolsa de Valores de Lisboa 1991, from various issues of the monthly Digest of the Research Department of the Lisbon Exchange, from December 1992 issues of the daily Boletim de Cotacoes and from circulars and statistical summaries furnished by brokers visited, who, for reasons given elsewhere, are not identified. Further detailed information on monthly prices and trading volumes from 1985-1994 were supplied direct. The kind assistance of Mr. Jose Bessa Mendes in providing this information is gratefully acknowledged.

Statistics for Copenhagen were supplied by the Copenhagen Stock Exchange. For early years the Exchange had to perform research of its own into file records. This research was commissioned by the present

author to ensure series of adequate length. Acknowledgement is made for the material for later years, supplied gratis, but not without effort, by the Information Department.

Statistics for Vienna were supplied in part by the Vienna Exchange but in the main from the published monthly statistics of the Austrian Control Bank. Statistics for Warsaw were provided by the Polish National Bank (Naradovy Bank Polsky) and, for Germany, from the Deutsche Bundesbank monthly bulletins. For Sweden figures were supplied by the Stockholm Stock Exchange. Use was also made of the monthly equity volume series for major countries, published from 1988 onwards by the 'Financial Times', based on figures supplied by NatWest Securities.

1.5 Summary

This chapter has outlined the overall structure and layout of the thesis and its objective of explaining the factors that underpin the enduring concept of national securities markets, readily formed and re-formed and equally robust to neglect and quiescence as to radical political and economic change and competitive pressure. The reasoning behind the selection of markets and the choices involved in deciding the scope of the empirical study, the resources used and the methodologies applied has been exposed. The main hypotheses motivating the investigation have been outlined and are further explained and refined in Chapter 2, following introductory material on conditions in world financial markets.

CHAPTER 2: THE RATIONALE FOR SMALL NATIONAL SECURITIES MARKETS

INTRODUCTION

This chapter first provides, in Section 2.1, a brief summary of larger-scale historical, economic and contemporary financial background to current developments in securities markets worldwide, identifying factors taken into consideration in the rest of the study and stating certain assumptions and limitations on the areas examined.

In Section 2.2 definitions are supplied for the criteria of viability, validity and development potential already referred to in Chapter 1. Detailed definitions of criteria are necessary to give direction to the empirical work. In contrast to these criteria, in Section 2.3, a review is presented of classical 'developing country' arguments for securities markets.

Section 2.1: Recent developments in world capital markets

Dynamic development has always been the exception rather than the rule in capital markets. Large-scale technological, economic and political transformations have provided the driving force for episodes of growth and transformation, often followed by collapse, reform, consolidation and long periods of quiescence. The financing of the Dutch and English trading companies during the 17th century, the worldwide railway booms of the mid 19th century and colonial expansion around the millennium are all examples of such episodes. Many of today's stock markets were shaped by them. Periods of expansion were often ended by financial market collapses and interspersed with more ephemeral investment surges having more the character of 'bubbles', using the modern definition of the term (for a full discussion see Dwyer and Hafer [1988]). The Wall Street Crash of 1929 tempered public enthusiasm for stock markets for decades and arguably continues to colour opinion, reinforced by the collapse of bubbles such as that of October 1987. Economic reconstruction after the Second World War was financed with

the help of international co-operative arrangements under the umbrella of fixed exchange rates from 1944 and without major stock market developments. By the 1950s and 1960s, capital markets lived a sheltered life somewhat apart from the mainstream of economic life. In many countries markets were not well regarded by governments wedded to doctrines well to the left of those regarded as conventional today. Across eastern Europe, financial markets all but disappeared. Today, world capital markets are well into a new development phase, one which is unique in that it does not owe its origins to economic expansion but to structural change in the world economic and political order; to the deregulation of financial flows; to the growth of information and communications technology; to new financial instruments and intermediaries; to competition between investing institutions and to rivalries between and within financial markets. It is thus important to enumerate briefly the factors behind these transformations and to assess the present position with regard to what may profitably be studied and what awaits further development and research.

2.1.1. Political and economic philosophy

Socialist ideas and Keynesian principles of economic management were widely perceived to have failed by the 1970s and were replaced by more 'liberal' economic views that gave a larger rôle to markets and competition. During the 1980s and early 1990s, the main effects of this change of view have been privatisation of state assets, respectability and a higher public profile for financial markets, trade liberalisation and the removal of many barriers to international capital flows. The failure of communism and rapid advance to economic normality of the former Soviet bloc's more market-oriented satellites, coupled with the forced renunciation of 'third way' socialised economic models by Sweden and others, have reinforced the new model during a prolonged severe downturn in world output and trade.

2.1.2: Oil prices, inflation, currency and interest rate developments

The tripling of oil prices by the OPEC cartel in October 1973, and a further turn to the same screw in 1979, gave rise to international financial co-operation to deal with the very large financial flows that followed the redistribution of oil-related income. Private banks increased their lending to sovereign states and the Eurocurrency markets expanded. Price inflation caused the final breakup of the established world monetary order into general floating and a period of highly volatile interest rates, followed by general stagnation. One consequence was, however, a recognition that markets were capable of absorbing shocks, and indeed were the only mechanism to do so: shown by the continuous cycle of agreement, collapse and renegotiation of most institutional initiatives to maintain world economic stability.

2.1.3: Technology and the management of complexity

The period of turbulence and stagnation that characterised the 1970s was replaced by renewed economic growth in the 1980s. There was however by now available a range of financial market instruments designed to accommodate large and complex capital flows, to manage risk and to tailor borrowing and lending propositions very accurately to the needs of issuers and investors. The advent of cheap and massive computing power able to calculate the value, risk and return to a limitless number of alternative investment positions added precision to planning and execution. New communications and information management techniques began to allow information to be communicated to all interested parties more or less instantly worldwide basis. The increasing freedom of capital to travel has thus been complemented by a comprehensive guide to the most rewarding destinations.

2.1.4: Present position

It may be that the transformation described above is now substantially complete. Apart from further developments in technology, both

financial and physical, world financial markets may now continuously converge and seek (without necessarily reaching) positions of competitive equilibrium based on trading out the increasingly well-known and accessible opportunities to earn higher than average yields in a given risk category in any market. Opportunities for excess returns must therefore be considered to be diminishing as improved information flows and increasing professional investment activity spread worldwide. On the other hand, this trend may be expected to increase competitive pressure to seek out areas where the prospects of above-average gain have not yet been exhausted. Evidence will be presented that this is the case. All the above has largely been considered from the viewpoint of securities prices and yields. Many studies have been able to point to stable patterns of returns across a wide range of countries, unaffected by the way local markets are organised, although returns have usually been measured in terms of local index movements rather than total yield including dividend receipts. The general assumption is made that globally operating forces inevitably produce convergence. This 'end of history' view is contradicted by a great deal of other evidence however and the rôle of transactions volume has been neglected. In established national markets there is also countervailing ambition for, and protection of, national institutions and practices through improving the ability to absorb competitive pressure, or by insulating them from outside interest, for example by tolerating corruption by insiders. In newly formed markets there is evidence of preferred local trading practice emerging despite conflicting foreign advice and pressure. This is understandable. Tradition has always been the main force underpinning confidence in established markets. With national commercial culture it creates a link between market operators and investors: groups who are everywhere famously unaware of the details of each others' business.

It is equally likely, and is retained as a hypothesis of this study, that the existence of perceptual national horizons in the minds of many issuers and investors, and to a lesser extent in those of traders and larger financial institutions, will continue to maintain an important rôle for smaller national securities markets. The difficulty of disseminating and achieving effective understanding of information about complex local situations is likewise a factor tending to promote the continuance of national markets. Two major risks characterise the present position and are the subject of general speculation, namely:

- (a) that the world financial system, including exchange parities, may become unstable because of the size of financial flows and their concealment by the use of derivative instruments. The capacity of the banking system to increase or cut off the supply of credit is well beyond the capacity of national governments and international institutions to control in the short run, and,
- (b) that the growing use of derivative instruments per se traded in options and futures markets, as well as those created by financial institutions for large customers, may lead to the collapse of individual institutions whose balance sheets no longer disclose the true position, particularly as regards interlocking contingent liabilities.

These risks will not be considered further in any specific way, but since some of the effects of major instability have already been observed in national financial markets (for example the reimposition of capital controls by the Spanish government during the September 1992 currency crisis and the effect of this on international bond

trading), the uninterrupted further deregulation of national markets and the permanence of assured freedom of movement of capital cannot be regarded as assured in any borrowing or investment decision and hence in the development of any financial market.

A further source of apparent instability has been the varying speed with which different countries have deregulated, removing interest rate and credit ceilings and freeing current and capital capital flows from exchange control restrictions. Some uneven features remain. German banks continue to succeed in restricting competition between themselves in a large and successful economy which has nevertheless only recently (1994) permitted a commercial money market to function with some freedom. Spain, Portugal and Greece have made progress but continue to maintain strictly regulated financial markets.

That the freeing up of financial markets increases welfare remains largely a presumption, against which may be set disadvantages such as overuse of credit for consumption and short term commercial investment, with a resultant building up of private debt to the detriment of savings and longer-term investment. Other drawbacks are the possibility of asset price inflation such as Britain suffered after 1988; insensitivity of national economies to previously adequate 'doses' of monetary policy; and increased financial fragility in the form of default risk as debt service ratios increase. As monetary conditions ease under the pressure of credit creation, whether or not the authorities at any given time wish them to, company gearing levels and the general capability of the corporate sector to leverage its operations on the basis of rising market capitalisation, increases risk. That risk is further increased if finance ministries and central banks then respond to the perceived diminution of their policy

authority by enforcing larger interest rate increases than would otherwise be the case. On the other hand breaks in financial markets worldwide seem to have proved less damaging to national economies than was formerly the case in a supposedly more closely regulated environment. In the contentious area of derivative and other secondary market instruments it has often been held that well-designed derivatives and the securitisation of the assets of financial intermediaries such as leasing companies reduce the cost of monitoring financial markets and relieve the need for credit rationing.

It has been pointed out by Blundell-Wignall [1991] that if financial liberalisation increases liquidity then permanent rather than transitory income would increasingly determine consumption expenditure; money supply (on increasingly broad measures) would decouple from economic activity levels; financial prices, based on expectations, would become a better lead indicator of inflation and real activity, and the influence of monetary policy on financial prices would become more diffuse.

Evidence for the improvement of indicators based on financial prices comes from the yield curve, reflecting the underlying term structure of interest rates. Blundell-Wignall shows that for all relevant countries except Japan the power of the yield curve to explain nominal GDP and inflation movements improves markedly in the 1980s compared with the previous decade. Another effect of market freedom is seen in the increased responsiveness of changes in long rates to changes in short rates and foreign long rates: in other words borrowers and lenders have greater freedom than formerly to neutralise or trade out disparities along the yield curve as soon as they appear (typically as a result of central government operations on short rates). On the

other hand there is evidence of greater financial fragility in the form of rising rates of company failure and debt default due to an increase in risk-taking induced by competition in both financial and non-financial market sectors. Some part of increased risk-taking may however be held to be due to the form of corporate bankruptcy legislation in many countries where, under limited liability provisions, promoters cannot be held liable for the full extent of their losses. This, if we are not careful, leads on to a debate about information asymmetries between borrowers and lenders. Suffice it to note here that there remain profound differences in the level of information sharing between continental European, especially German, universal banks and their clients, and the more strictly segregated commercial credit banking tradition of the US and the United Kingdom.

In common with the empirical results of this study based on an analogous treatment of trading volumes, Blundell-Wignall also finds increased volatility in bond yields and stock returns. Correlations between markets are found only rarely however, usually in connection with large disturbances having an international effect. Correlations increase between the 1970s and the 1980s (see for example Dwyer and Hafer [1988]). The present study finds similarly few inter-country correlations with some evidence of increase between the two decades, but does not examine international disturbances specifically.

Section 2.2: Criteria to be applied to national securities markets

For reasons given earlier the evolution of security prices alone is likely to yield mixed evidence about the health of a given market. A less well studied area has been transactions volume. This has multiple implications for:

- (a) conventional market microstructure analysis as regards immediacy, liquidity and other measures of performance and,
- (b) the basic structural form, stability and prospects of financial markets considered as branches of commerce dependent upon stable or steadily growing income flows for their survival.

As well as being less well studied, transactions volume is less publicised in the markets themselves. No market can function without price. Its discovery and propagation is the stuff of much market analysis. Volume, whether considered as order flow, as completed transactions or even as inventory is equally important but subject to much greater variation in treatment, with a different motivation for doing so, at every level in every market.

It is the basic thesis of this study that the mode of generation and the handling of transaction volumes is a fundamental determinant of the medium term form and function of smaller national securities markets and hence of their prospects. In the short run however the causality runs the other way, with volumes dependent on market form and functioning. In financial markets there is no long term (for a more closely defined statement, and exceptions such as long market memory, see Introduction to Part II. preceding Chapter 6. The usefulness of markets to their national economy is connected to their ability to mobilise savings, allocate capital and improve economic

efficiency through the transparency generated by an expanded information supply. Over the long run however they may flourish, languish or even die for a wide variety of reasons unconnected with their economic attributes. This phenomenon demands explanation.

The sheer variety and capacity for rapid transformation of securities markets also begs questions about their basic nature and the criteria to be applied to any study of their individual features. Securities markets also behave collectively and need to be studied as much in the way of a private industry as a public institution, even in smaller countries. They cannot be shown to be a necessary feature of the political, economic or social landscape because they possess economic justification or because are endowed with any particular constitution or regulatory rôle. Counter examples, including the absence of securities markets, can always be cited. Real world markets can only be shown to be viable or otherwise and evidence marshalled for factors that would improve their viability (or otherwise).

Justification can often be found, on the other hand, for allocating resources to create or maintain a market that would not otherwise be viable, by virtue of the positive externalities created by its operation. Such a market is defined here as a valid market. The ideal market is one which is both valid and viable and, as will be seen below, has also maximised its potential.

This study endeavours as a result to identify necessary and sufficient conditions for the creation and continued existence of smaller European markets and to explain their past, present and future in terms of their viability, validity and potential. These terms therefore receive more specific definitions below.

2.2.1: The viability of a national market

A stock market is viable if it can create and maintain securities trading at levels of volume sufficient to support its own continuance out of revenues resulting from participants' activities, at market prices. This is the only necessary and sufficient condition for a market to be viable and there is historical evidence that little more is required to bring a national public market into existence and sustain it over long periods of time. A viable market need not be a valid market: as evidenced by the frequent blossoming of speculative markets driven by an excess of savings or a gambling culture, possessing no legitimate supply side or regular fauna of participants.

Viability is further addressed in this study under the following headings:

1. Turnover volume

Confidence in a market on the part of issuers, investors, intermediaries and the public is a necessary condition for sustaining turnover in the longer run. Confidence is a product of perceived market quality, a factor itself dependent at least in part on turnover volume. Vicious and virtuous circles in the growth and the development of individual markets should therefore to be expected. The quantitative material in the study bears heavily on this point. Viability is assessed as a function of the behaviour and determinants of turnover volume. Turnover is also a widely accepted proxy for liquidity, a measure of reaction to information and the basic income provider for many market participants. It is accordingly a key long term indicator of viability. For a discussion of the relation between turnover volume and value and the precise definitions adopted for the bond and equity markets in the empirical research, see Section 6.2.1.

2. The securities industry

Where financial market operations are sufficiently extensive, their activities may be analysed in terms of structure and performance using criteria employed in other service industries and the microeconomics of competitive behaviour. The analysis of imperfect competitive equilibrium furnished by Chamberlin is reviewed later, as is work on US markets by a number of authors. In smaller markets characterised by stagnation interspersed with sporadic bursts of activity, the ability of 'survivors' to dominate trading, regulatory and information systems requires a socio-political, cultural or historical explanation. This is furnished by way of hypothesis and evidence for two models for such markets: the 'calving' model of securities firms and the 'starving population' paradox found in moribund markets.

3. Corporate Finance

Private firms need to be able to adjust the ratio between equity and loan capital employed in response to changes in the risk/return relationship they face in their operations through the business cycle. Use by listed companies to achieve a desired debt/equity ratio is posited as a main indicator for the viability of national stock markets and addressed as such in the research. A model is developed of the evolution of the basic debt/equity relationship in a typical firm through time and its relation to trading volume.

4. Economic convergence and divergence

Recent history has shown that convergence of activity levels, interest rates, currencies and national budget frameworks in Europe is not inevitable, adding significance to the separate evolution of

individual national markets. Much of the information supplied by respondents and garnered from current literature in the course of research predates the monetary and political turbulence of late 1992 onwards. Later developments may have changed the views of some respondents, but most in any case reflect the general view of market traders that turbulence and divergence creates business and adds to the viability of individual national markets.

5. Regulatory conflict and convergence

Internationally competing exchanges are motivated to lighten their own regulatory requirements in order to attract turnover from each other. Smaller national exchanges are often obliged to compensate for the ease with which their narrower markets can be manipulated by applying stricter regulation. In national markets with internationally traded segments, conflicts will be observed which require resolution.

Regulatory conflict is to be distinguished from regulatory competition between centres vying for turnover, on which there is an established literature.

The minimum standards perceived as required by smaller national markets to maintain confidence in their quality increasingly converge with those deemed appropriate for international markets. This applies whether or not a given market is internationally significant or whether the standards are relevant to it. International standards for the conduct of financial markets are autonomously developing more rigorous and explicit forms as the range of instruments and trading methods, as well as the risk of general instability and opportunity for fraud, increases. To the extent that these standards and trading features have come to determine confidence in national markets they

have to be applied in order to maintain turnover volume, whether or not they are appropriate. This trend appears in the research results, particularly with regard to insider trading regulations.

Pressure for national markets to conform to international practice is transmitted by the operations of multinational financial institutions and consultancies, by cultural changes in market-linked organisations and by the influence on market participants and public alike of greatly increased information, analysis and published and broadcast opinion about world financial markets. In larger markets it sometimes asserted that cross-listing can cause pressure for convergence. There is no evidence from the present research that this is a factor in the small national markets studied. The strength of the transmission mechanism in individual countries amplifies or attenuates the regulatory convergence processes described above. Regulatory conflict and unnecessary convergence may be held to reduce the viability of national markets.

2.2.2: Validity of national securities markets

The separate necessary and sufficient conditions for a national stock market to exist are few in number and there are no individual conditions that are both necessary and sufficient for their creation.

Necessary conditions are:

- (1) the existence of adequate numbers of issuers, investors and market entrepreneurs for the incentive to exist for them to come together,
- (2) a sufficiently well-developed commercial infrastructure and legal or quasi-legal arrangements that allow bargains to be concluded, securities to be delivered, title established and settlement effected, and

(3) toleration of financial market operations by the public authorities.

Nations can do without stock markets and markets can continue to exist in a moribund condition, serving little obvious economic purpose, for long periods of time. Existing markets can be brutally disrupted or extinguished, as happened recently in Nigeria. There are thus no circumstances that render the existence of a national (or indeed any) securities market necessary for economic survival. It can only be argued that there are costs associated with not possessing a market and a range of potential benefits that accrue to owning a national securities market with one or another set of operational attributes. Even a moribund market, for example, preserves valuable institutions that enjoy the confidence of participants. They can be revivified more easily than new ones can be created to service the requirements of economic or fiscal expansion. A market which reliably delivers qualitatively or quantitatively measurable benefits to the economy in which it is located, is termed here a valid market. Some further aspects of validity are discussed below.

1. Justification.

Into this area falls the question of what disadvantages accrue to the non-possession of public national stock markets, what unavoidable arguments exist for their establishment or continuance and what minimal essential operational characteristics are necessary for a valid market to exist.

Securities markets mobilise savings, improve the efficiency of real resource allocation and ensure that interest rates and returns are

market-determined. The analysis of van Agtmael [1984] along these lines is reviewed below. The mobilisation of capital for private enterprise, public bodies and fiscal deficits supplies a primary justification for national public stock markets but is neither necessary nor sufficient for their existence or absence in practice. In many countries private subscribers and domestic financial institutions, or the use of international capital markets and lending institutions, continue to be the mainstay of corporate and public finance even in the presence of securities markets. Markets do not guarantee an undistorted structure of interest rates and returns, especially to small savers. 'Justification' is therefore a complex issue involving the *ex ante* measurement of public and private benefit. The term is to be treated with caution. Only a market which, *ex post*, can be shown to deliver benefits above and beyond the resource cost of maintaining it may be held to be valid and offer the further possibility of viability in its own right.

2. 'Necessary lies'

Attitudes to stock markets are everywhere contradictory. Confidence and trust are regarded as basic, but abuse is common. Insider trading is increasingly prohibited but privileged information is widely used to obtain excess returns. Markets are alleged to be information-efficient and reflect underlying economic reality but everywhere behave otherwise for quite long periods. These are weaknesses that can be tolerated within a family, but not by outsiders. That argues for the necessity of markets that are, for a majority of participants, in some sense, their own and dependent on the strength of their loyalty rather than logic. National or regional markets may thus be valid and indeed better equipped than international entities to serve their

local economy in a world where no-one meets, or agrees to rely on, formal international standards of organisation and conduct. More trading may be done with national markets than without them.

3. The spatial 'horizon' of market participants

Issuers large and small, private investors, small savers, professional fund managers, brokers, banks, regulators and politicians all possess different attitudes to securities trading on national as opposed to foreign or international markets. The smaller the country, the more likely are these groups to coalesce and be represented by individuals with overlapping interests. For instance, in Austria at the time of the research fieldwork, the Mayor of Vienna and prominent national politician, Helmut Zilk, was the head of a major bank. The country's main broadsheet newspaper, 'Die Presse' is owned by the Chambers of Commerce. Presidents of regional and national Chambers are often elected members of Parliament, even ministers. Smaller enterprises in particular are less visible. Their position is affected by differential fiscal measures and financing practices which, added to small size and, often, poor liquidity, increase the difficulty of scrutiny and fundamental analysis by investors abroad. Mapping securities markets into their natural, spatial constituency may be held to increase their validity for all their actual and potential participants, including those based elsewhere.

4. Public policy attitudes

It is useful to categorise the public policy stance towards markets. Attitudes include forbidding, directing, regulating, manipulating, inhibiting, condoning, reforming, liberalising and promoting the operation of stock markets. Condonement is the only necessary condition for a market to exist. All policies except condoning involve legislative and administrative effort as well as at least implied redirection of economic resources, with consequent welfare effects at

the national and international level. A moment's thought devoted to the possible policy stances listed above is sufficient to show that each may have entirely different repercussions upon the viability of a market as opposed to its validity. For example, regulating a market may increase its validity as a safe resort for investors while destroying its viability by diverting a large proportion of trading turnover to more lightly regulated markets abroad.

2.2.3: The development potential of national markets

The ratio of the size and complexity of a national stock market to that of the national economy in which it is embedded is, on many measures, highly variable between countries. A great deal of this variation may be explained by the international activities of national financial markets and by the entrepreneurial culture of their participants. There remains however the question of what is the appropriate size for a national market in relation to the national economy, and what potential therefore remains to be exploited, particularly the potential for positive spillovers, in countries where the stock market is under-developed. This way of looking at development potential is to be distinguished from simple commercial growth and development. Development potential here refers to the gap between the present level of market scope and activity and any higher level that would deliver increased economic benefits, in the form of positive spillovers. A rough equilibrium can be specified where the costs of promoting a national securities market to levels of operation that are (a) higher than necessary to maintain validity and (b) greater than that reached by the naturally viable operation are equal to the extra positive externalities. The externality of most interest

to this study is information. The operation of markets can be shown to create information as a low-priced commodity, or as a free public good. It is of particular value to relatively underdeveloped but complex economies, dependent on a great deal of information. In all economies unlisted companies benefit from information about their listed peers. This general treatment of the information externality is to be distinguished from the information theoretic treatment of securities markets in general.

Section 2.3: Why are securities markets desirable or necessary ?

INTRODUCTION

The case for promoting securities markets in less developed countries (LDCs) has been set out by van Agtmael [1984] in the context of the lessons learned from third world political and economic mismanagement in the 1970s. Some of the main points of that analysis remain relevant in a different landscape, namely the creation of new markets in eastern and central Europe. The van Agtmael framework begs questions however when it is applied to the known deficiencies of some existing European markets large and small. Examples would be the failure of London's third market and doubt over the future of its second; the periodic reappearance of negative interest rates; corruption within apparently sophisticated markets such as Vienna and complete domination of a market by banks, as in Tel Aviv. A more general economic perspective on the functioning of securities markets has been supplied by Baumol [1965] whose analysis has been used as a starting point by many other authors. Although both authors develop a compelling case for national securities markets, the extent to which

the benefits they identify have not accrued, and the degree to which problems van Agtmael in particular associates with non-possession of securities markets have persisted, is striking even in mature economies.

2.3.1: The van Agtmael scenario

LDC development policies of the 1970s emphasised intervention by governments and the planned allocation of resources, rather than their allocation through stock markets. Van Agtmael identifies (below in bold) a number of benefits that can be conveyed by national stock markets in emergent economies as well as corresponding disadvantages and problems.

The financial system of a developing country is rendered more competitive and efficient through:

1. the availability of alternative, competing saving and borrowing instruments and institutions for investors and issuers alike.

Banks, for example, may or may not have a direct interest in client firms using the stock market rather than themselves to obtain capital. They have an indirect interest in reducing the risk implicit in clients' high capital gearing ratios, as well as in opportunities to invest at equity rates of return in companies about which they have more information than other outside investors. Interview responses collected as part of the present research leave little doubt that financial innovation is not vigorously pursued by credit institutions competing oligopolistically in a less than energetic manner.

Non-bank financial institutions are in a different position. Pension and insurance fund managers compete for levels of return that make them an attractive home for savers' funds over and above savings bank deposits. Investment banks require corporate clients for the flotations and other issues on which their fee and trading income is based.

2. opportunities for greater specialisation and financial innovation by intermediaries

Even simple broking creates opportunities for specialisation that are capable of reducing transactions costs, but only if a sufficiently numerous broking community exists to generate the necessary competitive pressure. Brokers may be divided into those offering execution only, those offering advice in addition to dealing services and those acting as discretionary brokers: in effect managing private portfolios for their owners. The first of these classes will emerge in a sufficiently competitive broking market where market share may be gained by offering reduced transaction costs. The third is likely to become a source of financial innovation in seeking to offer increased portfolio performance for clients (FINT [1993]/1). The advisory broker remains the norm in most markets and, in many countries, the opportunities have often been identified and exploited by foreign rather than domestic intermediaries.

3. creation of greater public awareness through promotional and marketing activities of participants

Evidence of this was found throughout the markets studied. Little of the increased awareness has fed into wider share ownership however. In the emerging economies short-lived share booms followed by stagnation have been the main result.

4. fewer opportunities for oligopolistic behaviour by banking institutions

This relatively mild statement conceals a minefield of difficulty in developed as well as developing countries. Van Agtmael is referring principally to checks on the behaviour of banks made possible by the existence of securities markets and the information they, the banks, both universal and credit institutions, depending on where in the world one examines the case, have to make public about interest rates and securities prices. In practice however the banks appear to be among the first to exploit securities markets to establish oligopoly and to bolster and protect their individual positions in the banking sector.

Savings can be more effectively mobilised because of:

5. opportunities to earn higher returns than offered by savings deposits

In bank-dominated markets this is not necessarily the case, either because the market is itself manipulated by the banks (Vienna) or because companies do not pay dividends at levels that reflect their earnings, thus biasing returns to capital gains, with timing and other factors adding to the risk of obtaining them.

6. a hedge against inflation in the form of investment in domestic wealth-creating equity rather than goods (property, gold, works of art) or overseas investment

The hedge in question is often colonised by poison ivy, since unanticipated inflation in liberalising economies is itself highly damaging. Poor prospects in the home economy also lead companies to undertake foreign rather than domestic real investment.

7. market rates are more likely to remain positive than administered rates

General economic efficiency is likely to benefit by:

8. increased propensity to save and invest rather than consume or export capital

9. reduced administrative corruption and better allocative efficiency of real resources by markets

10. the private sector is less likely to be crowded out by government funding requirements and better able to compete for resources

11. the facility of savers to liquidate their specific positions in the market encourages longer-term commitment in general

12. a balanced term structure of interest rates and better matching of funds flows into and out of investments with differing maturities

13. improved information flow about the behaviour of the real economy and warning of unfavourable developments, or the adverse

consequences of government policies, through the collective price response of markets

The above group of assertions would appear to be borne out in practice only by a roundabout route and over the longer term. The flow of information from markets offers, in general, puzzling and contradictory evidence about the behaviour of the real economy. It is the supply response to demand for analysis and interpretation that generates an improvement in information flows of use to decision makers. There needs to exist both a stock market and an infrastructure of comment and analysis for the relationship between market movements and the real economy to become apparent to untrained observers.

There is evidence that the research supporting investment decisions, and hence the price response of markets, is generated essentially at the country level and is dependent on local knowledge and networks of relationships based on confidence. Local brokers and financial institutions, including international organisations operating locally with indigenous or locally experienced staff, are the basis for the information flow. Almost 97% of respondents to the 1992 Euromoney European Brokers and Analysts Survey claimed to prefer to deal through local brokers and to commission or receive research from the same sources. Seventy four percent did in fact also deal through London, 38% through New York and 28% through Tokyo 28%, but local investment horizons, demand for locally sourced research material and a strong preference for dealing locally, at least in the equities sector, clearly exist. This reinforces the argument for ensuring the survival of national markets and counters the frequently made assertion that the eventual destiny of European securities trading lies in a single pan-European market.

The corporate sector in particular will improve its performance when it can:

- 14. adjust its debt/equity ratio at will, under growth conditions to leverage its activity levels using fixed interest capital, under more uncertain conditions to restrict outgoings to dividend streams under its own control**

This assertion is given form in the model of corporate financial structure developed in Chapter 4.

- 15. reduce dependence on the credit policies and term lending restrictions of banking institutions**

These restrictions are often replaced however by the short-term requirements of the market and such factors as the crucial timing of initial public offerings.

- 16. appeal direct to investors when high-risk or innovative projects are involved which would be declined by banks or excluded by the rationing rules for subsidised credit**

- 17. benefit from venture capital providers' intervention, once they in turn are able to liquidate their successful investments by flotation**

- 18. gain productive insights from financial information about firms, both externally (other firms) and internally (as a result of disclosure requirements)**

19. choose the level of separation of ownership and control and make any desired transition by share transactions

These last are important considerations, both for corporations with a widely based shareholder body and privately owned family firms. They may or may not be facilitated by the existence of a stock market however, and can be rendered more difficult. For example, the ability of pressure groups and outside interests to infiltrate companies at the level of the annual meeting as 'gadflies' owning a few shares is made possible by access to a public stock market (WELT [1992/1]).

A large Czech holding company whose chairman was interviewed in the course of the present study has been obliged to restructure itself on four occasions over three years. The latest (1994) involved hiving down activity into a number of subsidiaries, each with less than 150 employees to avoid the effect of current wage control legislation. Each subsidiary conducts one or more businesses, owned but not managerially controlled by the holding company. The Prague Stock Exchange began operations during this last restructuring but was not able to support complex corporate flotations of any kind. The operations described have been carried out with a view to eventual listing, but otherwise without regard to the presence of a national securities market.

Equity and individual welfare is improved by:

20. opportunity for individuals to participate in economic growth areas, with, it may be held, accompanying incentive effects

21. a low threshold for individual investment and choice of placements

22. opportunities for mutual/insurance/pension funds to run efficient investment programmes

This is likely to become an important future rôle for European stock markets due to demographic change and difficulty of funding state pension schemes.

23. owners of firms' ability to liquidate their holdings in full or in part on retirement, change of interest or as a hedge against uncertainty

Liquidation of holdings on retirement is not part of the European tradition, rather its opposite, a building up of patrimony. The realisation of gains from lucrative buyouts of state assets is an advantage that may be sought from central and eastern European stock markets although there is little sign of it to date.

24. tax collection can be rendered more equitable and efficient by disclosure of financial positions

The large number of bearer securities in circulation, deficiencies in tax systems, opportunities for foreign holding structures and the existence of loopholes tolerated by authorities as well as the skills of bank-based private client investment advisers and managers dilutes this point considerably in most of Europe.

Respondents in all centres were asked about their private client activities with replies that were difficult to interpret formally

but left little doubt as to the importance of their rôle in reducing tax exposure.

25. the risk of corporate instability and collapse as a result of overexposure to undisclosed commercial and credit risk within interlocking groups can be reduced

In summary, merely creating stock markets does not produce all of the benefits that can be claimed for them. That depends on the general acceptability of the forms and structures adopted and a market's subsequent ability to reach self-sustaining levels of turnover, based on participants' confidence in the liquidity, transparency and efficiency levels attained and in meeting specific requirements as well as the removal or reduction of official barriers.

De facto discrimination against the successful operation of stock markets has typically taken the following forms:

1. controls on interest rates, maintaining them below market levels
2. uncontrolled or tolerated high inflation
3. erratic monetary and exchange policies favouring investment in land, real estate or hard currencies
4. tax policies favouring bank deposits or public debt ahead of commercial private equity and debt
5. tax policies inhibiting disclosure of private investment income and holdings

6. tax policies promoting clandestine or offshore investment
7. tax policies that are not neutral with regard to the term structure of debt, to equity as opposed to debt, to capital gains as opposed to income or to preference dividends as opposed to interest payments
8. obligations on investment funds to invest in low-yield government bonds
9. restrictions on the formation of mutual/pension/insurance investment funds
10. public enterprise price discrimination and anticompetitive behaviour that inhibits the growth of the private sector
11. lax or nonexistent accounting frameworks allowed to form the basis for adequate prospectus and general information about viability, value and performance of companies

There are of course many examples of all the above listed problems in countries with established stock markets. General positive discrimination on the part of the public authorities, with a view to increasing the number of listings and dealings, can also occur, as under:

1. tax or other inducements to float companies
2. privatisation programmes, particularly those with a bias to wider domestic public share ownership

2. privatisation programmes, particularly those with a bias to wider domestic public share ownership
3. tax or other inducements to savers and small investors to take up private equity
4. policies to promote the formation and development of pension, insurance and other investment funds with large cash flows for portfolio investment and the need to provide real returns to their subscribers

The above group of points proved difficult to ground in evidence and appear to reflect conventional wisdom and a north American view of equity ownership that does not travel as well as its proponents may instinctively suppose.

This discussion concludes the analysis based upon van Agtmael's work, which provided a fruitful basis for many questions asked of respondents during the empirical research. It has not always been possible to agree with the assertions listed above however. The tensions are reflected in the preceding discussion but do not detract from the value of the initial inventory, without which the right questions may not have been asked in the first place.

2.3.2: The Baumol scenario

Baumol starts from the proposition that "The allocation of its capital resources is among the most important decisions which must be made by any economy. In the long run an appropriate allocation of real capital is absolutely indispensable to the implementation of consumer

sovereignty." (Baumol, [1965], p1.). Joseph Zaremba, in a foreword to Baumol (Baumol, [1965] pvi.) adds, "An additional factor entering into the determination of stock market performance and efficiency is that (American) enterprise today obtains only a small proportion of its capital needs through new stock issues. Thus if the stock market is to serve as an efficient allocator of capital in the economy at large, it must somehow exert an influence in the capital markets over which it has no apparent direct control but which nevertheless comprise the bulk of the capital resource available for investment purposes."

In arguments that overlap but do not duplicate those of van Agtmael, Baumol asserts that stock markets:

- 1. Provide information on the current cost of capital to guide real investment decisions by firms.**
- 2. Give access to large numbers of investors who each dispose of relatively small amounts of capital.**
- 3. Offer a simple mechanism for the transfer of funds at low administrative cost.**
- 4. Make available through securities prices an evaluation of the financial condition and prospects of borrowing firms.**
- 5. Reduce the required rate of return on funds borrowed for long periods by providing liquidity conditions that allow lenders to lend short by exchanging their holdings with other parties.**

Specialists, official brokers and other institutionalised dealers are often also required to maintain orderly markets, in other words to act in ways that reduce the amplitude of price variations in response to given stimuli. That implies costs and risks requiring some reward, compensation or insurance. For example there is no way to tell the difference between a temporary price fluctuation that can be resisted and the onset of a new trend that cannot.

Baumol argues effectively for the view that no-one knows enough about the effect of time lags and feedback to impose a duty to maintain stability on specialists and official brokers. Without reducing its validity this argument has however been overtaken by the development of derivative markets as a device to engineer out the dangers of excessive exposure to price swings. If a modern real-world exchange is constituted without a parallel derivative market being set up, the difficulties associated with expecting institutionalised traders to maintain stability re-emerge.

Writing before the abolition of fixed commissions on the NYSE (1975), Baumol analyses the position of specialists on this type of auction market. The arguments apply to contemporary European stock markets wherever major institutions have privileged access to the order flow. Specialists are in a different position to all other traders inside a market as well as investors outside it, in possessing a 'book' of current limit orders which provides an excellent source of detailed information about trading conditions across the securities they deal in, approximating supply and demand schedules to a greater degree than is possible in any other market form.

Additional arguments are adduced by Baumol for claiming that stock markets have the capability to approach perfect markets closely: the

product is homogenous, there are a large number of sellers, mostly relatively small, and entry and exit are free for investors. This line of argument interesting for the present study in two respects. First, the consequences of privileged access to the order flow will be examined later in the light of experience on two European exchanges, Vienna and Copenhagen. One conclusion drawn is that the combination of institutional financial power and privileged position with regard to information about clients' affairs (particularly corporate clients), as well as the existence of their own securities holdings, makes the position of banks in European markets much stronger and less legitimate than that of monopoly specialists on the NYSE, particularly following the abolition of fixed commissions.

Baumol also produces valid reasons for not using the stock market (Baumol, 1965, p.75). They have not lost their force and in this study are used as the basis for examining the position of unlisted companies in the national markets considered. They may be listed as under:

- 1. Unwillingness to dilute equity of existing holders**
- 2. Transactions cost of regulatory requirements**
- 3. Other transaction costs**
- 4. Uncertainty on amount yielded by an issue**
- 5. Protecting the value of stock options**
- 6. Avoiding market discipline by use of retained earnings**

In the European context, London excepted, there is not much evidence for the assertion (Baumol, 1965, p.79-80) that market sentiment affects corporate policy even when no issues are in prospect. And Baumol betrays a lack of specialist knowledge when he remarks that the offer of shares to current stockholders at below-market prices is a 'special arrangement' to which neoclassical analysis was never meant to apply (Baumol, 1965, p.7). Such rights issue prices are of course a way of attempting to equate the claims of current and future stockholders to value in the company and prior claims on residual equity in the event of a winding up that realises some but not all of the balance sheet value of shareholders' funds. They are designed to avoid rather than to create rents and market distortions. The recipients of rights issues are, in fact, rather apt to complain of ungenerous treatment, interpreting rights to mean privileges rather than just claims to existing assets.

As with the summaries provided by van Agtmael, the points furnished by Baumol proved useful in generating the design for interviews in the qualitative research for this study. Trading volume, the means by which markets sustain themselves under competition, is an issue which largely postdates the work discussed above and for that there proved to be no convenient starting point other than the data themselves.

CONCLUSION

In this chapter criteria for the existence of national securities markets have been discussed in the light of (a) contemporary developments in world financial markets, (b) the need to set out necessary and sufficient conditions for the survival and success of small national markets before attempting to analyse them

systematically and (c) the existence of a conventional rationale for the existence of national securities markets as deployed by international institutions (as represented by van Agtmael) and academia (as represented by William Baumol).

The main conclusion from a reading of contemporary history is that certain definite assumptions have to be made about the determinants of stability and desirable directions of development in order to permit a structured study to be carried out at a time of rapid change. Study of the conventional rationale for securities markets leads to the conclusion that the multiplicity of factors listed, while mostly positive for markets, nevertheless present a diffuse case. Exceptions and contradictions can easily be found among real-world financial centres. As a result, a simpler, more general set of criteria has been devised, against which the success of individual markets can be measured. These criteria are captured in the concepts of viability, validity and development potential.

The remaining chapters of Part I deal with theoretical and empirical considerations that relate directly to the study, as revealed by the literature of securities markets, before they, together with the criteria developed and discussed above, are applied to the markets examined in the empirical research in Part II of the thesis. A return is made to aspects of the present discussion in the synthesis presented in Part III.

CHAPTER 3: PRICE DISCOVERY, MARKET EFFICIENCY AND THE ROLE OF
INFORMATION

INTRODUCTION

Price discovery is the prime function of any market. All other processes by which resources are exchanged among economic agents may be carried out in other ways: but finding a price which allows supply to equal demand, the market clearing price, is fundamental to most unconstrained economic behaviour. In markets for goods, price is related to the utility that consumers and firms can extract from them and, when markets clear, they are held to be satisfied, allowing equilibria to be defined. In financial markets, market clearing security prices contain information about the prospective return, subject to risk, on investments, as collectively estimated by market participants through the act of clearing the market. Trading confers no utility until returns are realised however. There arises, accordingly, the possibility of further rounds of trading based on the new information revealed by price, rather than simple equilibrium. Clearly the way in which information is incorporated into prices, and in which prices then form the basis for further market activity, is fundamental to the efficient operation of financial markets.

In Section 3.1 below we review the process of price discovery through the activity of buyers, sellers and intermediaries in securities markets and relate price movements to information about potential risk and real returns to derive a concept of market efficiency, as defined in the standard literature of the subject. A distinction is made between the main types of security, equity and bonds, and the effects of diversification, particularly diversification between national markets, are discussed. In Section 3.2 onwards, issues that relate

directly to individual national securities markets are discussed, beginning with the relation between market movements and the real economy. Section 3.3 deals with the rôle of information and proceeds, by way of the concept of information asymmetry, to analyse the function of financial intermediaries. Two ideas important for the empirical research are identified, namely the creation of intermediaries by the process of privatisation in the liberalising economies of central Europe and the value of market information to commercial companies who are not themselves listed on an exchange. Conclusions derived from the discussion of price and information issues are developed before moving on to consider the related question of trading volume in Chapter 4.

Section 3.1: Price discovery, market movements and efficiency.

Security prices should reflect real returns. As is well known however, prices move in a more volatile manner than the underlying returns, a fact which requires explanation. Cootner [1962] was among the first to suggest that movements in security prices should be seen as a series of constrained random fluctuations around their true intrinsic value. The constraints consist of the limit to random deviation due to the activity of 'naïve', 'noise' or liquidity investors producing variations which have no relationship to underlying values. Movement outside this range invites exploitation but noise investors are not necessarily uninformed: they may be dealers adjusting an inventory position (Ho and Macris [1985]) or exhibiting differences of opinion (Varian [1989]) about recent information arrivals. Small deviations cannot be capitalised upon by informed professional investors because of the existence of transaction costs. If prices move significantly and sufficiently to overcome transaction costs, professional

investors, aware of the difference between price and intrinsic value will bid up low prices or sell off overpriced securities to realise a gain, causing a return to the 'correct' price. Thus, to the outside observer, prices will not move far beyond the upper and lower limits of professional intervention unless some change in underlying intrinsic value occurs.

Samuelson [1973] extended Cootner's model to define the behaviour of perfectly efficient prices in perfect markets that remain in continuous equilibrium and hence react instantly to new information. Real markets exhibit a number of characteristics which undermine this process and the assumptions which underpin it. For example, in a thin market characterised by low volume and low levels of investor attention, prices would move more erratically to new positions over long time periods and with greater amounts of variation along the way than would be the case of those traded in conditions more closely resembling those required by the assumptions. The concept however forms a basis for a more general idea of efficient markets where, in the absence of other effects, prices fluctuate randomly but in a narrow range around their intrinsic values (Fama, [1965], [1970]).

More detailed study of the behaviour of securities prices has also to acknowledge the basic difference between bonds and equity. Bonds are of course legal contracts entitling the owners of title to cash flows of interest and repayment of principal under precisely defined conditions. The market price of a low-risk bond can consequently be calculated with equal precision by observing the current market interest rate for securities of like structure, similar risk and time to redemption.

A general consequence of this fundamental difference between bonds and equities is that bond prices move together in response to market influences. Individual equity issues are of course governed by the circumstances of the issuing company as well as those obtaining in the securities markets. In Chapter 6 we offer empirical evidence to show that in the small, bond dominated markets of Europe, equity trading volume is strongly associated with bond trading volume.

3.1.1: Risk

The conventional quantitative surrogate for financial risk is variation in the rate of return, measured either as the variance or as the standard deviation of returns. Risk is of interest in the context of this study for two reasons. First variance in returns has to do with size of market, size of individual issues and of issuing institutions and liquidity (trading volume) at any given point in time. Second, the appropriate response to risk is portfolio diversification which today implies readiness to invest in more than one geographical market.

Trading patterns in the small European markets covered by this research are influenced by the diversification strategies of foreigners.

In equities, distributions of returns have been shown on many occasions to be quite stable in large and small markets alike (see for example Blume, [1971]; Vasicek, [1973]) and Herrera (MISC [1992]/1)). The natural variability inherent in equity returns arising from market and company-specific events is well understood by investors and the public at large. The risk structure of bond holdings is technically well-known but not common knowledge. Ross [1976] has classified the independent individual risks associated with holding bonds, an itemisation of risk incorporated in the Arbitrage Pricing Theory (APT) model (Ross [1976]) and supported by empirical estimates of the

effects (Roll and Ross, [1980]). Default risk, market risk, purchasing power risk and marketability risk are particularly important in the newer markets of central and eastern Europe plus Portugal, less so in Copenhagen and Vienna.

3.1.2: Diversification

Pioneering empirical research (Evans and Archer, [1968]; Johnson and Shannon, [1974]) showed in fact that simple diversification is capable of reducing total risk in such a way that it converges to systematic risk (the undiversifiable risk associated with movement of the whole market), practically removing nonsystematic risk (that associated with movements in a specific security), once a level of 10 to 15 securities is reached. Later empirical work (Elton and Gruber, [1977]; Tole, [1982]) suggests that the number may be somewhat higher. Beyond some optimum level, superfluous diversification attracts unnecessary costs.

The number of securities needed to be available to allow investors to construct efficient portfolios is still considerable. In markets where there is no effective limit to choice and where quality ratings such as Standard & Poor's are available, it has been shown by Wagner and Lau [1971] that even undiversifiable risk can be further reduced by building portfolios out of highest-quality securities only. This is because quality ratings essentially measure the risk of bankruptcy, which is correlated across the market, making it a systematic risk, but nevertheless a lower risk in the highest rating category.

Markowitz diversification (Markowitz, [1952]) attempts to reduce portfolio risk without necessarily reducing returns by deliberately selecting assets which exhibit low covariance of returns and is

equally dependent on large populations of available securities and copious information. Diversification techniques imply the kind of expertise normally found in larger fund-managing financial institutions, creating asymmetry of expertise in smaller markets where banks have the necessary resources but independent brokers often do not. Portfolio diversification analysis has however been captured in the form of readily available software to run on personal computers (see, for example, Bookstaber, Scott, Foresman & Co, [1985]).

Technical development makes expertise accessible to investors in smaller markets, but puts a correspondingly higher premium on the quality of information about available returns.

The fact that portfolios will always dominate single assets is a powerful argument for advocating policy action to encourage small markets in the early stages of development to offer at least a minimum number of assets that will allow some elements of diversification. As Evans and Archer [1968] showed, the first steps towards diversification are the ones that yield the greatest reduction in total risk: randomly putting together 10-15 equities will render the risk of a portfolio largely indistinguishable from the market average.

Empirical research (Ibbotson and Sinquefield, [1977]; Dusak, [1963]) has shown that share price indices, bond price indices and commodity indices tend to be uncorrelated. However very few securities *within markets* are uncorrelated, leading to the need for Markowitz portfolio analysis to find them and creating an obvious incentive for investors in large centres to diversify into foreign markets with the expectation of finding more plentiful uncorrelated investment opportunities there. With increasing convergence and interdependence

between large financial centres and a marked tendency over several recent business cycles for the major economies to move together, the place to look for low correlations has been precisely the smaller economies exhibiting out-of-phase business cycles. The trend has moved so far that even newspaper readers are now regaled with explanations of the risk frontier effects of including emerging markets in the portfolios of pension funds (FINT [1994]/1). It might at first seem appropriate to look for surges of foreign investment in those economies notably out of synchronisation with major investment centres as evidence of this. Unfortunately, however, the reasons for asynchrony may well be bad for investment and there are many other grounds for surges of investor interest. A recent example is the swell of interest in Spanish bonds and those of other economies who were, in 1991-92, exhibiting high interest rates but under an obligation to reduce them to converge with the European norm in order to maintain their position in the ERM and move towards monetary union. This created opportunities for medium-term capital gains to bondholders as interest rates fell. In the event they did not do so and the market bubble collapsed. Cross-border securities investment flows show the consequences of global diversification clearly, as shown by Table 1.

Table 1. INTERNATIONAL SECURITIES INVESTMENT FLOWS

Annual averages among industrial countries (\$bn)				
	1975-79	1980-84	1985-89	1990
OUTFLOWS	12.4	41.8	176.8	151.6
European Union	3.8	18.9	62.6	79.8
US	5.8	5.8	9.5	28.5
Japan	2.6	13.8	89.9	39.7
INFLOWS	25.0	57.8	186.0	159.1
European Union	8.5	17.7	70.4	94.4
US	4.6	16.7	59.2	2.9
Japan	3.0	11.9	23.3	34.7

source: BIS, FINT [1992]/1

The table also exhibits the influence of economic factors, in particular the leap performed by the European Union during a period of economic growth accompanied by rapidly increasing levels of economic integration in the approach to the Single Market in 1992.

Herrera (MISC [1992]/1) has analysed a number of factors that make for real differences between returns in an internationally diversified portfolio. Using a multi-index model (see for example Furstenberg and Jeon [1989]), risk is examined by region, country and industrial sector. Herrera finds that in a nationally diversified portfolio 34% of returns variance is to be explained by country factors, 28% is accounted for by a regional (here Europe) effect, 9% by industrial sector and 29% for 'rest of the world'.

Section 3.2: Market movements and the real economy

The analysis of Prat [1982] is pursued here, supplemented by other and later work. Prat studied the relationship between bond yields, share prices and yields, consumer prices and national income per capita to establish the likelihood and strength of the connections among prices, trading volumes and yields on financial markets and the general economic conjuncture. The story is one of approximate relationships and time lags between correlated variables that vary according to the countries studied. Dynamic interdependence rather than causal relationships is stressed, particularly in view of the fact that informationally efficient markets can be expected to act on anticipated economic developments.

3.2.1: Stock Prices and Bond Yields, Index Movements, Profits and Dividends

The relationship between share index movements, profits and dividends in the United States has been widely studied. Molodovsky for instance used data from the years 1871-1960 to show a general connection between the three (Molodovsky, [1962] pp. 12 and 16). Although a good positive correlation existed between yields on common stocks and low risk bonds between 1871 and 1934 this correlation disappeared completely between 1935 and 1960. Prat has confirmed that the correlation also breaks down in the period 1947-1980. While large-scale, long term variations do not correlate well, Macauley [1938] had already obtained much better results by eliminating medium and long terms cycles and trends to compare short run effects only. Eleven series, some inverted, show remarkably good correlation over a very long period, from 1860 to 1935. The series include call money and time deposit rates in New York, railroad stock prices and bond yields, bank clearings, pig-iron production and an index (Snyders) of general prices (Macauley, [1938], p. 218).

Various reasons can be adduced for the longer-term studies to be marked by periods during which relationships break down. Macauley was unable to find any strong (inverse) relationship between movements in US railroad common stock prices and railroad corporate bond yields over the period 1857-1936. He regarded this as primarily the effect of uncertainty over future earnings affecting stock prices to the extent of obscuring the relationship, rather than a denial of its existence. A secondary factor, according to Macauley would have been a shift in the debt-equity ratio over the business cycle affecting the relative prices/yields of stocks and bonds.

The relationship sought is that between the level of stock prices and the rate of interest because, of course, the level of stock prices is what determines the percentage yield actually measured from a given money level of profits or dividend payments. As well as any demand/supply shifts induced by changes in the debt/equity ratio the effect of interest payments in themselves has a significant impact on reported profits, thus the rate of interest 'leaks' into stock prices via the effect on anticipated profits. The effect would be amplified by the gearing level. No author to our knowledge, including Prat, has made this point. It is usually obscured as theoretically irrelevant under the Modigliani-Miller (1958) assumption that income from equity and debt is equally taxed in the hands of investors. This assumption is not supported empirically.

Fluctuations in long term interest rates with sign reversed have been a good predictor of stock price movements one to three quarters ahead in a number of countries over quite long periods (see Prat p.66 for US 1967-76, West Germany 1960-1976, Italy 1952-1976, UK 1952-1976, Belgium 1952-1976, Switzerland 1952-1976, France 1952-1976, Japan 1956-1976 and Canada 1949-1976).

Other empirical work (Graham, Dodd and Cottle, [1962] p.481 and pp. 485-86), again based on American data, has shown that a large number of companies see a relationship between dividend and the share price while undistributed profits are not particularly valued by the market. This corresponds to the results of Blume and Friend discussed in Chapter 5. Other studies, notably Malkiel and Cragg [1970], have looked for correlation between the share price/profit and the dividend/profit ratios. Positive correlations have been found, indicating a preference for dividends. Pettit [1971] measured the market reaction to dividend changes on a sample of 625 shares in New York between January 1964-June 1968 and found a strong price reaction

to announcements of dividend changes but very little to similar profit announcements. Peyrard [1974] and Sigalla [1977] obtained similar results for the Paris Bourse.

Arguments for the influence of profits over that of dividends can be based on the results obtained by Murphy [1968] from a study of profit growth rates and share price growth rates of 203 American companies in the period 1955-1964, showing positive correlation between the two variables. Lorie and Hamilton [1973] pointed out that there are companies which seldom or never pay dividends, companies which are moreover in vogue and whose shareholders have obtained high returns. And a sectoral study (Friend and Puckett, [1964]) showed that firms in stagnant sectors could improve their share price by increasing dividends while those in growth sectors could achieve the same thing by increased profit retention.

Miller and Modigliani [1961] had of course already made their classic attempt to settle the matter at the theoretical level by demonstrating that firms facing similar opportunities and risks should be able to maintain the same share price whatever their dividend distribution policies. This has never been uncontested either at the theoretical level (Gordon, [1963]) or empirically, (Gordon, [1959], [1962]; Graham, Dodd and Cottle [1962]. More recently, US and British experience offers both statistical and anecdotal evidence (see, for example, ECON [1993]/1, FINT [1992]/2) of firms' and institutional investors' preference for maintaining dividends in the face of declining profits. The attitude is not universal however and debate continues (see FINT [1991]/1, [1992]/3 among many other examples).

3.2.2: Economic and fiscal uncertainties

The relevance of all this to the present study concerns the likely future evolution of financial institutions in smaller European markets as increasingly unviable state pension schemes give way to private provision. If the path of the UK market is followed the results will be profound: in 1963 55% of equity was owned by individuals and only 10% by pensions funds and insurance companies. By 1992 this relation had almost exactly reversed (ECON [1993]/2). Overall empirical confirmation is of course entirely dependent on tax neutrality between distributed and undistributed profit, which is hard to find in any real-world régime, especially over the time-periods necessary to establish firmly the alleged irrelevance of dividend policy to the evolution of the share price. The portfolio management behaviour of the institutions remains in many cases unclear (see for example Davis [1988]).

Fama [1981] has examined the relationship between equity returns, real economic activity and money in order to account for the widely observed negative correlation between inflation and (US) common stock returns. The phenomenon should be inconsistent with the ownership of real assets as implied by ownership of equity: owning real assets should provide a hedge against inflation. Fama finds that real stock returns are positively correlated with real economic activity as represented by capital expenditure, real rates of return on capital and the level of output. Inflation is in fact acting as a proxy for other relationships, notably the demand for money, which have accompanied and dominated real economic factors to produce the observed effect. As Fama admits: "However, this conclusion leaves us without an economic explanation for part of the documented decline in

expected real stock returns during the post-1953 period." (Fama [1981], p.563). This concludes the review of Prat's and others' contribution to discussion of securities market and real economic phenomena.

Section 3.3: The rôle of information

3.3.1: External value of market information

It may be the case that information arising from financial market related operations can corroborate more direct information about economic structure and the conjuncture, or, in the case of poorly developed or unreliable public statistical services, substitute for it. In order for this to be the case, it may be asserted, the nexus of all individuals, firms and institutions making up the markets plus general business and government decision-making has to be large enough to sustain demand in a market for information. There is then potential for a synergy extending within and beyond the markets themselves. This has nothing directly to do with the use of non-generally available information by traders, the asymmetry that drives trading in individual securities. On the other hand it does have to do with market efficiency, loosely defined for the moment as the rate of response to available information. The two questions needing to be begged are: 'how much information needs to be available for markets to be efficient in some general sense' and 'what constitutes availability?'. There is for instance serious doubt that dealers and their clients do have access to an item that is reported after the close of business and 'available' on an exchange announcement that has not yet been circulated. The greater the density of news services, investigation and analysis, the greater is the likelihood that

'available' information will in fact be of good quality and quickly available to all. Market movements which then follow become in turn more useful as information. For example, when in 1962, the BMA first announced the establishment of a connection between smoking and lung cancer, shares in Bunzl Paper shot up, drawing attention to a particular connection in the tobacco industry and providing an instant forecast estimate of its effects, duly reported upon and analysed the next day in the press.

In the empirical part of this study arguments are therefore presented and evidence sought for the proposition that publicly reported statistics, information and general business and market analysis form a useful and significant part of the general commercial and economic infrastructure of a country or region and improve its economic efficiency relative to a similar entity without this advantage. Such information is defined as being of the kind that is free or widely obtainable at a low cost in money or effort. It is hard to imagine a financial centre that managed to function without some significant information spillovers, but the focus of attention in what follows will be to note the opportunities for regulatory and market authorities to create the necessary environment for useful synergies and identify the costs and benefits associated with doing so.

The above concepts represent a considerable extension of the idea of "the price system as....a mechanism for communicating information" (Hayek [1945]). Financial markets provide information about other markets and non-market developments. Clearing the market in one or more stages is not the end of the story. If markets are rendered in some sense more efficient by improved information obtained at some resource cost, and, independently, the rest of the economy could

benefit from data emanating from the same general sources with some further cost, then the total benefits might well exceed the total costs. If the two needs are considered in isolation that might not be perceived and small or new markets might continue to function inefficiently on inadequate information within an economy suffering the same problem.

Finally, another important informational aspect of new securities markets is the extent to which public comment is informed and universally believed myths are routinely countered. Two such myths, for example, are that market returns can be systematically improved upon by investment 'skills' (FINT [1994]/2) and that money flows into or out of markets when major developments occur. In the former case, to 'beat the market' the investor has to be, and in general remain, privy to information about the probability of returns or some aspect of market dynamics, as well as concealing his or her trading from others who would only have to copy it for any gains to be traded out. The latter case is a simple confusion of stocks and flows. (ECON [1987]/1).

Theoretical work by Dow and Gorton [1993] confirms that when it is not clear what implications new information has for the value of an asset, the actual pattern of price movements following the information arrival may bear little relation to the final price level reached. They point out that "In general, information structures which differ from the standard 'truth-plus-noise' paradigm can result in a rich pattern of price responses, while remaining consistent with rationality."

Using a model of returns generation developed by Amihud and Mendelson [1987], Damadoran [1993] uses data of daily returns on the New York Stock Exchange/American Stock Exchange as compared with NASDAQ during the period 1977 to 1986 to estimate a coefficient of price adjustment over time, upon the arrival of information. For the purposes of the present study the main result of interest is that NASDAQ stocks, as an example of an over-the-counter market representing the direction of development in many small European markets, have a much lower coefficient of price adjustment for periods of up to five days (as base period for the calculation of returns) and exhibit higher intrinsic variance and noise in the returns generation process than stocks traded on the major exchanges. As Damadoran points out, the chief significance of the result is due to the smaller equity amounts and lower trading frequency of smaller companies rather than the difference of market mechanism. This fact emerges when company size classes are compared on the larger exchanges.

3.3.2: The Value of Market Information to Unlisted Companies

Unlisted companies can benefit from information about listed companies gleaned from the level of individual share prices, market movements and the publication of information required of listed companies. Listed companies in turn can compare their privileged private estimate of their book value and profit expectations with the market's perception of their value based on some measure of expected returns plus published information. To the extent that share prices for industrial sectors as well as smaller groupings within sectors move together, unlisted companies have advantages in lower costs of information production, in concealment of their position and, after abstracting from the more general market movements expressed by an

appropriate index, in benefitting from a free direct impression of their sector's prospects based on the share price of listed companies. This last item of information is of greatest value within economies not well served by research and statistical services or low reporting standards. This positive external benefit of stock market information extends to the assessment of business prospects on a cross-national basis, again particularly where more orthodox research is impractical.

A further positive externality arises in the use of market information to value unquoted companies for the purpose of acquisition by private sale. The investigation and analysis of such companies, the search for interested investors and the broking of deals has become, in the absence of an adequate secondary market, a minor industry in the United Kingdom. Its inputs are a mixture of freely available and highly privileged information.

3.3.3: The market-internal rôle of information

The arrival of an item of information in a securities market may be regarded as merely the kickoff in a game whose results cannot be predicted. Subsequent price movements, plus the reported volume of trading are two means by which the level of reaction is communicated. This data is then fed back into the trading process as new information, with indeterminate results since the process dynamics are now non-linear. In business cultures where the opinion of the markets is relevant to real investment and other forms of decision making, a further, wider loop is potentially created in the form of business policy based on potential market reaction.

Volume information, discussed more fully in Chapter 4, is distributed differently from price information, being less an 'automatic' byproduct of the existence of a market than quoted prices; intrinsically more costly to produce; requiring initiative to obtain and some compulsion to publish. It accrues naturally to dealers but not to other market participants. The form of market organisation and the level of competition dictates to whom it comes and to what extent it may be exploited by them in trading. In many circumstances, volume information, expressed as the flow of orders, could be defined as privileged, inside information disclosing, for instance, the degree to which current prices fail to represent equilibrium values. Its capture is worthwhile on its own as a source of information on which to base an in-house trading strategy, apart from the commissions and other benefits accruing to capture of the order flow considered purely as market share within the securities industry.

An important distinction needs to be made between latent and actual information flows, that is to say between information that exists but is not widely propagated and information which is actually available to market participants, individually in groups, or generally. Latent information can also be considered to be latent order flow, given the accepted proxy relationship between the two. The concept of latent information has implications for trading in small, narrow or thin markets. Any propagation of information with potential significance for trading may generate volume. News of trading activity is itself relevant to future trading. The elements of a non-linear expansion of trading activity would seem to arise from a simple expansion of the information resource, or rather from the actualisation of what exists in latent form.

The expansion of information is investigated, market by market,

in the empirical part of this study. Both an expansion of trading volume in line with the growth of information and a tendency for bursts of activity to be clumped together is observed in the econometric analysis of trading volume in selected markets described in Chapter 6.

It has been pointed out at length by Grossman [1989] that prices cannot be considered as information in the sense of Hayek [1945] (p.527) merely by virtue of their rôle within the Marshallian or Walrasian frameworks for clearing markets, where demand schedules are based on mere comparison of the payoff available from alternative investments measured by their market-clearing prices. Prices within such frameworks are constraints on action, not information on which to base a decision. A practical manifestation of this idea is the limit order submitted by an investor specifying a quantity to be purchased at or below a given price. By specifying an actual market clearing price, the investor indirectly attempts to collate other peoples' information with his or her own. A schedule of such limit orders for various quantities at various prices defined to be market clearing prices, in fact represents a rational expectations model of the price function for the market involved, incorporating all the information available to the investor and everyone else in the market. It does not imply perfect foresight. The idea of prices conveying complex information in this sense is due to Lucas [1972].

Returning to Grossman: "The Walrasian equilibrium not only leads to poor allocations under asymmetrical information, but also is a bad positive model of equilibrium. A good model of equilibrium prices..should have the property that traders have no desire to

recontract...sophisticated traders will desire to recontract at the Walrasian price and thus it is not even market-clearing when traders have rational expectations." (Grossman, [1989], p.23).

Latent information, discussed earlier above, has been examined by Ho and Michaely [1988], although they do not employ the term. They are able to show that markets may not attain informational efficiency (after Fama [1970]) when public information is costly to produce and investors can obtain better quality versions of the same information by paying more for it. The obvious case of published accounts is cited, where extracting useful information from an apparently straightforward document is technically difficult and hedged about with potential pitfalls, such as accepting stated depreciation rates or stock valuations. Using a rational expectations model for a representative investor at equilibrium, Ho and Michaely find that the level of informational efficiency depends upon the cost structure of the information supply. Conversely efficiency does not depend upon investors' expectations and the risk associated with given rates of return. Furthermore, if investors' risk preferences were identical, the marginal cost of information at equilibrium would be identical across the market, whatever the actual costs associated with finding out about this or that individual stock. This rarefied conclusion is better examined for possible practical implications away from equilibrium and the representative investor. It implies in fact that less information will typically be obtained for small companies and incorporated in the stock price than for large ones. This is because, in the case of a small company, the marginal resource costs of acquiring information are likely to be higher (Ho and Michaely cite the relative likelihood of having an active public relations department) and less volume is available over which to spread costs.

The existence of 'patchy' information efficiency leads on to the possibility of manipulating markets by making available latent information, particularly regarding smaller companies. Short sellers do not need to obtain new information, but merely to recycle existing information that might predict lower earnings, to move the share price. Ho and Michaely examine the effect of 'repackaged' stories falling into this category on the daily mean returns during a standard 'event' period (see Brown and Warner [1985]) from a sample of 29 newspaper commentaries published between 1982-1984. They find abnormally large price movements over the course of the event period, with a disproportionate effect on smaller, more thinly traded stocks. Thus a market cannot be considered informational efficient or inefficient as a whole, it is necessary to examine the structure of information efficiency for any given market in detail before coming to a conclusion about its efficiency relative to other markets. Similarly the efficiency of a single market may be expected to vary over time with the size structure of the companies that make it up and with the volume of equity trading taking place. This conclusion is of considerable significance for the markets studied in the course of the present research. In particular, the relation between 'news' events and large-scale changes in the volume of trading seems particularly well-established for both Copenhagen (effect of financial scandals on private equity holdings) and Vienna (market takeoff following 'discovery' by Fortune magazine). These events are discussed in the relevant chapters.

3.3.4: Information Asymmetry

Financial markets have often been described as markets in information and information is typically asymmetrically distributed between borrowers and lenders, creating a different world from that inhabited

by many models of firms' capital structure and market behaviour based on information symmetry, such as the Miller-Modigliani [1961] theorem where capital structure is based on numerous assumptions which include symmetrical distribution of information. Leland and Pyle [1977], further discussed below, have shown that there may be a statistical variation between capital structures of firms earning the same return, but not necessarily a causal one, allowing the idea to survive. Nevertheless, information asymmetry has had to be taken into account since Akerlof [1970] (see below) and Spence [1973], [1974a], [1974b] and probably before all of them. Its importance in the context of the present research is that information asymmetries and market imperfections are likely to be very pronounced in many of the national securities markets researched. Information-related mechanisms have also been widely held to be responsible for the two key sources of market failure, moral hazard and adverse selection. Hammond [1990] has demonstrated the impossibility of perfect capital markets and with it the need for perfect foresight and other abstractions inconsistent with any discussion of information. When some information about individuals is private, perfect capital markets may be impossible, and when intertemporal factors are brought into account they are necessarily so (Hammond op. cit. p.37.).

3.3.5: Signalling and the rôle of financial intermediaries

Any analysis of securities markets in course of development needs to take into account two particular aspects of information asymmetry discussed in the significant paper by Leland and Pyle [1977] already mentioned. Borrowers will typically know more about the quality of their projects than the lenders they need to approach for finance. Lenders will be faced by competing borrowers, who may therefore talk

up their projects. In extreme cases this may be deliberately misleading, creating moral hazard. Promotion of projects may lead to lenders estimating a higher average rate of return than is actually available. Both cases encourage lenders to assume more risk than they intend. This will not go unnoticed, leading to failure of the market to provide funds. The losers are worthy projects which go by default. Leland and Pyle [1977] argue that information about project quality can be transferred to lenders via the *actions* of would-be borrowers in taking more equity in their own projects than would be optimal for them in the context of a capital market that was willing to lend funds. Such entrepreneurs are therefore obliged to sacrifice welfare to get their message across.

Leland and Pyle also address the problem of explaining financial intermediation as an activity in terms of information asymmetry. Information is a valuable commodity, but returns to its sale are affected by the fact that buyers can resell without hindrance, allowing the originating firm to appropriate only a small part of the total market. The quality of information cannot be accurately assessed by buyers if there is no way to restrict the number and maintain the reliability of sellers. In the manner suggested by Akerlof [1970] poor information will come to dominate the market, driving out the quality providers who experience higher search costs and cannot compete with the purveyors of 'lemons' (inferior merchandise). Financial intermediaries, it is suggested, come into being because they are able to use specialised information directly to purchase financial assets, forming a portfolio which yields a return greater than a set of assets put together on the basis of generally available information. The state of theory in this area is further discussed in the next section.

One characteristic of rapidly developing markets is an evolving population of financial intermediaries with continuous creation of new institutions and products. In the developed western world the process has been gradual and evolutionary. In emerging economies of central and Eastern Europe it has been slow or rapid according to the privatisation method employed to bring formerly state owned assets into a public domain defined on market standards. The spread of information about successful innovations and alliances between large institutions have created the technical resources to move any financial product into any market where the regulatory system will support it. There is as yet no convincing single model to explain the results of empirical research into the pattern of development.

Intermediaries issue securities and other claims to their customers that offer different risk-return characteristics than their own assets. Three forms of intermediary can be defined (Dowd and Lewis [1992], p4.). A simple broker is merely a channel for transactions and the purchase and sale of information and other services. This is not an intermediary in the sense of being part of the chain of debt and claims stretching between final investors and ultimate borrowers. True financial intermediaries are mutual funds whose investors share in a portfolio of assets or deposit-takers. Merely differentiating these two types of intermediary makes clear why traditional financial intermediation theory is unsatisfactory, particularly for the purpose of speculating about what forms of intermediary may be expected to arise in new and transformed financial markets. Mutual funds tend to hold marketable securities and do not guarantee returns to investors beyond promotional claims. Deposit takers tend to promise a rate of return, indeed to guarantee it, and many of their liabilities are of short-term maturity, including cheque accounts. Deposit-takers' assets tend to be non-marketable.

There is no easy explanation for the fact that deposit taking intermediaries tend to specialise in non-marketable securities, nor the offer of a guaranteed rate of return. Search and verification costs supply further illumination however. Search costs are those associated with identifying an investment opportunity. Verification costs are those of estimating its yield. Leland and Pyle [1977] suggest that financial intermediaries arise as a way of avoiding the loss of value associated with disseminating information and leads on to the idea that intermediaries use the information directly to acquire productive assets, financing themselves by the issue of claims to investors who by this means can benefit from the information without it being disseminated. Specialisation is part of the information-limiting process. A problem, not avoided by Leland and Pyle, is that the investor has to choose among intermediaries rather than among original investments. The solution offered by Leland and Pyle, as part of their general approach to information asymmetry, is for the owner of a mutual fund to commit part of his own wealth to the fund, thus demonstrating and signalling his commitment to its quality. This explanation creates sufficient conditions for the existence of deposit takers and mutual funds.

In summary therefore, some borrowers may wish to restrict the circle of lenders, to rely on one lender or to restrict the amount of information they supply. They would typically turn to a deposit-taking financial intermediary, to whom they would issue non-marketable claims. Those not influenced by these factors would have the ability to issue marketable securities which could be purchased direct by investors or any kind of intermediary. The former kind of borrower predominates over the latter in the developing markets of central and eastern Europe, but steady migration from one position to the other

may be expected to nourish securities markets with rising levels of primary issues for many years to come.

3.3.6: Intermediaries created by privatisation

Privatisation of state assets in emerging countries of eastern and central Europe has given rise to intermediaries created or altered by a completely different process from that in western markets. The best examples are the large numbers of investment trusts created in the Czech Republic and Slovakia, or the crippling of established banks by closed circles of mutual debt among companies and between companies and banks. Since the theory of financial intermediary creation is not yet complete and causal factors such as information costs, availability and asymmetry might have a completely different impact in such economies, the data themselves will generate future debate. For instance, as is likely, high search costs might favour the rapid development of intermediaries selling to retail investors. On the other hand many intermediaries themselves might be corrupt, as seems to have been the case in both halves of the former Czechoslovakia, leaving investors facing their own information asymmetry vis-à-vis competing investment trusts. As Leland and Pyle [1977] point out "*..a return to information can be gathered only if the buyers of the intermediary's claims believe that the intermediary uses good information.*"

In many 'liberalising' economies of central and eastern Europe the quality of information is compromised by the closed nature of much privatisation, preserving as it has the privileges and wealth

accumulating possibilities of the former *nomenklatura*. Over-regulation; the creation of closed companies whose shares cannot be traded without the companies' permission; retention of blocking participation by governments and existing managers; the licensing of monopoly by tying markets to specific companies and the reimposition of price controls on products and services; not to mention a necessary semi-criminalisation of business in order to make progress in a chaotic environment (Young and Reynolds [1994]), all serve to render intermediation and the transmission of information difficult and unreliable.

CONCLUSION

The principal aim of this chapter has been to demonstrate the significance of the information supply infrastructure of a securities market in determining its informational and operational efficiency. It has been shown that information supply is both an output of market structure and its operations and a determinant of them. Markets generating certain information patterns will tend to operate in ways that relate to what that information does or does not reveal and will develop a structure capable of operating within the restrictions of the information supply, with higher or lower levels of trading activity in the medium term. The general significance of information for markets therefore lies in the way it operates to maintain sufficient trading activity to underpin viability and validity and a self-sustaining feedback relationship. This in turn underlines the importance of transparency as a feature of market design and periodic reform to ensure that a balanced trading structure is maintained in the face of oligopolistic and monopolistic influences. The importance of financial intermediaries has been stressed but the subtleties of

the informational relationships between borrowers and lenders may not be easily expressed in traditionally structured markets, or be lost in the rough-and tumble of emergent markets.

Chapter 4, which follows, now deals with the general question of trading volume, viewed from the perspective of the extant theoretical and empirical literature, as developed and extended by appropriate models for the markets studied here.

INTRODUCTION

As has already been indicated, this study is primarily concerned with the viability and validity of securities markets and their capability to deliver benefits through further development. The prime measure of all these three aspects of a market's health is transactions volume. If a market is defective it will not be used: essential trading will be accomplished in other ways. If it is healthy, trading volume will not only reflect this fact, but will, on the evidence, grow well beyond the levels required to issue securities and adjust portfolios in line with economic and business fundamentals. In the literature of securities markets there is a strong orientation towards explaining returns rather than treating volume itself as the dependent variable. In some cases the very existence of trading is the object of speculation. Research has, however, often shown that volume is dependent on market microstructure and the asymmetrical distribution of information. The microstructure contemplated has usually been that of larger markets in general and US markets in particular. In this chapter we begin with the theoretical and empirical work 'as found' and then depart from it in specified directions related to the current study. In Section 1 the literature of the price volume relationship is reviewed, followed in Section 2 by that on the determinants of trading volume. In Section 3 an existing model of trade generation is extended and adapted to explain the behaviour of diversely motivated agents. This leads on to further discussion of market structures and investor behaviour in Chapter 5.

Section 4.1: Research into the price-volume relation

A thorough review of the price-volume relation is to be found in Karpoff [1987] on which the following discussion draws. We abstract what is relevant to smaller and thinner European markets, usually over longer time intervals than the hour or day, usually in fact monthly. Some insights remain of value to establish the importance of volume and its implications for trading based on information asymmetry.

Karpoff makes two significant observations about the quality of research into the price-volume relation. First, after reviewing findings that (a) there is no price-volume correlation, (b) that the correlations relate only volume and absolute price changes, (c) that they relate any volume and price change and (d) that volume is higher when prices increase than when they decrease, we have: "The reason for these seemingly inconsistent findings is that most tests are based on implicit assumptions that the price-volume relations are functional and monotonic....Thus, a researcher may find weak support for any of the above hypotheses and stop looking for the others. (op. cit. p120). Elsewhere: "Is the theory that guides empirical work in this area adequate? The models reviewed in this paper sacrifice generality for tractability and this has led to some artificial behavioural classifications such as "optimists/pessimists" and "bulls/bears". An important but difficult area for further work in this area is to develop a theoretical understanding of markets that incorporate many diverse agents." (op. cit. p. 123).

The above represents a neat summary of the problem of analysing European markets where the fauna are not only diverse and not amenable to the representative agent approach, but one or another group often dominates. This is particularly true of banks, who do not figure in

US markets to the extent they do in Europe. Their presence can distort the whole trading structure by its influence upon capital requirements as well as trade and position size. Under the heading 'tractability' also falls a traditional preoccupation with equilibrium models that can be analysed for optimal solutions in an environment that is both linear and reductionist. To the extent that theory can help at all in the face of complex stochastic phenomena, the present study chooses a model environment of agents with complex motivations, acting through time, using assumptions that would be recognised by practitioners.

Market lore has it that (1) a small volume is most often accompanied by a fall in price (2) a large volume is usually accompanied by an increase in price (3) a large change in volume may be accompanied by either a large fall or a large increase in price. These are the basic empirical findings confirmed by many studies starting with Ying [1966]. The basic relationship found is a positive association between price variability as measured by the square of price change (to render all data positive) and trading volume. Ying's results are further discussed below in section 4.2.

Some authors have interpreted price change as market response to new information and volume as a measure of the extent to which investors disagree about how to evaluate it (Richardson, Sefcik and Thompson, [1986]). Beaver [1968] maintained that "(price tests) reflect changes in the market as a whole while (volume tests) reflect changes in the expectations of individual investors. Verrecchia [1981] examines this contention in some analytical detail, concluding however that "the degree of volume reaction to new information cannot be used to infer unambiguously the extent of agreement among investors about how that information should be pursued."

The chief value of volume data therefore appears to lie in acting as a proxy for rates of information flow to investors that cannot be observed directly. This enhances its value as a trading tool, particularly when captured in detail by one trader in the form of order flow, especially if the information does not have to be published in detail. Stickel and Verrecchia [1994] have analysed the relationship empirically with some care. To present the bad news first, price prediction from volume information turns out to be feasible only within the bid-ask spread, where it has no arbitrage value. The so-called bid-ask bounce - transactions within the spread that contain no information (Roll [1984]) - also supplies noise to confuse meaningful price signals. More interestingly, Stickel and Verrecchia show that volume information allows price changes that flow from genuine information to be distinguished from those that do not. Investors seem to conclude that a price change supported by strong volume is likely to represent the activity of informed investors. The authors test this proposition with positive results using daily earnings announcements, coupled with the relevant trading data on the NASDAQ-National Market System (NASDAQ-NMS) in the period 1982-1990: that is to say since the first opening of the NMS. The study is replicated on non-announcement days with similar results, demonstrating robustness to other kinds of information arrivals. They conclude that without volume support, even large price changes do not reflect an underlying change in value and are typically partially or completely reversed on the next trading day.

Volume information can also provide an additional parameter to apply in using variance to estimate risk, as well as to resolve the well-known problem of leptokurticity in returns distributions where the

efficient market hypothesis in any version would predict normally distributed returns. In the former case Carpenter and Upton [1981] have used a factor, m , the rate of information arrival, to adjust beta estimates for finite-time price adaptation. Trading volume is a proxy for m . Likewise, in the second case mentioned above, leptokurticity in returns distributions almost disappears when price changes are grouped by volume classes proxying for m (Clark, [1973]).

Other uses of volume data jointly with price data to improve empirical tests are reviewed by Karpoff [1987]. In particular Karpoff poses the interesting question: "Does the size of the market affect the price-volume relationship ? In the course of analysing price-volume relationships on speculative markets Tauchen and Pitts [1983] had already pointed out that if the volume of trade is trending strongly over a period, then a rise in the number of active traders involved can conceal the basic relationship between the square of price change and the trading volume: simply because more traders will generate more transactions by their presence. The data therefore need to be detrended where appropriate, to arrive at values that represent an underlying general level of activity with number of traders held constant. This is not particularly satisfactory, but the underlying situation is nevertheless entirely typical of smaller markets undergoing sporadic bursts of activity over short time periods.

Messembinder and Seguin [1993] extend the evidence reviewed in Karpoff [1987] for positive correlation in real time between trading volume and price volatility: they find that negative price shocks are generally associated with smaller volumes than are positive ones.

Kyle [1985] redefines volume as a measure of market depth, where depth is identified as the order flow that would be necessary to cause

prices in a market to move by one unit. Depth is found to vary with the level of recent market activity using data of daily settlement prices, trading volumes and open interests stated on eight futures markets. This all lies a little way from our main focus, but the main result may be robust over longer time periods and in different markets. It is shown that unexpected volume shocks have a larger effect on price volatility than anticipated ones, an effect magnified when the shocks are positive.

An interesting result with potentially far-reaching implications for further research and applications in real-world markets is the conclusion drawn by Jones, Kaul and Lipson [1994] that the relationship between trading volume and market volume is dependent only on the number of trades involved and not on their size. Thus the volume of trading disguises the real operator by aggregation. No information is conveyed by the trade size itself. As the authors point out (op. cit. p. 645) "Our findings are quite contrary to the old Wall Street adage that "it takes volume to move prices. ""

Theoretical models of the relation between volume and absolute price change have to consider trade size, but treat it differently according to whether they fall into the competitive or the strategic category, and draw their conclusions from overall volume rather than the number of trades. 'Strategic' models often consider a monopolistically inclined informed trader who disguises his or her position by making several small trades rather than one large one (see most recently Foster and Vishwanathan [1990] or Kyle [1985] and Admati and Pfleiderer [1988]). In 'competitive' models information asymmetry is considered as the relative precision of information held by informed as opposed to uninformed traders, with trade size positively

correlated with information quality (Pfleiderer [1984] and others). Most recently Holden and Subrahmanyam [1992] have achieved a synthesis of the two model variants but retain the overall result that the size of trade matters, along with volume.

Jones, Kaul and Lipson [1994] used a purely empirical approach to contradict the above approaches, along with those of a number of other volume-oriented seekers after the information content of market events. Beaver [1968], Bamber [1986], Jain [1988], Morse [1981], Richardson, Sefcik and Thompson [1986] and Ziebart [1990] are cited as examples. Jones, Kaul and Lipson show that in nearly all cases the volume-volatility relation disappears when the relation between volatility and the number of transactions is controlled for. The data are daily trading volumes of NASDAQ and NMS securities over the period 1986-1991. The average size of trade (total number of securities traded divided by daily transactions volume) retains statistical significance in association with absolute price change only for smaller firms: that is to say, only in normally thin markets. All results were insensitive to other possible measures of volume such as dollar value, number of shares traded or the turnover ratio (number of shares traded divided by those outstanding).

The Mixture of Distributions Hypothesis (MDH), which claims that volatility and volume are correlated only because a mixing variable in the form of information arrivals is related to them both, is sufficient to account for the relation normally posited. Jones, Kaul and Lipson [1994] point out that their results are validly interpreted by the MDH, but that it offers only a statistical rather than a valid economic explanation of events. Easley and O'Hara [1990] and Harris

and Raviv [1993] invoke the number of bargains in asset price determination models, albeit using a standardised unit trade size, with the latter authors showing a positive correlation between number of trades and absolute price change.

None of the above cited studies seems to point to an obvious intuitive conclusion. Indeed a practical *a priori* assumption could be made in the absence of empirical evidence: unless traders know a great deal about the holdings of others, only the fact of a trade, and not its size, is information about potential returns that can be validly incorporated in the price. An attraction may be inferred by seeing a great number of people flocking to the ticket office, but its nature will not be revealed by observing how many tickets they each buy, particularly as, among the punters, there will always be ticket touts.

Section 4.2: The determinants of transaction volume

The study of the determinants of transactions volume, as opposed to the rôle of trading turnover in price formation and returns generation in securities markets, has a curious history. While real-world markets have shown dramatic growth, much theoretical work has concluded that trading volumes are likely to be small or nonexistent in equilibrium. Varian [1989] discusses the problem in detail. The empirical work of those who have concentrated on the determinants of volume has, as has been seen, produced results which are useful in short period (daily or intra-day) trading situations, but notably lacking in insights into longer-run phenomena and, least of all, in conclusions about the real origins of normal trading activity levels, as opposed to bubbles and other transient phenomena such as initial public offerings (IPOs). Most recently the joint determination of price and volume has been

favoured. Karpoff [1987] is typical "Empirical relations between prices and volume can help discriminate between differing hypotheses about market structure." op. cit. p. 109. The literature relevant to the origination of volume per se is reviewed below.

As, it may be argued, the lifeblood of the securities trading 'industry' in the countries studied, all possible determinants of the level of activity are important and medium term considerations predominate over the short run. Insights into the future direction of turnover volume are of practical use for planning purposes and to identify entrepreneurial opportunities. Unlike price determination studies, useful results are unlikely to suffer the indignity of being traded out of existence on becoming known to the markets.

We approach the problem from three directions. First, in the course of reviewing this part of the literature, the work of those authors who have treated transactions volume as a major variable of interest are identified. Among these authors, those whose model formulations accommodate a richer market fauna than the representative agent and are capable of long run dynamic analysis, are considered in detail. As a second stage, a promising model (Huffman [1992]) has been extended to take account of hypotheses developed in the course of this study and used to provide a background, although not a complete theoretical underpinning, for the analysis of the empirical data. The final goal is to explain the very large evolution of securities market transaction volumes that has taken place since the early 1970s.

4.2.1: Empirical research on the determinants of volume

Osborne [1959] was probably the first author to apply quantitative

techniques to securities market trading, explaining trade volume as the means by which price changes and associated price relativities were 'diffused' across the market. Granger and Morgenstern [1963], using cross-spectral analysis, found that "the volume of shares transacted bears no discernable relationship to any conventional concept of supply or demand." despite certain correlations between volume and daily highs and lows. Charles Ying [1966] took similar data, namely daily NYSE closing prices and volumes on the S & P 500 Index of common stocks (GM used individual transactions on two stocks only), to derive the opposite conclusion, namely that large *increases* in volume are accompanied by large price changes; that large volume *levels* are associated with price rises and small volumes with price declines. Crouch [1971] reported similar findings. These results are also in line with received market wisdom and explanations are to be found in a number of studies independently of the approach employed. Ho and Macris [1985] for example, find continuous marking down by traders is a response to the holding cost of a long position in the absence of buying volume at current prices. Many studies have been criticised on grounds of the appropriateness of their data however (see Epps, [1975] and Karpoff [1987] who furnishes a succinct inventory of the genre). Epps' [1975] approach was the first to postulate a distinctive behavioural cause for the urge to trade, namely differences of expectations as to future prices ("bulls" and "bears") resulting in buying or selling volume respectively.

This line of argument has subsequently matured into the 'differences of opinion' explanation for trading, as opposed to differences in information or endowment, and is represented most recently by Hal Varian [1989]. Price change is understood to represent the market

absorbing new information while volume indicates the measure of disagreement involved in doing so. It has been pointed out however that "it is difficult to think of a sensible theory with vastly different beliefs that are sustained over any period of time" (Chari, [1989]). Copeland [1986] took forward the 'diffusion' idea from Osborne [1959], this time in the context of the diffusion of information serially from trader to trader, with volume being generated in the process. Others have extended the model with inventory and speculative considerations.

Another approach, based on an abstract definition of traders' collective behaviour is to be found in Epps and Epps [1976]. Here, traders are held to react differently to price changes for a single transaction according to the volume of the transaction: in this case they act simultaneously rather than serially. This assertion is contradicted by the empirical result of Jones, Kaul and Lipson [1994] already discussed. Although empirically supported, Epps and Epps' version of the "mixture of distributions" hypothesis is merely a return to the contradictions of price-volume linkage and difficulties of complexity discussed in the previous section. Over-concentration on price or attempting to make 'lumpy' return distributions (Clark [1973]) disappear has caused many researchers to stumble on arriving at real-world volume-related phenomena that destroy equilibrium solutions. For example, Tauchen and Pitts [1983] p. 504: "...our applied work suggests that if the volume of trading is strongly trended over the sample period, then the results of a price variability-volume study can be very misleading. A sharp rise in the number of traders can conceal most, and perhaps all of the relation between the squared price changes and the volume of trading."

All this gives rise to considerable doubt about the true explanation of volume by price or price by volume or any *single* joint cause. We are in any case able to desert the field on grounds of inapplicability to the circumstances of small, heterogenously organised, although not necessarily inefficient, markets in Europe. One idea is retained from Tauchen and Pitts [1983] however and further developed in Carpenter and Upton [1981], namely that calendar time in a securities market is not relevant. Rather the rate of information arrivals, for which unobservable variable the transactions volume is the usual proxy, is to be taken as a measure of effective time. We further retain the conclusion of Karpoff (Karpoff, 1987, p. 121.) that "simultaneous large volumes and large price changes - either positive or negative - can be traced to their common ties to information flows." Where we differ perhaps is in attributing to information flows the degree of precision implied by the use of a short, neat term. Information flows end up in fact becoming, contradictorily, like Sir Julian Huxley's celebrated definition of God, "a symbol for man's residual ignorance". As Johnston [1991], p. 61, observes, "the inscrutable and the unknowable may be ascribed the properties most convenient for the current problem".

Some loose relationship of trading volume to the growth of information is nevertheless detectable in the longer run using monthly data in the European markets studied in detail in the next chapter. The scale and time invariance of the relationships among volume variables found there is noteworthy. A similar invariance in the structure of information flows may be postulated whereby complex, larger-scale phenomena are absorbed more slowly but in the same manner as the immediate news items which generate the well-studied dealings that

arise in minutes or hours . By the same token, the information contained in market-clearing prices, although occasioning recontracting in the very short run (Grossman [1989]), may be held to contain a long run component. For instance when 'prices advance on a broad front' for several days or weeks, does this not convey information useful to inform the longer-term investment decisions of agents in a way that daily price movements cannot? Morse [1981] and Beaver [1968] offer evidence of the persistence of high volume after the information events that apparently gave rise to them have long passed. Karpoff [1987] (p.123) finds this "puzzling". The present author does not, particularly in view of the emerging possibility of non-linear dynamic responses to information flows in financial markets. If the present research affords evidence of scale and time invariance in price-volume and volume-volume relations over long periods in smaller markets, an interesting avenue for future research in the direction of grounding those relationships involved more firmly would seem to open up.

Section 4.3: A model for the generation of trading volume in securities

There is a contradiction between the diversity of information sets possessed by agents in some models and equilibrium in financial markets where all information is reflected in prices and hence known to all agents. There is therefore likely to be no trade in equilibrium. Huffman [1992] has attempted to construct an equilibrium model in which informed and uninformed agents trade and maximise their expected utility at equilibrium, but where exogenous shocks prevent the uninformed from obtaining perfect information. Trading takes place even at equilibrium and the volume of trade varies as the price of

capital deviates from its expected value. This is consistent with market behaviour as observed by Karpoff [1987]. We are not in sympathy with the Huffman [1992] model as a useful description of the behaviour of agents in small European markets but find it convenient to adopt its utility function and other features in a model developed in the next section. The model also employs some assumptions used by the same author (Huffman [1987]) in the construction of a dynamic equilibrium capital asset pricing model (not directly relevant here) for its basic motivation to trade. Huffman's contribution to the final result below is therefore acknowledged, but we set off in a rather different direction in order to develop a simple model of the volume-related behaviour of agents in securities markets.

4.3.1: A model with homogenous agents diversely motivated by life cycle stage

The assumptions of the model are that agents come into existence in time period t_0 with a fixed endowment of capital that is capable of yielding a dividend in each time period and a price on capital markets. The capital markets operate in a costless manner and have no intermediaries: agents trade freely if they wish to do so.

The agents are assumed to have an intertemporal substitution function with a risk-averse profile. In other words they are prepared to sacrifice present for future consumption as a decreasing function of present consumption and to maximise their utility by an appropriate choice between consumption in the present and future periods, the latter made possible by reinvesting the balance of their capital and dividend after present-period consumption to yield income and capital gains at a later date. The choices of a typical agent are modelled

over his or her lifetime. Since continuous time simulation is used, agents at all stages of their life cycle, with differing levels of wealth and risk preference, will be active at any one time. Shuffling the ages randomly and summing these 'typical' agents produces cross-sectional heterogeneity.

Huffman suggests a two-period model of the form

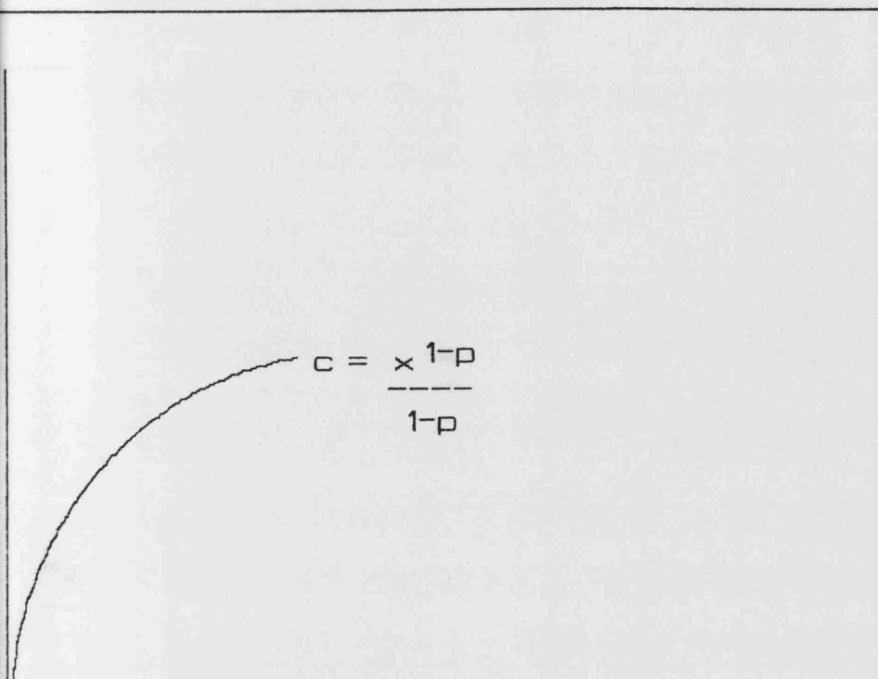
$$\left[\frac{(c_2^j)^{1-\rho}}{1-\rho} \right] + \left[\frac{\alpha_3^j (c_3^j)^{1-\rho}}{1-\rho} \right] \quad \rho > 0, \quad \rho \neq 1. \quad (1).$$

where an appropriate choice of ρ in the basic expression component

yields a risk averse intertemporal substitution function of the form shown in Figure 1.

The term c_t in the full expression represents consumption in the t th period. The α -term is reserved for random preference shocks applied in the Huffman model and reproduced here only for documentation purposes. The superscript j represents the j th agent, again cited only for completeness.

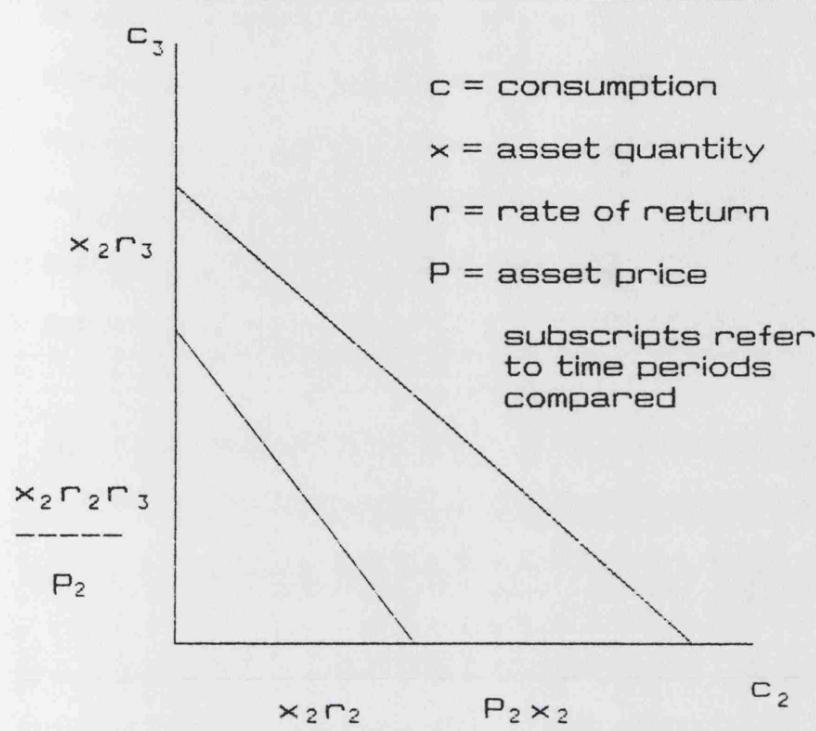
Figure 1: INTERTEMPORAL SUBSTITUTION FUNCTION



Intertemporal consumption substitution
function for a risk-averse agent

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Figure 2: PRESENT AND FUTURE CONSUMPTION



Interperiod consumption possibilities

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The relationship between present and future consumption is summarised in Figure (2) which shows that maximum consumption in period 2 would be achieved by drawing on the proceeds of capital x_1 at a price of P_1 after drawing interest r_1 upon it. Maximum consumption in period 2 would be yielded by reinvesting this sum in its entirety, giving $(x_1 r_1 r_3 / P_1) + (x_1 r_3)$: that is to say this period's interest converted to capital at the end-of-period price P , plus the existing capital x_1 left to accumulate interest during period 3.

The combined slope of these functions is therefore

$$\frac{\frac{x_2 r_2 r_3}{P_2} + x_2 r_3}{x_2 r_2 + P_2 x_2} \dots \dots (2)$$

which after some elementary algebraic manipulation yields the much simpler relation

$$\frac{r_3}{P_2} \dots \dots (3)$$

This by appropriate substitution, simplification of terms and dropping the ~~ex~~-term and superfluous superscripts, gives a new expression

$$\frac{c_2^{1-p}}{1-p} + \left[\frac{(c_{2\max} - c_2) (1 + \frac{r_3}{P_2})^n}{1-p} \right]^{1-p} \dots \dots (4)$$

where the optional power, n , allows a multi-period interval of forward

substitution if required. This is an addition to the Huffman model which amplifies the urge to invest but does not change the relationship. If n is set to one, agents do not get rich very quickly under most assumptions.

Simplifying the terms in a way that allows easy computation and differentiation with respect to consumption in period 2 we obtain

$$\frac{C^R}{R} + \frac{(TM-TC)^R}{R} \dots \dots (5)$$

In any two-period pair, utility is maximised by setting the derivative of (2) to zero.

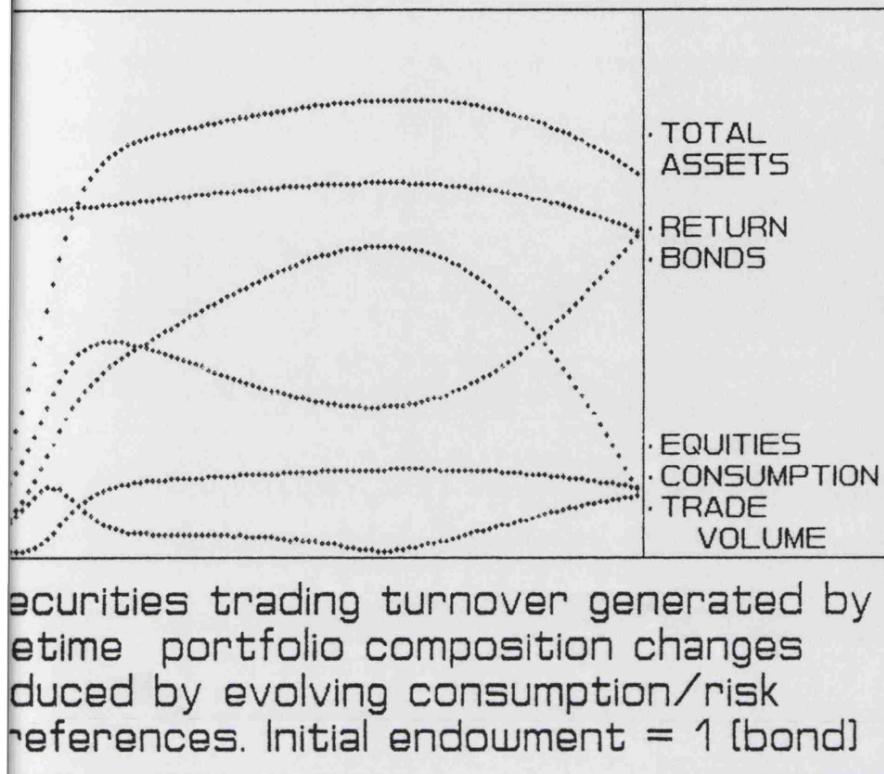
$$C^{R-1} - T(TM-TC)^{R-1} = 0 \dots \dots (6)$$

This yields the basis for proceeding to the next period, at which point we depart from the Huffman [1992] model by exploring the behaviour of agents through time as their wealth and age increases. The methodology is thus continuous simulation of utility-maximising behaviour through time. The relevant time is the lifespan of an individual agent during which period risk preferences change with a rising level of wealth and the approaching end of life. This characterisation of an individual agent may also, very conveniently, be extrapolated to the general population, given that the average age of the population in most countries is rising due to demographic change and the first fortunes made in the post-war period are falling into the hands of an inheriting generation.

Agents construct a portfolio with a low risk and a high-risk asset which combine to give the maximum return consistent with acceptable levels of risk, eventually actually setting aside assets in trust for descendants or to endow a worthy cause. Some general assumptions are made about the lifetime risk acceptance/aversion profile. These are made in a relative rather than an absolute sense: in other words a risk-averse agent would be able to vary his or her risk without actually becoming risk-accepting as such - hence the generally upward-concave substitution function.

Young, not-rich agents are assumed to be more risk averse on the ground that risking their patrimony would risk their entire income. As they become richer and have both a higher level of consumption and more wealth to fall back on they become less risk-averse. Finally, when rich, they again become risk-averse, preferring to sleep at nights rather than add to already substantial wealth by risky investment. In the final phase risk aversion is allowed to increase without limit. This function involves discarding high-risk assets and represents endowing descendants or causes with assets before death. We do not treat the case of agents who consume capital towards the end of their life with a strategy of matching maximum total consumption to life expectation (see Huffman [1987] p.145).

Figure 3: LIFETIME CONSUMPTION, INVESTMENT, TRADING



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The lifetime profile of such an agent is exhibited in Figure 3. The results are the output of a QUICKBASIC program (UTILVEST.BAS: see Appendix 2) which maximises the utility of consumption and investment using (6) in each period to arrive at wealth and age-adjusted risk preferences. These give rise to a required rate of return in each period. That in turn is realised by partitioning wealth into a two-asset portfolio based on a high risk/high return asset (the 'equity' component) and a low risk/low return asset (the 'bond' component).

Figure 3. therefore exhibits the mix of the agent's portfolio and shows in addition total assets, total consumption and the required rate of return. Endowment is represented by the difference between capital at the peak of wealth and the remaining holdings of bonds and equity. It may be asserted that agents would in fact always wish to increase their capital in order to leave a maximal inheritance: this is a risky strategy since the date of death cannot be predicted and inheritance taxes may supervene at any time, hence the common practice of consigning wealth to trusts at an early date.

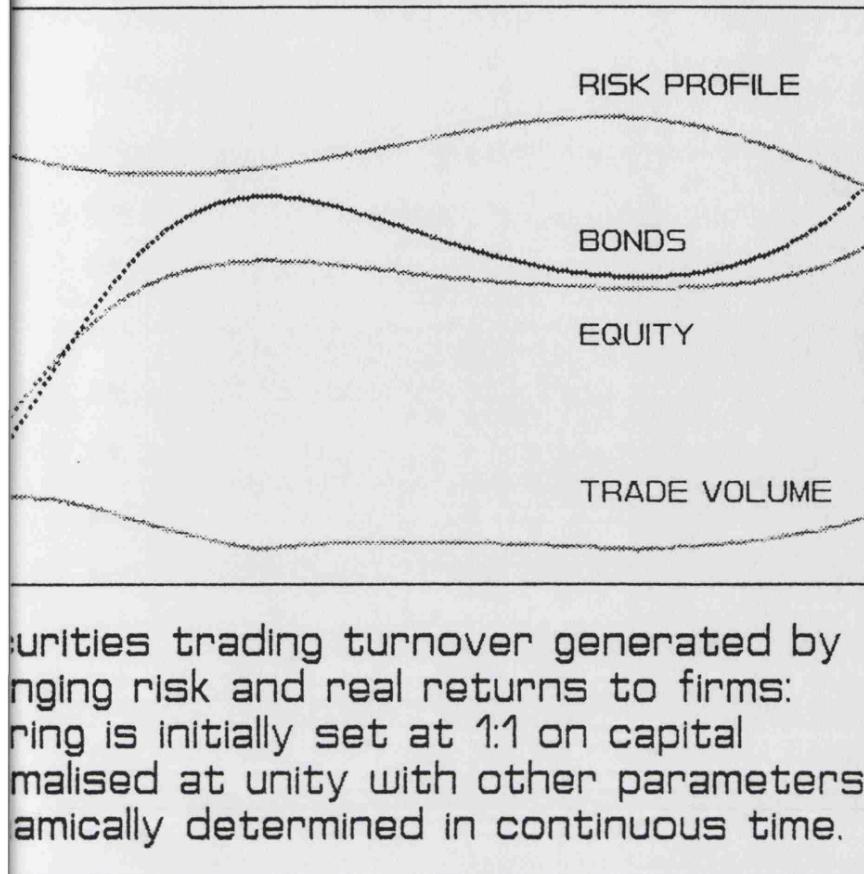
The volume of trading which results purely from portfolio growth and asset switching is shown as the bottom line of Figure 3. It is not difficult to see that the addition of Huffman's information shocks, as well as a range of economic factors that tend to vary the yield gap between equity and bond returns would all further increase trading volume.

A similar exercise is attempted from the supply side using the simple paradigm of a company that grows from a small size in a finite market. Its real rate of return is postulated to fall with growth over time, either because it comes to exhaust market demand or because rivals

enter the industry. In this model, business risk is represented by historically reducing margins (a valid contemporary phenomenon). Further risk is incorporated for gearing levels and interest cover which has the prudential effect of limiting bond issuance. Business risk has the effect of increasing the dividend requirement.

Figure 4. shows the balance sheet structure of the firm in terms of equities and fixed interest debt assumed to take the form of debentures. This is in response to the changing total risk profile illustrated at the top and gives rise to securities market trading (including, in this case, primary issues and bonus issues) illustrated on the bottom line. The model is schematic and the parameters used may be perused in the QUICKBASIC listing already referred to. Its development proved instructive however in that a wide variety of parameterisations resulted in a stable, sensible capital structure, which nevertheless implied continuous changes in the gearing level to respond to the current relationship between total risk and real return. Adjusting their gearing level in response to changes in risk and return in real markets is, it may be asserted, the ultimate motivation for securities market activity by commercial firms.

Figure 4: LONG TERM CORPORATE TRADING



08.PIC

Conclusion

The motivation for developing the model extension presented in this chapter has been to demonstrate that trading volume can be generated by normal investment and issuance needs: in the first case through portfolio adjustment throughout the individual agent's life cycle and, in the second, by gearing adjustments required in response to changes in business fundamentals. It is of course possible to envisage a general equilibrium model based on both the supply and demand sides of securities markets as represented by the two models described above. This is left for a future development.

The result obtained contrasts with the thrust of some of the evidence presented in the literature reviewed earlier in the chapter, namely that the existence of trading volume is difficult to explain. It should also be noted that there has been no need to refer to the price-volume relationship discussed at the beginning of the chapter, since this is essentially a short term phenomenon. On the other hand, one should be aware that trends are often established as a result of initial impulses. Short term volume increases, exogenously induced by whatever means, can operate to establish a longer-term higher level of trading. Evidence for this is considered in Chapter 6 and elsewhere, for example in the context of the effect of one-time market reforms upon the volume of transactions.

CHAPTER 5: MARKET STRUCTURES AND INVESTOR BEHAVIOUR

INTRODUCTION

The behaviour of broking firms in smaller financial markets is a complex mixture of price and nonprice competition, collusion and observance of 'territories'. Occasional breaches of accepted practice and fresh outbreaks of competitive behaviour are characteristic, often induced by the appearance of new entrants, mergers and changes in market and regulatory structures.

The markets chosen for study are small, volatile and subject to the pressures of emergence and transformation. This fact militates against a reductionist approach in analysing the forces at work, particularly as regards seeking competitive equilibria based on pure price competition. Price competition between small numbers of firms, based on the Bertrand and Cournot duopoly models is often referred to in the literature on financial markets but, for the reasons given above, is not dealt with here.

The tool chosen for analysis in this case is the theory of imperfect competition that may be traced back to Alfred Marshall [1920] but best developed in Chamberlin [1933] whose analysis is followed below.

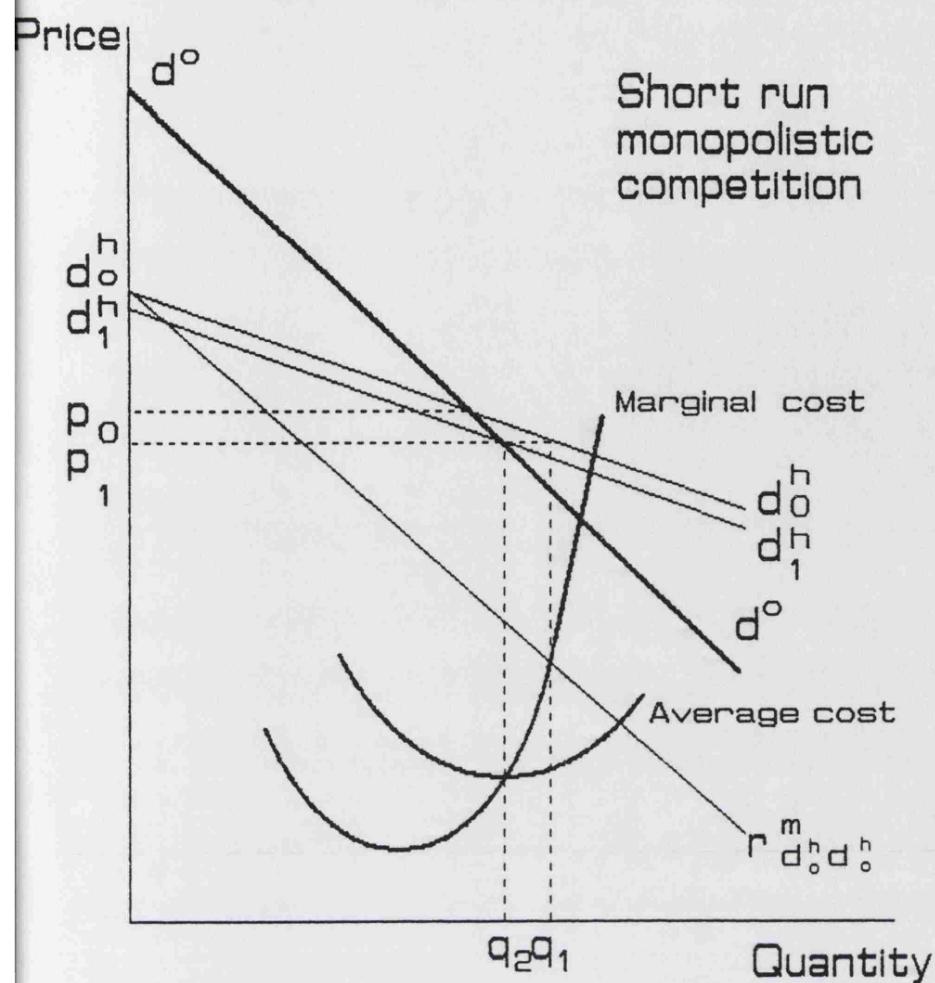
In the rest of the chapter we examine markets and the securities broking industry in terms of their microstructure and consider investor behaviour. In all cases the aim has to be the extraction of useful insights into the behaviour of European markets examined from a literature dominated by north American thought and practice. Direct evidence from European markets is presented in section 5.4.

5.1: The securities broking industry under imperfect competition

The key to this form of competition is product differentiation, whereby suppliers of a product or service maintain elements of monopoly by incorporating unique features, protected by patents, trademarks, copyright or difficulty of reproduction. They are however exposed to competition from rivals with similar but not exactly identical offerings. A producer is enabled to maintain a price differential and monopoly profits that correspond in size to the unwillingness of his customer, at the margin, to defect and meet most of his or her requirements elsewhere. The utility to the consumer of the unique, as opposed to generic features of the product or service will determine exactly what price differential can be maintained.

In Chamberlin's (1933) analysis only a short run equilibrium is built on price discretion and may be observed. The long run equilibrium is achieved by entry and exit of firms, yielding an industry with stable numbers and modest profits. This is less easy to observe in small markets but is intuitively acceptable to market participants in smaller centres, as was revealed by the results of interviews and discussions.

Figure 1: THE SHORT RUN



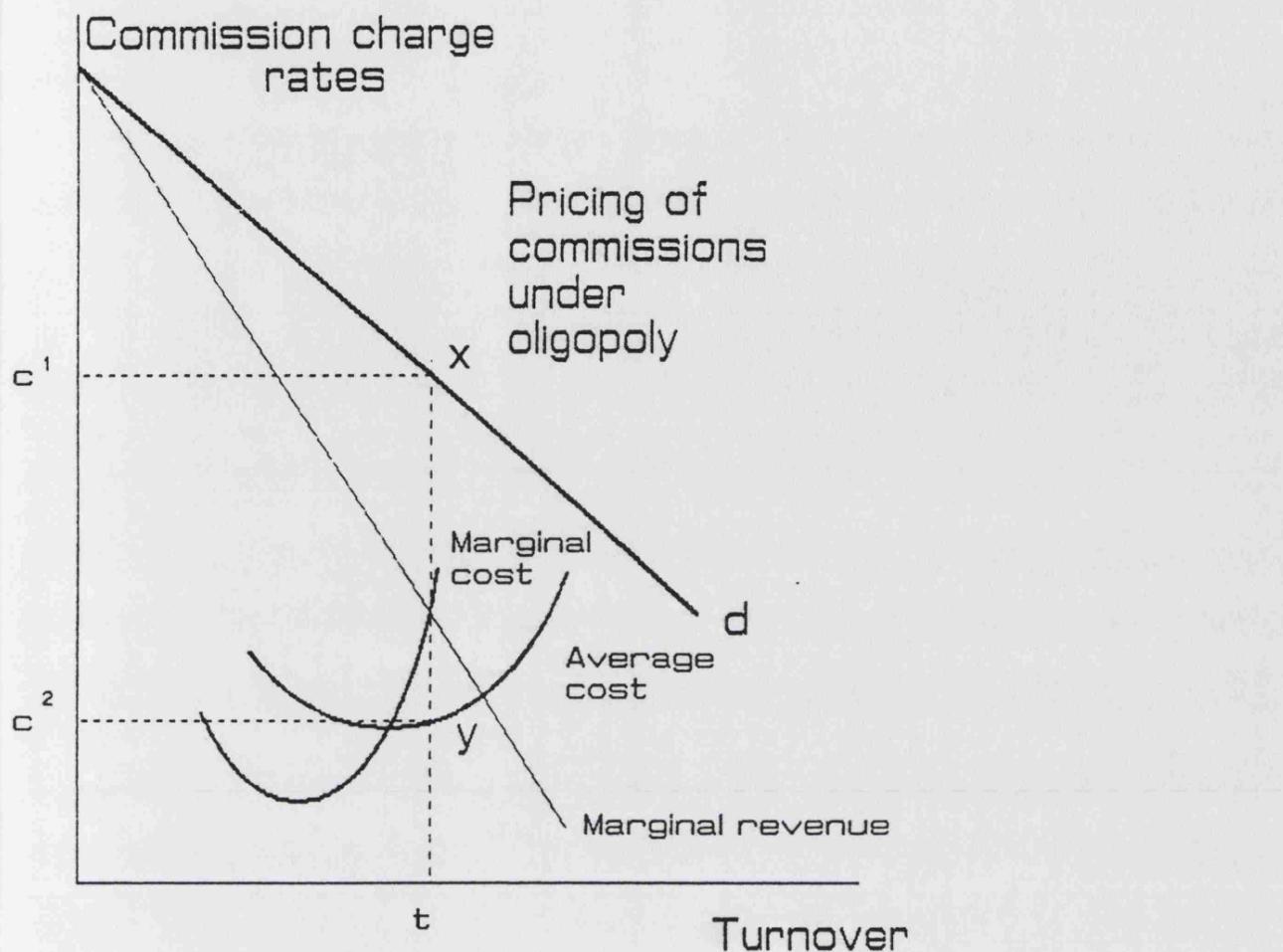
The model is based on the difference between observed demand, the locus d^0d^0 in Figure 1. and hypothetical demand dd^h for a firm's product, the hypothetical component being a firm's estimation of demand for its product provided competitors do not change their prices. This demand will not be perfectly elastic, even in the presence of a large number of firms, because of the ability to differentiate products and for price changes to have an impact that is imperceptible at the level of the industry. A price p_1 is therefore adopted, equating marginal cost with marginal revenue on dd^h .

All firms rationally follow suit, causing output to fall from Q_1 to Q_2 at price p_1 on the observed demand curve. The hypothetical demand curve has now shifted to $d_1^h d_1^h$. Equilibrium is only achieved where the hypothetical marginal revenue curve intercepts the marginal cost curve and $d_1^h d_1^h$ crosses d^0d^0 .

This equilibrium may be seen to be unstable however, since it will not be maintained if the intercept price at $d_1^h d_1^h$, d^0d^0 is above or below average cost at this point, entraining gains that can be competed for by new entrants or losses that will force eventual exit from the industry.

A long run equilibrium is only furnished by exits and entries yielding the solution seen in Figure 2. where average cost, individual firms' hypothetical demand and observable demand all meet at a point which must, by construction, be a tangent to the average cost curve at an output level less than that which would yield minimum average cost.

Figure 2: THE LONG RUN



We therefore expect to observe competition characterised by discretionary pricing, with exits and entries leading to the formation of a stable stockbroking 'industry' over a sufficiently long period undisturbed by shocks or strong exogenous influences.

Where pricing is not discretionary in the short run, in other words where a regime of fixed commission rates obtains and is effectively enforced, then nonprice competition based on services may be expected. This has been demonstrated by Shepard [1975] in the case of the US securities brokerage industry based around the New York Stock Exchange. The economic loss of efficiency involved was expressed in the form of a range of service provision which tended to exceed the requirements of many clients. The system was of course swept away in the major 1975 reform which subsequently served as a model for London and others.

5.2: Dealership versus auction markets and the role of market making

5.2.1.: Price Discovery

We follow Schreiber and Schwarz in Amihud, Ho and Schwarz [1985] p.19, and many others in maintaining that price discovery is the primary function of a securities market, and that the physical processes of matching buy and sell orders merely show by their complexity that it is no simple matter to find the correct price at which trading should take place. Trading arrangements should be seen as an important ancillary to the price discovery process. Excessive competition, for example, can induce traders to break up the flow of orders to hide the information it is capable of revealing, so making it difficult for the true market-clearing price to be found.

Efficient price discovery is important because trading costs and the variability of demand from investors cause the prices at which markets clear to vary unceasingly. Transactions priced on the basis of order flow will not in general reflect equilibrium values. Schreiber and Schwarz [1985] show for example that short period price changes within a single trading day would significantly alter the rate of return on a stock held for one year, according to when, during the trading day, it was traded at each end of the holding period. The effect, commonly plus or minus 10% on the return over the year, is well outside what would be expected from a normal, information induced change.

Ho, Schwarz and Whitcomb [1985] produce results suggesting that theoretically desirable equilibrium prices can only be achieved over an extended trading period, either continuous or passing through a number of rounds. Effective price discovery is nevertheless indispensable, because equities do not have any intrinsic value derived from elsewhere. Investor demand for different risk/return classes is not stable and trading is not a friction-free process. Continuity of trading, low transaction costs and easily available information are therefore all equally important attributes of any market. This conclusion is broadly supported by the present research as well as anecdotal evidence from many financial centres. For instance the relationship between individual stock returns and the market index is usually strong when measured at monthly or longer intervals, but becomes progressively weaker as shorter time intervals are selected, suggesting that time is required to establish a correct price.

Bagehot [1971] was the first to analyse market microstructure from an economic point of view and also the first to make the distinction between information and liquidity trading. The rôle of the specialist

in US markets is interesting, since variants of this role are to be found in European markets, albeit informally and in fragmented forms in most cases. The specialist may:

- (1) set the spread, but provide immediacy only as a passive accepter of orders at the quoted price (see also Demsetz [1968]).
- (2) as an entrepreneur making profit at the expense of liquidity traders and losing out to informed traders (see also Copeland and Galai [1983]).
- (3) as an inventory trader for whom the spread is an opportunity to improve the inventory position towards an optimal value (see also Smidt [1971]).

This group of perspectives is also discussed by Barnea [1975] and puts the dealer in control of spreads and the provision of liquidity to the market. In this study we are less concerned with inventory considerations than with the existence of limit orders. This is because, under European conditions, dealing inventory is difficult to distinguish from portfolio holdings by the major banks. The use of public limit orders to provide competition, although less well developed than in the US, is a more practical policy option than that of a system of specialist inventory-holding quasi-monopolist dealers. Public limit orders are also an information-oriented, transparency-increasing measure. Techniques and systems rather than privileged participants also represent movement in the direction of process and away from institutions, argued for elsewhere.

5.2.2 Liquidity, immediacy and inventory

Considering markets which are not well supported by trading, Schreiber and Schwarz [1985] give three definitions of illiquidity, all linked to the reasonableness of established prices:

1. Where price volatility renders the convertibility of an asset into cash uncertain.
2. Where an investor with large holdings cannot change his or her position without moving the price.
3. Where actual market prices do not bear a consistent relation to those that would prevail if trading were frictionless, that is to say without transactions costs, information costs or inventory costs.

The last of the above definitions applies to the market as a whole.

The first two apply to individual stocks.

Schreiber and Schwarz [1985] further show that market design influences the degree to which prices approach equilibrium, largely through the extent to which markets create liquidity, as defined by the liquidity ratio, namely the value of shares traded for every one per cent change in the share's price. The larger is this ratio, the more liquid the market may be considered to be. This is purely a demand and supply ratio however and says nothing about price movements induced by information. If new information arrives, the number of trades required to move the market to a new price level is a measure of efficiency. The fewer the trades required to move the price to its new value, the more informationally efficient is that market. The liquidity ratio is thus to some extent only a measure of the degree of

instability of prices and has therefore to be treated with some caution according to the circumstances which apply and the use to which it is put.

A market maker supplies immediacy as defined by Demsetz [1968] when he or she offers prices without seeing orders. This implies the market maker taking risk and holding inventory, a service paid for in the bid-ask spread. Cohen, Maier, Schwarz and Whitcomb (CMSW) [1979] have reviewed the literature on market makers as suppliers of immediacy. Amihud and Mendelson [1980] and Mildenstein and Schleef [1983] and others demonstrate that a market maker's price setting is largely based on inventory considerations. Stoll [1978a] and Ho and Stoll [1981] view inventory as a portfolio held unwillingly and although the size of the spread is largely independent of the inventory position, it does reflect return variance in the stocks held. It is therefore a reward for risk taking in inventory. The spread is also influenced by the information asymmetries already described in Section 3.3.3 and further discussed in the next section.

5.2.3 Market structures

Biais [1993] has analysed the structure of fragmented (telephone and electronic) markets and their centralised (floor or pit with open outcry) counterparts for differences in price formation, liquidity and numbers of dealers. In centralised markets the traders are market makers or processors of limit orders, whereas in fragmented markets they are dealers. Following Ho [1983] and Ho and Stoll [1984] it is considered that, in centralised markets, dealers can observe their colleagues' trades and infer their inventories with some accuracy. In a fragmented market, even where the quotes displayed are firm (in SEAQ alpha stocks, French OAT bonds and NASDAQ equities for example) it is not actually possible to infer the prices at which trades take place,

since they may be negotiated over the telephone within the quoted spread. It is also difficult to use behavioural cues such as level of activity to infer selling or buying pressure dictated by the need to optimise inventories for the prevailing market conditions. For example, an informed trader in an open outcry market can see his or her price immediately 'shaved' by a not necessarily well-informed neighbour (this is the reason that the 'tick', a well defined minimum price step, is used to protect specialist dealers from fine undercutting on the New York Stock Exchange), whereas the telephone trader cannot be so observed.

Schreiber and Schwarz [1985] also discuss the consolidation of order flow, meaning, in effect, the exposure of all orders to the market, in the context of the NYSE specialist system. We must ask whether consolidation is possible and desirable without specialists. The question is an important one for small European markets since (a) the number of markets with specialists is small and diminishing and (b) the tradition of a market, or that of its neighbours or advisers involved in setting up new trading arrangements, may render a system of specialists unacceptable, whatever its merits. It may well also be the case that specialists impose more costs than they generate benefits. The alternative is the full and clear exposure of the order flow on trading screens, perhaps accompanied by additional analysis of trends and movement summaries.

Ho and Macris [1985] point out that the dealer-based NASDAQ market making system is greatly different from that operated on most European exchanges. Against the obvious benefit of the ability of dealers to enter and leave the market without hindrance and for stocks to be traded by one or more dealers, equally for individual dealers to deal

in any number of stocks they wish, must be set the basic trading rule of the NASDAQ system that dealers must offer firm quotes on any orders coming to them. Thus the basis of competition is the capture of order flow. It may be argued that competition based on the capture of order flow in smaller national markets may lead to the same problem that exists there already, namely its retention by large financial institutions able to benefit from trading both on the knowledge gained from the order flow and by such techniques as recouping on a manipulated spread what is lost on a shaved commission, and vice versa. Ho and Macris also point out that the float in a stock, usually determined by corporate management at the time of issue, is an important determinant of the stock's trading characteristics. Competition based on order flow capture would naturally tend to focus on the heavily traded stocks with a large float, leading to the neglect of others.

NASDAQ market makers bear costs that auction dealers do not, in particular inventory. As well as the financing cost of holding inventory, dealers must bear the price risk of unanticipated price changes and must be prepared to offer quotes to other traders and to investors who are better informed than they are, and who will trade against the market maker. Time is the fundamental determinant of inventory cost and the thinner the market, the longer a dealer will take to turn over his or her inventory. This is a severe inhibiting factor on small dealers thinking of trading thin stocks. In a large enough market, dealers can control excess or inadequate inventory by dealing with each other. Market makers can protect themselves against the vagaries of the order flow by limiting the size of the transactions they are prepared to entertain at the current quote and,

by adjusting the quote as required, avoid having too much or too little stock on their books. These are unlikely to be available options in a very small market, or may put small dealers in debt to large portfolio-holding institutions who are also competing as dealers as is the case with European banks. Inventory costs, particularly in the presence of asymmetric information, have been examined in detail by Glosten and Milgrom [1982] and Copeland and Galai [1983].

What of auction markets? The periodic call auction has been the most typical market in Europe before the reforms and technological changes of the late 1980s. Their form and evolution is examined in Chapters 7-10. Until work on the microstructure of markets began to reveal extra complexities, the marketmaker in an auction market was assumed to be a Walrasian auctioneer with sufficient information to ensure that transaction prices were set equal to fundamental prices. In other words, between the beginning and the end of a trading session prices might fluctuate with dealing activity but at the end would remain unchanged at the fundamental price in the absence of new information.

At one extreme of the call auction market is the automatic order processing system, where the market maker is in effect a computer collating orders. Such a market has been analysed by Ho, Schwarz and Whitcomb [1985] (HSW), who show that, because orders arrive anonymously and are batched without public disclosure; because recontracting cannot occur; because additional orders to balance the market cannot be solicited and because the market maker cannot enter orders for his or her own account, this type of market can generate trading strategies that may induce increased price instability. In other words transaction prices may deviate increasingly from fundamental prices. Both of the preceding examples also fail to take

account of the rational expectations equilibrium (Grossman [1981], where, because the market price aggregates all available information, the fact of being able to observe the resultant price causes investors to want to trade again. The market may have cleared on the first auction, but it has generated the desire to trade again. Recontracting is the key problem of periodic call auction markets. The disclosure of orders as they are submitted would help traders to work out the likely market clearing price and possibly place additional orders. The problem created by this possibility however is that everyone, in wishing to see everyone else's orders, would wait until the last possible moment before placing their own. As a third possibility, if the marketmaker is an involved auctioneer, able to accumulate orders and observe imbalances, then it is possible for such an auctioneer to use the advantage of seeing the order flow to ensure that imbalances are eliminated. In practice however this is done by allowing the marketmaker to trade for his or her own account. The ability to do this profitably creates once again competition for order flow, leading potentially to its capture by one or more of a small group of powerful financial institutions.

If trading is continuous, the information contained in price changes is made available to the market at all times and recontracting can occur at will. Ho and Stoll [1983] show that limit orders placed by investors in possession of information in a market where there is no market maker in effect carry out the same function as the bid and ask spread in a dealership market.

A periodic call auction may provide a disincentive to increased trading volume by the mechanical nature of its operation. For example, in several markets, such as Zurich until recent (1994) reforms,

multiple trading rings are required to divide the market into manageable segments. Brokers need to deploy more floor personnel; a problem mentioned during interviews in Lisbon; and there is a general lack of apparent immediacy in trading. A possible merit of periodic call is the use of delay to ensure that information is revealed in the prior placement of orders. An example of this is when, in continuous markets, a severe imbalance of orders suspected to be caused by information asymmetry occasions a trading halt and initiates a call auction at the restart. It is notable however that, in practice, markets such as Copenhagen which have adopted continuous double sided auction, without market makers, in association with the introduction of electronic trading, rarely if ever have need for trading halts. Quantum turnover volume increases have also occurred following the move to continuous trading.

A market maker may be considered an active price stabiliser if his or her behaviour is to anticipate price trends and trade ahead of them, thus moving the price towards the (anticipated) correct fundamental value. Stoll [1976] found that in general market makers did not behave as active price stabilisers. The somewhat different view that market makers are destabilising (see, for example, Ney, [1970]) is a popular view rather than one supported by research, or indeed regulatory policy. It finds some echo in the practice of many exchanges, including newly formed ones in central Europe, to limit price movements within the day, typically to 5% or 10%. For reasons of viability in the markets considered in this study we are inclined to prefer a fully transparent continuous auction market with a public limit order book and no market makers. Here traders possessing varying amounts of information trade against each other and the implied spread is represented by the prices bid and offered stated in limit orders.

5.3: The behaviour of investors

There have been many attempts to explain investor behaviour at the theoretical level. In Chapter 4 an attempt was made to demonstrate one aspect of investor behaviour, namely the propensity to trade itself. More complete approaches have used utility theory. Utility theory (Von Neumann and Morgenstern [1947]) proceeds from the assertion that investors are risk-averse, wealth-maximizing, rational and able to compute the choices before them, however complicated the probability structures upon which they are predicated. Empirical research discussed below has tended to show that support can be found only for the first two attributes.

5.3.1. The Wharton Survey

Blume and Friend [1978] were commissioned by the Twentieth Century Fund to study the investment patterns of individual US retail investors. The survey analysis is still well-regarded today (Nagy and Obenberger [1994]) but predates a great deal of work in Behavioural Finance (see Kahnemann and Tversky [1979, 1982] and Statman and Caldwell [1987] as well as utility theory based empirical studies such as Baker, Hargrove and Haslem [1977]).

Blume and Friend show that analyses of market aggregates and the price behaviour of individual issues going back as far as 1928 carried out as part of their study show no evidence of the growing role of institutions affecting market efficiency and no particular economic reason for encouraging greater relative participation by the individual investor. A direct 'classical' utility-based wealth maximisation motive underlying most investor behaviour is established.

This evidence of shareholders' behaviour and intentions is confirmed in a more recent survey of retail investors by Nagy and Obenberger [1994], based on information from 137 experienced retail investors with holdings in Fortune 500 firms, who responded to a detailed questionnaire asking for direct responses to developments in 34 investment variables classified as to "act upon", "consider" or have "no influence". Wealth maximising factors predominated over behavioural factors as the focus of investors' attention.

In the Wharton survey 45% of respondents used earnings volatility as their measure of stock risk while 30% used price volatility. The authors note that this is at odds with the normal academic studies which typically rely on past price fluctuations or on market returns to measure risk. Investors seem to rely more heavily on past earnings volatility for this purpose. It is evident however that private investors do not like fluctuations. 65% of respondents said they would be less likely to buy or hold a stock that fluctuated a great deal for no discernable reason. Upward movements would have much less effect on their opinion than downward movements. The SEC measures volatility within a month by the interquartile range of the percentage changes in the value of the market as defined by the daily close of Standard and Poors Composite Index (op.cit. p.161).

The authors of the Wharton Survey work also find that institutions are generally loath to exercise influence over management and prefer to sell out if they dislike a situation; still an important current issue.

5.3.2: Spatial preference in equity investment

The tendency for equity investors in particular to possess a natural spatial preference is referred to in the empirical part of this study as their 'horizon', since this was the term used in discussion with interviewees. This natural hypothesis was confirmed by the responses received and indeed regarded as a perfectly ordinary and accepted phenomenon, used among other things for promoting wider share ownership with slogans analogous to 'I'm backing Britain'. In the financial markets literature the phenomenon is termed 'home bias' but has resisted a number of attempts to account for it in economic, informational or market structure terms.

Cooper and Kaplanis [1994] review the evidence and construct a model of their own, with negative results. They find that home bias cannot be accounted for by two of the principal candidates, inflation hedging (Adler and Dumas [1983] and Stulz [1981a]) or the costs of international investment (Black [1974], Stulz [1981b], Cooper and Kaplanis [1986]). The authors directly tested observable portfolio holdings against the predictions of a model in which investors in many countries attempt to maximise returns using a portfolio which includes a component to hedge domestic inflation. Inflation risk, induced in part because investors in different countries are constrained to consume different bundles of goods, is expressed as deviation of the exchange rate of a currency from purchasing power parity (PPP).

Earlier contributors to the literature (Eldor, Pines and Schwarz [1988] and Stockman and Dellas [1989]) considered the rôle of non-traded goods in inducing investors to adopt a home bias as protection against price uncertainty in this sector. French and Poterba [1991] assume greater 'optimism' on the part of domestic as against foreign investors. This factor certainly has some support from the empirical

research carried out for the present study: not generally expressed as 'optimism', but as 'greater certainty' about how to evaluate good or bad news emanating from firms and information-producing agencies.

Statman and Caldwell [1987] have shown that properly diversified portfolios with significant home bias can nevertheless earn similar returns to the universal 'market' portfolio. Table (1) summarises empirical data from a number of countries and indicates the importance of the phenomenon.

Table 1. HOME BIAS IN NATIONAL EQUITY PORTFOLIOS

COUNTRY DOMESTIC	MARKET CAPITALISATION AS A PERCENTAGE OF TOTAL as at December 1987	PERCENTAGE OF EQUITY PORTFOLIO IN EQUITY
France	2.6	64.4
Italy	1.9	91.0
Japan	43.7	86.7
Spain	1.1	94.2
Sweden	0.8	100.0
UK	10.3	78.5
USA	36.4	98.0
Germany	3.2	75.4
TOTAL	100.0	

source: Cooper and Kaplanis [1994]

5.3.3.: Investor preferences, life cycles and risk aversion

A conjectural 'investor's life-cycle' model for the generation of trading volume was developed in Chapter 4. Supporting empirical evidence is supplied by Cohn, Lewellen, Lease and Schlarbaum [1975] who find that in general risk aversion increases with the wealth of investors. LeBaron, Farrelly and Gula [1992] have since found a wider

range of factors that might be responsible, not all of them rational in a utility or wealth-maximising sense, but commonsensical in the context of the investor's individual circumstances. Barnewell [1987] offers a psychographic explanation of investor behaviour while Warren, Stevens and McConkey [1990] consider demographic and lifestyle factors. Both are perhaps difficult to translate to a non-North-American environment. Riley and Chow [1992] come closest to the rationale espoused in the extended Huffman model of Chapter 4. They conclude that increasing income, wealth, age and education all contribute to a lowering of risk aversion. Once investors have reached the goal of satisfying their consumption needs, represented by the convergence of consumption to a stable level in the model of Chapter 4., they may be considered free to consider the longer term, including transfer to the next generation. Gunthorpe and Levy [1994] provide support for this proposition, finding that optimal portfolios change "drastically and systematically with changes in holding period" (op. cit. p. 51.). The further out the investor's horizon, the greater is the proportion of low-risk assets that should be incorporated in the portfolio, even if, in a strict analysis, returns are held to be independent over time and stationary.

5.4: Evidence and models from European securities markets

In this section we seek to bridge the gap between the focus of the literature and that of the empirical research. In doing so it has proved necessary to create several new models of market structure and behaviour that may be held to characterise the evolution of European securities markets specifically.

If European markets as a whole, or particular individual centres, offered a radically different profile, that would constitute an

opportunity to diversify away risk or earn excess returns. The iron law of markets, that gains are traded away and cannot subsist once known about, would obtain. The centre involved would suffer or benefit from investor attention until its returns were roughly in line with others, all relevant factors (such as tax, local inflation and currency parities) being equal. This is what is, in fact, observed.

We first review the evidence for returns generation, then, in section 5.4.2, discuss international investor interest followed by large-scale phenomena such as convergence and European regulatory integration, Euromarkets and international equity issues. Throughout, some examples are drawn from the London market but, as is made clear, only where relevant to smaller markets. London cannot be considered, for most purposes, a typical European market. In section 5.4.3, the prospective influence of financial innovation is briefly reviewed.

Section 5.4.4 onward is devoted to discussion of terminology, definitions and models which have proved useful in the empirical work of Part II.

5.4.1: Phenomena and evolution of European markets.

A comprehensive review of the behaviour of European markets is to be found in Hawanini and Michel (1984). Many of the surveys reported there employ data from the 1970s and earlier when, as has been clearly shown elsewhere, the whole climate of securities trading was different. Paradoxically this is of little importance however. Hawanini and Michel confirm that as regards prices and returns generation, the behaviour of European markets is surprisingly similar to that of American markets. In particular they are informationally efficient, often exhibiting strong-form efficiency as well as

responding similarly to American markets in tests against standard asset pricing models. Later studies continue to confirm these basic results.

Hawanini and Michel thus establish that there is probably not a great deal more to be learned by further geographical extension of price and returns behaviour studies. They are reticent on volume however, leaving the field clear for efforts to secure a satisfactory explanation of the great general increase in trading volume and volatility observed in the 1980s.

The Capital Asset Pricing Model (CAPM) cannot be rejected for European markets, but "the evidence in favour of this pricing model is usually rather weak" (op. cit. p.11). On the other hand the leptokurtic distribution of stock prices, held anyway by other authors to be evidence for underlying weakness in the CAPM is entirely similar to that on the NYSE. Hence investors should be expected:

- (a) to behave rationally in seeking to maximise returns in line with expectations formed partly out of price information, and/or,
- (b) to exhibit 'herd' characteristics and short term speculative behaviour leading to the formation of bubbles and periodic collapses, and/or,
- (c) to exhibit a mixture of all these things plus elements of dynamic response to prior period outcomes and 'market memory' phenomena.

Hawanini and Michel find it a "peculiar situation" (op. cit. p.54) that banks in Europe have simultaneous access to both markets and

information about their customers that could be useful in investment decision making. In purely numerical terms American practice in separating banking from securities trading is in fact the more peculiar phenomenon, but the difference has enormous implications for comparisons of market structure and behaviour, as well as for policy models of markets suitable for emerging economies.

Section 5.4.2: Large-scale market evolution

We now examine larger scale evolutionary processes affecting securities markets in Europe. With one exception they tend to act in the direction of deregulation and de-restriction at the national level. The exception is the European Commission Directives that affect all markets, but not equally. Of the markets considered in this study, those not already European Union members or candidate members, have all expressed an interest in eventual EU membership. Prospective candidates have tended to behave in approximately the same way as existing or candidate members, modelling their policies on the requirements they hope eventually to have to meet.

5.4.2.1: Foreign interest in European markets

A particular reason for increased international interest in smaller European markets lies in their relatively low levels of informational efficiency. With the stubborn exception of so-called 'time-arbitrage' – the ability to exploit known differences in the volume of activity, and hence information that affects prices, at various times of day, after trading breaks (Goodhart, [1988]) and seasonally – there remain few opportunities to exploit inefficiencies in the dissemination of information in larger markets. The introduction of new instruments

that are, for a time, imperfectly understood, even within efficient markets, has offered opportunities to exploit informational inefficiencies, but opportunities to develop new instruments in existing established markets have now largely been exploited. Even leasing and student loans receivables have been securitised and ever-wider ranges of derivative instruments continue to appear (ECON [1993]/2). The *overall* relatively inefficient developing markets now create the best circumstances for sophisticated foreign investors to compete for excess returns based on superior powers of information processing and analysis.

In moving the focus from large, mainly north American markets to small European ones it is necessary to identify the level at which 'the market' is pitched for the purpose of identifying risk diversification opportunities. The components of systematic risk can be analysed by using multiple indexes. These may represent world markets, country markets or international industry sectors (Furstenberg and Jeon, [1989]; Grinold, Rudd and Stefek, [1989]). Of particular interest to the present study is the behaviour of stock returns at the individual country and European levels. Herrera (Herrera [1992a], [1992b]) analysed a diversified sample portfolio of 340 European shares for their monthly returns in the period June 1981 to March 1991. Using standard indexes restated to give equal weight to all shares represented, variance in the portfolio returns were explained as to 34% by individual country effects, 28% by Europe-wide effects, 29% by world market effects and only 9% by European-level industry effects. The implication of this result is that industrial sector analysis is not of great benefit in selecting stocks (although fundamental analysis at the individual company level remains an important

underpinning for the selection of individual stocks. The size of the European component may be expected to grow at the expense of the country component as economic integration proceeds.

5.4.2.2: Convergence

One way of obtaining evidence for increasing levels of integration and convergence among European markets is to study the relationship between domestic and 'offshore' interest rates. Under the parity theory of interest rates (see, for example, Shapiro [1992]), perfect capital mobility between countries will ensure that returns are equated between domestic and foreign investments when denominated in a common currency. Such a measurement is possible due to the existence of the Euromarkets, allowing the yield on a Eurocurrency deposit and a domestic money market deposit to be compared. Any yield difference is a measure of the extent of divergence. This analysis has been performed by Aylward [1992] for a range of countries for the period 1985–1991: in summary they show steady convergence among the main EU economies and their satellites (such as Belgium and Holland) with Switzerland and the United Kingdom the exceptions. Aylward also applies the test of stock market correlations of daily returns for sample periods within the same general time span. Again, without citing the detailed results, correlations are shown to increase significantly, arguing for a considerable and continuing increase in the level of capital mobility within Europe as a whole. These results however predate a period of general turbulence culminating in Britain's departure from the European Exchange Rate Mechanism in 1992 and a subsequent debate about the structure, pace and direction of integrated economic policymaking which has not been restricted to the United Kingdom.

Weakness in correlations between markets, coupled with the availability of higher returns in higher-risk reforming and developing economies, in principle offers opportunities for international investors to choose portfolios that earn better returns, but, due to the scope for further diversification held out by weak correlations between markets, at no greater risk. The increase in returns has been estimated at around one percentage point on an equity portfolio that adds 20% of emerging market stocks to its fully diversified 'major market' holdings (ECON [1993]/1). Given that, in 1991, American investors held only 0.5% of their equity portfolios in all emerging markets taken together, the scope for intervention in small European markets over the medium term would appear to be large.

5.4.2.3: The Euromarkets

The history and broad features of the mature, London-based Eurobond market are well-known and are not described here in detail. The recent evolution of the whole Euro-market is however of interest as an example of the extent to which a minimally regulated international market can develop both a secure and reliable trading structure and an increasingly intricate range of products and facilities: in 1992 it allowed \$279 billion to be raised in 15 currencies by institutions located in 40 countries, not, of course, restricted to Europe.

The Euro-markets may be viewed as a growing threat to national primary and secondary bond markets to the extent that cost and flexibility advantages now permit smaller and smaller issues while differential regulatory burdens remain a problem in single countries.

5.4.2.4: International Equity Markets

The evolution of an international primary equity market to parallel that of the Euro debt markets has yet to begin in earnest. Precursor developments such as the extension of NASDAQ to European equities in a single country, coupled with appropriate developments in global settlement and custody services are in the pipeline. As to actual current developments, global equity issues have already been established by the expedient of issuing multiple listed tranches on different national exchanges under the general supervision of a lead manager for the whole issue. Global Depository Receipts (GDRs), on the lines of the American Depository Receipts (ADRs) long used by European companies on US markets, have now made their appearance, providing a half-way house to truly international equity issues. Although new equity capital now flows across national borders at increasing rates, firm and market size considerations probably ensure that it will not prove a serious threat to smaller national markets in the foreseeable future. The very large firms interested in global issues are mostly unable to raise their requirements in any one market, at least without serious price distortion. And smaller companies are affected by spatial considerations - the investment 'horizon' within which they are known and accepted by investors and outside of which they are invisible to all but professional analysts operating mainly in secondary markets.

5.4.2.5: European Commission Directives

Directives are alluded to here only briefly in the interests of a complete discussion.

The Large Exposures Directive is regarded by the securities industry as a regulatory response to pressure from the banking industry, forcing financial institutions capable of handling large issues to comply with capital adequacy requirements on the same scale as for the banks themselves: it is therefore of some interest as a competition issue.

The Admission Directive sets out terms for the coordination of minimum admission requirements for companies to obtain an official stock exchange listing. The Listing Particulars Directive lays down a range of disclosure requirements according to the type of security for which a listing is sought. The directive gains particular force from a frequent national requirement for large investing institutions to maintain a major proportion of their assets in the form of officially listed securities.

The Public Offer Prospectus Directive defines the disclosure requirements for offerings of unlisted securities. It is, however, set about with numerous exceptions. This and the Listing Particulars Directive embody the idea of mutual recognition, whereby approval in one member state is held to satisfy the requirements of all others, at least in principle.

The Investment Services Directive governs the behaviour of financial intermediaries.

5.4.2.6: Group of 30 Standards

The group of 30 is a respected, self-appointed body of bankers which has taken the initiative in specifying improvements to international securities trading and settlement. Of most significance to smaller national exchanges is the pressure the Group of 30 has exerted for more rapid settlement, based on the T+1 standard (settlement one day after conclusion of a bargain). More rapid settlement, together with the increasing levels of technology required for communication, trading and administration nationally and internationally, has variously reinforced reform and put pressure on traditional broking firms as reported in Chapters 7-10.

5.4.2.7: Corporate finance and the economic and market cycle

In European markets the 'startup/grow/float/cash-in' cycle extolled in US business mythology is simply nonexistent. This fact changes the corporate finance landscape in its entirety. We concentrate however on effects that may be expected to be observed in capital markets.

After a recessionary trough has passed, gearing can safely be increased and loans or bonds preferred to equity. Near the top of the cycle the reverse applies (ECON [1991]/1). The evidence shows that initial public offerings (IPOs) of equity are historically more likely to be successful from the issuer's point of view, near the top of the financial market cycle than elsewhere (Loughran and Ritter [1993]). This occurs usually, but not always, before the top of the economic activity cycle, and towards the end of a so-called bull market phase. Most countries of Europe exhibit the same pattern with long periods of virtually total inactivity in between. In the absence of a national

stock market to signal turning points, the pricing and timing of debt and equity issues to meet real business requirements is difficult. On the other hand the long new issue dry periods between corresponding cycle points are a major factor in reducing the viability of individual equity markets. Given the frequency of reform, new bursts of activity often take place under different rules to those which prevailed during the preceding period, leading to uncertainty about the duration, strength and stability of the new market run. Equally, discontinuity privileges institutions able to benefit from upsurges of activity when they occur, but whose survival is not at risk from periods of stagnation because they have other activities. In general this means banks.

Banks may also take a different view of the amount and circumstances under which they would encourage smaller clients to issue equity, in which they may participate, according to the likely degree of liquidity if the share is/will be quoted. Banks may inhibit liquidity in stock markets by smothering other participants and this very lack of liquidity may well then also inhibit them from supporting customers in equity issues.

Banks are also inclined to favour arcane capital structures that dilute the influence of shareholders. Price differences occur between companies with complex capital structures and those with simple ones, favouring the latter (FINT [1993/1]). Attempts to simplify capital structures thus give rise to price changes in the shares affected.

5.4.3: Financial innovation

The role of derivatives markets has widened dramatically since the bulk of the research for this study was carried out, although only a short time span is involved. In this section we briefly consider the implications of financial innovation and derivative markets in particular for the future of smaller European capital markets on the basis of indirect evidence.

Miller [1991] conducts a discussion of financial innovation in terms that are extremely relevant to the survival and development of securities markets as business organisations, dependent on the generation of "transactions, clearing and settlement services to the customers at prices remunerative to the exchange's members" (op. cit., p viii). Miller identifies the source of most innovation as the incentive to avoid regulatory and tax burdens by redefining or relocating a source of income by appropriate new instruments and transactions with the general effect of permitting what was formerly restricted and/or attracting a lower incidence of tax than would otherwise be the case. The stream of opportunities can be expected to remain inexhaustible as the authorities respond by changing the tax and regulatory structure in the "regulatory dialectic" (Kane [1986]). Indeed, the opportunities offered by regulatory and tax changes can be construed as an ongoing subsidy to financial markets, in the form of the gains or tax savings made by their clients as instruments are devised to avoid them.

Miller also offers a definition of *significant* innovations as those that "continue to grow, sometimes very substantially, after their

initiating force has been removed". Examples, such as foreign participation in Iberian bond markets are cited elsewhere in this study.

The demand for immediacy, as opposed to mere liquidity, is an important factor in determining whether a market has a future. Immediacy was discussed in section 5.2.2. and there defined as the ability to buy or sell a security immediately rather than waiting for a counterparty to be found, implying that dealers will set a price without seeing orders. The desire to buy or sell itself is motivated by a 'liquidity event' (Miller, op. cit. p25), namely the perception that actual holdings deviate from desired holdings in some way. The demand for immediacy depends on the volatility of prices and the extent to which the risk of an unanticipated price move can be diversified. The suppliers of immediacy are the marketmakers who are better able than the individual investor to diversify the risk of holding a security whose price may change: they are thus in a position to make net gains by, in general, selling at a better price than they offered to the investor.

Liquidity in the service of immediacy allows markets to be analysed using their level of need for immediacy (i.e. the risk of price volatility during the period a final buyer or seller might expect to wait to find a counterparty). Immediacy is the criterion against which the degree of liquidity actually supplied is measured.

5.4.3.1: Index futures contracts

Constructing a portfolio is only incidentally to do with the specific equity stocks included in it. The objective of stock selection (except for some specialised professional 'stock-pickers' who, even if

successful, must always remain a minority) is to reduce the level of risk. Portfolio construction then reduces merely to a choice of the equity and debt proportion at any one time, in turn governed by a view of the ongoing relationship between interest rates and levels of business activity. A mechanism to facilitate the necessary trading without dealing directly in a suitably wide range of stocks is of course the index futures contract. It is thus not surprising that volumes in the index futures market have increased enormously and that, as Miller points out, "transactions undertaken in response to anticipated (or feared) changes in the immediate macroeconomic environment..now tend to be directed to the index futures market rather than the stock market."

For smaller European stock markets the opportunity to benefit from extra turnover volume and, for national economies, the possible welfare gain from an additional sensitive indicator of short term economic and business prospects has not in fact been missed. All the markets surveyed in this study now have formal or informal derivative markets alongside them. Sometimes, as in the case of Lisbon they have been formally launched as a major high-risk investment for the participants - in the Portuguese case the whole future of the Oporto exchange has been wagered.

A serious objection to the existence of traded options and futures markets is the possibility to create so-called portfolio insurance, i.e. risk reduction, strategies. The construction of these strategies is not considered here, only the potential effects are significant. Many commentators hold that strategies to limit the downside risk in portfolios by complex put and call arrangements automatically generate trading patterns that reinforce any pre-existing market price

movement, particularly in view of the fact that such strategies involve program trading and timing rules that operate automatically to produce 'herd' effects – that is to say, positive serial correlation in securities transactions. The issue is largely unresolved and currently the subject of regulatory initiatives in many parts of the world.

5.5: Towards a balanced ecology of market participants

In this section we develop several definitions and models that will be useful to describe, analyse and draw conclusions about the markets considered in Part II as well as to illuminate the final summary and conclusions in Part III.

5.5.1: Market structure and dealing practice

The small size of many domestic markets can result in severe damage to their infrastructure or virtual extinction as a quite common result of a change in trading conditions. This, in principle, requires continuous attention from public policymakers wherever the market participants do not have a direct interest in the future of the market themselves. Markets need to be structured so as to ensure that their governing institutions are populated by agents whose main interest is in the maintenance of a viable, valid market.

Two classes of agent may be defined for this purpose:

1. A market-dependent firm is defined as one whose existence is dependent upon sustained trading activity in securities markets.

The definition includes institutions who conduct other business than securities trading, but only where the continuance of trading activity is entirely dependent on profitability, without cross subsidy, and would be discontinued if regular trading losses were to be incurred.

2. A market-independent institution is one with substantial business interests other than securities trading, able to subsidise trading losses, willing to accept them in order to remain in the market, and capable of using resources generated elsewhere maintain or improve its competitive position.

This usage contrasts with the conventional appellation of 'independent broker', applied to firms who are not part of a more broadly based financial institution. Such brokers are typically anything but independent in the sense that they exist only where trading conditions permit them to earn a living.

Simply insisting that brokers handle every transaction may protect the species but destroy the habitat. In the Dutch market for example, the practice, prior to the September 1994 reform of market trading rules, of passing practically all transactions through the 'hoekmen', or specialists, many of whom were poorly capitalised, was widely held to have been responsible for poor liquidity, high transaction costs and consequent diversion of trading volume to London. The reform in fact concentrated on reducing the number of 'hoekmen', not entirely unopposed since the changes effectively eliminated the breed, in order to create an effective group of market makers on London lines, with capital resources sufficient to support their book. (FINT [1994]/1).

The above given definitions of market-dependent and market-independent participants are maintained throughout the rest of the thesis for the purpose of considering arguments and evidence related to the rôles of these parties in maintaining viability and validity in their national market.

5.5.2: The minimal broking firm and broking firm 'calving'

As has been seen, the structure of the securities broking industry is susceptible to analysis using the microeconomics of imperfect competition, concepts such as entry barriers and other theoretical apparatus available within the structure of industrial organisation economics. This has been done for the US market by Shepard [1975]. The markets studied here are in general too small to permit any form of equilibrium analysis, too heterogenous for straightforward quantitative approaches and undergoing too rapid change for longer-run comparisons to be useful. On the other hand two characteristics of the modern broking firm can be specified to help explain structural change in established markets and illuminate developments in new and emerging markets:

1. The minimal broking firm

Formerly, the only basic resource requirement for an independent broker was a telephone and a simple record-keeping system such as an order book. Such brokers still exist, for example in Brussels. No new minimum standard can yet be formulated and may be expected to emerge by natural selection, exhibiting different characteristics in different markets. A simple model for such a standard can however be proposed on the basis of the evidence provided by the numerous visits to broking firms carried out for this study. The model is articulated

here only in sufficient detail to indicate the amount of resources, pre-existing skills and effort required to create a new firm in a given market.

The general model is that of a partnership or a limited company with capital requirements that relate more to its commercial viability as a small firm than to its dealing activities. On the basis of observation in the course of the empirical study, about six persons are typically involved, two in an administrative capacity and the other four acting as principals, dealers, analysts and salesmen in various combinations. The number six - and the functions listed - came up many times in the course of interviews and discussions. The individuals involved are required to have a substantial skill endowment in formal and business education as well as examination and experience-based qualifications as demanded by the regulatory authorities under which they operate. Microcomputer-based systems are required for trading, together with communications links to the markets and subscriptions to at least one information service such as Reuters and/or Bloomberg. A not inconsiderable expenditure is required for promotion and/or research (terms which are often, in practice, interchangeable). The required education, trading and professional skills, investment and starting client base form a much more formidable barrier to industry entry than would face a normal commercial entrepreneur in a trading or service provision environment.

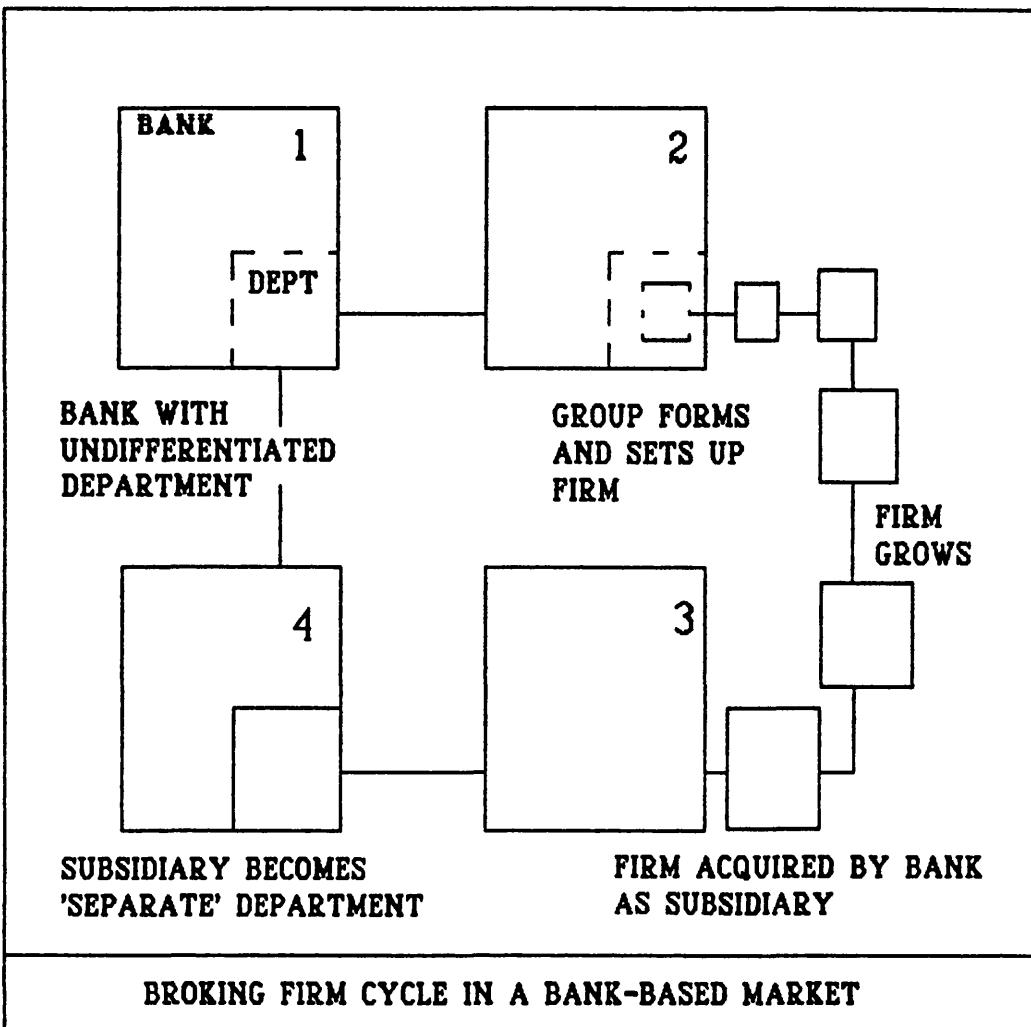
2. 'Calving' of new broking firms

The obvious source for new firms formed out of small groups of professionals is existing banks and other large financial institutions operating in the markets. This in fact turns out to be the case in

established markets. Numerous broking firms interviewed in the course of the empirical research were formed (usually some time ago) by individuals and (more recently) by small groups who had left larger organisations, usually, but not always, in buoyant market conditions, to exploit current opportunities. There exists an opposite tendency for large institutions to absorb broking firms. The process, interestingly, tends first to preserve and then systematically to extinguish the identity of the acquired firm, presumably for marketing reasons. Reabsorption was not observed during the empirical research and would probably not, in the nature of the case, have been revealed by interviewees. It is however well documented in the public prints, as numerous examples from larger markets attest. (FINT [1992]/6, FINT [1993]/2, FINT [1993]/3). Figure 3 illustrates the whole process of calving and reabsorption in the form of a complete life cycle model for a market-dependent broking firm. A bank with a securities trading department that is an integral part of an organisation (1) may find a group of traders and other professionals departing to form their own, independent firm (2), usually during an equity boom or other favourable trading period. The firm may grow and acquire useful specialisms and a desirable client list. At this point it may become attractive to a major institution, particularly if, because of a less favourable trading climate, the price is right, and be acquired as a subsidiary (3). As the above cited examples show, the acquiring firm often extinguishes the separate identity within its own corporate framework by (4) absorbing the subsidiary, but retaining separate trading activity, particularly where insider trading is regulated, only eventually integrating the activity to return to position (1).

Figure 3. refers to a bank-based or dominated market like Vienna or Copenhagen (further discussed in Chapters 7 and 9), but the model is to be observed operating in other markets as the examples cited show.

Figure 3: THE CALVING CYCLE



5.5.3: 'Starvation' of the broking firm population

There is, unfortunately, another influence at work on market-dependent firms in a market where cyclical or structural decline in volume is under way. The demise of colleague or competing firms is perceived as a benefit by the survivors, with the remaining business accruing to them. As shown in the simple model developed below, the effect becomes more pronounced the more serious is the underlying situation, with the result that no action may be taken to assure the continuance of the broking sector as a whole.

The starving population paradigm may be adduced, drawn from microbiology. It has been used to explain the survival of bacterial populations, in particular to solve the problem of their survival well beyond the period that would be predicted on the basis of the available food supply for the metabolic needs of individual organisms. Such populations characteristically survive for long periods in a starving situation, reviving dramatically to exploit food supply opportunities as they occur. The survivors in fact feed upon the metabolic components of the non-survivors, exhibiting complex dynamic changes in numbers, including even temporary growth.

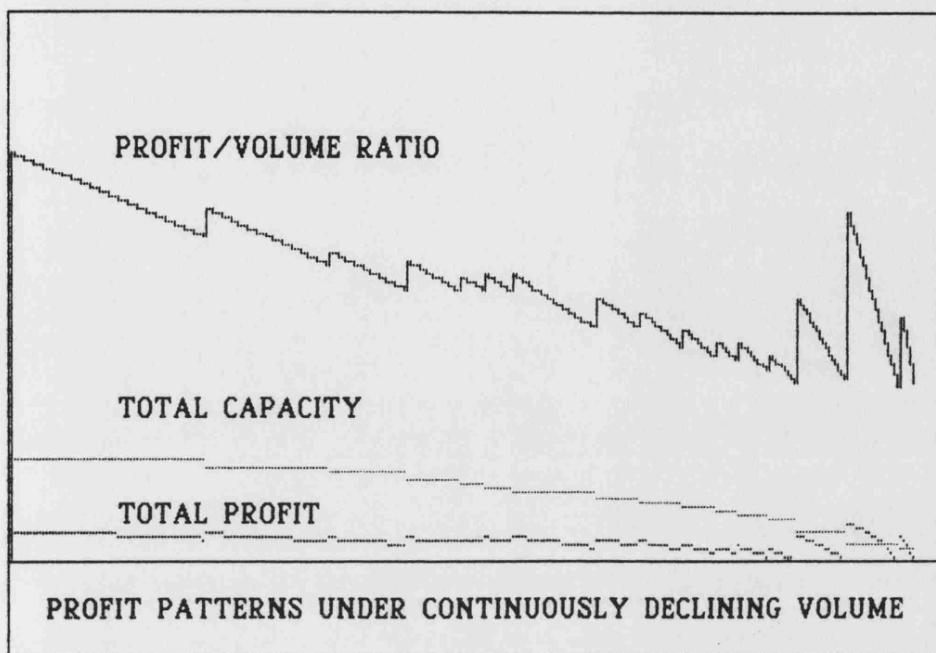
The model has obvious application to the population of broking firms, the denizens of an industry characterised by feast and famine. In particular, the clients and skilled staff of a recently defunct firm become available to the remaining firms in the market. In a market such as Brussels, characterised until recently by a large number of small brokers, the client redistribution effect is small unless large numbers of brokers are going bust within a short time. At the time of

the fieldwork visit this process was however in full swing. In a much smaller broking community, the extreme case is Vienna, the loss of one broker can transfer a large amount of business to the remaining one or two, creating for them the illusion of growth in a contracting market.

One conclusion that can be drawn from this model is that contraction of the broking firm community should not be expected to occur as a linear function of business volume or commission income, even though other variables, such as the total number of dealers employed, may well be expected to do so.

A simple model of the process can be constructed to give some impression of the nonlinearities involved. Figure 4. shows the ratio of profit to turnover in a broking community comprised of heterogeneously sized firms with market volume continuously reducing through time. Firms have fixed costs related to their size, but size is not assumed to imply higher returns to scale. The market is simulated through time until the community is extinguished. Firms are eliminated in each period as soon as their net revenue is insufficient to cover fixed costs. Since this may occur to larger or smaller firms indifferently in any one period, windfalls of varying size occur, in the form of extra market share and temporarily increased volume, to the survivors. This is represented in terms of profit levels and the profit to turnover ratio. The results are striking. Noting that the only parameters of the model are trade volume, the number of firms and the size of their fixed costs, the profit to trading volume of the survivors is shown to be extremely volatile and likely to disguise the secular downward trend in the underlying variables, trade volume and market capacity. It is not necessary for the whole market to decline to obtain this result, only the share going to market-dependent firms.

Figure 4: BROKING FIRM STARVATION "GAINS"



Various parameterisations of this model are possible, including more detail on the redistribution of skilled resources as well as merely of turnover. However the simplest structure possible still succeeds in making the point. A listing of the program STARVATA.BAS is supplied as Appendix 3. A perusal of the QUICKBASIC code and commentary will reveal the detailed rules applied.

CONCLUSION

In the first part of this chapter we reviewed the mainsprings of securities market behaviour, namely the way in which the market is organised, competitive factors arising from market structure and the behaviour of investors. The conclusions that may be drawn are in some cases confirmable from simple anecdotal evidence and, in others, highly dependent on theoretical analysis of the circumstances of the individual market.

Perusal of the press reveals that, in the short term, markets respond in a very similar manner to stimuli, however they are organised. That appearance is in part journalistic treatment and disingenuousness by market participants because information influences investor behaviour. Does the evidence reviewed in this chapter support the idea of all markets being similar in the short run ? The answer is, in general, yes. Most mechanisms for arriving at a price and trading securities, whether under marketmaking or auction systems, whether put through the market or dealt outside it, produce the same result. The differences lie in the total income available from investors' transaction costs - commissions, fees and the spread - and its distribution among market participants. Investors are sensitive to transactions costs but, apart from fund managers in large centres, do not switch between markets in the short term. The medium term is a different matter. Here we have tradition as well as the structure of the market to consider: market share and influence enjoyed by individual participants, the risk culture of investors and issuers, the history of trading volume, the imminence or recency of reform and existence of long term drift to other centres through cost or regulatory differentials. In all these respects each market has to be considered (a) as the product of its own history and (b) as moving in one direction or another under the influence of institutional and market change. Detailed evidence for selected markets is considered in Chapters 7-10 and, separately, under the heading of trading volume, as a measure of medium term viability and validity for all markets. The clear conclusion is that specific market microstructure is irrelevant to trading volume, provided it suits issuers and investors in the country involved and is not undermined (a) by a differently organised rival market or (b) through capture by a major participant with suppression of information (notably order flows) and competition. This conclusion is taken up

again in Part III. In the second part of the chapter it was shown, first, that European markets yield broadly similar net returns, as adjusted for local factors like as tax and currency. Opportunities exist to diversify portfolios and reduce risk, but not to gain excess returns for a long period. Gains are traded away by international investor attention, but that is not the same thing as market convergence. Convergence is driven by European integration rather than market phenomena as such. The process is not continuous. European directives and Group of 30 initiatives are of relatively minor importance to date. Thirdly, financial innovation, especially the growth of derivative markets, is important but has not formed part of the present study. Small national markets compete for volume against larger centres rather than among themselves. Minor exceptions such as Vienna/Budapest are dealt with elsewhere. Fourthly, the focus for future competition is likely to be in the tradeoff between lightness and effectiveness of regulation, in reduction of transaction costs and in the provision of efficient, transparent trading systems and information services. This competition may result in casualties among regional rather than national exchanges but is unlikely to result in the demise of any national stock market. The risk of temporary collapse and decline into a moribund state is nevertheless historically well established and remains present for all exchanges. These conclusions, finally, required further structural foundation than is available in the literature. Models and definitions to support the empirical research described in Part II were therefore proposed. Factors contributing to the wellbeing of national exchanges and the means to reform, including many existing available trading and organisational models, are well understood by market authorities and others. It is hoped that the models and terminology developed in Section 5.4.3 will contribute to the debate.

PART II: EMPIRICAL RESEARCH

INTRODUCTION TO PART II

The organisation and methodology of the empirical research was introduced in Chapter 1. Here we provide a brief recapitulation and guide to the structure of this section. Chapter 6 stands apart from the rest in that it applies econometric methodology to a small group of markets to discover what determines the evolution of trading volume over a long period, motivated by the consideration that trading volume has already been identified as the 'lifeblood' of small national securities markets, as well as regional markets within countries.

Methodologies are described in the introduction to Chapter 6.

Chapters 7 to 9 describe, analyse and evaluate the qualitative research carried out in Copenhagen, Lisbon and Vienna: markets studied at the greatest level of detail, as defined in Chapter 1. Chapter 10 deals with all other markets studied, at various levels of detail. In chapters 7 to 9 a similar division of material and layout has been followed. In Chapter 10 the same organisation has been introduced where possible, but with omission or merging of topics as dictated by the level of detailed enquiry undertaken. Conclusions are drawn with respect to each market at the end of the relevant chapter or section, but comparative aspects and general synthesis are deferred until Part III (Chapter 11). All the enquiries in Part II cover a long time period. In Chapter 6 the period 1971-1993 is analysed (elsewhere numerical data covering only part of the period were available: in certain cases, later data are also tabulated). In Chapters 7 to 10 a much longer period is reviewed, encompassing the history of each exchange from its origins, and dealing with more recent evolution from as far back as seemed necessary to throw light on present-day events.

Nevertheless, in general, the choice of a *long time period* does not impute validity to the *long term*. As has already been asserted, the long term probably does not exist in any meaningful sense for securities markets. Long time periods have nevertheless to be considered, not only to provide evidence to support this assertion, but also in other respects. Throughout this part of the thesis, markets are considered to draw on their past in two ways:

- 1) In the econometric sense, markets may have a memory as measured, loosely speaking, by autoregressive tendencies in the data. This is more important for their short term dynamic behaviour than their medium term evolution however. We examine the data using econometric methods only for evidence of short-run dynamic influences on the volume of trading therefore. In the medium term we merely observe the large-scale evolution of volume and enquire into its causes, looking primarily at such factors as information expansion, the development of technology, competition and reform, which are less amenable to econometric analysis. A long-run model of the relation between equity turnover and bond trading volume is in fact successfully developed in Chapter 6, but this too should be interpreted as providing evidence of persistence, stability and measurability in an enduring short term behavioural relationship (cointegration maintained by an error correction mechanism), rather than a long-run structural feature of the markets concerned.
- 2) As regards their institutional, commercial and economic development, markets have a much longer memory of what went before. This memory of past practice persists in the culture of trading and transmits one very significant element onward through time: it establishes the level of trust between participants that allows a

level of confidence sufficient to permit trading in a very ephemeral commodity, securities, to take place. The upper and lower limits of trust are set by knowledge of past behaviour, good and bad, as modified by agents' judgement of the extent to which past trading behaviour is likely to be reproduced in future. On the other hand, the rate at which trading practice is being influenced by competitive, regulatory and technological change (including the technology of investment instruments themselves) sets another kind of limit, namely the extent to which the past is any guide to the future. Once again, we therefore elect to consider only the medium term, defining that to mean in the present case, the maximum length of time over which past practice offers any realistic guide to the future. As a rule of thumb, this period should perhaps never be considered to exceed the working lifetime of a market participant.

COMPARATIVE STATISTICS AND SURVEY DATA

As an aid to understanding the discussion of individual markets, some basic data is now presented in a format which allows direct comparison. Table 1. below gives comparative statistics of established stock exchanges studied, plus London and NASDAQ for comparison purposes. The most important characteristics to note are the dominance of bond trading and the small size of the market-dependent broking sector. Conventional ratios of market capitalisation to turnover and GDP are vitiated by the large size of the bond sector and the year-on-year volatility of equity turnover and prices, as exemplified in the econometric study.

Table 1.

NO. OF LISTED COMPANIES YEAR END (1992)	EQUITY TURNOVER		MARKET VALUE OF DOMESTIC LISTED COS.	TURNOVER AS % OF VALUE	VALUE AS % OF GDP	BOND TURNOVER	TRADING SYSTEM	MEMBERSHIP
	DOMESTIC	FOREIGN	(£m)	(£m)	(£m)	(£m)	D=DEALERS A=AUCTION P=PRESENCE C=COMPUTERS S=SCREEN TRAD.	MI MD
FOREIGN %								
AMSTERDAM	251	246	49	28,979	283,135	10.25	81.8	81,311
BRUSSELS	164	154	48	6,011	42,383	14.29	34.3	824
COPENHAGEN	257	11	4	10,536	21,619	48.60	40.3	517,867
STOCKHOLM	108	10	8	15,350	50,366	30.42	64.3	309,743
GERMANY	425	240	36	258,718	217,935	118.89	26.0	632,299
LISBON	100	0	0	792	5,748	14.04	n.a.	5,311
MADRID	401	3	0	21,544	76,880	28.57	25.2	5,552
VIENNA	94	47	33	2,774	12,386	21.77	14.5	659
(1)				7,700	11,505		-	30,059
SWITZERLAND	180	240	57	76,489	129,209	58.91	104.7	n/a
LONDON	1878	514	21	1,044,713	624,393	167.31	115.8	633,038

source: Stock Exchange Yearbook 1994 and (1) Austrian National Bank monthly surveys,
Roell (1991), CMSW (1985), Lewis (1996)*.

Table 2. presents stylised responses to the structured, questionnaire-based interviews for the markets studied at Level 1, where the sample is large enough to support reasonable comparisons. The views of market-independent (MI), market-dependent (MD) and market authority (MA) institutions are compared. In this presentation the significance of the data lies in the differences of viewpoint represented by each party and supports the discussion in Chapters 7 to 11 (the distribution of views was not dissimilar in the Level 2 study, but the numbers are not large enough to support this stylised presentation).

Table 2. Responses to standard questionnaire

(For full text of questions see Appendix 1.)

	DENMARK			AUSTRIA			PORTUGAL		
	MI	MD	MA	MI	MD	MA	MI	MD	MA
1. Market dependent on special situations:									
	(Y=Yes, X=Some extent, N=No)								
tax bias	5	4	1	2	4	1	1	4	1 2
gov't deficit	1 3 1	2 2	1	1 5	1	1	2 2	1 2	1
funding	1 4	1 3	1	2 4	1	1	1 3	2 2	1
privatisation	5	4	1	4		1	3 1	2 1	1
property values	4	1 3	1	3		1	2 2	3	1
foreign investors	2 2	3	1	3 3	1	1	3 1	3	1
interest different	4 1	4	1	5	1	1	3 1	1 2	1
inter bank trading	5 1 2 1		1	3 3	1	1	1 3	1 1 1	1
2. True extent of trading:									
	(Y=Yes, X=Some extent, N=No)								
price formation	5	2 2	1	4 1 1	1	1	4	3	1
trading volume	4 1	2 2	1	3 2 1	1	1	3 1	2 1	1
spreads and comms	3	1 3	1	4 1 1	1	1	3 1	1 2	1
fundamental vals.	5	3 1	1	5 1	1	1	4	1 2	1
price related inf.	4	1 3	1	4		1	2 1 1	2 1	1
3. Trading affected by:									
	(Y=Yes, X=Some extent, N=No)								
turnover tax	5	4	1	6	1	1	2 2	1 2	1
capital gains tax				1 5	1	1	4	3	1
inheritance tax				6	1	1	4	3	1
pension funding	3	2 2	1	3 3	1	1	3 1	1 2	1
4. Interviewees' interests:									
	(W=World, R=Region, C=Country)								
countries	2 2 1	1 3		3 2	1		2 1 1	2 1	
	(A=All, T=Trading, C=Commission)								
types of business	5	1 1 2		5	1		4	1 2	
	(A=All, C=Corporate, P=Private)								
types of client	5	1 2 1		5	1		4	2 1	
	(A=All, E=Equity (mainly), D=Debt (mainly))								
instruments/mkts	5	2 2		5	1		4	2 1	
	(A=All, C=Corporate, P=Private)								
other services	5	1 2 1		5	1		4	2 1	

Table 2. contd.

DENMARK			AUSTRIA			PORTUGAL		
MI	MD	MA	MI	MD	MA	MI	MD	MA

5. Parent bank relation, if any:

(S=Strong, W=Weak, N=None. no entry means all are principals)

	S	W	N	S	W	N	S	W	N	S	W	N	S	W	N	S	W	N
org'n/control	2			1	1								2	1	1			
source of trading	2												3	1				
source of issues													1	3				
client/market info	1												1	2	1			
capital resource	2												4					

6. Strength of Bourse:

(G=Good, A=Average, P=Poor)

	G	A	P	G	A	P	G	A	P	G	A	P	G	A	P	G	A	P
broking	5			1	2	1	1			5	1		1	1		3	1	
business finance	3	1		2	2		1			3	3		1	1		1	2	1
small savers	3	1		2	2		1			1	4	1		1		2	2	
volume	4	1		3	1	1				5	1		1	1		4	1	1
public opinion	5			4		1				4	2		1	1		3	1	2
balancing interest	3			3	1	1				4	2		1	1		1	2	1

7. Limits to participation:

(S=Severe, A=Acceptable, N=None)

	S	A	N	S	A	N	S	A	N	S	A	N	S	A	N	S	A	N
numbers of brokers	5			3			1			4	2	1		1		3	1	
seat price or cap.	5			4			1			6		1		1		4	3	
technology requ'd	5			2	2		1			2	4		1		1	3	1	
other restrictions	3			2			1			3					2	2		1

8. Small saver participation:

(H=High, I=Intermediate, L=Low)

	H	I	L	H	I	L	H	I	L	H	I	L	H	I	L	H	I	L
	1	3		4		1		3	1				1		1	3	1	2

9. Soundness of equity:

(G=Good, A=Average, P=Poor)

	G	A	P	G	A	P	G	A	P	G	A	P	G	A	P	G	A	P
new issues	3			1	2		1			4	2		1	1		3	1	
finance for SMEs	3			3		1				3	2	1		1		1	3	
stock liquidity	4	1		2	1	1				4	1	1		1		2	2	
savers/investors	3			2	1	1				4	1	1		1		1	2	
public info.	3	2		3	1	1								3	1	3		1

10. Trade diversion abroad:

(H=High, I=Intermediate, L=Low)

	H	I	L	H	I	L	H	I	L	H	I	L	H	I	L	H	I	L
instruments		4	1	3		1				1	4			1		2	2	
issuers/investors		4		2		1				6			1		2	2	2	
past		4			1					2	4		1		1	3	1	
present		3	1			1				6			1		2	2	2	
future		4			1					1	5		1		2	2	1	
domestic funds		4			1					2	4		1		3	1	2	

11. Size of funded pension sector:

	H	I	L	H	I	L	H	I	L	H	I	L	H	I	L	H	I	L
past and present		1	4		4	1				1	5		1	1		1	3	1
future		1	4		2	2				2	4		1	1		3	1	2

INTRODUCTION

In Part I, Chapter 4, the literature relevant to the evolution of trading volume was examined and ideas developed concerning specific determinants of trading activity. We now develop further hypotheses and test them in the course of examining the behaviour of data from selected markets, of modelling the evolution of trading volume in general and of analysing the short-term dynamic relationship between equity turnover and bond volume in particular. Hypotheses are stated in Section 1 and the literature background briefly recapitulated. The scope, methodology and data of the econometric study are described in Section 2. The rest of the first half of the Chapter follows the methodological order of the work and reports, successively, data treatment and transformations; investigation of seasonality and of stationarity in the data at various lag lengths; establishment of the order of integration; tests of static association between series, plus discussion of the implication of these associations. The second half of the chapter, beginning in Section 3, deals with the development and testing of:

- (1) single variable models regressing selected variables on their own past values for evidence of autoregressive processes, and
- (2) multi-variable models considered to encompass the process generating the volume data of the securities markets studied, and progressively reduced, using a general to specific methodology, to obtain a parsimonious representation of the process, then,

(3) error-correction models of the long-run relationship observed to persist between equity turnover and bond trading volume.

Two satisfactory models are found and described, for the Copenhagen and Vienna markets respectively, with corroborative evidence from the German market. Conclusions are developed and discussed at the end of the Chapter and further integrated with those of the qualitative research in Chapter 11.

Section 6.1: Hypotheses and relation to literature

The widely accepted hypothesis of joint determination of price and volume has been assumed valid for very short term dynamics of the markets studied. Daily and intraday determinants of price and volume were not part of the present study however. Attention focussed instead on monthly transaction volumes in bond and share trading: both are, as already discussed, important for assessing the validity, viability and development potential of small securities markets dependent on turnover for their future growth. 'No-trade theorems' were rejected in favour of the extended Huffman model of trade generation also discussed in Chapter 4. This model offers an alternative to the 'differences of opinion' approach (Varian [1989]) and, in effect, substitutes changing tastes and priorities among investors over their lifetime for differing interpretation of information arriving in markets as the basic long-run motive for engaging in securities trading. The idea of enduring differences of opinion has been criticised by Chari [1989] and is not consistent with the hypothesis developed below that trading volume is driven by increased availability of reliable information at an ever-reducing resource cost of production. In view of extensive collinearity among the variables it is difficult to establish a direct relationship between the long-

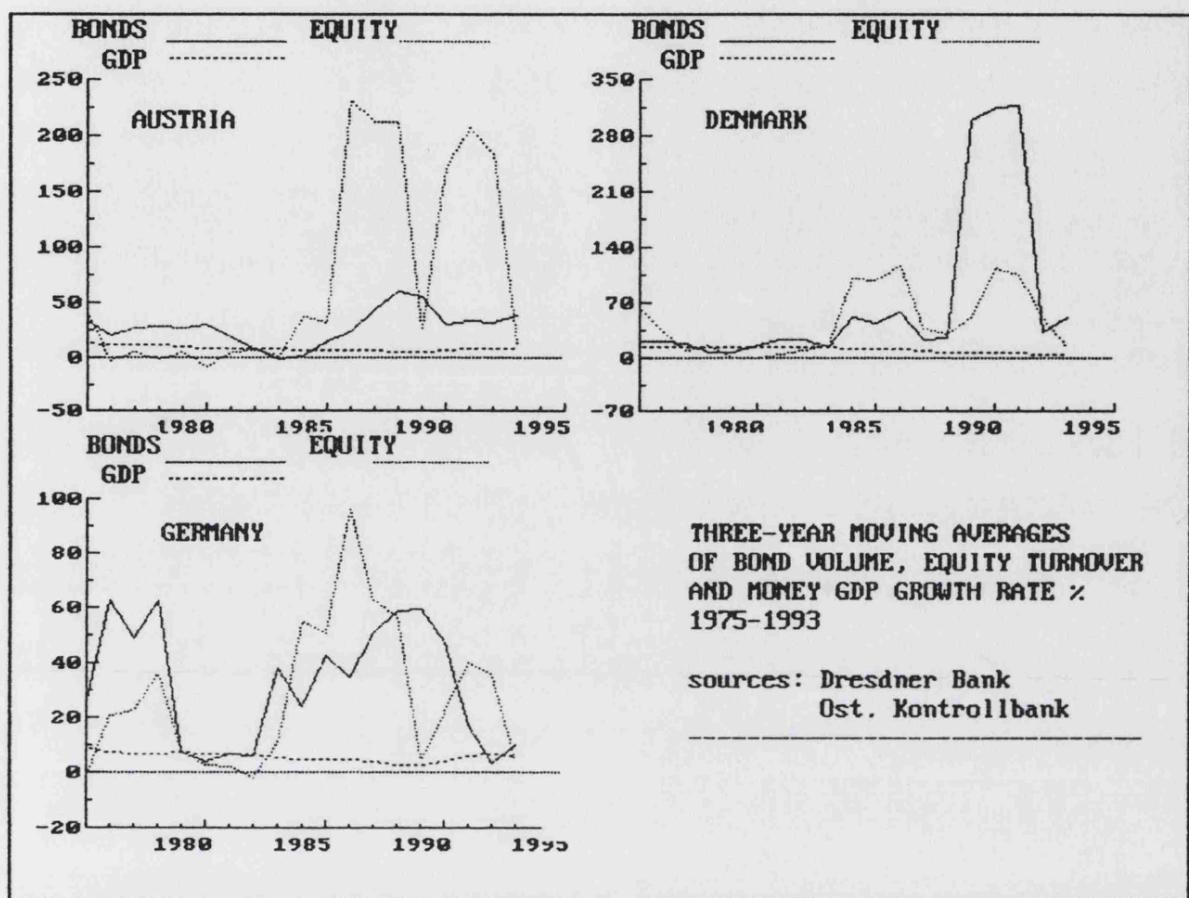
run growth of trading volume and general economic growth at current prices as measured, for example, by money GDP. On the other hand it would be unwise to reject such an obvious relationship or to avoid investigations in which basic economic variables are embedded (see for example Grossman and Shiller [1982]).

Trading volume growth has in most cases outrun economic development however, as Figure 1. shows, and this requires explanation.

The hypothesis for which support is sought here is that the level of trading activity on the part of individual agents, hence collectively, is a function of transaction costs when these are defined to include the cost of procuring information to support the relevant decisions, and of the level of certainty, defined as knowledge about the prospective risk inherent in a given portfolio. The degree of certainty is also a function of information and may be incorporated into the present definition of transaction costs as follows:

- (1) An investor requires a given, market determined rate of return to compensate for a given perceived level of prospective risk.
- (2) The perceived level of prospective risk may be held to be higher by virtue of incomplete information about the actual level of risk of a given portfolio and uncertainty about future market developments.
- (3) The required rate of return is net of transaction costs. This includes such items as commission, spread and administrative cost but is held here to include the cost of acquiring sufficient information to identify desired trading opportunities or justify ones currently being considered.

Figure 1. THREE YEAR MOVING AVERAGE BOND VOLUME, EQUITY TURNOVER AND MONEY GDP



(4) Information acquired in order to identify trading opportunities will not necessarily be associated with any specific trade. It is hard to envisage a situation where investors or traders restrict their information purchases to what is relevant only to deals already under consideration. There will therefore exist a certain 'mass' of information associated with a given level of trading activity which will in general serve both to inform specific transactions and to increase certainty about the level of risk involved in any transaction.

(5) Any reduction in the price of a unit of information of given utility may therefore be expected to induce the following effects:

- (a) to reduce the transaction cost of identified transactions, thereby inducing additional transactions as a result of new opportunities identified at an enhanced or maintained return net of transaction costs.
- (b) to increase the total demand for information in accordance with its price elasticity of demand
- (c) to increase certainty levels, thereby inducing transactions previously inhibited by uncertainty
- (d) to operate a multiplier effect on future demand for information and upon transactions, resulting from the impetus supplied by (a) and (c) above, given the feedback widely believed to exist between current and future transactions levels.

Mainly anecdotal evidence about the growth of general market information has been collected for this study, but there appears to be

no difficulty in sustaining the argument that the real and money volume of securities trading would be expected to increase at a rate generally in excess of the real and money rates of economic growth, by virtue of the increase in information supply. On the other hand, identified defects in the information supply would be expected to have the opposite effect, particularly as regards the level of uncertainty. This is also supported by the evidence, here in the case of the Austrian market.

One thing that is known to financial markets under even the weakest set of information assumptions is the broad order of the lags involved for real economic shocks of various kinds to work through the system. This implies (a) known length for discount periods before losses and gains materialise and (b) the understanding that there is plenty of time during that interval for further shocks, with quite other effects and lags, to occur. The result is that one should not expect financial markets to react to changes operating over the longer term, even if they are severe, in the same way as would be expected in the short run: the intermediate dynamics furthermore are complicated and affected by information feedback mechanisms from price and order flow data. The difficulty has been identified by, among others, Doornik and Hendry [1992] (p.4): "economics time series data are generated by a process of immense generality and complexity. The econometrician seeks to model the main features of the Data Generation Process (DGP) in a simplified representation based on the observables and related to prior theory...there are many necessary but no sufficient conditions for model validity.."

In view of the above arguments, in the empirical study to be described, volume data from selected markets have been analysed in

accordance with certain basic expectations about their behaviour, which constitutes the prior theory, confirmed where possible by appropriate modelling procedures and tests, as follows:

- 1) The evolution of trading volume over time is analysed as a combination of deterministic and stochastic processes arising from trend factors and feedbacks from previous events in single time series after first justifying and performing certain data transformations and testing their validity for incorporation into time series models. The possibility of seasonal influence is tested, as is the nature and extent of associations between series, particularly spatially between different financial centres. Given clear changes apparent between two 'epochs' discernable in the data, temporal comparisons are also made and analysed. Single and multivariate time series models are however constructed only for the whole of the period. This corresponds to hypothesising that the parameters underlying market behaviour are constant and that the changes are a dynamic response to exogenous influences. Chief among these is the growth of information supply and related computing and communications developments facilitating trading.
- 2) Deterministic trends underlying the individual time series for bond volume and equity turnover is expected to be a compound of general economic growth and a factor representing the effect of reduced transaction costs as defined above. A long run steady-state measure of these combined influences is therefore sought. No attempt is made to distinguish the individual contribution of each factor separately.
- 3) Trading volumes are further hypothesised to be jointly determinated, with prices, as one part of a set of possibly

cointegrated time series within each market selected for study. That implies, indeed requires, prior definition of long term behavioural relationships between the variables. Appropriate hypotheses are established alongside the relevant equations as these are developed below. We focus specifically on the determinants of equity turnover, arguing that this is heavily influenced by events in the bond markets which dominate in the small national financial centres studied. A model for the generation of equity turnover is developed for each centre studied.

Data on three markets, transformed, tested and modelled in the manner described above and in the introduction to this chapter formed the material for the empirical study. The whole process is now considered in further detail.

Section 6.2: The empirical study

Three markets, studied separately and in comparison, were chosen to form the basic research object for this part of the analysis. The aim was to explain their behaviour in terms of trading volume as well as to provide a benchmark against which to draw inferences about the behaviour of other, less well-established centres surveyed. The markets selected were the Austrian and Danish markets, complemented by the German market for purposes of comparison in light of the likelihood of interconnection. For reasons discussed below, as well as on obvious geographical, economic and institutional grounds, the three markets are linked in the eyes of investors and highly visible to each other. The Danish market has run a positive yield differential with the German market. This was held by several interviewees in Copenhagen to be one source of investor interest, and hence of trading volume, in

Danish bonds. The Austrian market is perceived to shadow the German market closely. Austrian long bond yields and interest rates move in a much narrower band than the Danish equivalent and the band is centred on German rates rather than lying above them. All these differences can also be explained by general economic performance however, in particular a lower level of consumer price inflation in Austria than in Denmark at most times, and the fact that Austrian monetary policy shadows that of Germany. The composition of the three markets in terms of the instruments traded (government, bank and other debt, together with equities) is somewhat different, which invalidates absolute yield comparisons.

6.2.1: The data set

Transaction volume data and related time series were collected for the period January 1971 to December 1993. The task was not without its difficulties and this fact is significant for the conclusions of the study. Most stock markets were willing to furnish information that was easily available, even if not published. Volume information was not always easily available however and, in the case of the Danish market had to be purchased in view of the work involved to extract it from records. Cohen, Maier, Schwarz and Whitcomb (CMSW) note in their survey (CMSW [1986], p. 37) that "nearly every foreign exchange has some "hole" in its price-volume reporting system. Perhaps the worst offender is London" (prior to 1986). These 'holes' in the information generally available, although of a different nature in each market, obscure significant aspects of their activity from general view.

Equity and bond turnover figures were obtained in the case of Denmark direct from the Copenhagen Stock Exchange, for Germany from the statistical annexes to the monthly bulletin of the Deutsche Bundesbank

and for Austria from the analogous publication of the Oesterreichische Nationalbank. Bond series were in nominal values and equity series in market values, both measured in national currency at current values.

The underlying assumption of this treatment is that the stock of bonds in issue and the volume of trading would be expected in general to rise in line with any fall in the purchasing power of money over the long run even after abstracting from the effects of economic growth.

On the other hand, the stock of nominal-value equity would not necessarily rise in the same way, initial public offerings being heavily influenced by trading conditions and the evolution of the corporate financing tradition of each country, but market valuations and the money measure of trading volume would be expected to do so.

The increasing value of the *existing* equity stock would therefore broadly equate with the renewed and ever-increasing stock of bonds in issue at nominal values.

Figure 2. shows the original data series for bonds. In the last box the series are superimposed with matched ranges to allow coincident patterns to be observed. These are noticeable whenever large temporary shocks occur. The Austrian and German markets are, as expected, closely related, while the Danish market 'takes off' in volume terms later than the other two over the period studied.

Figure 3. shows the equivalent equity turnover data series. Here the behaviour pattern in the three countries is visually similar but with the market cycles displaced from each other in time with peaks and troughs of activity apparently only weakly reflected in other markets.

Figure 2. MONTHLY BOND TRADING VOLUMES, LOCAL CURRENCY

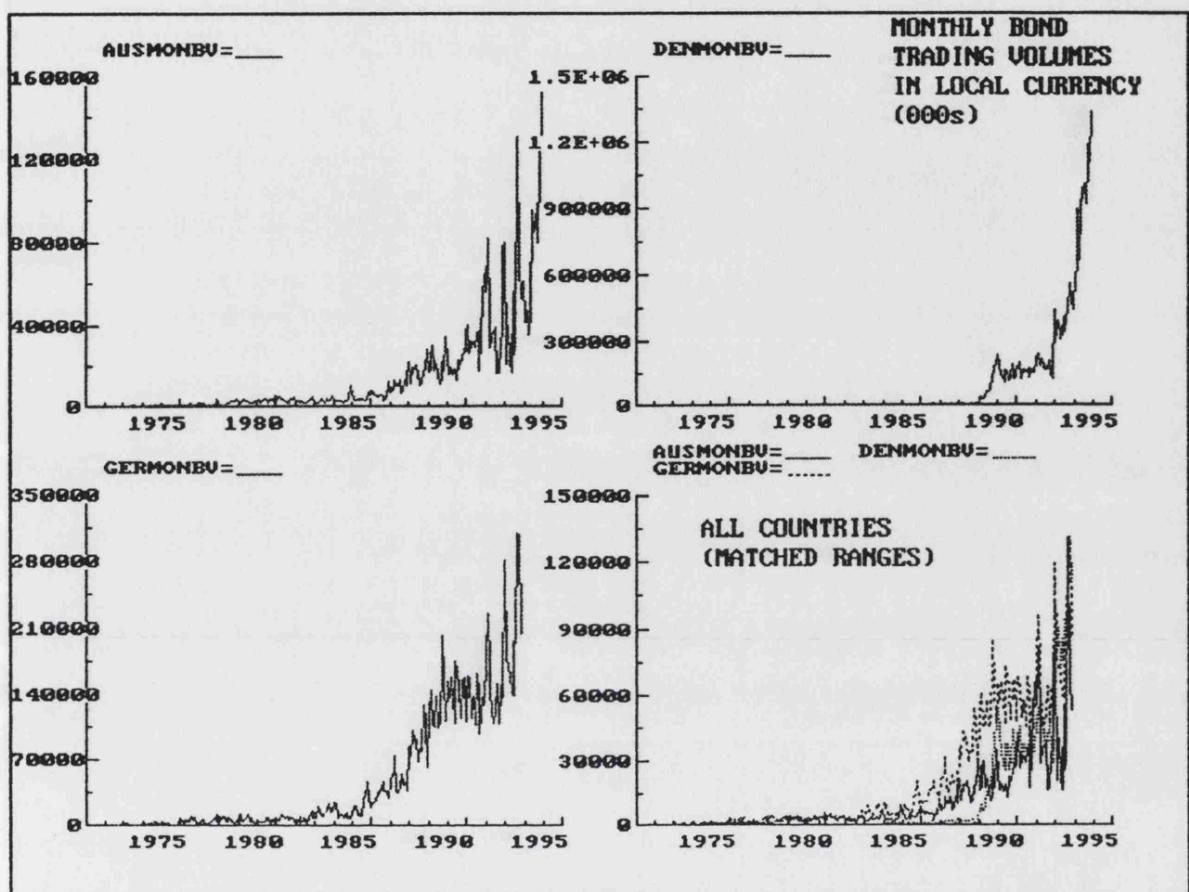
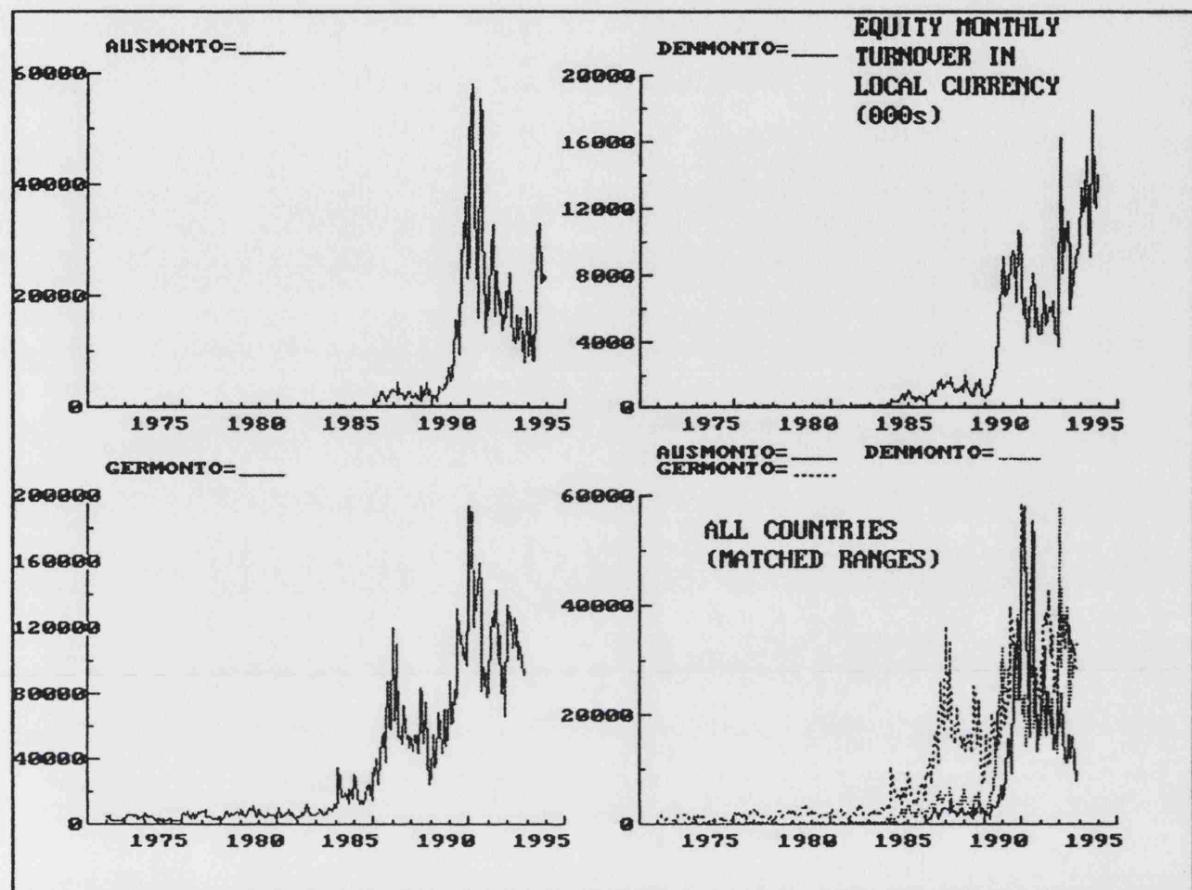


Figure 3. EQUITY MONTHLY TURNOVER, LOCAL CURRENCY

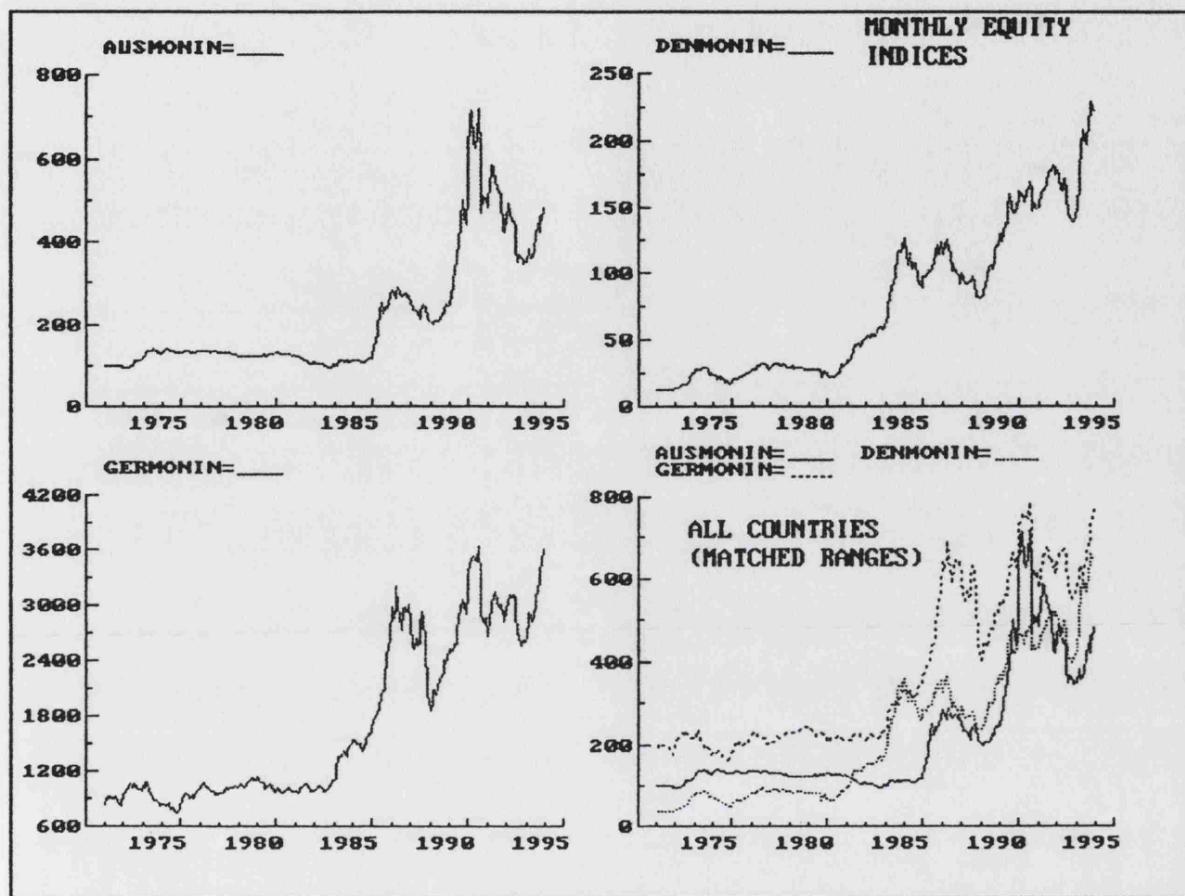


Bond trading volume and equity turnover data were adjusted as required for changes in recording methods that took place during the sample period in all markets, notably as a result of moving to reporting both sides of the market (purchases and sales). Changes induced by market reforms, such as integrating off-exchange trades into the reported figures, could not be adjusted for, since the behaviour of the data prior to reform was a matter of conjecture.

Stock market indices were obtained from the same sources, supplemented by historical statistics published in Mitchell [1992] to fill in lacunae and assist in ensuring the accuracy of splicing at the time of index rebasing.

The evolution of the series of equity market indices in all three countries is shown in Figure 4.

Figure 4. MONTHLY EQUITY INDICES



Consumer price indices, short term interest rates and long bond yields on government stocks for all countries were taken from one source, namely the long running monthly series of international comparative statistics published by the Oesterreichische Nationalbank.

Short interest rates, long bond yields, equity returns and the yield gap were reduced to real terms using consumer price indices. Equity returns were conventionally defined as the percentage difference between annual rests of the stock market indices, measured monthly, and hence do not reflect dividend payments. The yield gap was calculated as index returns on equities less the long bond yield, both as defined above.

Real short interest rates are displayed in Figure 5. Denmark displays a markedly different pattern to the two German-speaking countries which tend to share the same experience.

The appropriateness of using real rather than nominal bond yields is illustrated graphically in Figures 6. and 7. Raw yields converge towards the end of the sample period because of economic integration and low inflation. Before that they reveal widely divergent behaviour. When deflated by the consumer price index a much more closely connected cyclical pattern emerges and convergence is not complete owing to the maintenance of a yield differential in the Danish market. The first differences of the real yield data are seen to exhibit much lower volatility as compared with the raw yield series.

Figure 5. REAL SHORT INTEREST RATES

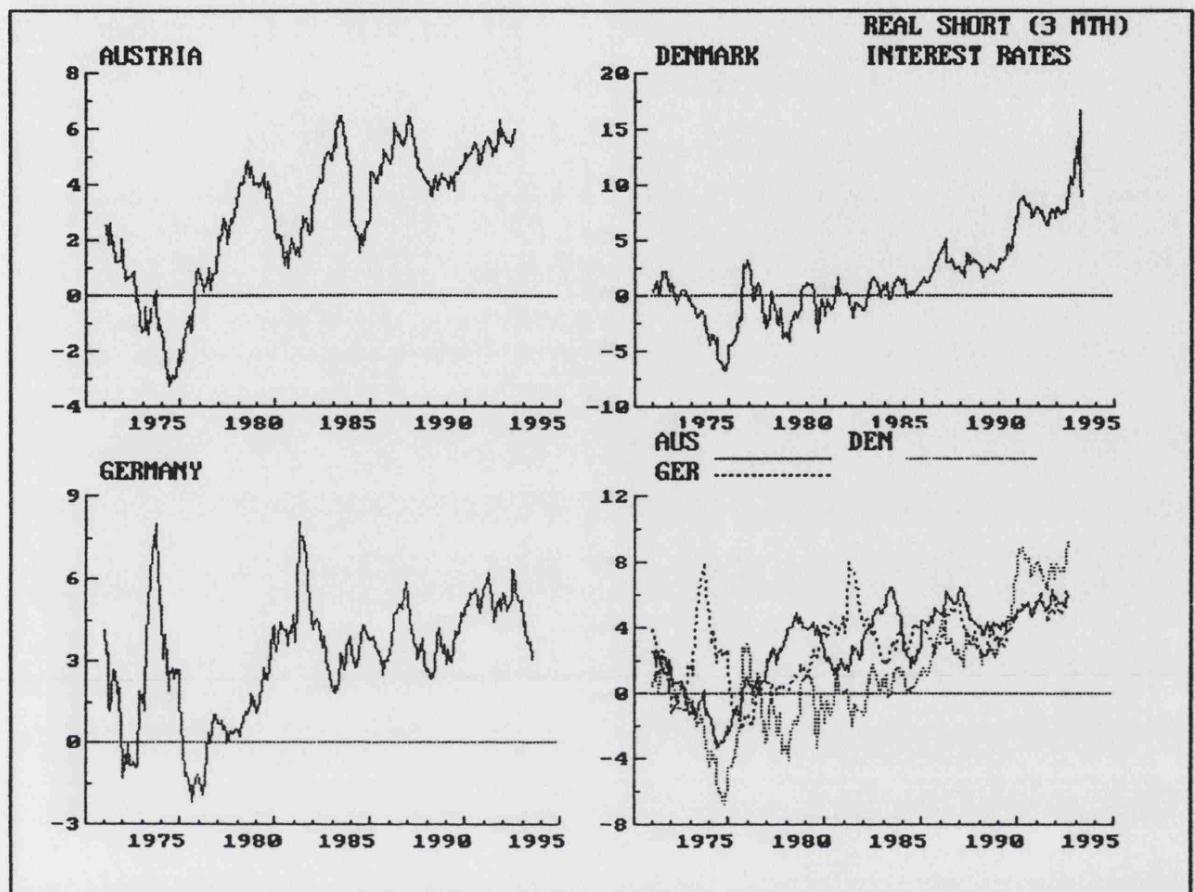


Figure 6. LONG BOND YIELDS AND FIRST DIFFERENCES

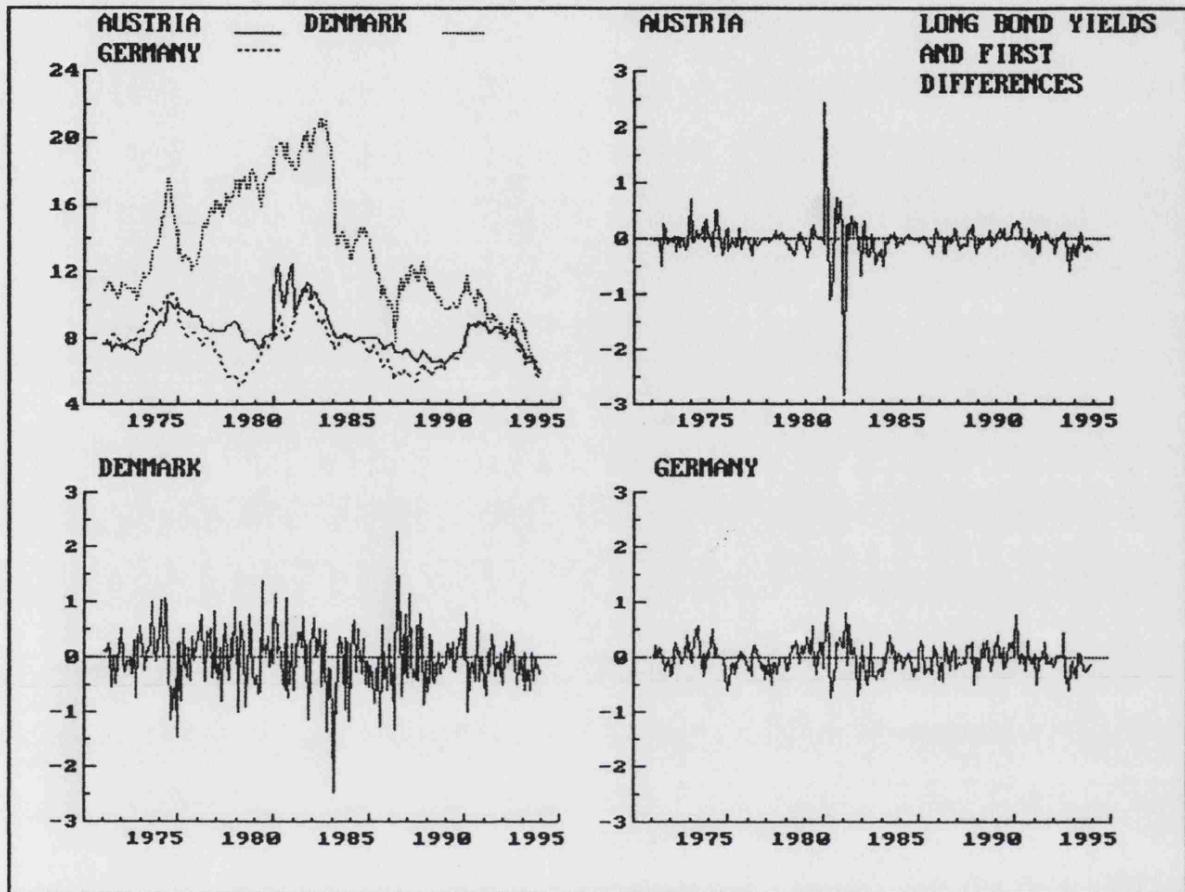
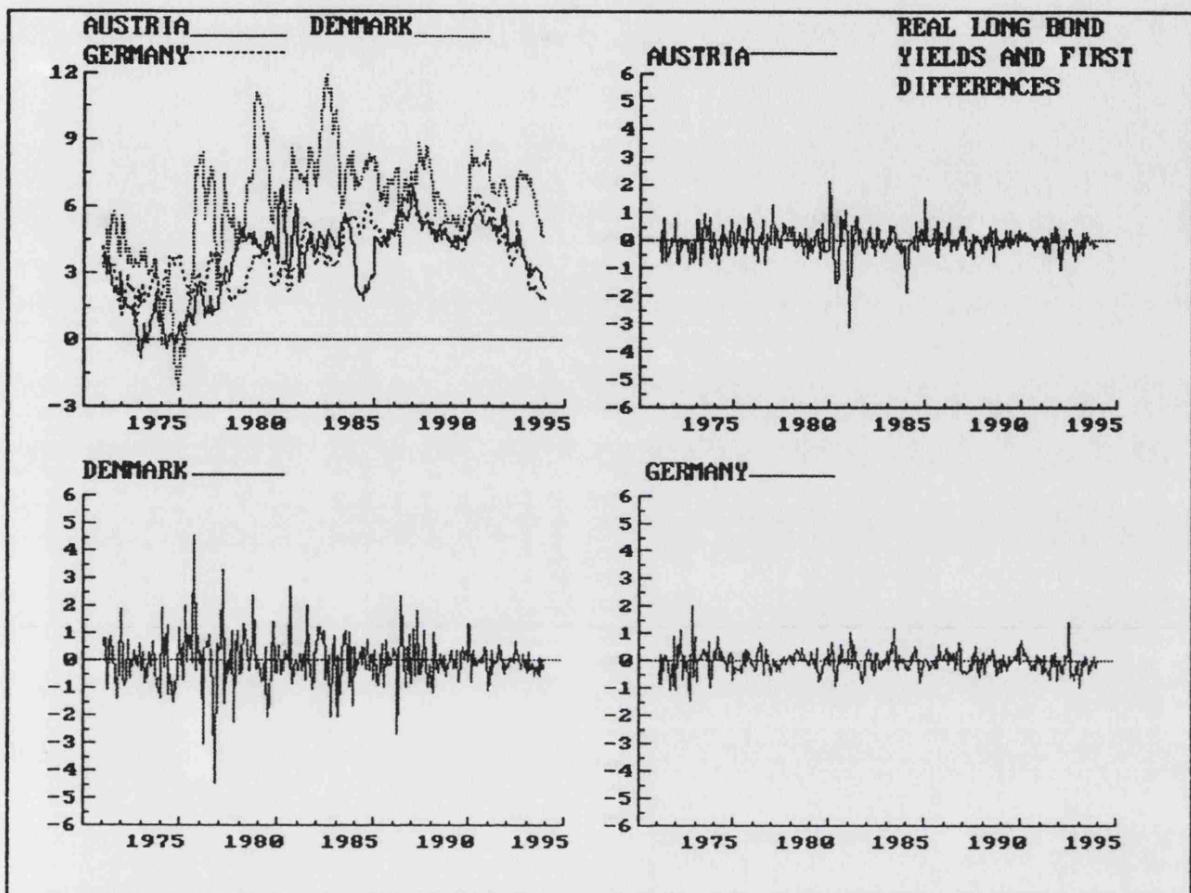


Figure 7. REAL LONG BOND YIELDS AND FIRST DIFFERENCES



Systematic shifts constituted an interesting feature of the data, creating an opportunity to examine market structure and behaviour, but a problem in terms of the final statistical model to adopt, as well as in respect of effects on stationarity tests.

A large 'step' in Danish bond volume was observed, dating from 1988-1, due to a combination of market reform requiring more complete reporting and the generation of extra business as a result of systems and information flow changes emanating from that reform. This development seemed initially to justify the use of a dummy variable from 1988-1 for some tests although it was later found to be unnecessary in modelling, particularly when differenced data were used, reducing a step change to a single 'impulse'. The surge in trading volume which followed reform has to be regarded as an integral part of the data series. A similar shift in the Austrian equity market in 1985, traceable to a single published article in Fortune magazine rather than to market reforms, are likewise regarded as exemplifying existing market behaviour rather than indicating a major shift in the character of the market.

In analysing the data and modelling the markets concerned, no attempt was made to accommodate parameter shifts that could not be identified with *known* exogeneities. It is assumed throughout that shifts in turnover volume may be generally considered a proxy for departures from equilibrium as a result of price changes consequent on the arrival of information related to the real economy. Any attempt to forge links from economic events to market developments risks what has

been described in this context as "the temptation to engage in mechanical curve-fitting exercises" (Judge et al. [1988], p. 436.). The evidence for direct and immediate linkages between the markets and the real economy is weak, both in the relevant literature and as confirmed by the present research.

6.2.2: Data transformations and tests

Preliminary tests of the individual data series in various forms revealed the need for care in transformation and produced the well-known distortions of established tests and measures which arise on taking logarithms, differencing and on the inclusion of lagged variables. These data related issues are now identified in summary form, followed by the results of the detailed testing, before proceeding to a discussion of the modelling strategy finally adopted.

1) Logarithms

Taking (natural) logarithms of monthly bond trading volume statistics (1971-1 to 1993-12) produced roughly linear trends in all three markets, revealing an exponential trend in the underlying data and allowing visual examination of data for the early years, which, because of large scale increases, was not easy to peruse in levels.

Figures 8 and 9 exhibit the similarity of the behaviour pattern of all three markets when the bond volume and equity turnover data are examined in this form.

Figure 8. LOGARITHMS OF MONTHLY BOND TRADING VOLUMES

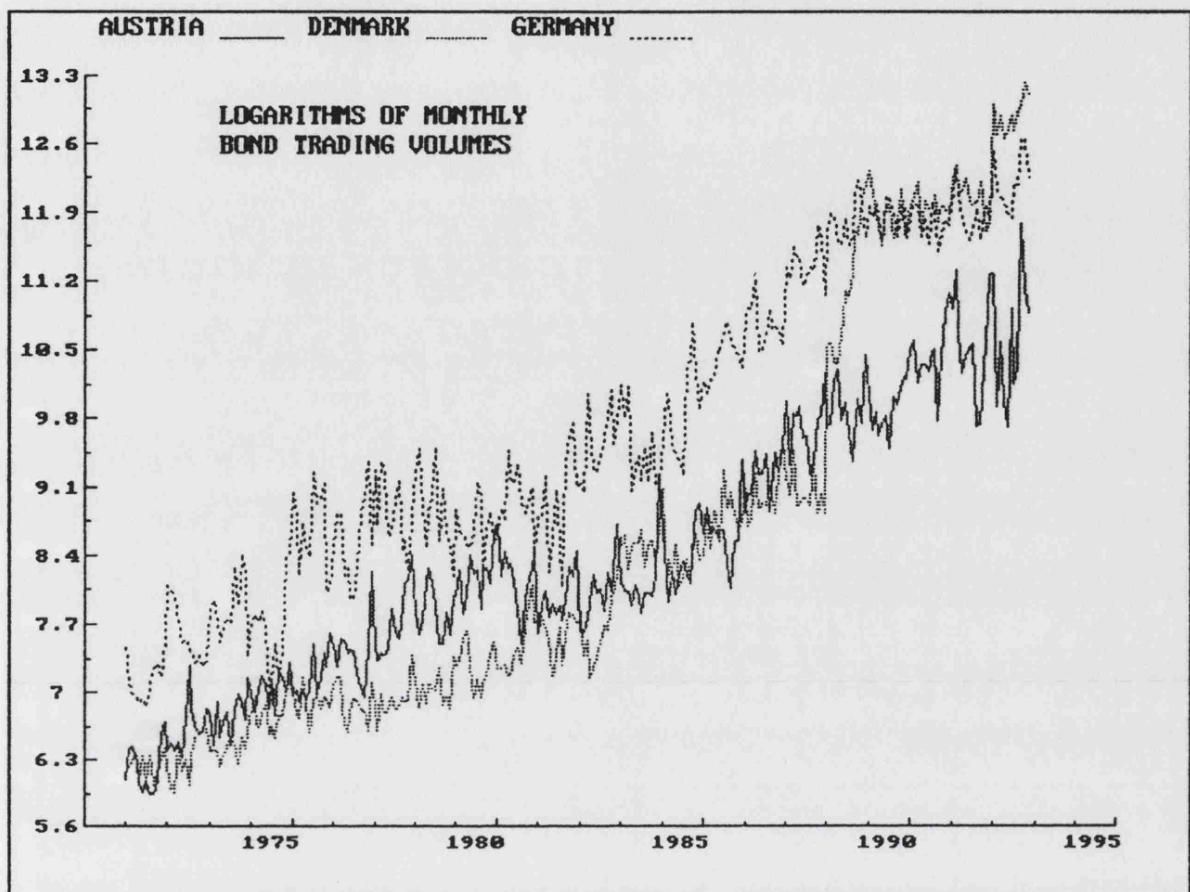
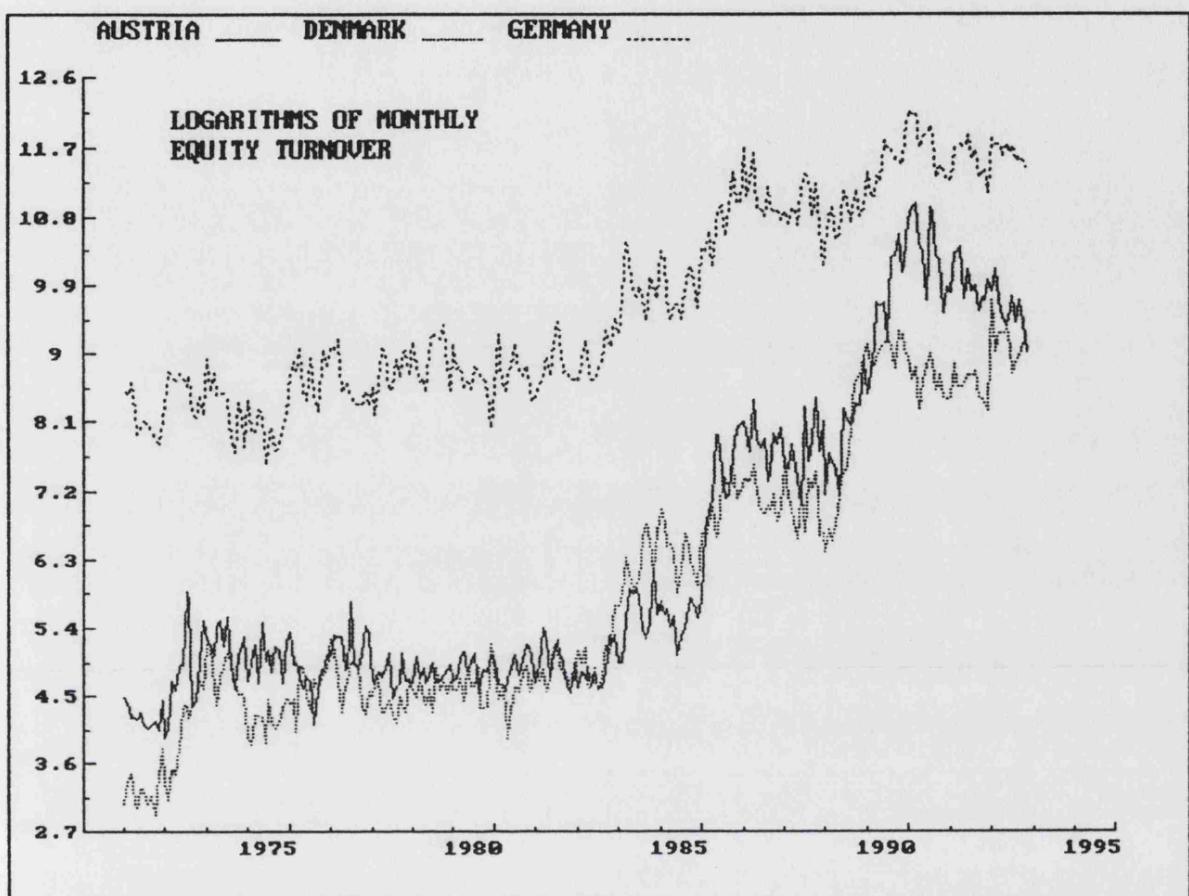


Figure 9. LOGARITHMS OF MONTHLY EQUITY TURNOVER



2) Differencing

Models and tests based on autoregression of variables in first differences produced poor results compared with exactly similar formulations in seasonal (i.e. annual) differences. This was of course due to impounding a year's worth of change into each of the model variables, as opposed to a single period's worth. It was eventually considered appropriate to use first differences although this created a higher hurdle for the modelling process in terms of producing results with a meaningful economic interpretation, not least by the test of forecastability.

1) Trend effects

Modelling bond volume and equity turnover data in logarithms against their own previous values with two lags, but without differencing, produced exaggerated model 'fits' (see Figs 13 and 14) reflecting not agreement among the variables but the influence of strong linear trends in the data. These were dealt with as part of the process of transformation and testing required to produce stationary series as reported below.

2) Presence of lagged variables

All models in lags produced Durbin-Watson test results converging on 2.0 as the number of lags included increased. This is, again, a well-known result and obliged recourse to Lagrange Multiplier (LM) tests (see, for example, Cuthbertson, Hall and Taylor [1992], p. 107-9).

3) Number of lags

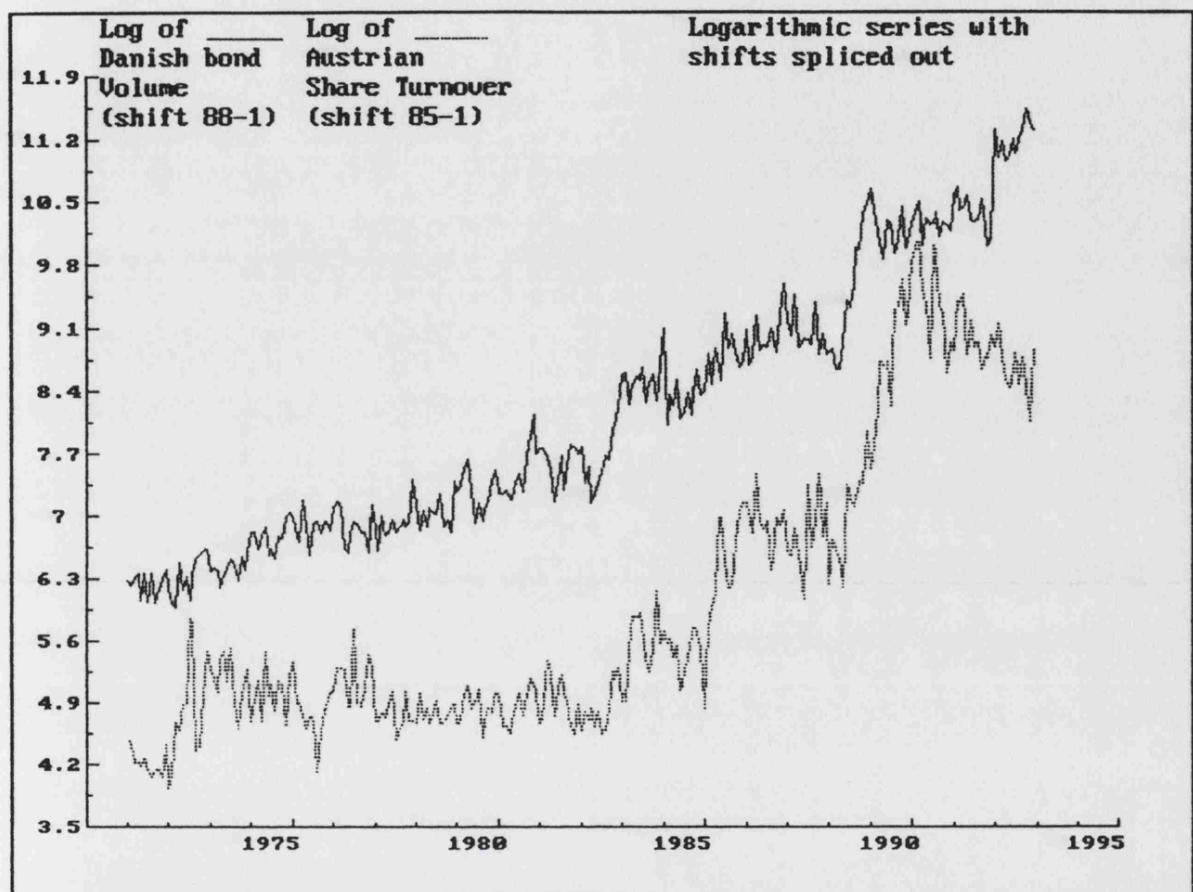
In general one lag rather than two, three or more, proved to be a sufficient representation of the data. The R^2 test result increased in every series analysed, according to the number of lags employed, up to 12 or more, but this has been shown to be an artefact of the addition of variables rather than a valid result (see Doornik and Hendry [1994], p. 307). In the course of testing, the results proved to be insensitive to a wide range of higher lags selected for various purposes. To demonstrate the point, some comparative results for different lags are included in Table 11, furnished as an appendix to this chapter.

4) Shifts

The 1988-1 Danish bond volume shift was also examined by simple auxiliary testing, as follows. It is known that a shift can cause stationary ($I(0)$) variables to test $I(1)$ in Dickey-Fuller tests (see Doornik and Hendry [1994], p. 93). The series were therefore spliced at the known join point and the results retested. The data were not, of course, used for any other purpose in this form.

Figure 10 shows the (logarithmic) data re-presented with the shifts spliced out by calculating separate intercept terms for the earlier and later items and subtracting the difference from the later subset. Visual examination of the spliced series permits the suspicion of a non-linear trend in the logarithmic series to be entertained. On the other hand the 'episodic' nature of the growth and stagnation pattern in both markets dissuades any attempt to establish such a growth pattern.

Figure 10. LOGARITHMIC SERIES WITH SHIFTS SPLICED OUT



Test results for the spliced data were practically identical to those for the untreated data, as shown below:

TABLE 1.: TESTS OF SPLICED BOND VOLUME AND SHARE TURNOVER STATISTICS

Augmented Dickey-Fuller tests at shown (bracketed) lags on monthly data (**= H_0 rejected at 1%)	ADF (2) on logs spliced	ADF (2) on logs unspliced	ADF (1) on 1st diffs of logs spliced	ADF (1) on 1st diffs of logs unspliced
Danish bond volume	2.202	2.623	-16.76**	-15.8**
Austrian share turnover	0.9104	1.15	-15.24**	-15.26**

5) Seasonality

Initially suspected seasonal effects were removed by differencing the logarithms of variables over a one-year period rather than by the use of dummy variables. This may be justified by observing that seasonal effects in financial markets are not pronounced, particularly as compared with the magnitude of shocks and there is no case for treating seasonal *volume* changes, for which there is no obvious 'trading out' incentive, in a different way to any other kind of shock. Thus, in assuming stochastic seasonality as opposed to deterministic seasonality (as would be the case if seasonal dummies were employed) it was assumed that all shocks to the system are permanently incorporated in the stochastic process and do not die out, as would otherwise be the case (see Charemza and Deadman [1992], p. 140). Seasonal differencing also provided a first opportunity to eliminate the log-linear growth trend and test for stationarity of the series, with recourse to further differencing only if stationarity

could not be established. This was not in fact necessary, reflecting the effective linearisation of the growth trend as a result of taking logarithms and the additive (rather than multiplicative) nature of the seasonal factors, if any. On the other hand the data revealed a conflict between tests in that first differences were as successful as seasonal differences in producing a stationary series. Detailed examination of the test and single equation model results reported below led to the conclusion that non-seasonal differencing should in fact be retained for all differenced variables.

Volume and turnover data were formally tested for stationarity in the presence of possible seasonality by use of the modified Dickey-Hasza-Fuller test (Dickey, Hasza and Fuller, [1984] as modified by Osborn et al. [1988], p.365). In this test the data in seasonal differences, in this case 12 times per year, is first regressed on its past values for a chosen number of lags. The number of lags selected proved to be arbitrary above 2 in the present sample(s), as discussed above, except for the construction of the 12 month seasonal test variable. The coefficients of a 12-lag regression model in seasonal differences with no intercept term were used to construct the artificial variable z , formed by summing the lagged values of the data in (logarithms of) levels, transformed by the coefficients of the 12-lag model, into a single term.

$$z = \text{eqto} - \sum_{i=1}^{12} \beta_i \text{eqto}_{t-i} \quad (1)$$

in this case for the variable $eqto$, meaning monthly equity turnover in logs (see Charemza and Deadman [1992] p.137). On re-estimating the

model in seasonal differences with the artificial variable z added as a regressor, the t -value obtained for the coefficient on z may be interpreted as a test of the null hypothesis (existence of a seasonally integrated process capable of being removed by seasonal differencing). This test, performed on the variables from all three samples and requiring 'significant' negative t -values in order to reject the null hypothesis, gave positive values in all cases, not allowing H_0 to be rejected. A parallel test of the data in first differences, rather than seasonal differences, however produced similar results, placing in doubt the real existence of seasonal trends and leaving the final interpretation a matter of judgement based on the relative strength of the t -values and other parameters reported. For this and other reasons given earlier, the data were eventually treated as being non-seasonal in nature.

6) Order of integration

A time series is said to be stationary if its key distributional characteristics remain stable over time. Here we consider only weak or second order stationarity, denoted by stable means, variances and covariances (see Spanos [1986], pp.137-140). The number of differencing operations d required to produce a stationary series is said to reflect its order of integration $I(d)$. The differenced series $\Delta^d y_t$ is thus $I(0)$. Stationarity is not a necessary condition for a series to be $I(0)$ - see Hendry [1986] and not all series can be rendered stationary. Having established the validity of differencing to remove trend and, where appropriate (but not in the present case) seasonality, the volume data therefore now offered themselves for further testing for stationarity against a new null hypothesis: that

they were integrated of order 1 and stationary, requiring no further differencing. The alternative hypothesis is, conventionally, that further non-seasonal differencing is required (recourse to more than first seasonal differences rarely being justified, see Charemza and Deadman [1992], p.130). The relevant test is the augmented Dickey-Fuller test. In all three markets tested, negative t-values, representing significantly lower than lower-bound values of the published test statistic, obliged acceptance of the null hypothesis and allowed the data to be accepted as a series $SI_1(0,1)$ - that is stationary when differenced, with no further seasonal or non-seasonal differencing required. See Table 2.

An excursion was made into second and higher differences in the case of series which appeared visually to betray nonlinear characteristics in logs. The result of taking second, third and fourth differences of logs of bond volumes did not produce the expected reversal of ADF test results due to overdifferencing. The significance of the ADF test variable was merely driven higher. This result may be regarded as confirmation that the log series were in fact integrated $I(1)$ and the first difference series $I(0)$, (Charemza and Deadman [1992], p. 133).

After the volume data, bond yields and interest rates, nominal and as deflated by the consumer price index, were similarly tested for stationarity, prior to modelling. First differences of the levels of real and current long bond yields and short term (3-month) interest rates were examined. Slightly higher levels of autocorrelation among the residuals were found for up to five lags when real bond yields rather than the raw yields, were considered. This was taken to be due to a time lag in the adjustment of actual yields to arrivals of information about the inflation rate. Since this could be a factor

influencing trading volume, real rather than recorded rates were used. Determining real bond yields is of course a complicated matter (for recent empirical research see, for example, Smith [1994]). It was not an intrinsic part of the present study to go beyond a satisfactory proxy for real yields.

TABLE 2: AUGMENTED DICKEY FULLER STATIONARITY TESTS FOR MONEY AND REAL YIELDS AND INTEREST RATES

	ADF(2) LBYD (Lev)	ADF(2) LBYD (Dif)	ADF(5) LBYD (Dif)	ADF(2) STRT (Lev)	ADF(2) STRT (Dif)	ADF(5) STRT (Dif)
AUS CURR	- 0.1844			1.063		
AUS REAL	- 0.7953	- 10.43**	- 9.037**	- 0.3516	- 8.398**	- 5.862**
DEN CURR	- 0.4631			0.1636		
DEN REAL	- 0.8632	- 10.03**	- 7.099**	- 0.7404	- 9.917**	- 6.465
GER CURR	- 0.3507			- 0.6797		
GER REAL	- 0.6892	- 9.784**	- 7.693**	-1.295	-8.54**	- 6.018**

key: LBYD = Long bond yield STRT = Short (3 month) interest rates
 ** = H_0 (autocorrelated residuals) rejected at 1% level.
 (where negative, sign appears above numeral)

7) Associations between series

A fundamental difference between debt and equity markets is that bond yields are ultimately limited by the repayment of principal at par and real interest rates regress to a long run value, whereas equity values and their running returns, measured as dividend or earnings yield, can increase without definite limit as the worth and earning power of

underlying assets in real and monetary terms alike grow in line with economic activity (we do not consider the obvious converse case).

A number of apparently obvious relationships among variables, such as a connection between market activity levels and the yield gap, had to be rejected at an early stage on grounds of inadequate correlations among the differenced log or levels data and poor model results.

Similarly some interesting correlations, such as those between short-term interest rates in each country were able to be explained in general terms but could not be meaningfully incorporated in model formulations. This preliminary analysis involved systematic rejection, a pruning of variables in the spirit of a general-to-specific modelling approach, rather than a specification search. The variables eventually retained (equity turnover, bond volume, long bond yield and the share price index) represent the core data of any securities market.

Comparisons were made between trading volumes in Denmark and Austria and real long bond yield, yield gap, index and interest rate differences between these markets and Germany. Comparisons of first differences yielded negligible inter-country correlations, indicating that there was no discernable volume response, at the level of the monthly aggregates in Austria and Denmark, to changes in Germany or to changes in the bilateral gaps between countries. Comparisons in levels revealed exaggerated correlations based on trends present in the data as previously discussed. Although exchange rate movements were significant at times over the 22-year period, in examining the data in graphic form, including cross-plots of sub-periods, it was not considered likely that adjustment for the exchange rate factor would have improved the chances of detecting meaningful relationships. This

is particularly true in bond markets, which are international in character and may be expected to move in response to other, third-country developments as well as those in the group of countries studied (for methods of tackling this problem see Smith [1994]). The results of these unsuccessful explorations of the data are not reported in detail.

Of considerably more interest was a temporal comparison of the two 'halves' of the sample period, before and after the marked apparent change in behaviour to be seen in the data in levels. The sample was split for the purpose into the period 1971-1 to 1981-12 and 1982-1 to 1993-12.

Some of the static relationships in the form of simple correlation coefficients among the data in first differences over the two halves of the sample period proved to be revealing. Volume data and stock market indices were differenced from logs of levels, rates and yields were differenced from their real values in levels. German values in the tables are for purposes of comparison and assessment of any possible rôle as exogenous variables affecting the Austrian and Danish markets, not for modelling the German market, which, as a large entity, is not the prime focus of this study (but see later modelling results). Simple correlations of course conceal relationships which emerge only with lags. It is not considered likely however that most of the relationships examined below, consisting, as they mainly do, of inter-return and volume-return responses, would be likely to persist beyond the monthly periods aggregated in the present data, being formed essentially at the daily and intra-daily level. The last relation examined, that between equity turnover and bond volume, is much more significant however and motivated further analysis and

modelling reported later. The following Tables 3 to 7 illustrate the results. Relationships indicated by lower case letters in square brackets are discussed in detail further below. In the whole of the rest of this section levels data are designated with variable names in upper case, logarithms in lower and differences commencing with letter D or d.

Headed columns and rows are period 1971-1 to 1981-12, unheaded columns and rows (offset one across and one down and connected by letter for reference to text which follows) are period 1982-1 to 1993-12

TABLE 3: CORRELATION COEFFICIENTS: Real short interest rates (RSIR) and real long bond yields (LBYD) for (A)ustria, (D)enmark and (G)ermany

In levels:

	RSIR_A	RSIR_D	RSIR_G	LBYD_G
RSIR_A			.2995 [b]	
				.3281
RSIR_D			.3314 [a]	
				-.0374
RSIR_G				
LBYD_A	.8710 [e]			
	.8506			
LBYD_D		.7210 [f]		
		-.1812		
LBYD_G			.4897 [g]	
			.4702	
LBYD_A		LBYD_G		
	.0306 [c]			
		.3751		
LBYD_D		-.1365 [d]		
		.7259		

In first differences:

	DRSIR_A	DRSIR_D	DRSIR_G
DRSIR_A	.7042 [h]		
	.9002		
DRSIR_D		.8242 [i]	
		.6052	
DRSIR_G			.6559 [j]
			.7541

The relationship between real short interest rates in Denmark and Germany broke down in the second half of the sample period [a] while those between Austria and Germany strengthened [b]. This is consistent with Denmark's temporary macroeconomic divergence from Germany. Long bond yields on the other hand show markedly increased correlations [c] and [d].

Empirical research has suggested that European markets are efficient in maintaining the structure of returns between different classes of risk and asset category. This is reflected in the very similar degree of correlation between long bond yields and real short interest rates in each market over the two periods (.85 to .87 [e] in Austria against .49 to .47 [g] in Germany).

The long bond yield/short term interest rate relationship breaks down in Denmark [f], reflecting internationalisation of the bond market in the 1980s and greater economic volatility. In first differences however ([h], [i] and [j]) the short run relationship is maintained throughout both parts of the sample period.

TABLE 4: CORRELATION COEFFICIENTS: Real long bond yields and real index returns (RIXR)

In first differences:

	DLBYD_A	DLBYD_D	DLBYD_G
DRIXR_A	.8618 [k] .0840		
DRIXR_D		.8557 [1] .4363	
DRIXR_G			.1238 [m] .0418

A strong association exists between movements in long bond yields and changes in returns on the share price index during the first half of the period in Austria and Denmark, but breaks down in the second ([k] and [1]). This is consistent with the further collapse of a similar but weaker relation in the German market [m], all reflecting greater awareness of and interest in equity as a 'local' national economic phenomenon as against increasingly uniform international bond markets.

TABLE 5: CORRELATION COEFFICIENTS: Share price index (INDX) and equity turnover (EQTO)

In first differences:

	dindx_a	dindx_d	dindx_g
dindx_a			.1647 [n]
dindx_d			.5662
deqto_a	.0572		.1341 [o]
	.4047		.2650
deqto_d		.2784	
		.3925	
deqto_g			.5560
			.5299

Austrian/German share index movements become much more correlated [n], Danish/German movements less so [o]: the latter a reflection of the *comparatively* more international, especially Scandinavian, character of Danish as opposed to Austrian equity and the closer connection of the Austrian with the German economy.

TABLE 6 CORRELATION COEFFICIENTS: Long bond yield gap to index return and equity turnover in first differences (eqto) and levels (LBYG):

	LBYG_A	LBYG_D	LBYG_G
deqto_a	.0585 [p]		
	.3409		
dqto_d		.0755 [q]	
		.0822	
deqto_g			.4924 [r]
			.4862

There appears to be no pattern of response of equity turnover to changes (both variables expressed in first differences) in the yield gap between long bond yield and index returns in each market ([p], [q], [r]).

TABLE 7: CORRELATION COEFFICIENTS: Bond volume and equity turnover
In first differences:

	dbvol_a	dbvol_d	dbvol_g
deqto_a	.2752 [s] .2058		
deqto_d		.2792 [t] .2971	
deqto_g			.3591 [u] .5246

On the other hand the relationship between equity turnover and bond volume in each market, while weak, is remarkably consistent both over time and in each market ([s], [t], [u]). This constitutes the most interesting result of the static analysis and forms the basis for much more detailed examination in the next section.

Section 6.3: The evolution of trading volume

6.3.1: Single variable models

Given that the data generating process of transactions volume in financial markets is generally admitted to be complex and largely unknown for the individual series, a realisation is assumed of a discrete (see Spanos [1986] p. 133) stochastic process of the form

$$y_t = \theta_1 y_{t-1} + \dots + \theta_p y_{t-p} + e_t \quad (2)$$

in each time series analysed separately. That is to say, an autoregressive process (AR) (see, for example, Johnson [1991] p. 306, Judge et al [1988] and others) links present with past values of the variable y_t of an order p , with p (the number of lags to be chosen) to be determined by examining the autocorrelations generated by orders 1 to k , $k > p$, for the rate at which their influence on y_t declines, as well as the size of the partial autocorrelations (the coefficients of

a regression of the variable under examination on its own lagged values) up to the same order, which emerge. The tendency of financial market variables to be extensively influenced by their own past history suggests that the determination of the order p of the process AR(p) will not be simple, creating the problem of devising a parsimonious representation with the fewest lags possible, consistent with efficient estimation. It therefore appeared appropriate to consider not only past values of the y_t but of the e_t also, extending the model to the form

$$y_t = \theta_1 y_{t-1} + \dots + \theta_p y_{t-p} + e_t + \rho_1 e_{t-1} + \dots + \rho_q e_{t-q} \quad (3)$$

where we are considering some weighted, moving average (MA) representation. This would be an ARMA(p, q) model (see references to Johnson and Judge et al. above) of the past q values of the random errors e_t as well as the y_t themselves. Finally, as has already been indicated, the data are expected to be stationary only when differenced, hence integrated (of order 1).

An appropriate model of the whole data generating process for prices and volumes might well therefore be an autoregressive integrated moving average model of appropriate order, designated ARIMA(p, d, q) for single dependent variables explained in terms of their own previous behaviour.

The terms within the bracket above should not be taken as implying that a rapid solution was possible however. Underlying growth and other exogenous low frequency economic influences may be expected to complicate the picture. The same is true of heterogenous random shocks applied to the system by the arrival of information, including

information about prices and other endogenous variables such as dealer inventories as well as factors such as returns in other markets (here the bond and equity markets respectively within the same national financial market). These influences have all been identified in the literature as significant for the operation of financial markets, where the existence of market clearing prices does not signify equilibrium in the the overall process but rather supplies fresh information to fuel further trading rounds.

Examining the structure of autocorrelations and partial autocorrelations, formulating appropriate single equation models, testing their performance and analysing the residuals of surviving candidates were all required before a final choice could be made as to the best parsimonious representation of the likely data generating process of all the individual series considered. In doing so, guidelines set out in Cuthbertson, Hall and Taylor [1992], p.96 and Judge et al. [1988], p. 696 were found useful as well as model parameterisations suggested by Doornik and Hendry [1994], p. 166. The order (1,1,1) was eventually selected for bond volume and equity turnover modelling after testing other formulations, particularly ARIMA(2,1,2).

Stationarity has already been defined above as 'weak sense' stationarity, restricted to unchanging means, variances and covariances among the errors of a process. The covariances among the e_t between periods in such a process depends of course only on the time difference between the periods and not upon their location in time within the sample. Covariances are accordingly expected to decline with separation in time, reflecting attenuation of intertemporal influences. Stationarity demands (but is not

sufficiently described by) the arithmetical requirement of coefficients on the x_t that sum to less than one: otherwise the x_t , $x_{t+1} \dots$ would grow explosively. Similar reasoning constrains the coefficients on the e_t , in addition to the requirement for a geometrically declining progression reflecting the attenuation referred to above. These expected features are therefore among those tested for in the output of the models developed to describe the evolution of equity turnover and bond trading volume.

In the three equity markets an ARIMA(1,1,1) model was able to be found by non-linear least square methods (see Judge et al. [1988] p.697). Results are reported in Tables 8 and 9 below. The models for each market are remarkable for the similarity of their coefficients (see equations cited opposite country name in the tables) but nevertheless fail to improve on the performance of the simpler AR(1) model regressing equity turnover on its immediately preceding lagged value. In general the misspecification tests reported show that autocorrelation is not removed and the residuals from both approaches are distributed significantly differently from normal over the first four moments. In the bond markets only the Danish market, with its international characteristics, produced a stable ARIMA(1,1,1) model. When refitted to the data, autocorrelation was removed but residuals were not normal and the functional misspecification F-Test (see Doornik and Hendry [1994] p. 395.) indicated a serious problem with this model.

Chi-squared tests of all model specifications were satisfactory, as were all F-Tests other than the one reported above. It was concluded that either a time-dependent variance structure was present in the error terms of the single-variable lagged models or other variables

were responsible for the evolution of volume data in both bonds and equities in all three markets. Attention therefore focussed on developing models with the appropriate features. In the single-variable series it was considered that distributed lags would be unlikely to occur, given the rapid-response nature of financial markets. The possibility of conditional variance (the size of the variance of observed results being influenced by previous variability) was therefore explored before moving on to models incorporating other explanatory variables. ARCH tests performed on the residuals from modelling equity turnover, bond volume and market indices separately on their own lags failed to produce any evidence of time-dependent variance however.

TABLE 8: COMPARISON OF AR AND ARMA MODELS FOR EQUITY TURNOVER (MISSPECIFICATION TESTS)

AR(1)

ARMA(1,1)

AUSTRIA (ARMA(1,1) equation:

0.21359*lag(deqto,1)-0.58419*lag(residual,1)

AR 1- 7F(7,251) =	3.5475 [0.0012] **	(7,250) =	2.4334
→ [0.0199] *			
ARCH 7 F(7,244) =	1.2502 [0.2760]	(7,243) =	1.3354
→ [0.2341]			
Normality Chi ² (2)=	13.539 [0.0011] **		9.7343
→ [0.0077] **			

DENMARK (ARMA(1,1) equation:

0.24583*lag(deqto,1)-0.53275*lag(residual,1)

AR 1- 7F(7,251) =	2.4495 [0.0191] *	(7,250) =	4.5943
→ [0.0001] **			
ARCH 7 F(7,244) =	0.2698 [0.9651]	(7,243) =	0.35725
→ [0.9261]			
Normality Chi ² (2)=	14.552 [0.0007] **		14.959
→ [0.0006] **			

GERMANY (ARMA(1,1) equation:

0.34677*lag(deqto,1)-0.70852*lag(residual,1)

AR 1- 7F(7,241) =	5.5662 [0.0000] **	(7,240) =	2.9603
→ [0.0054] **			
ARCH 7 F(7,234) =	0.22863 [0.9782]	(7,233) =	0.15325
→ [0.9934]			
Normality Chi ² (2)=	2.0396 [0.3607]		1.7832
→ [0.4100]			

TABLE 9: COMPARISON OF AR AND ARMA MODELS FOR BOND VOLUME
(MISSPECIFICATION TESTS)

	AR(1)	ARMA(1,1)
AUSTRIA (ARMA model failed to converge on a stable value)		
AR 1- 7F(7,240) =	5.4389 [0.0000] **	
ARCH 7 F(7,233) =	0.8316 [0.5620]	
Normality Chi ² (2)=	1.8032 [0.4059]	
DENMARK (ARMA(1,1) equation: 0.019071*lag(dbvol,1)-0.40001*lag(residual,1)		
AR 1- 7F(7,254) =	2.5882 [0.0135] * (7,253) =	1.3513
[0.2267]		
ARCH 7 F(7,247) =	0.26315 [0.9675] (7,246) =	0.40805
[0.8969]		
Normality Chi ² (2)=	75.114 [0.0000] **	73.275
[0.0000] **		
RESET F(1,260) =	3.0034 [0.0843] (1,259) =	4.9155
[0.0275] *		
GERMANY (ARMA model failed to converge on a stable value)		
AR 1- 7F(7,240) =	4.9494 [0.0000] **	
ARCH 7 F(7,233) =	1.5418 [0.1540]	
Normality Chi ² (2)=	5.6784 [0.0585]	

The results obtained to this point therefore lead to the general conclusion that modelling the single variables exclusively on the basis of their own past values is unlikely to lead to stable models capable of forecasting efficiently. On the other hand much of the behaviour exhibited is strongly suggestive of autoregressive effects, including time-varying levels of variability. This is borne in mind during the course of the work to model equity turnover, described in the next section, where it was considered useful to model turnover in the presence of other market variables, notably bond trading volume and the share price index, as well as its own past values.

6.3.2: Modelling equity turnover

What follows is a brief discussion of the motivation for the specific modelling strategy employed at this stage.

Observed co-movement of bond transaction volumes and turnover in equity within each country examined is strongly suggestive of a medium to long term relationship between the variables. We hypothesise that:

- (a) trading activity is required to adjust portfolio relationships in response to economic events, in particular to prospective growth and inflation. It affects both markets and accounts for simultaneous or near-simultaneous changes in trading volume.
- (b) the share market is more likely than the bond market to delay the adjustment of portfolios because of short-run influences such as over-reaction to news, 'dead' periods ahead of announcements and so on. The bond market is less sensitive to economic news affecting corporate earnings and other sectoral developments and tends to move *en bloc* in response to its own stimuli.
- (c) volume in the two markets is co-ordinated in the longer term by joint factors underlying growth in bond volume, equity market value and lower transactions costs, particularly in respect of the information component of transactions costs discussed elsewhere.

- (d) any long term relation identified would comprise a component for economic growth, net of purchasing power changes, and a residual, being the relationship defined at (c) above.
- (e) since the variables in levels display exponential growth and cannot therefore remain in a constant relationship to each other at every point in time, that a correcting influence exists, tending to restore the long run relationship after short run excursions and results in the maintenance of an observable stable long term relationship between bond and share trading levels.

No attempt is made to establish causation (share trading causes bond trading or vice versa). On the other hand, the equity markets studied are much smaller than the corresponding bond markets and are likely to be separately influenced by stock price index movements. We therefore establish an initial model in which the dependent variable is the volume of equity trading, explained by the volume of bond trading, index movements and any other variables initially considered likely to influence the course of events. Into the last category fall long bond yields, a general price index and a broad measure of money growth, all as defined earlier. In a separate exercise, discussed later, the variables were examined for further evidence of cointegration in a general multivariate environment. A general-to-specific methodology was employed, proceeding from a broadly specified model in levels with the key variables - bond volume, equity turnover and the stock price index measured in logarithms - by a process of progressive, tested restrictions and transformations to produce a parsimonious representation of the hypothesised data generation process.

We now turn to the modelling process itself. The first model considered employed 2 lags on all the chosen variables in line with the previous finding that 12 lags were rarely significant in the evolution of the single variable series (a twelve-lag model for each market was in fact formulated and tested but the results supported the above supposition and were of insufficient interest to report in detail: the same applies to the inclusion of the broad money measure which was dropped at an early stage). For each of the two markets studied (Vienna and Copenhagen) the equation

$$\begin{aligned}
 egto_t = & \beta_1 cons + \beta_2 egto_{t-1} + \beta_3 egto_{t-2} \\
 & + \beta_4 bvol_t + \beta_5 bvol_{t-1} + \beta_6 bvol_{t-2} \\
 & + \beta_7 idx_t + \beta_8 idx_{t-1} + \beta_9 idx_{t-2} \\
 & + \beta_{10} lbyd_t + \beta_{11} lbyd_{t-1} + \beta_{12} lbyd_{t-2} + e_t
 \end{aligned} \tag{4}$$

was tested for validity and explanatory power with and without restrictions and for forecasting ability over the last 12 months of the sample period in the restricted form. Dropping *Ibyd*, the real bond yield and its lags, entailed no significant loss of information, as measured by the F-Test on this reduction in either market. Further reductions of the remaining variables or any of their lags produced an F-Test rejection in all cases (marginally for all lags=1 in the case of the Danish market). The model in this form

$$\begin{aligned}
 egto_t = & \beta_1 cons + \beta_2 egto_{t-1} + \beta_3 egto_{t-2} \\
 & + \beta_4 bvol_t + \beta_5 bvol_{t-1} + \beta_6 bvol_{t-2} \\
 & + \beta_7 idx_t + \beta_8 idx_{t-1} + \beta_9 idx_{t-2} \\
 & + e_t
 \end{aligned} \tag{5}$$

yielded the results illustrated in the accompanying Figures 11 and 12.

Figure 11. MODEL 1. AUSTRIA EQUITY TURNOVER

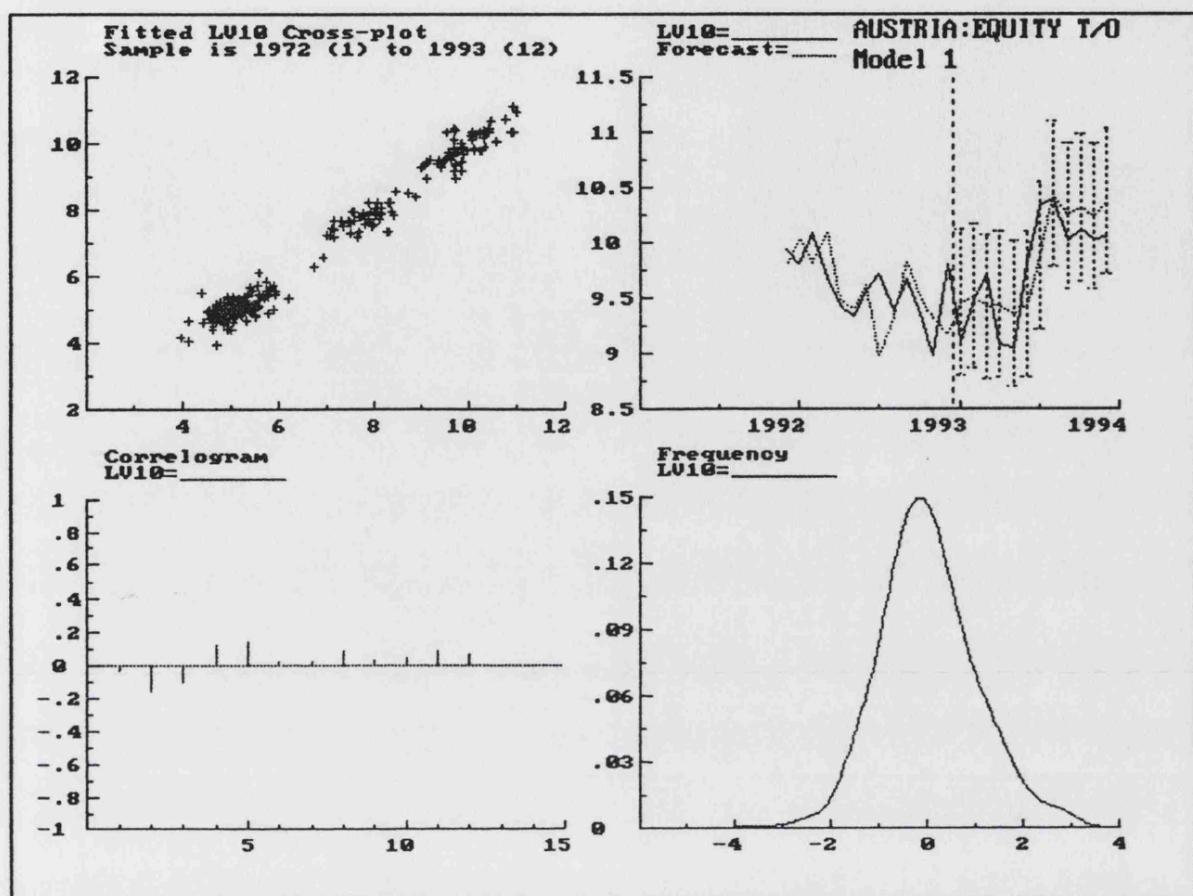
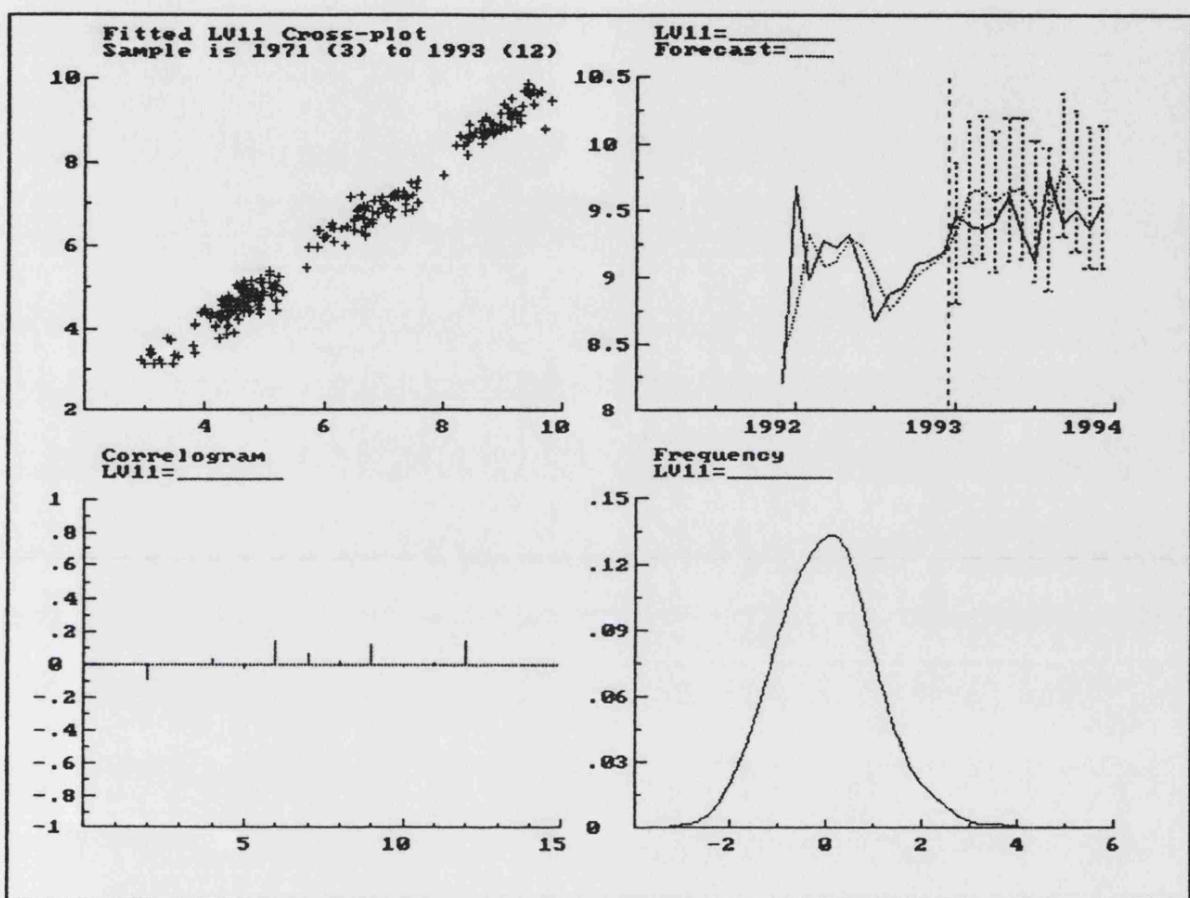


Figure 12. MODEL 1. DENMARK EQUITY TURNOVER



The wide standard error bands and clear time-dependent relationships indicated in the grouping of the actual and fitted crossplots as well as the generally unsatisfactory visual fit, with forecasts lagging reality, all confirm the theoretical expectation already established for the individual data time series, that the model is unsuitable in its present form by virtue of nonstationarity, in spite of uncorrelated and fairly normally distributed residuals.

A model in seasonal differences

$$\begin{aligned}\Delta^{12}eqto_t = & \beta_1\Delta^{12}eqto_{t-1} + \beta_2\Delta^{12}eqto_{t-2} \\ & + \beta_3\Delta^{12}bvol_t + \beta_4\Delta^{12}bvol_{t-1} + \beta_5\Delta^{12}bvol_{t-2} \\ & + \beta_6\Delta^{12}indx_t + \beta_7\Delta^{12}indx_{t-1} + \beta_8\Delta^{12}indx_{t-2}\end{aligned}\quad (6)$$

and one in first differences

$$\begin{aligned}\Delta^1eqto_t = & \beta_1\Delta^1eqto_{t-1} + \beta_2\Delta^1eqto_{t-2} \\ & + \beta_3\Delta^1bvol_t + \beta_4\Delta^1bvol_{t-1} + \beta_5\Delta^1bvol_{t-2} \\ & + \beta_6\Delta^1indx_t + \beta_7\Delta^1indx_{t-1} + \beta_8\Delta^1indx_{t-2}\end{aligned}\quad (7)$$

were next constructed, adopting the same approach. It is not viewed as credible that the short run dynamics of a securities market are capable of being modelled in seasonal differences, involving as they do an inherent 12-month lag, but as already pointed out, the impounding of 12 months data into the model produces an outrageously good fit. This is to be compared with the fact that the model in first differences fits poorly. Graphic results from both models are reproduced in the accompanying Figures 13-16.

Figure 13. AUSTRIA EQUITY TURNOVER MODELLED IN SEASONAL DIFFERENCES

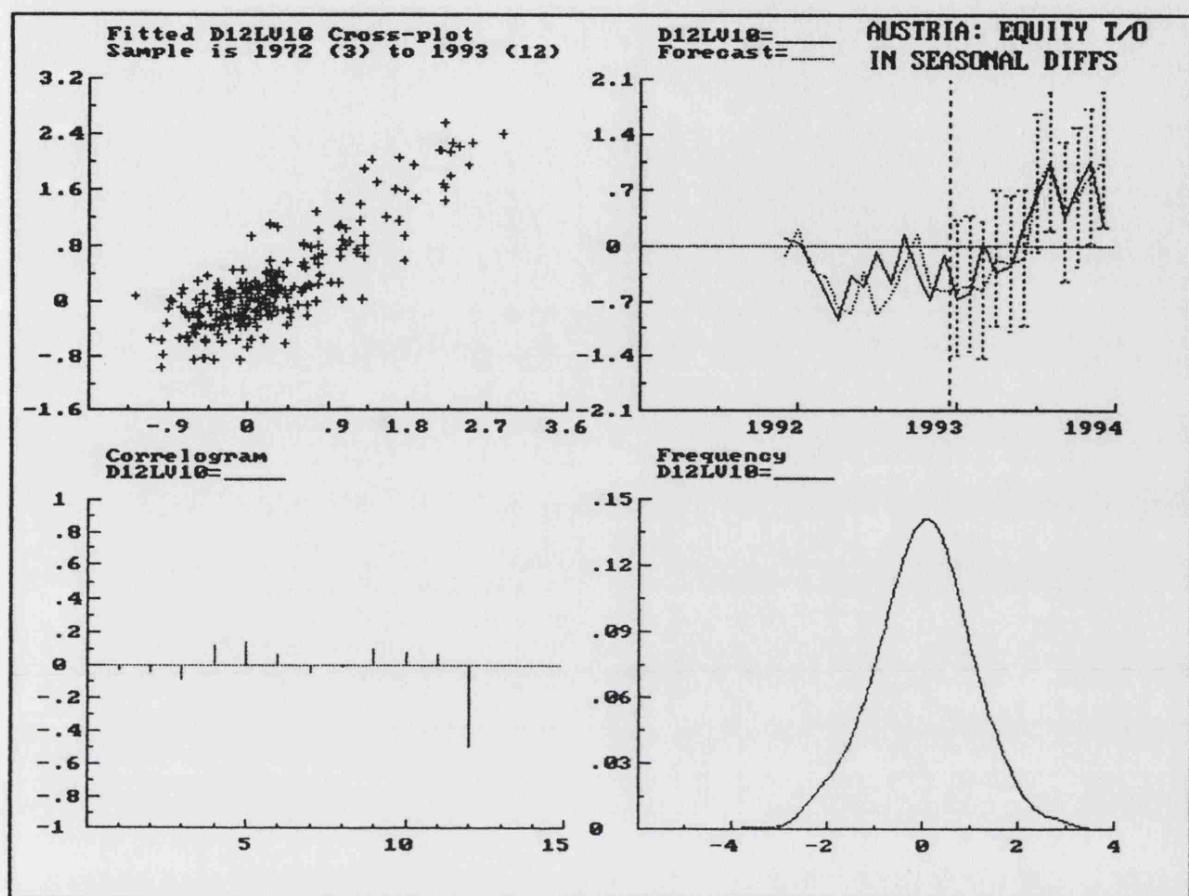


Figure 14. DENMARK EQUITY TURNOVER MODELLED IN SEASONAL DIFFERENCES

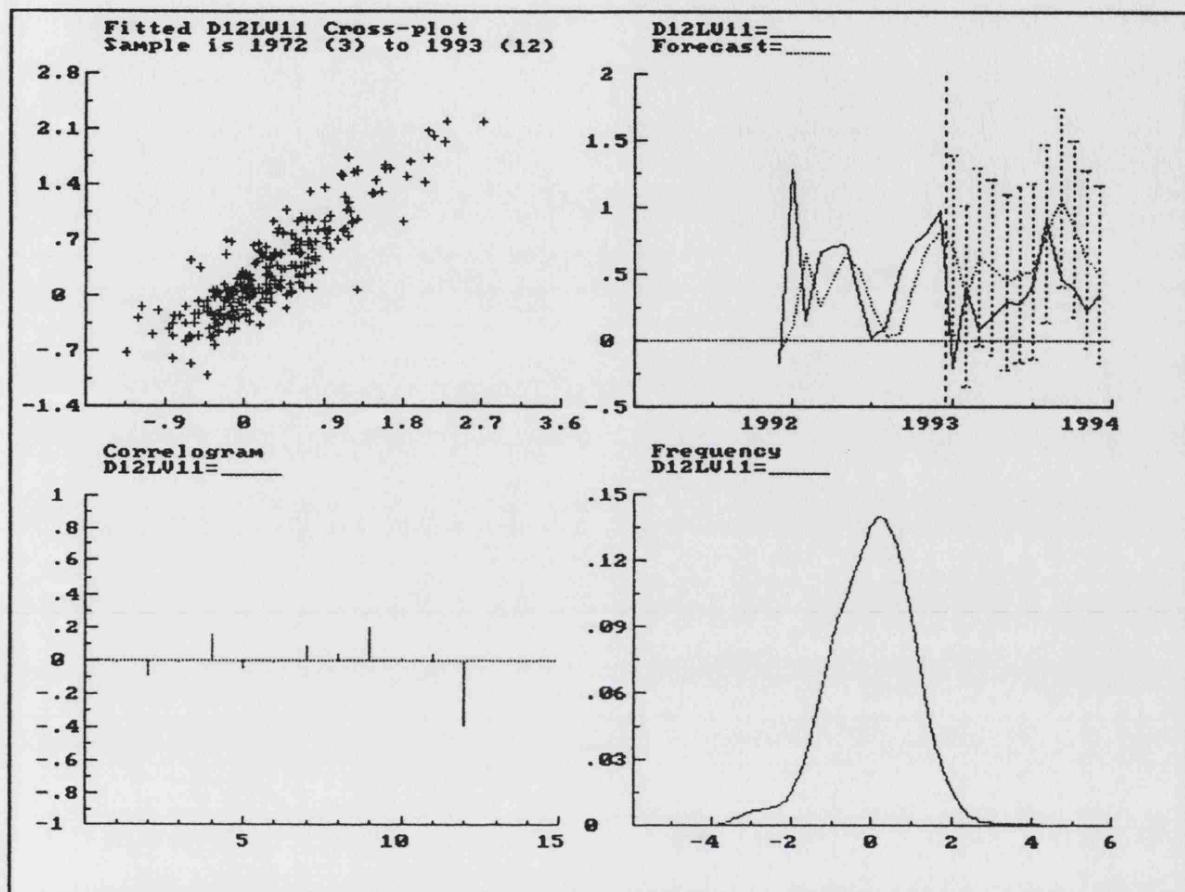


Figure 15. AUSTRIA EQUITY MODELLED IN FIRST DIFFERENCES

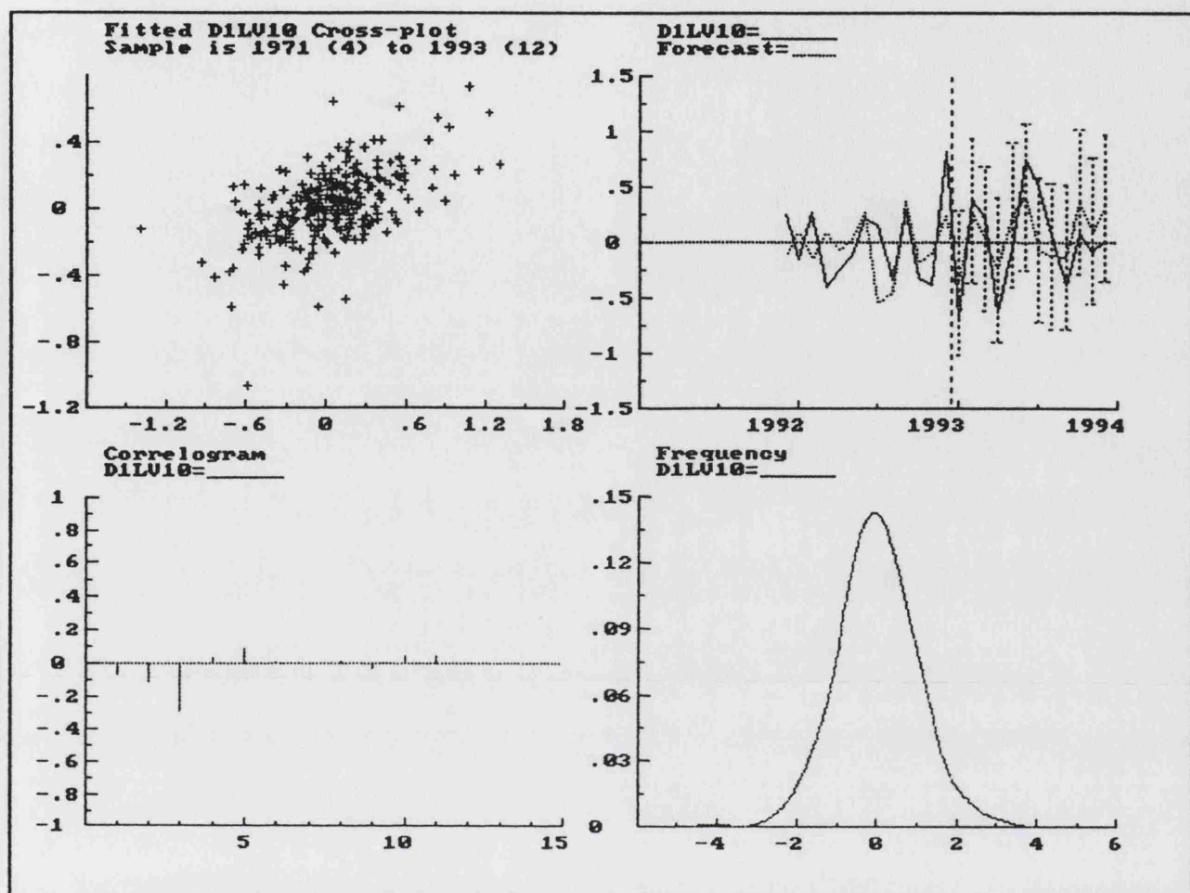
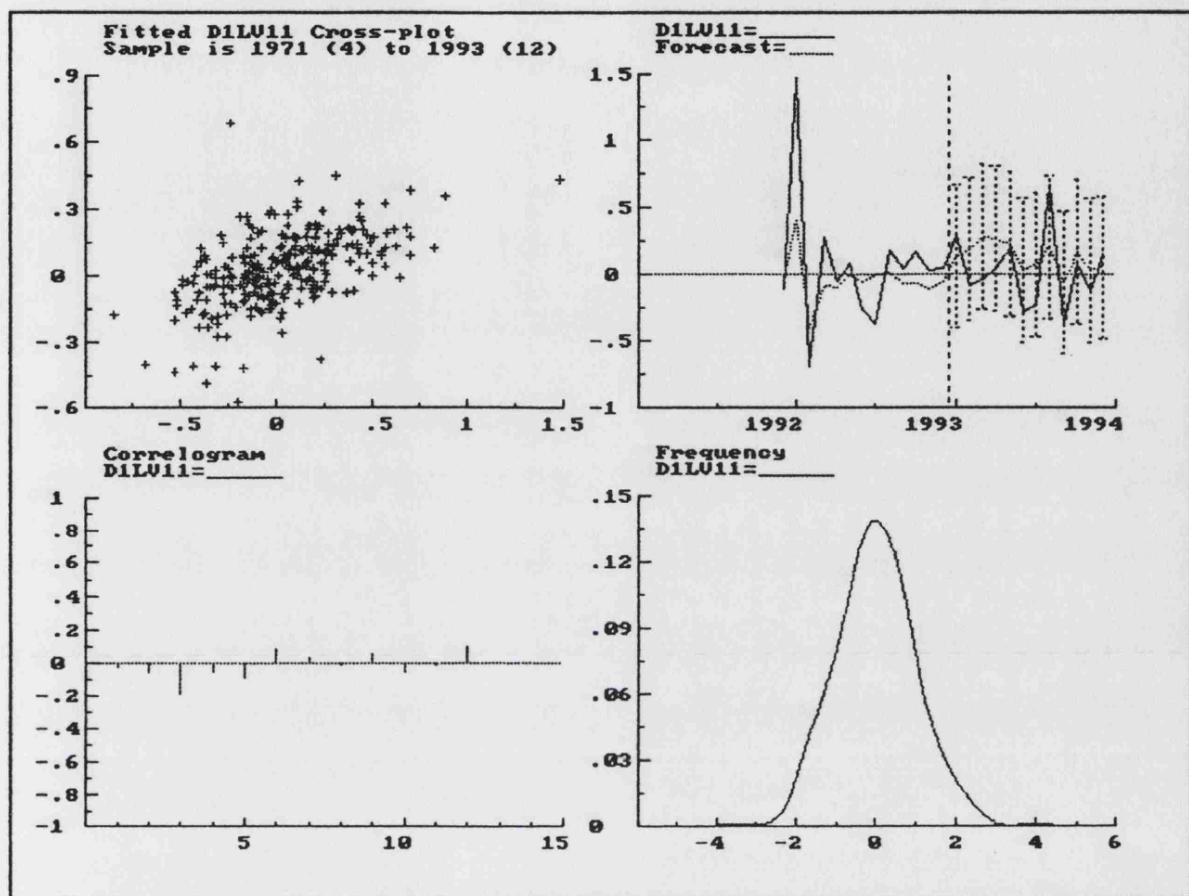


Figure 16. DENMARK EQUITY MODELLED IN FIRST DIFFERENCES



The only statistical result of interest as between the two forms is on the point of whether both forms of differencing induce stationarity, as was the case with the single variables. This is evident from the correlogram as well as from the underlying statistics not reported here.

To summarise progress to date therefore, a model in logarithms of levels looks attractive and appears to forecast well, albeit within wide error bounds, but is likely to be forecasting only the continuation of an established linear trend. In seasonal differences the moving average effect of twelve month data produces equally attractive-looking fit and forecast but cannot be theoretically justified. A model in first differences has neither fit nor forecast to recommend it, but should, *a priori*, better represent the presumed data generation process that produces the apparent observed cointegrated drift in equity turnover and bond volume. Therefore, in order to improve the explanatory power of the last model form cast in first differences, recourse was made to an error correction mechanism capable of reconciling the postulated long and short run dynamics involved.

It has been shown in empirical studies broadly relevant to the present study (Hendry and Mizon [1978], Hendry [1980], Baba et al [1983] and Cuthbertson Hall and Taylor [1992], pp. 103–106), that economic agents do indeed appear to act to adjust short term to long term relationship. The model is grounded theoretically in the idea of a motivation to adjust a (costly) out-of-equilibrium position on the part of agents upon detecting their situation in information emanating from the relevant environment (Hendry and von Ungern-Sternberg [1981]). The situation often modelled for example is that of consumers

adjusting their consumption to long run income prospects. The information on which to base decisions there is poor and the effects slow to appear. In financial markets the much greater supply of immediate, relevant and relatively accurate information, plus the motivation to maximise returns from a balanced portfolio to match current or expected equilibrium conditions, a more rapid rate of adjustment is to be anticipated. Trading volume is of course already widely accepted as a proxy for the extent of any out-of-equilibrium position.

If the long run relation

$$\frac{\text{EQUITY TURNOVER}}{\text{BOND VOLUME}} \quad (8)$$

is to be maintained constant, that is $\text{TURNOVER}_t = K \cdot \text{VOLUME}_t$ where K is some constant we should expect signs of an attempt to return to it in every period, acting against the tendency of the individual growth variables to follow diverging underlying paths. A similar relation

$$\frac{\text{EQUITY TURNOVER}}{\text{MARKET INDEX}} \quad (9)$$

may also be present. With data expressed in logarithms (8) and (9) may be restated in the form of an error correction mechanism

$$ECM = eqto_{t-1} - bvol_{t-1} \quad (10)$$

or, in the presence of both factors

$$ECM = eqto_{t-1} - bvol_{t-1} - idx_{t-1} \quad (11)$$

Adding an expression of this form to the model in differences, with the expectation that its coefficient will be negative to offset the hypothesised short-run divergence from long-run congruence, would be expected to improve its stability and forecasting performance.

The error correction model form thus arrived at is either

$$\begin{aligned}\Delta^1 \text{eqto}_t = & \beta_1 + \beta_2 \Delta^1 \text{bvol}_t + \beta_3 \Delta^1 \text{indx}_t \\ & + \beta_4 (\text{eqto} - \text{bvol} - \text{indx})_{t-1} \\ & + \beta_5 \text{bvol}_{t-1} + \beta_6 \text{indx}_{t-1}\end{aligned}\quad (12)$$

where both the price index and bond volume enter the error correction, or

$$\Delta^1 \text{eqto}_t = \beta_1 + \beta_2 \Delta^1 \text{bvol}_t + \beta_3 (\text{eqto} - \text{bvol})_{t-1} + \beta_4 \text{bvol}_{t-1}\quad (13)$$

where bond volume alone enters, or

$$\Delta^1 \text{eqto}_t = \beta_1 + \beta_2 \Delta^1 \text{indx}_t + \beta_3 (\text{eqto} - \text{indx})_{t-1} + \beta_4 \text{indx}_{t-1}\quad (14)$$

where the index alone is instrumental in correcting the long run relation.

In all cases the long run solution represents a correction to be applied to the short run model to account for the tendency of agents to attempt to restore by trading the desired long run relation between their bond and equity holdings as they react to short run events.

Long run solutions for each market for each version of the error correction mechanism above are reported in the following table:

TABLE 10: LONG RUN ERROR CORRECTION MODELS

$$\text{DECMAUS} = \text{D1LV10} - (.2955 * \text{D1LV1}) - (2.8100 * \text{D1LV13}) + (.3018 * \text{LV100113}) \\ + (.17340 * \text{LV1}) - (.4925 * \text{LV13}) + 3.2500; \quad (12a)$$

$$\text{DECVAUS} = \text{D1LV10} - (.3296 * \text{D1LV1}) + (.07702 * \text{LV1001}) - (.0286 * \text{LV1}) \\ + .3837; \quad (13a)$$

$$\text{DECXAUS} = \text{D1LV10} - (2.9320 * \text{D1LV13}) + (.2142 * \text{LV1013}) - (.5403 * \text{LV13}) \\ + 2.5150; \quad (14a)$$

$$\text{DECMDEN} = \text{D1LV11} - (.2855 * \text{D1LV2}) - (1.5630 * \text{D1LV14}) + (.2887 * \text{LV110214}) \\ + (.1509 * \text{LV2}) + (.001869 * \text{LV14}) + .6098; \quad (12d)$$

$$\text{DECVDEN} = \text{D1LV11} - (.3302 * \text{D1LV2}) + (.1701 * \text{LV1102}) + (.03351 * \text{LV2}) \\ + .1452; \quad (13d)$$

$$\text{DECXDEN} = \text{D1LV11} - (1.9980 * \text{D1LV14}) + (.1079 * \text{LV1114}) \\ - (.1305 * \text{LV14}) + .3061; \quad (14d)$$

$$\text{DECMBER} = \text{D1LV12} - (.2818 * \text{D1LV3}) - (4.5540 * \text{D1LV15}) + (.5683 * \text{LV120315}) \\ + (.42660 * \text{LV3}) - (.4902 * \text{LV15}) + 3.6060; \quad (12g)$$

$$\text{DECVGER} = \text{D1LV12} - (.3880 * \text{D1LV3}) + (.2127 * \text{LV1203}) \\ + (.04106 * \text{LV3}) - .3985; \quad (13g)$$

$$\text{DECXGER} = \text{D1LV12} - (4.9400 * \text{D1LV15}) + (.5068 * \text{LV1215}) \\ - (.8119 * \text{LV15}) + 4.7240; \quad (14g)$$

LEGEND: DEC_{V,X,M/AUS,DEN,GER} = Error correction variable in differences for bond (V)olume, Share Price Inde(X) or (M)ultiple in AUStria, DENmark or GERmany.

For each country respectively:

D1LV1..3 = First differences of bond volume at time t.
 D1LV10..12 = First differences of log of share turnover at time t
 D1LV13..15 = First differences of share price index at time t.
 LV1001 etc log share turnover - log of bond volume, all at time t-1
 LV1013 etc log share turnover - log of index, all at time t-1
 LV100113 etc both above, see equation (11)

These results are the long-run solution of models based on an error correction model parameterisation proposed by Doornik and Hendry [1994] p. 166.

The final form of the error correcting model thus becomes (using (12) above)

$$\Delta^1 eqto_t = \beta_1 + \beta_2 \Delta^1 bvol_t + \beta_3 \Delta^1 idx_t + \beta_4 ercm_t + e_t \quad (15)$$

This model was tested, with the results presented graphically in Figures 17. and 18.

It is immediately evident that a dramatically improved fit has been achieved. On the other hand both standard test results and the correlogram show evidence of serial correlation. This is confirmed visually by graphing the residuals which show clear evidence of a random walk that centres on zero but takes values far from this mean over relatively long periods. Figures 19. and 20. summarise the results so far for the Austrian and Danish markets exhibiting, in order, the three variables in logs and differences, followed by the error correcting factors and the residuals from the whole model. It continues to be noteworthy that the same model sustains the same conclusions in both markets so far. Logs of the variables are seen to be stationary in differences, as are the three candidates for an error correcting mechanism. Only the residuals exhibit a clear random walk, producing the serial correlation evident in the correlogram of Figures 17. and 18.

Figure 17. AUSTRIA ERROR CORRECTION MODEL

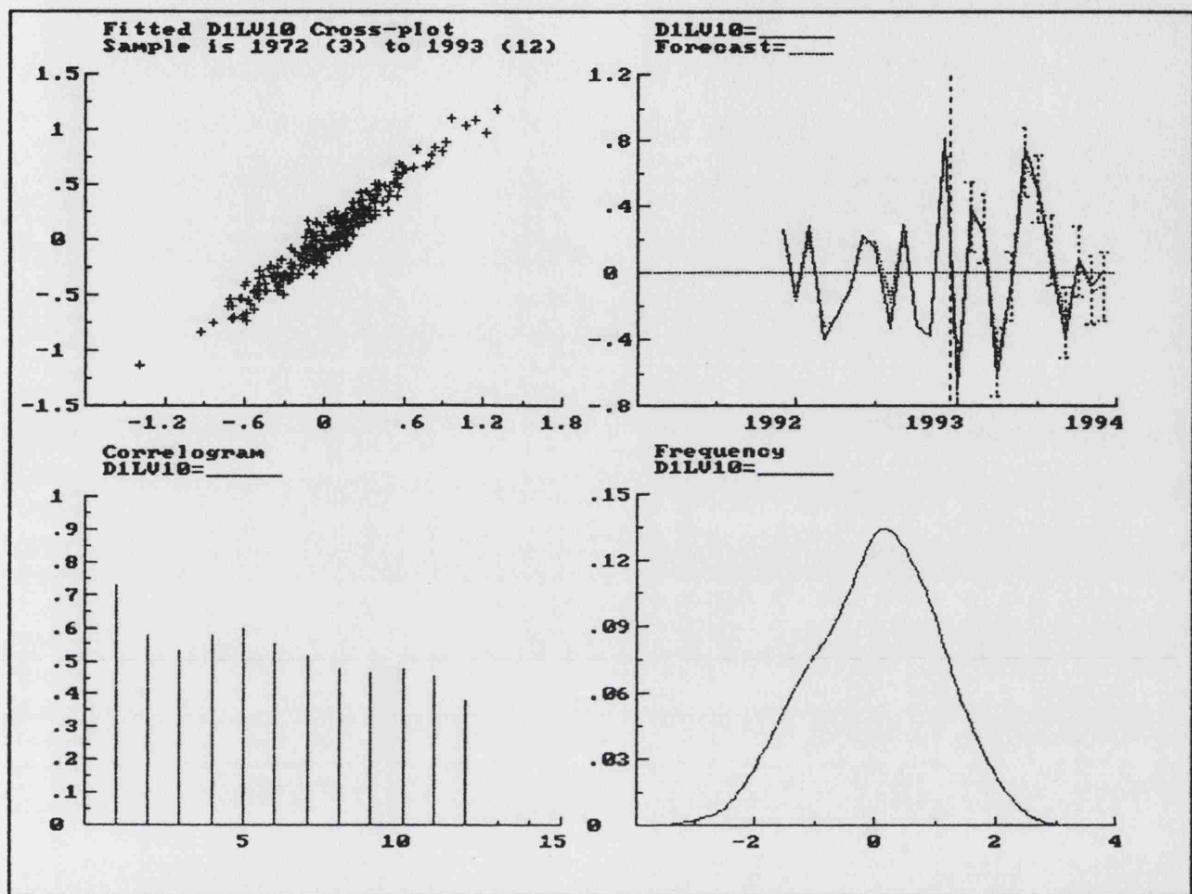


Figure 18. DENMARK ERROR CORRECTION MODEL

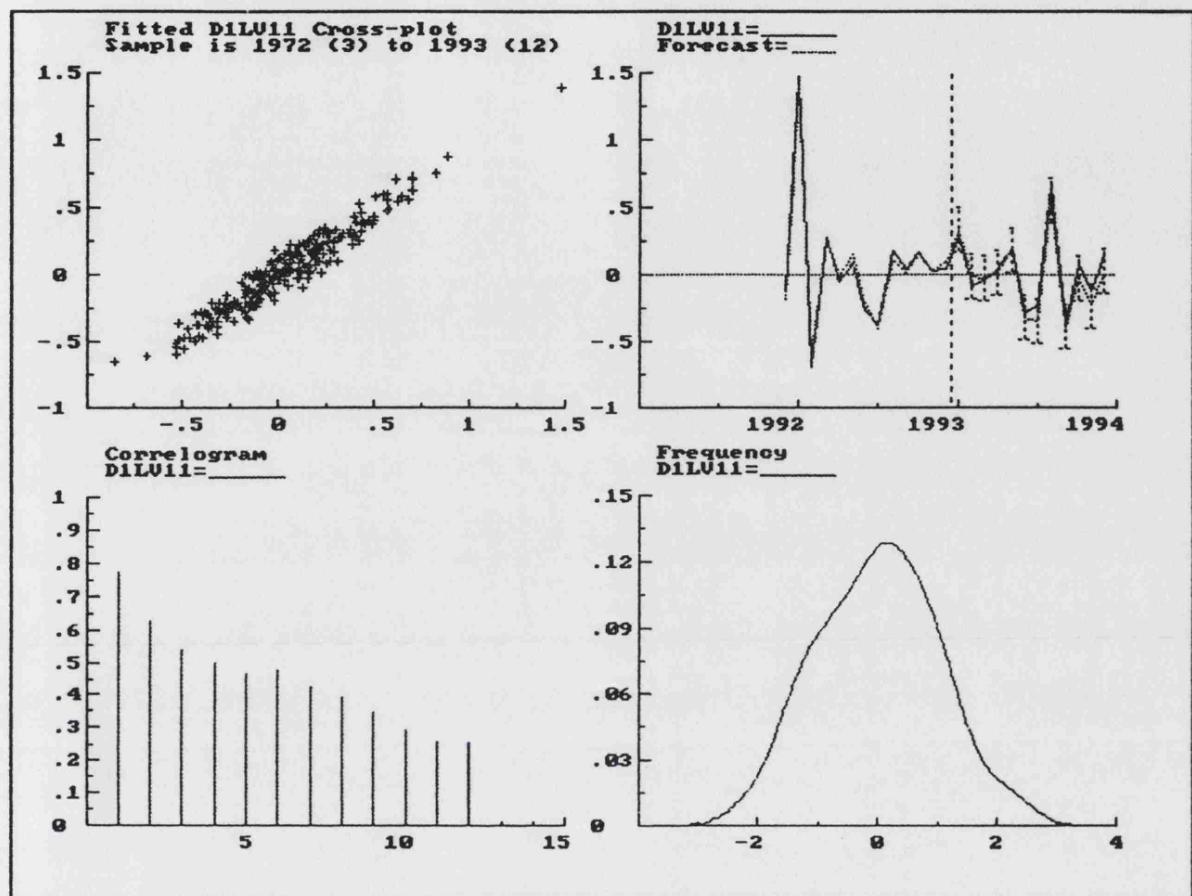


Figure 19. AUSTRIA VARIABLE TRANSFORMATIONS AND RESIDUALS

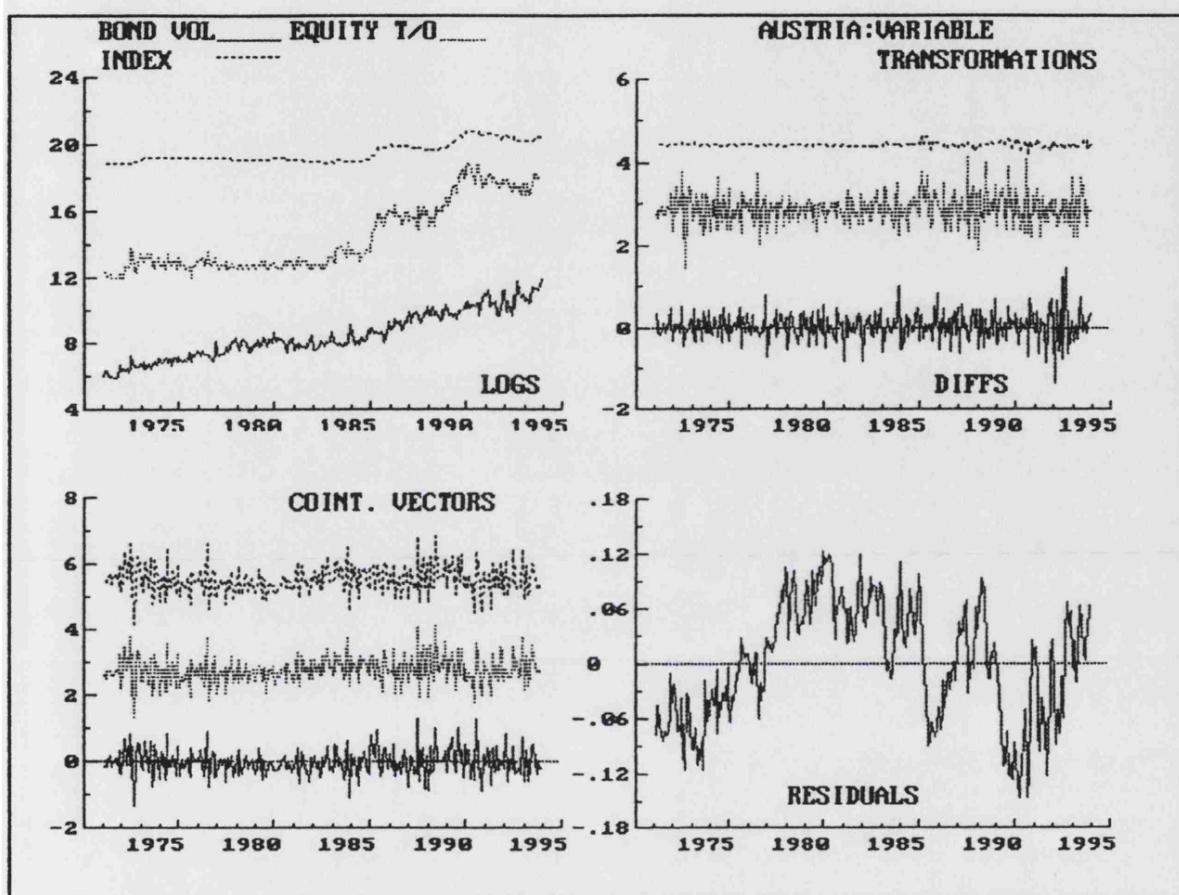
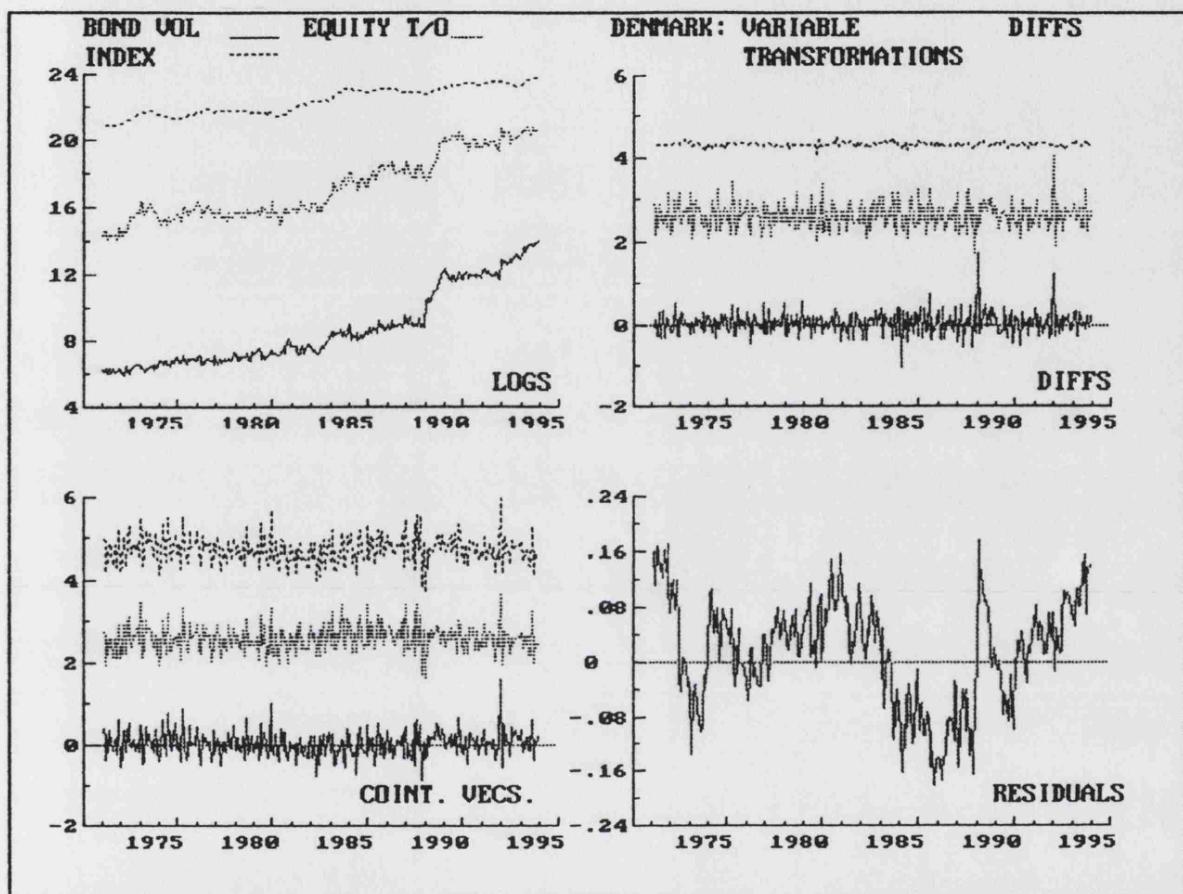


Figure 20. DENMARK VARIABLE TRANSFORMATIONS AND RESIDUALS



The further possibility arises however that agents would seek to counter random shocks affecting the bond market in the same way they would respond to deterministic shifts or short term trends. That amounts to stating that the variance of equity turnover is itself likely to vary, demonstrating autoregressive conditional heteroscedasticity (ARCH) characteristics. The phenomenon had previously been tested for in the single variables comprising the models developed so far and not found. It was provisionally accounted for by the addition of the residuals from the previous result, lagged one period, as a further regressor to the existing model, which was then re-estimated.

The results of estimating the equation

$$\Delta^1 \text{eqto}_t = \beta_1 + \beta_2 \Delta^1 \text{bvol}_t + \beta_3 \Delta^1 \text{indx}_t + \beta_4 \text{ercm}_t + \beta_5 u_{t-1} \quad (16)$$

are much more satisfactory. The correspondence of actual and fitted is much closer, forecasts remain well within narrow standard error bounds and tests of model specification and stability are acceptable, as shown in the table of final results. Residuals are close to 'white noise' although there is some evidence of long period wandering around the mean, particularly in the Austrian case. The possibility of ARCH residuals was nevertheless not neglected (see further below).

Figures 21-22 for Austria and 23-24 for Denmark, show the fit and white noise appearance of the residuals, together with a correlogram with little evidence of serial correlation and a close-to-normal appearance for the distribution of the residuals.

Figure 21. AUSTRIA ARCH MODEL RESIDUALS (TWO ERROR CORRECTION TERMS)

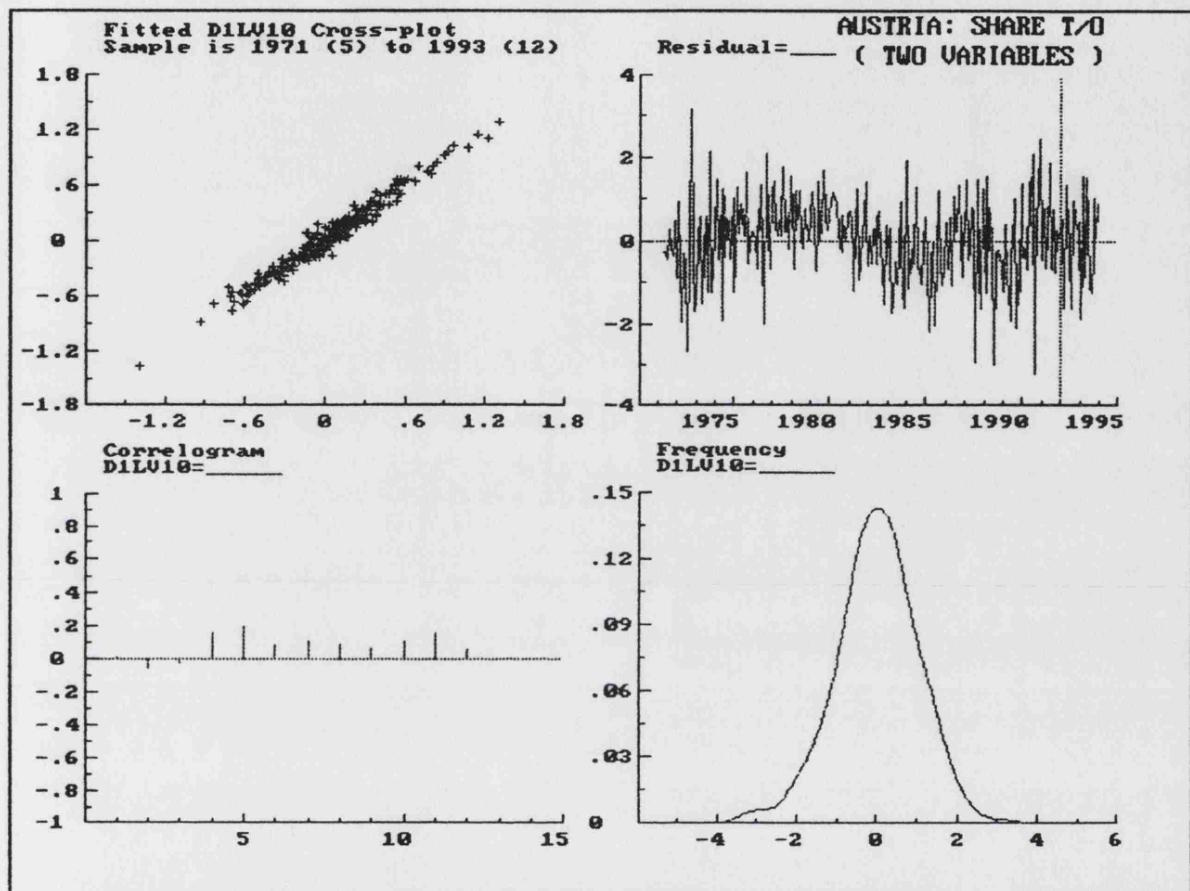


Figure 22. AUSTRIA ARCH FORECAST AND OUTCOME

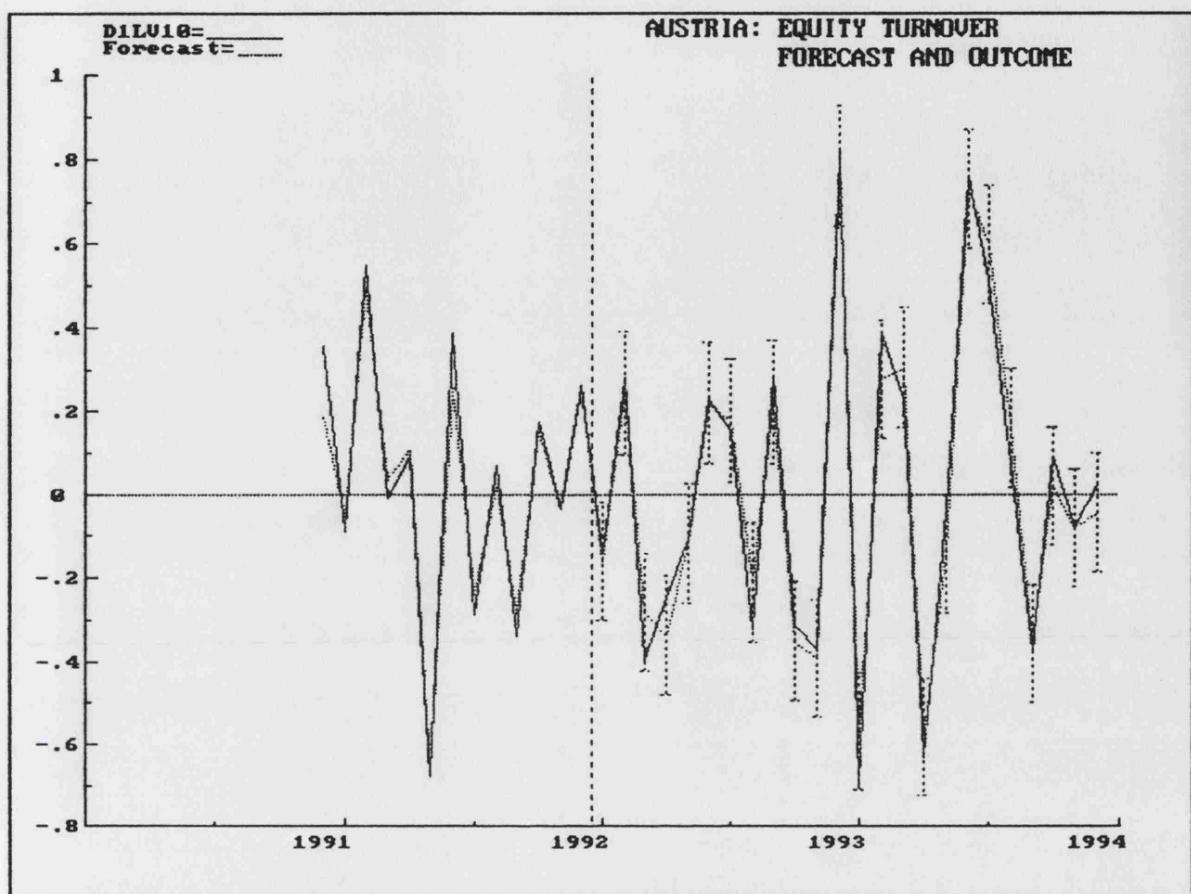


Figure 23. DENMARK ARCH MODEL RESIDUALS (TWO ERROR CORRECTION TERMS)

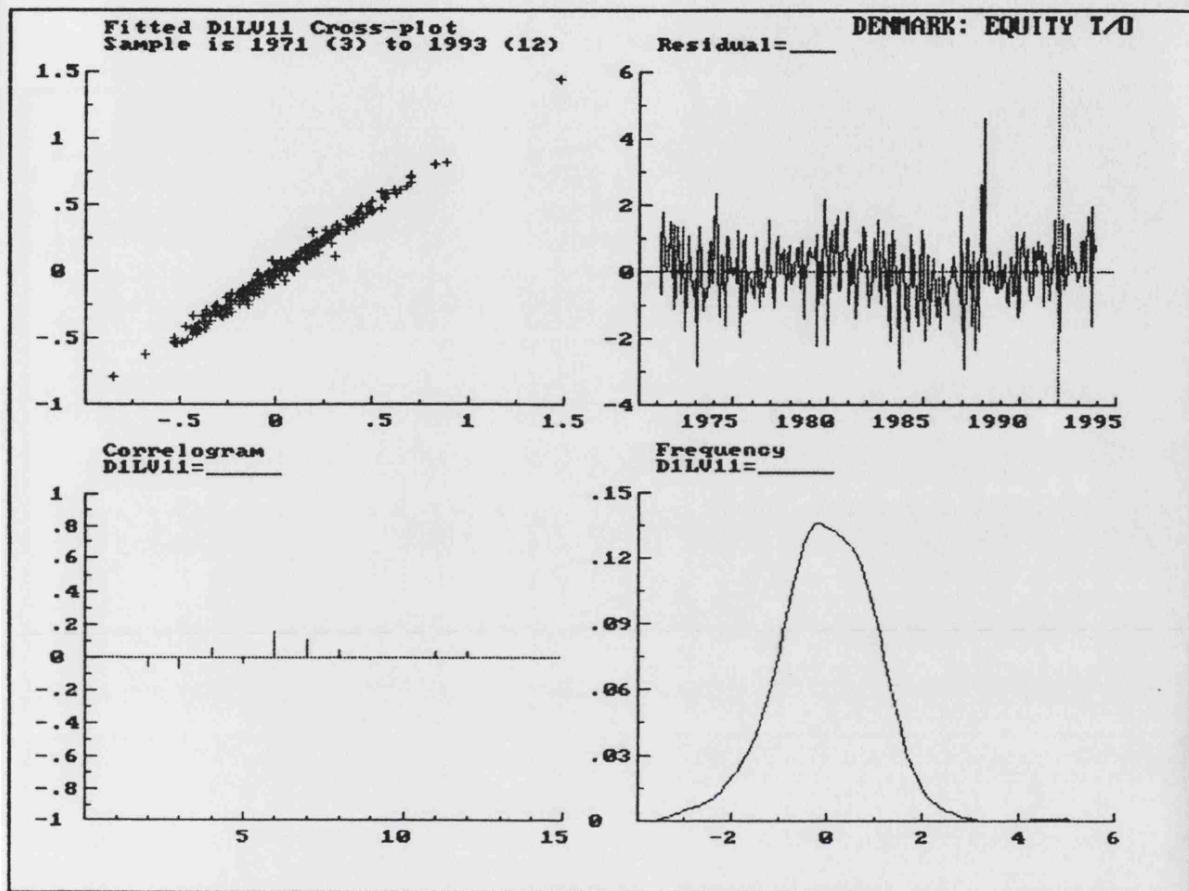
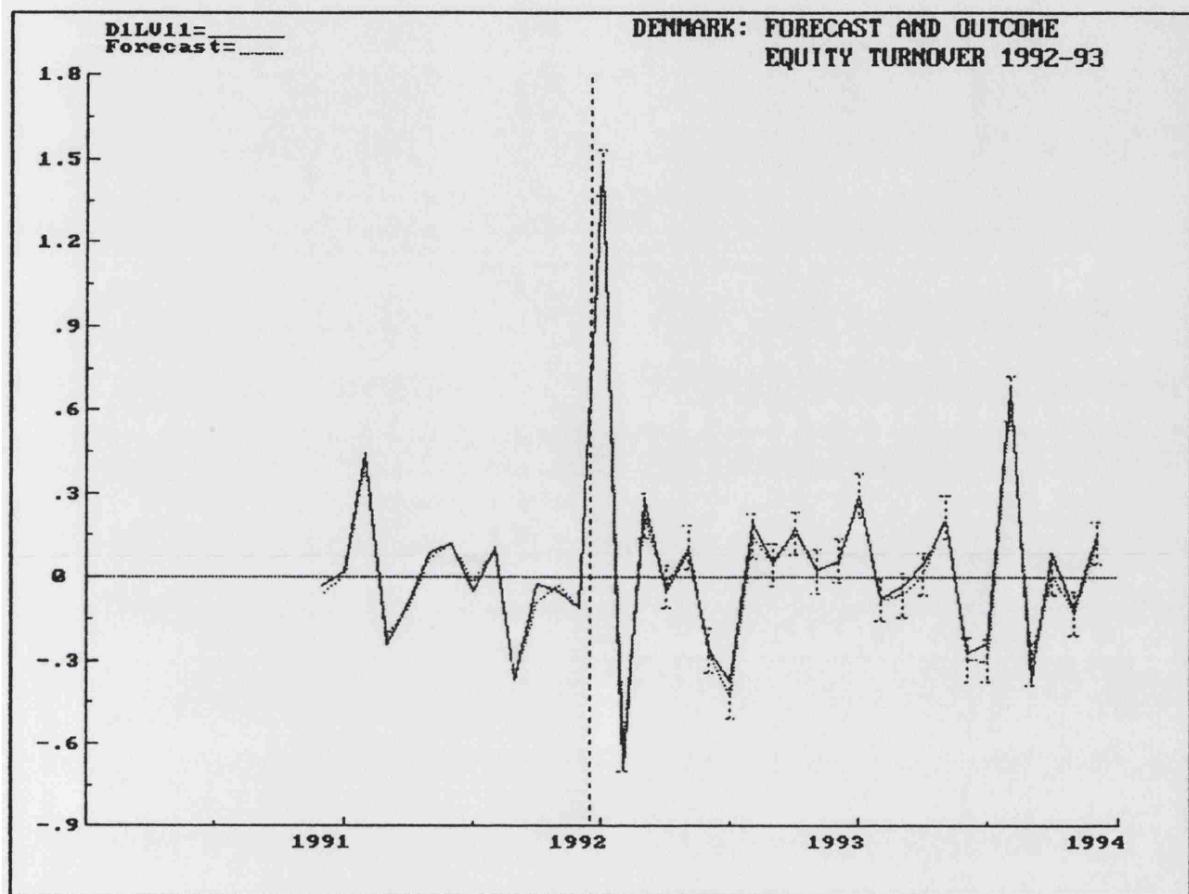


Figure 24. DENMARK ARCH FORECAST AND OUTCOME



Figures 22 and 24 in particular show the efficiency of the forecasts achieved. With the forecast period extended to 24 periods there are no forecasts outside the error bounds and little evidence of lagging or failing to accommodate turning points.

It is possible to observe continued random-walk-like wandering in the residuals from the Austrian model however, together with consistent positive, if small, residual serial correlation and a less satisfactory distribution of the residuals. This gives rise to the suspicion that cross-equation linkages are present in an error correction with two terms. Recasting the model with a single error correction term - on bond volume rather than bond volume plus the index - a better fit and all-round better results are obtained. The results are exhibited in Figures 25 and 26.

At this point the two markets evidently begin to differ in the details of their responses. Austrian equity turnover appears to be less influenced by the share price index. This is consistent with the evidence of market structure already presented, trading activity reflecting the behaviour of banks suiting their own convenience as well as maintaining step with Germany to a greater degree than Denmark. It remains an open question whether modelling equity turnover on bond volume alone is the best representation of the data generating process overall.

Figure 25. AUSTRIA ARCH MODEL RESIDUALS (ONE ERROR CORRECTION TERM)

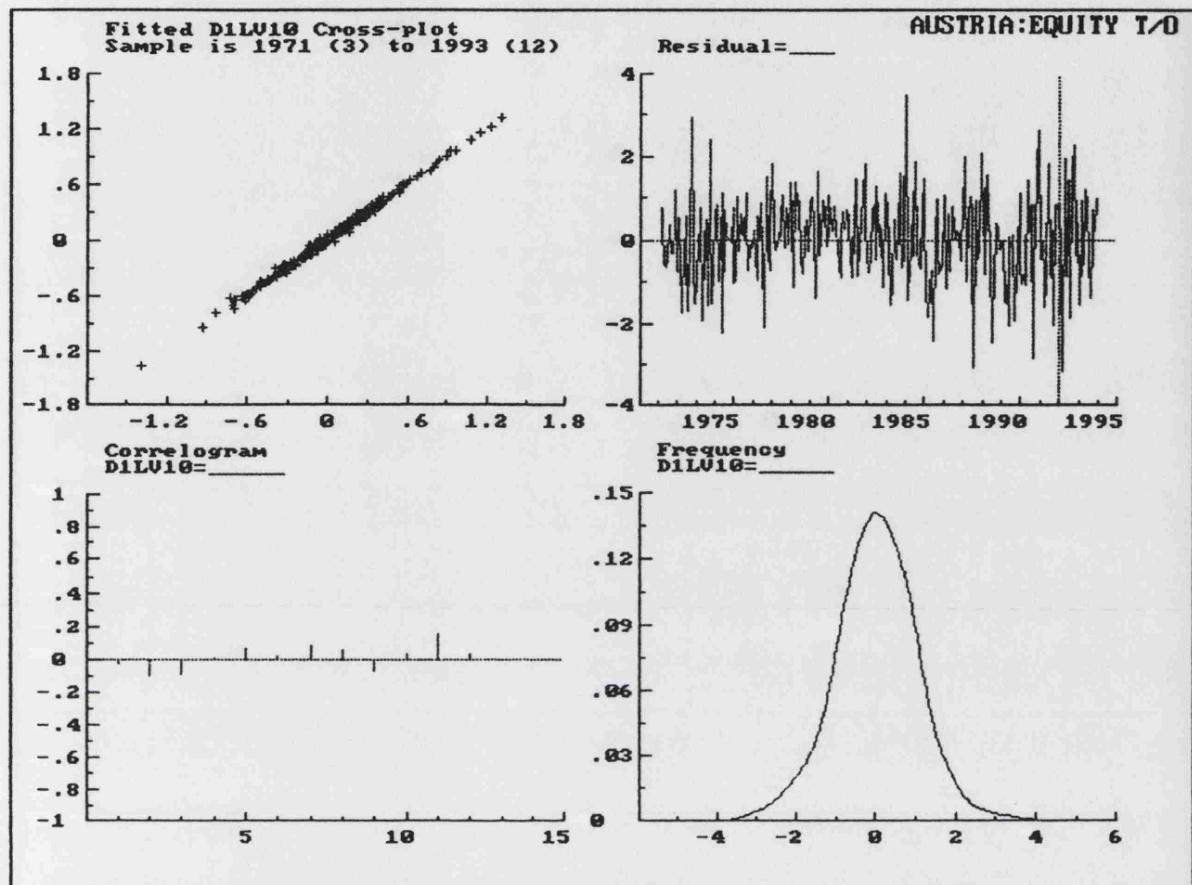
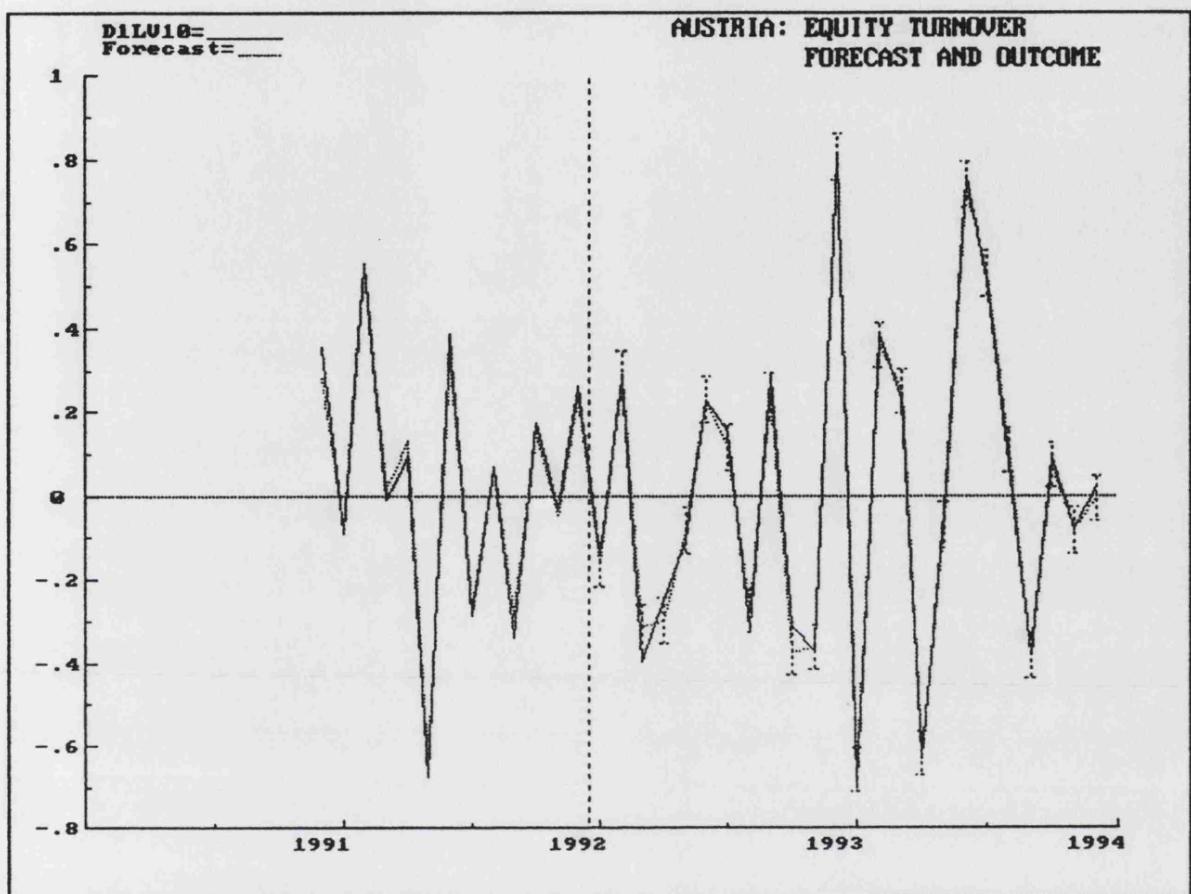


Figure 26. AUSTRIA ARCH MODEL FINAL FORECAST AND OUTCOME



Evidence of autoregressive heteroscedasticity remained a suspect in the residuals from the (purposes of comparison) model of the German market, despite earlier testing for ARCH moments in the individual data series used. A Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model (see Engle [1982]) was therefore developed for all three markets, replacing the simpler procedure of adding the untreated residuals to the regression, equivalent to an ARCH slope coefficient of unity.

For the Austrian market the best ARCH equation failed to improve on the performance of the earlier model. For the Danish market no convergence could be found in the non-linear least squares minimisation. Both of these results would seem to suggest slope coefficients close to unity in the putative ARCH model. The detailed results are not reported.

In the case of the German market, using the optimised ARCH model produced much improved overall results and forecasting performance, to a level comparable with the other two markets on the basis of their simpler treatment. This is of sufficient interest to report in detail, in spite of the fact that modelling the German market was not a prime goal. The results are displayed in Figures 27 and 28. Figure 29 shows the conditional and unexpected components of variance, which are in accordance with the hypothesis that major shocks to the trading system produce a decaying train of variability in equity trading volume. The remaining, unanticipated variance is small and stable.

Figure 27. GERMANY ARCH MODEL RESIDUALS

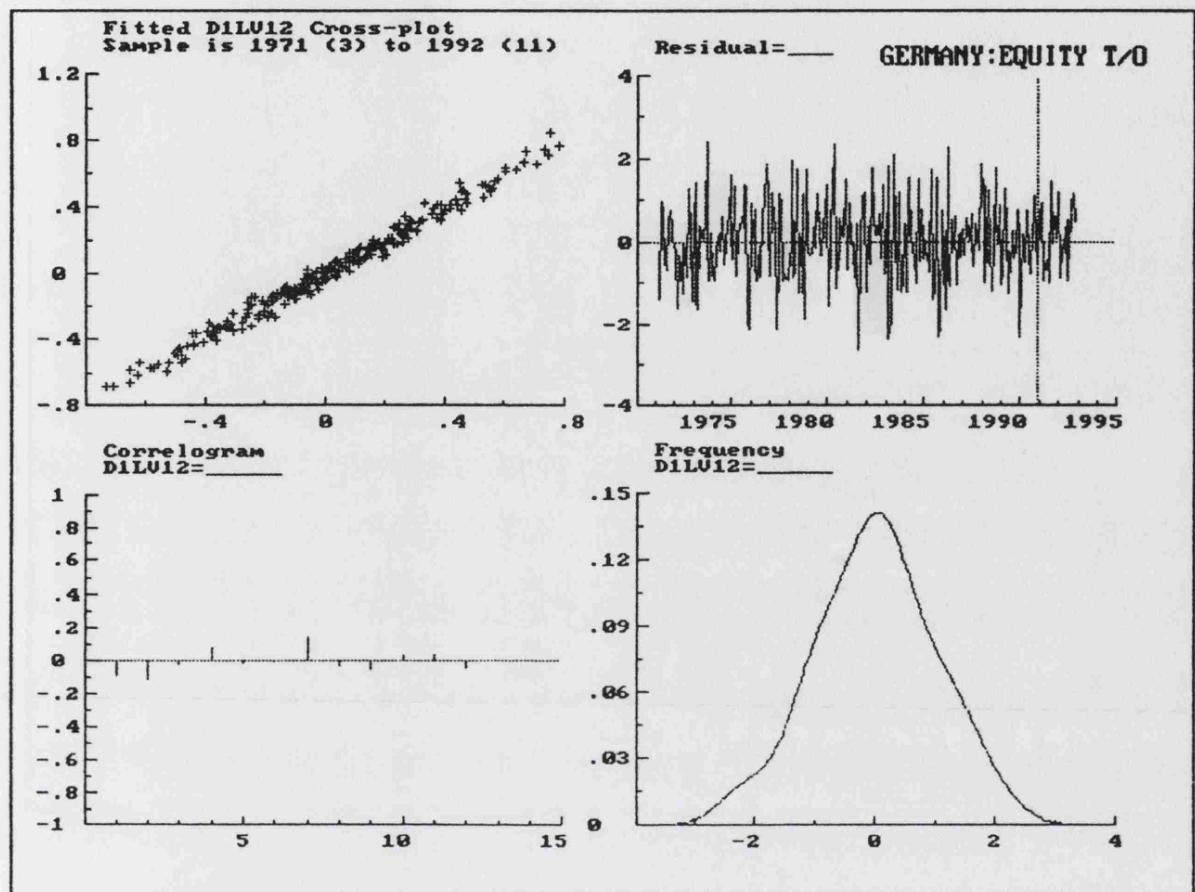


Figure 28. GERMANY ARCH FORECAST

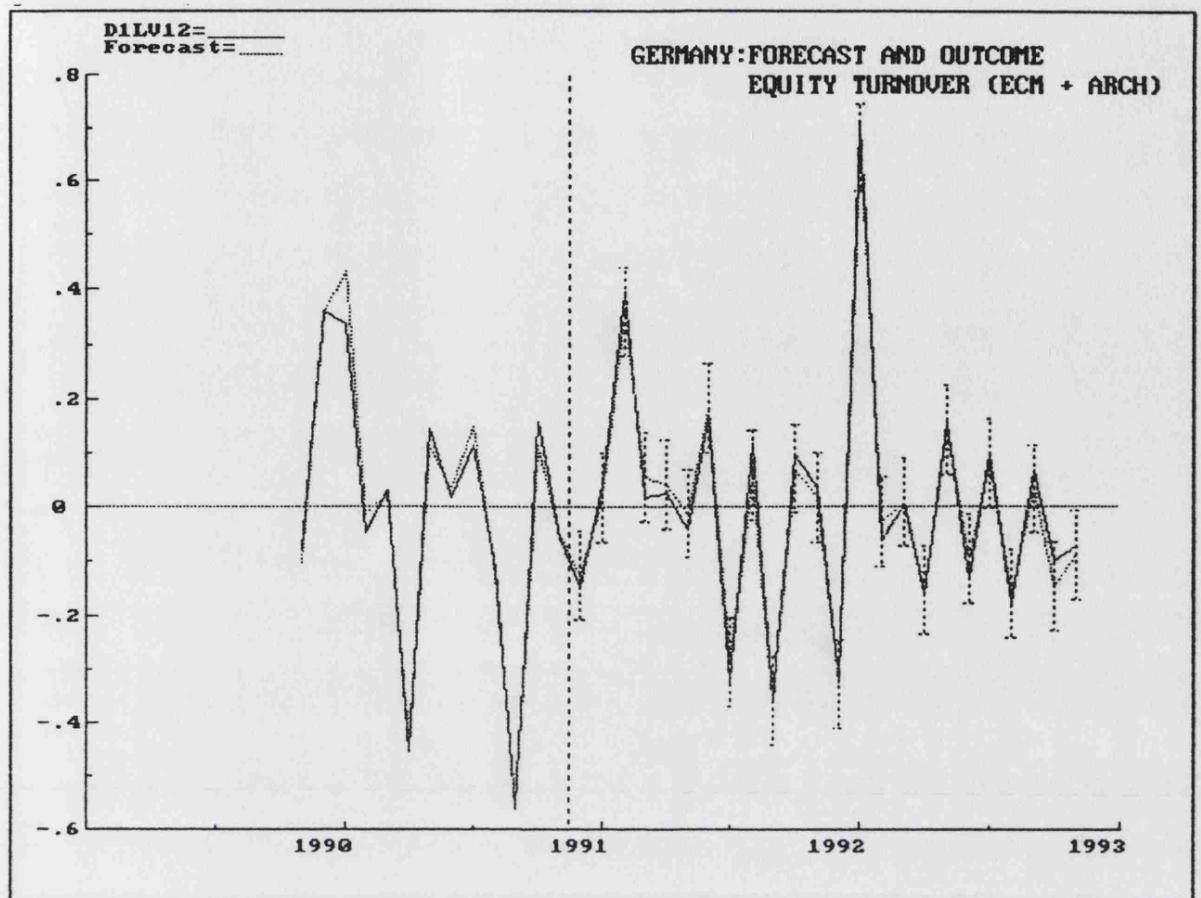
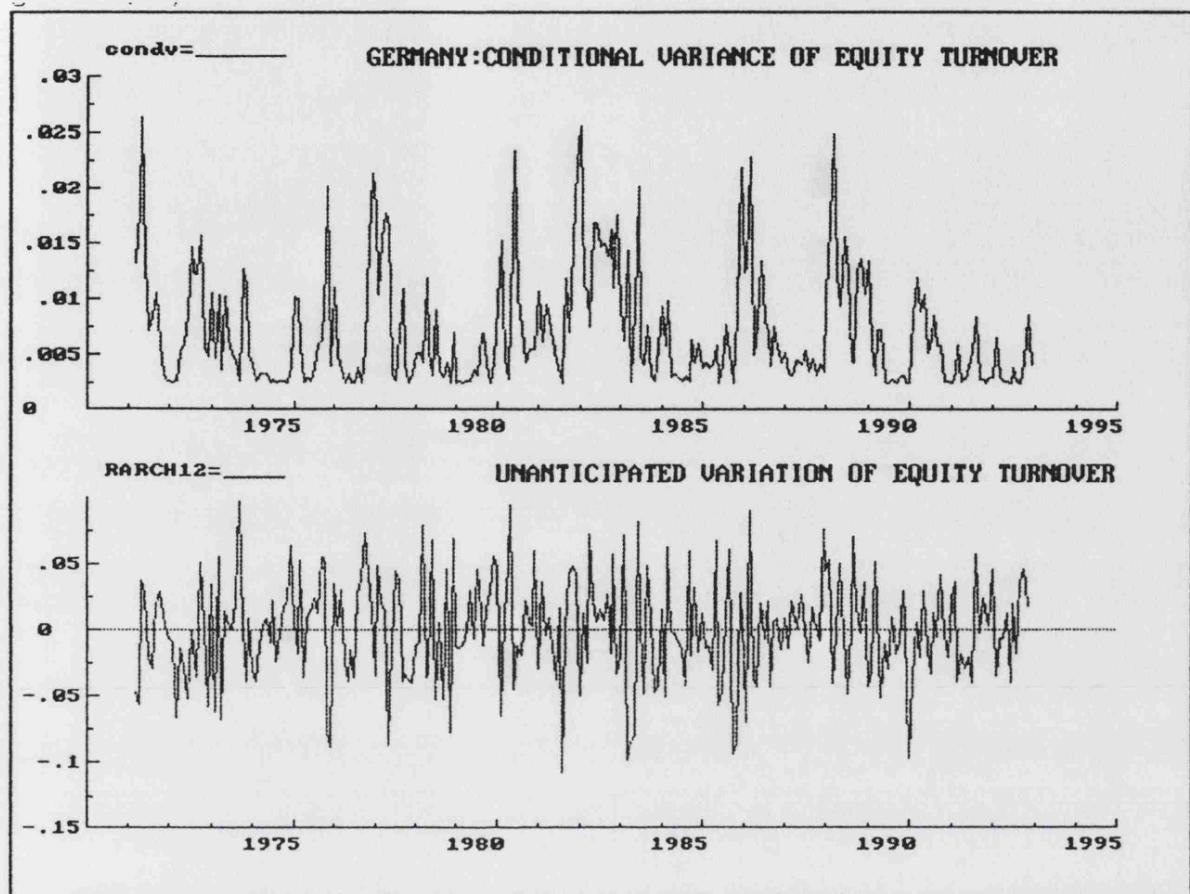


Figure 29. GERMANY CONDITIONAL VARIANCE OF EQUITY TURNOVER



The full model for the German market is based on the equation

$$\Delta^1 eqto_t = \beta_1 + \beta_2 \Delta^1 bvol_t + \beta_3 ercm_t + \beta_4 arch_t \quad (17)$$

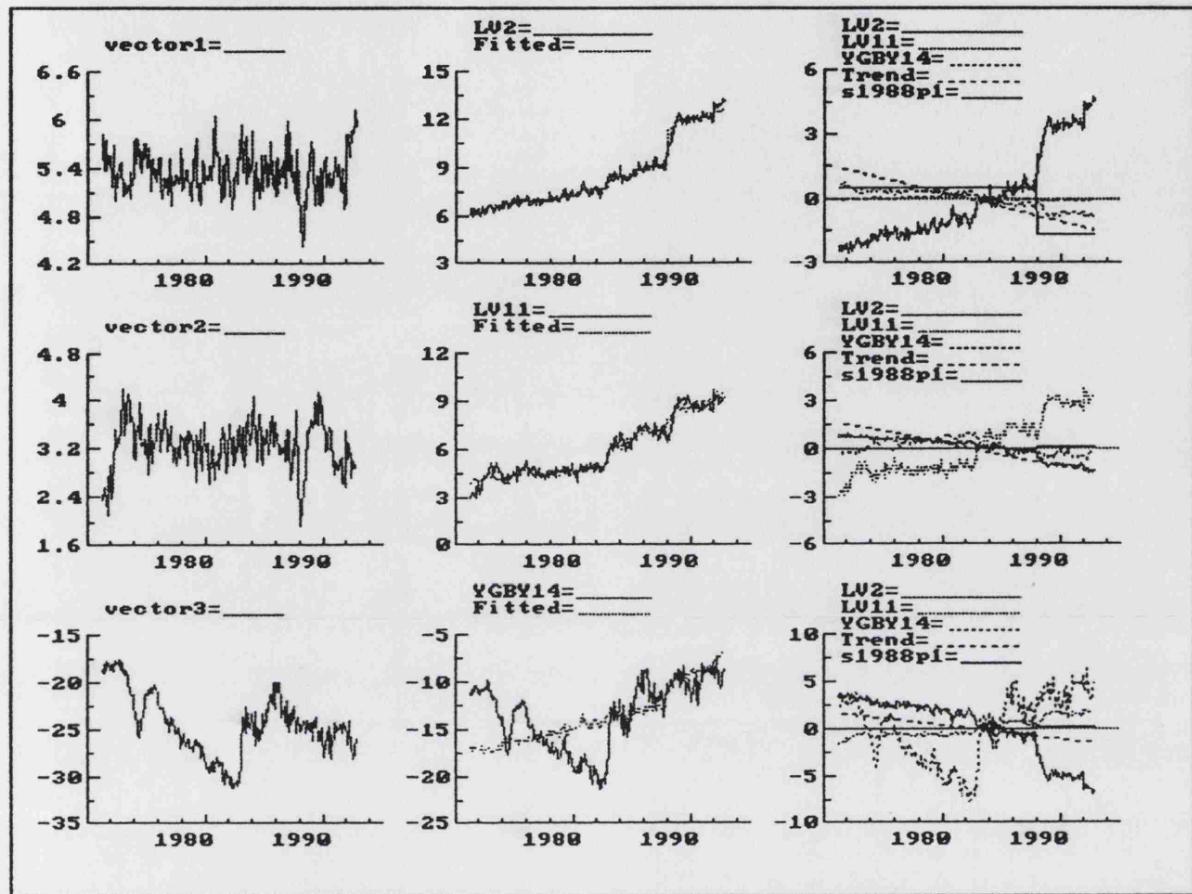
where $arch = (\text{sign preserved}) \sqrt{.6762u_{t-1}}$ and $ercm$ is error correction function number (13g) from Table 11.

The (passed) functional misspecification tests from PC-GIVE version 8.0 on the final model for the German market are shown below.

AR 1- 7F(7,238) =	2.026 [0.0526]
ARCH 7 F(7,231) =	1.4372 [0.1912]
Normality Chi ² (2)=	0.30787 [0.8573]
Xi ² F(6,238) =	2.0822 [0.0560]
Xi*Xj F(9,235) =	1.8077 [0.0677]
RESET F(1,244) =	1.9147 [0.1677]

The conclusion drawn is that the expected value of variance in equity turnover in all three markets is affected by the degree of variability in previous bond volume and share price index movements. This can only be demonstrated in the case of the German market, probably for reasons of larger size and lower general volatility. A direction is indicated for further, future research on the other two markets, together with any other suitable candidates for a similar approach, to determine the precise nature of this aspect of their dynamic behaviour. Figure 30 shows the conditional and unanticipated variance of equity turnover in the Austrian market for example, where, although not able to pass misspecification tests in the present parameterisation of the model, there would appear to be scope for further detailed investigation.

Figure 30. AUSTRIA: CANDIDATE COINTEGRATING VECTORS FOR VAR MODEL



Further avenues for research, possibly using higher frequency data, are suggested to establish a more exact model in a multivariate context. A further future study suggests itself into the possibility that the German market behaves more like a small regional market, or a collection of such markets (as it is in fact organised) than a large international centre. The proposition is supported by much anecdotal evidence.

As an appendix to the present investigation, an unrestricted reduced form model was run to test for cointegrating relations in a vector autoregression (VAR). Cointegration was used to verify the results obtained from general-to-specific modelling rather than as a modelling strategy, based as it is on an essentially different econometric methodology. Further investigation of the restrictions required to establish the exact parameters of the cointegrating vectors and to base a satisfactory model upon them constitutes an opportunity to re-examine the present or higher frequency data (unlikely to be available for the whole of the sample period considered here). This is considered more appropriate as a separate future activity based on the rather different VAR methodology. Figure 30 shows two satisfactory and one unsatisfactory candidate for cointegrating vectors for the Danish market using this approach, together with their fit and plots of the variables entering into them.

INTENTIONALLY

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CONCLUSION

The overall conclusion drawn from all the analysis and modelling work described above is that the three markets share strong structural and dynamic features which produce models of their data generation process, particularly equity turnover and bond trading volume, that are remarkably similar in character, if not in detail. The similarities do not appear to be based on spatial factors, since the markets are differently organised and possess different trading instruments and practices, as well as exhibiting only the degree of connectedness that one would expect from co-habiting a highly integrated economic region. Direct correlations between the data from different markets are weak and models were improved by the progressive exclusion of candidate independent variables from among the data of other markets. The effects of different trading practices on markets are discussed in detail in Section 5.2.3 and the actual setups and instruments are compared in the Introduction to Part II, more detailed description on each market being furnished in Chapters 7-10.

The underlying reason for the observed relationship between bond trading volume and equity turnover is, it may be concluded, that the markets in question are heavily dominated by bond trading and conduct equity trading on the basis of what is necessary to rebalance portfolios in consequence of changes in bond holdings. This conclusion, reinforced by the dominance of the bond market in simple size terms, allows the further surmise that causation runs from the bond market to the equity market rather than the other way round. Needless to say, economic factors such as unanticipated government borrowing requirements and changes in prospective inflation (both operating on long term interest rates) affect both markets as joint influences. In markets such as the United Kingdom, where attention to

equity predominates irrespective of market size, the influence of the economic factors is felt there directly. A good example was the revelation of a large, unanticipated extra UK government borrowing need on September 18th 1995, which produced a fall of 31 points (0.87%) in the FT-SE 100, not reflected in other indices, and generated considerable equity trading volume. The results of this part of the survey are therefore mainly applicable to the study of bond-dominated markets, but should be relevant to the newer markets that are developing as this feature evolves and relevant data accumulates.

APPENDIX

TEST RESULTS

The following table 11 exhibits the standard test results obtained by modelling each variable in turn at the lags shown on its own previous values, without further treatment, as discussed in Section 6.2.

Results are grouped in threes, representing the three countries, Austria, Denmark and Germany, in that order. A single star alongside represents significance at the 5% level, two stars represents the 1% confidence level. Of interest is the close grouping as between countries in many cases.

The tests are identified as follows and are output from PC-GIVE

Version 8.0. (Doornik and Hendry [1994]): $R^2 = R$ Squared

DW = Durbin-Watson DF = Dickey-Fuller

ADF = Augmented Dickey-Fuller DHF = Dickey-Hasza-Fuller

Table 11.

	R^2	DW	DW(UR)	DF	ADF	DHF
SEQTO		1.98	1.35	-10.52**	-3.28**	
		2.05	.29	-2.69**	-.04**	
		1.88	.90	-7.51	-.19**	
seqto_2	.65	2.03	.45	-5.37**	-3.81**	
	.73	2.02	.34	-4.35**	-3.35**	
	.52	2.06	.62	-6.40**	-3.78**	
seqto_12	.72	1.79	.44	-5.39**	-4.20**	4.76
	.77	1.80	.35	-4.73**	-4.14**	5.87
	.64	1.76	.60	-6.30**	-4.13**	3.87
bvol_12			.08	.58	3.63	
			.02	1.38	2.35	
			.06	.40	2.55	
dbvol_2	2.19	1.13		-8.45**	-4.67**	
bvol_12	1.84	2.55		-21.22**	-4.72**	
		2.61		-21.38**	-3.82**	
		2.53		-20.64**	-5.64**	
sbvol_12	.45	1.85	1.16	-8.59	-3.24	5.92
	.76	1.70	.45	-4.62	-2.88	6.86
	.48	1.79	.85	-7.24	-3.12	6.39
INDX_12	1.50	.02	.25		-.19	
	2.00	.01	1.18		.82	
	2.01	.01	1.13		.57	
indx_12	1.98	.01	1.70		.86	
	1.99	.00	2.42		1.28	
	2.00	.01	1.85		1.09	
dindx_12	1.98	1.41	-11.67**	-3.20**		
	2.01	1.84	-14.21**	-4.30**		
	2.00	1.45	-11.49**	-3.64**		
sindx_12	.95	2.01	.08	-2.26**	-2.81**	2.65
	.95	2.08	.08	-2.74**	-2.79**	3.78
	.94	2.09	.09	-2.29**	-2.60**	2.85

INTRODUCTION

The Danish market closely resembles one of two alternative models frequently cited as desirable, if not yet attainable, for the emergent economies of eastern Europe. Based on a deep and liquid bond market, the sole exchange, Copenhagen, is efficiently organised on the basis of electronic trading, automated settlement and dematerialised custody and possesses a varied fauna of participants. The alternative, a 'presence' bourse with trading floor and printed securities, has already been eschewed by most newly formed and reforming exchanges. The case for the Danish model is supported by the high turnover which followed immediately on its inception and increases in volume after every successive subsequent fiscal and market reform on the way to the present market configuration. The development of trading volume in this market has already been analysed in Chapter 6.

In this chapter, institutional and other factors are examined on the basis of questionnaire-based formal interviews with market participants, published evidence from the market authorities, various independent authors and contemporary press and periodical literature. The structure of this and subsequent chapters in Part II follows a sequence beginning with a historical overview (Section 7.1), followed by discussion of contemporary issues (7.2); an exposition of the market's structure (7.3); discussion of regulatory issues (7.4); the influence of information expansion (7.5) and a synthesis of the survey results (7.6). Conclusions are based on the relation between the evidence gathered and the six basic hypotheses set out in Chapter 1. Since the issues addressed by the hypotheses are closely interconnected, an explicit one-to-one form of analysis is not

possible: the hypotheses are best considered jointly as the set of parameters to which the arguments presented relate. They were, it will be recalled:

1. that economic benefits are available from improvements in business infrastructure and information expansion as a result of the operation of a viable and valid securities market,
2. that wherever market power is in a small number of hands, opportunities exist to improve market structure and performance, especially volume generation, by distributing market power,
3. that similar benefits follow upon the lowering of entry barriers and promotion of a balanced fauna of market participants,
4. that reform increases turnover and continued reform continues to produce a similar response,
5. that spatial perceptions on the part of equity issuers and investors work in the interest of national and regional markets,
6. that the direction of development in small national securities markets tends to replace institutions and their rules with market processes and products.

The next-following brief overview serves to identify factors in the early and more recent history of the Danish market as they bear on the present-day evolution and future potential of Copenhagen as a financial centre.

Section 7.1: Historical background

Denmark's first bourse was established during the reign of the mercantilist King Christian IV (1597-1648). He also ruled Norway, maintaining a commercial culture that was Nordic or Scandinavian as much as it was Danish. Denmark's prosperity has always been based on trade rather than domestic industry, as symbolised by the original, imposing, 1625 Bourse building still standing directly on the Copenhagen waterfront. Equity trading is known to have been established as early as 1684. The Copenhagen exchange therefore shares the same liberal commercial culture as Amsterdam, Lisbon and London and is to be differentiated from, for example, the closed Viennese tradition of trading mainly in government securities. The Copenhagen market subsequently shared in the general pattern of European stock exchange development characterised by speculative bubbles and sequences of trading, industrial and railway booms, interspersed by crises, collapses, periods of stagnation and reform. In the present context this history is best seen as contributing to forming in Denmark, as elsewhere, a general public view, a cultural concept, of a national stock market, imagined as a part-respectable, part-scandalous, mysteriously moving, but essential economic and business institution with a profile varying from front page news to semi-obscurity according to the scale of contemporary events surrounding it. Except for noting that this long tradition puts Denmark in the ranks of those countries possessing a consciously established and reputable stock market, it is not considered useful to report it in great detail here.

In 1919 the Danish Parliament replaced self-administration with a formal regulatory structure, but without significantly reducing the

independence of the Bourse. The market itself moved into undistinguished office premises in the Nikolai Plads in 1974. A major market reform was undertaken in 1986 with a view to moving away from the traditional open outcry system. Copenhagen was not the first Scandinavian bourse to take this step, Stockholm having done so a decade earlier, in the early 1970s, as the world's first electronic bourse. From 1988 the Copenhagen exchange was completely dematerialised with the advent of the 'ELECTRA' electronic trading and associated settlement and custody systems.

During the 1980s there was a strong increase in trading volume in all sectors, accompanied by upward price movements with marked surges at the time of reforms and introduction of new trading systems. The total equity index had moved from its base of 100 at January 1st 1983 to 360 by early 1990, stagnating somewhat thereafter.

During the period, the growth of the small, open Danish economy was led by foreign rather than domestic demand as corporate earnings grew strongly. A buoyant property market up to 1986 and an increased public sector deficit thereafter produced a parallel increase in bond issues and corresponding growth in levels of trading volume. An increase in the size of the overall investor community occurred, consisting mainly of domestic and foreign institutions rather than private investors and small savers.

From about 1976 foreign investors had begun to discover both the quality of the main bond instruments traded and an interest rate differential of up to 1.5 % maintained with other markets, notably Germany. This, together with the fact that withholding tax was not charged on interest payments abroad, led to a sustained increase in

bond trading volume and the internationalisation of the market. A further unexpectedly large impulse was given by the introduction of electronic trading in 1988, itself a response to high volumes and consciousness on the part of the market authorities of the need to ensure that this manna was not lost to other, competing exchanges, notably Stockholm and London. The 1988 volume increase was also to a great extent the result of previously unreported trade becoming visible. Before 1988 only about 10% of securities trading was done through the CSE and off-exchange trading was not reported. On the other hand, interview respondents for this research asserted that the visibility of the market, both in terms of reporting and detailed information concerning individual securities' movements in the daily list, had heightened the general perception of liquidity, leading in turn to substantial real increases in trading volume.

It is an open question whether a market as efficient and well-exploited as the Danish bond market can expect to generate greater volumes of trading in the longer term. On the other hand, the country shares a Europe-wide imbalance between equity and loan finance in corporate balance sheets and, as a member of the European Union, hence of the Single Market, it faces competitive pressures for improved corporate commercial performance.

On the supply side of the corporate finance market, a large increase in privately funded pension schemes is expected, in response to the demographic and fiscal changes common to all the developed countries of Europe. The exchange is well-adapted to process-oriented rather than institution-oriented trading in the event that increased equity trading activity follows the NASDAQ model. Copenhagen also possesses a rich supply of younger, well-educated, local-market-trained personnel

in established financial institutions. They are available to found new, specialist firms as required. Elements of the 'calving cycle' of new firm formation are clearly in evidence, three of the broking firms visited falling into this category.

Total equity market capitalisation has traditionally always been small, most shares being held privately on a long term basis. Fiscal factors have since 1986 become favourable to equity market growth following the relaxation of capital gains taxation rules, although these still favour institutions rather than individuals. A more important factor for the equity market has however been the narrow base for trading. In the three-tier market, Tier I, the main market, accounts for about 98% of market capitalisation. Of the 195 companies quoted, the ten largest account for 52% of market value and 50% of trading volume. The size of these companies renders it difficult to move the price of any one of their shares by manipulative trading activity. The market may therefore be considered valid. On the other hand the size of deal for which the market is able to supply immediacy is open to question. A consensus among the brokers interviewed in Copenhagen was that approximately 15 issues were liquid enough to be considered for actively traded institutional portfolios. The equity market can therefore be regarded as only marginally viable for foreign and domestic institutional investors other than banks.

Banks enjoy a number of advantages of market position, access to information and possession of portfolios whose short-term performance is not closely scrutinised by clients and shareholders, allowing them to trade when it suits them. On the other hand the excellent infrastructure, and the capability of that infrastructure to respond to future opportunities, renders Copenhagen's potential very great.

Section 7.2: Contemporary issues

There are problems associated with adopting the Danish model as the basis for other, newer exchanges. First, the Danish market has developed organically, deriving its base of confidence and general acceptability from a long historical background embedded in Danish, Nordic and general European commercial culture. It is questionable whether its development trajectory could be duplicated from a different starting point within a practical timescale in the radically different material circumstances to be found, for example, in eastern Europe. Denmark's large bond market alone is the product of a distinct financial tradition, namely the issue of property-backed loans which owed their enormous growth to tax advantages that no longer obtain and to a form of collateral, property, that has lost some of its credibility.

Second, the Copenhagen market is not without contemporary difficulties, as recognised by a majority of the participants in their responses to interview questions. Among them may be cited failure to offer an adequate source of risk capital for small and medium, even large-scale, businesses, a long period of stagnation in the equity sector and market 'management', if not actual manipulation, by large institutions in the bond market. The survival of smaller participants cannot be guaranteed, and, for reasons not connected with the stock market, many of its larger banking institutions have a recent and ongoing history of severe instability. One bank whose stockbroking arm was interviewed as part of this research had been reorganised only shortly before the interview date, and has since filed for bankruptcy. Others are suffering well-publicised difficulties.

Three specific observations emerge from the research, that are relevant to other markets hoping to generate a similar architecture. To begin: the Danish market has survived the partial demise of the tax-exempt status of property-secured loans, these instruments having been progressively replaced by other offerings without loss of turnover volume, although property-based bonds still account for two-thirds of the nominal value remaining in issue. The phenomenon of a market continuing to develop after its original *raison d'être* has departed, where participants stay on after their original incentive to enter has been removed, is shown elsewhere in this study to be an important characteristic of market development.

Second: international interest in Danish securities, the basis for high liquidity levels, has created a pool of foreign holdings, mainly in London. A fear expressed by several Copenhagen respondents was that this pool was becoming large enough, by mid-1992, to form the basis for a separate market conducted entirely in London, perhaps also in Stockholm, based on a circle of institutions known to each other and linked by specialist brokers in the foreign centre. The ease with which such arrangements can come into existence is demonstrated elsewhere (see the case of Austrian bond specialists in London, Chapter 8). In the Danish market, 'diversion by drift' applies largely to fixed interest securities and was not regarded as a serious problem in equities. From the tenor of their replies, respondents' mainly relaxed attitude to the development was based on a sense of Nordic solidarity, of knowing and being on friendly terms with all the institutions concerned and being represented themselves in Stockholm and London. These circumstances would almost certainly not apply to many other centres.

Third: turnover volume in Copenhagen has undergone a quantum increase, clearly shown in the long run statistics analysed in Chapter 6. This would appear to represent an opportunity for other exchanges to benefit by following suit and increasing their turnover volume. Detailed discussion with market participants revealed further necessary conditions for volumes to increase by whole orders of magnitude however. For example a relatively large starting size of order flows is required for there to be profit in trading relatively small differences in prices and yields. An already large order flow can often be increased without difficulty - 'trades beget trades'. A small flow will not always afford profitable new trading opportunities if spreads are small. Further, market participants must possess a relatively high degree of control over the portfolios whose composition is changed by their trading activity. Finally, participants must face general competitive pressure for performance inside or outside the securities market. All these conditions are fulfilled in Copenhagen, both because of the large size of banks' own and managed portfolios and because there is competition among themselves on a number of fronts, not only in bond markets.

Section 7.3: The structure of the Danish market

The Copenhagen Stock Exchange is one of three institutions which together control and operate the Danish securities market as a whole. The others are the Guarantee Fund for Futures and Options and the Securities Registration Centre. Three key features of a small, modern, national securities market are thus integrated: securities trading, derivatives trading and settlement and custody. Since research fieldwork was completed a further institution has been announced, the Copenhagen Stock Exchange International (COSI) providing a trading

system for international securities not listed on the CSE. This innovation is rather more than a defensive measure against trade diversion, being oriented essentially to the capture of trading volume in regionally important securities, including German, Norwegian and Swedish share and bond issues. It represents an attempt to increase the range of equities and scale of bargain for which immediacy can be provided, by going beyond the limited equity base of Danish registered companies alone.

In the bond market approximately 36% of issues are made by the Danish government, and 63% by mortgage credit institutions. Three main instruments are issued. Bullet loans (so called because the principal falls due for payment in its entirety on the maturity date, rather than being scheduled or ballotted for progressive repayment) form about 41% of the bond market. Serial loans, repaid by declining instalments that include the interest due at each instalment date, are responsible for about 9% of issue volume. The commonest instrument however is the annuity loan at 46% of issue volume, repaid in equal instalments, interest predominating in the early years. This form of repayment would be familiar to a British private mortgagor. No turnover tax is paid on bond market trading. The tax is however payable at a rate of 1% on share dealings: a factor which interviewees held partly to blame for poor market participation by small savers. A stronger disincentive in their view however was capital gains tax at 50-68% on gains realised within three years by residents. Institutions could avoid capital gains by trading tactics that involved buy-back deals to bridge the three-year limit. They could also deal with non-residents to whom the impost did not apply. Tax arrangements in the equity market therefore work against direct participation by investors who do not possess knowledge, trading skills and connections.

It was considered unlikely by all respondents that the situation would change in the near future, mainly because resultant losses of government revenue would accrue at a time when it was already difficult to control the public sector budget deficit.

The continuous auction trading system requires no trading floor and no personal presence by members or their representatives at the Copenhagen exchange. It is thus an entirely electronic system operated from brokers' offices. Five subsystems are operated of which one, the Information System, is an integral part of the others. The Match System continually matches round-lot bids and offers whenever a new bid or offer is made at the same or a better price with respect to the direction of the desired transaction. The Accept System is in effect an electronic notice board, like those on the NASDAQ or SEAQ systems. It allows brokers to see all bids and offers relating to a particular issue and to accept one of them as required, after which the item is deleted from the system. The Trade Support System allows interest to be registered in trading large blocks of securities without revealing a price. This system is available to a restricted group of subscribing institutions involved in block trades. Finally, the Reporting System registers deals made outside the electronic trading system, since its direct use is not obligatory. These transactions must be entered within 90 seconds of completion, or at start of trading if the bargain is made out of hours.

Section 7.4: Regulatory issues

Copenhagen shares the subtler difficulties faced by smaller countries in attempting to square light regulation for competitive reasons with the tighter control required to avoid manipulation of narrow markets,

particularly the equity market. A new set of Rules of Ethics and Information Obligations came into effect on January 1st 1992 to "reflect the increased demands .. made of listed companies by shareholders, investors and other market participants (but) without imposing undue restrictions on issuers" (CSE Annual Report, 1991). As a major example of the difficulty of pursuing an even-handed approach in a small economy, the events which followed are instructive.

Political pressure obliged the CSE to propose in March 1992 that the major shipping lines' former exemption from half-yearly reporting, reinforced for other companies by the new regulations, be withdrawn. A P Moller, Denmark's largest firm and a group that avoids being treated as such for reporting purposes, however were in a position to exert heavy pressure to frustrate the regulatory intention.

Trading rules introduced to control insider trading in Denmark were cited by three brokers and two banks as 'stupid'. The same term was used by all respondents, reinforcing an impression gained elsewhere that views were highly concerted as a result of frequent contact and discussion among market participants. On being asked to elaborate, most respondents cited inability to trade intelligently in equities on the basis of researched fundamentals, without using information that could be construed as privileged. This objection is frequently encountered in other markets and in contemporary press and professional commentaries. It may be that strict definition of insider trading sets a finite limit to the informational efficiency of markets.

Listings in the Copenhagen market were made conformable to EC rules for admission and prospectus requirements from June 1991. EC Directive 80/390 and later amendments, which cater for mutual recognition by all

EC countries of a prospectus for securities listed on the exchanges of any member state, were implemented in October 1990.

The CSE was the initiator of the proposed Nordic Exchange, still under discussion but considered by Danish and Swedish brokers unlikely to go forward. The less formal 'Nordquote' information network has been established and is considered sufficient to co-ordinate and raise the investment profile of the five Nordic exchanges.

Section 7.5: Information expansion

Since 1988 the CSE has actively marketed the information produced as a byproduct of its electronic trading operations. The revenue, along with reported cost reductions from the adoption of computer-based trading systems, has contributed to financial stability and permitted further development investment. From 1991, increased availability of real-time information has led to its use by international information reprocessors and vendors to deliver value-added services to international investors. This development in turn has led to increased awareness and active trading interest from abroad (CSE Annual Report, 1991).

The views of all interview respondents were sought on the extent to which publicly available, market-related information had improved in recent years, the reference year being 1986, prior to the reforms and trading upsurges. The summary judgement asked for was a characterisation as 'some', 'great', or 'explosive' expansion.

The consensus was that there had been a great expansion in the last ten years, particularly in the area of exchange reporting. The daily

list had grown from one to ten or more pages and much-expanded statistical and other services were now available. The 1993 list of such services runs to three full A4 pages. Bloomberg screen-based market information services were introduced in 1989 with 20 subscribers. The number was, at end-1993, over 100 and the main competition, Reuters, is often only retained out of necessity. Improvements in the Reuters service had been noted as a result of Bloomberg's arrival.

The market is also served by a specialist publication "Monday Morning" -literally the result of weekend analysis by investment journalists and regarded as essential reading. The newspaper "Borsen" expanded to a general readership paper in order to maintain circulation. One unanticipated positive result has been wider public awareness of market matters. On the other hand a number of financial scandals, particularly the 'Northern Feather Company' affair and several property crashes, as well as the well-publicised difficulties of the major banks, have had an inhibiting effect on small savers' willingness to consider equity investment. There is equal reluctance on the part of companies to release information about their activities in spite of the previously identified regulatory changes designed to standardise and render more frequent their announcements and interim reports.

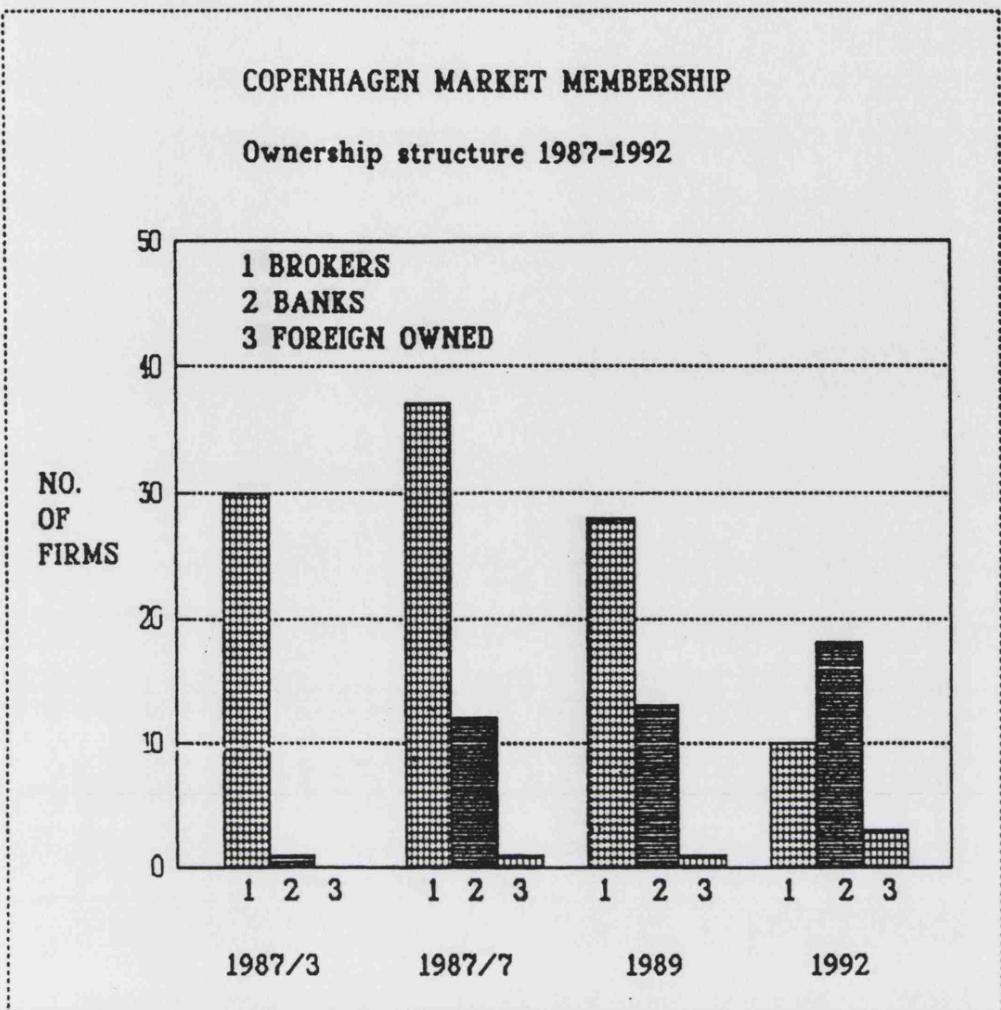
Section 7.6: Survey results

Interview questions were identical in all European centres, apart from supplementaries and the discussion of information expansion. Questions

were administered after allowing respondents to say anything they wished by way of introductory remarks about themselves, their organisation, clientèles and markets, but reserving rejoinders and general discussion until after the structured interview was complete. Supplementary questions were added and clarifications requested as the interviews proceeded. The ensuing discussion tended to focus on questions already asked rather than raising new issues. Sessions were often of 90 minutes or more and accompanied by discussion with respondents' colleagues and visits to dealing rooms. The interviews conducted in Copenhagen were directed chiefly towards establishing the rôles of, and competitive relationships between, banks and market-dependent brokers in the Copenhagen market, both dynamically and as regards the effects of possible structural change on the health of the market: its validity, viability and potential, as defined elsewhere.

A very large number of points was raised by respondents in reply to questions about the relative strengths of market institutions. Many of these points have been incorporated into arguments elsewhere, but are here synthesised into a 'picture' of the market as observed by its inhabitants. The respondents were all involved in broking. For simplicity of identification of the actors, 'banks' are the broking arms of banks and 'large broker' means a large non-bank securities trading institution. Small brokers are those normally described as 'independent' but for whom the term 'market-dependent' is reserved here.

Figure 1. COPENHAGEN MARKET MEMBERSHIP



source: Copenhagen Stock Exchange

Because of the centre's small size and close-knit structure, it is often difficult to avoid identification of an individual organisation in reporting views. This problem has been handled in some cases by suppressing comment that was both contentious and easily traceable to source. In others it is dealt with by omitting a detailed characterisation of the respondents' organisation.

Bankers stressed that their main trading objective was commission income and that competition was fair and based on commission levels. The decline in broker numbers (see Figure 1) was attributed to the need for a technological base for electronic trading and for high-quality client advice, research and information services; all of which could only be supported by high turnover.

The brokers all regarded commission levels as too low and spreads as too small 'to live on': this phrase was used repeatedly. All brokers and one medium-sized bank went on to claim that the larger banks were mainly interested in capturing market share. Methods mentioned were shaving commissions and recouping profit on the spread; using own security stocks and crossing orders in large volume to maintain a price differential to the market; having house rules that required a profit on every trade; maintaining spreads at levels that were too narrow to arbitrage, given transaction costs, but wider than would obtain in a free market. Two banks were named as offenders, one much more frequently than the other. On the other hand, two other bankers claimed that banks' shareholders - 'a sophisticated group' - were unhappy about the policy of chasing market share without gain and to the detriment of the market. They would act as a curb on the worst practices. One small broker professed to be unmoved by market problems and pressure on the independents, stating merely that "while there are

(market) waves, we live!". This view was identical to that expressed by independent brokers in other centres and, given declining broker numbers, would appear to be evidence for the starvation process (see Chapter 5). With only 10-15 liquid equities it was considered too easy to move the price on the rest, rendering anything other than retail commission broking hazardous.

The structure of mutual relationships between market participants emerged as complex, with smaller banks reporting views that resembled those of the independent brokers, while one large, foreign-owned broker exhibited some of the concerns of both. The issue on which positions most clearly diverged in a contentious manner was competition, based on capture of the order flow and maintenance of spread and commission income from turnover volume, mainly in the large bond market.

There were equally wide differences between the two main camps, brokers and large banks, with regard to equity and corporate finance as well as, to some extent, private portfolio management. These differences however reflected the normal commercial stance of competing bankers and brokers that would be expected and recognised as such by clients in any financial market. Indeed similar views were expressed in every centre researched. Bankers, it was alleged, abused their privileged position as (often the sole) financial advisers of their smaller corporate clients by almost never recommending equity issues as an alternative to bank borrowing. When asked in return why brokers did not attempt to promote equity flotation among companies themselves, the reply (again, interestingly, in every case), was that such an initiative would be a matter for the Stock Exchange. The banks and their clients also regarded the whole question of corporate

finance as a matter between themselves, rendering the new issue market impenetrable.

Two brokers with extensive corporate clientèles gave more complicated answers, based on their own practice of arranging mixed financial packages with elements of venture capital provision, private placements by 'angels' (private individuals and corporations prepared to put up equity) and off-balance sheet techniques such as factoring. Foreign venture capital and domestic venture capital specialists are largely absent from the Danish market. The corporate specialist brokers were unable to square a generally agreed need for a greater proportion of equity finance on company balance sheets, as well as for readier access to the stock market, with the equally general absence of any initiatives leading in that direction. They instead made rather vague reference to a change of position later when market prospects in general picked up. This stance was, again, common to all centres and taken to be an implicit reference to the worldwide tendency for IPOs (initial public offerings) to be heavily bunched near the top, towards the end of a bull market. Issuers and their advisers generally exhibit a better sense of timing than investors in extracting the maximum cash from a given issue. They could hardly be expected to dwell on the fact when discussing it with a researcher. All respondents agreed that there was no equity culture among private individuals despite sporadic share booms in recent decades.

A large foreign-owned broker claimed that there were not too few independent brokers for the size of the market, but rather too many bank-based brokers. The main disadvantage they conferred was inability to deal other than at a profit to themselves on every deal, and the proferring of bad advice, readily accepted by clients who

automatically accepted bank advice as good advice. Outside Copenhagen the situation was particularly bad, with all advice coming from a single generalist within a local branch. Independent smaller brokers could not generate enough business to afford promotion that would raise their profile.

Several brokers alluded to the ability of two, named banks to net out the stock exchange system by crossing orders internally, using securities from their own stocks to maintain a price differential to the main market, recouping in their own 'managed' spread what they gave away in shaving commissions to gain original order flow in the first place.

One of the large banks described this situation as 'normal competition' but then went on to describe the other large player, blamed for unfair competitive practices, as "the match-box", cornering as much order flow as possible, so as to match orders internally without exposing them to the market. The respondent's own organisation was described by its competitor in turn as promoting a second market in fixed interest securities and influencing the price of the main market as a result. The CSE confirmed later, in answer to written questions, that:

- (1) unreported trading occurred between institutions that had exchange members as subsidiaries and departments although
- (2) orders crossed within exchange-member institutions counted as trades and
- (3) that only non-member, non-bank institutions were permitted to trade without reporting the trades to the market within the stipulated 90 seconds (or, out of hours, at the start of next day's trading.

While it was considered by the Exchange authorities unlikely that these practices could lead to the tacit establishment of a separate market with its own price structure they responded that it "most certainly" materially affected prices, that it "probably" affected the competitive position of market-dependent brokers. To an enquiry about whether the overall health of the market was adversely affected, the cautious reply was, "we expect so".

There were, on the other hand, no plans to change reporting arrangements or the status of the financial institutions involved. A majority of the market-dependent brokers felt that a de facto separate market among the banks existed already.

The two major banks also revealed different attitudes to privileged information. One held that all dealings between the bank and its securities arm was "on market terms" with no information being released that might allow trading gains to be made or risks to be avoided. The other maintained that "provided one went high enough", any information about companies could be obtained by the securities trading arm and that this was not infrequently done.

CONCLUSION

Analysis of recent evolution in the membership of the Copenhagen Stock Exchange (Figure 1), plus the evidence of interviews reported above and other material, shows a continuing flux that cannot be explained by the market reforms and technological developments of 1985-88. In particular the increase in trading volume has not been reflected in the number, or indeed the operational size of broking firms. The

general thrust of change, as elsewhere, is towards the absorption of small broking firms into larger institutions, either banks or major securities trading, investment management and/or investment banking firms. This trend is balanced in Denmark by the creation of new firms based on one of two groups of opportunities: either specialist commission-based trading in blocks of securities of particular interest to larger institutions and a few private clients, or suppliers of a range of corporate finance and portfolio management services to the corporate sector and, again, private clients.

The first of these trends, absorption of brokers by banks, may be characterised as potentially unhealthy for the future of the market as a whole, leading as it does to increased concentration in the securities 'industry' and to the loss of specialist skills in small market niches which large market-independent institutions tend to ignore or to neglect. The second trend, new firm creation, while being too weak to counterbalance the first, offers evidence for the existence in Denmark of a natural cycle in the evolution of the broking population. A model of this process has been described in detail in Chapter 5. To maintain a fauna of market participants sufficient to guarantee the long-term viability of the market, a sensitive balance has to be maintained between the competitive position of market dependent and market-independent securities broking firms. To the same end the enforcement of a high level of transparency, particularly with regard to information about the order flow, is essential.

In the Copenhagen market, order flow has largely been captured by market-independent institutions, in particular two of the major banks. They have used their position to exclude market-dependent firms by

narrowing the bid-ask spread (except where they are in a position to maintain it by internal trading) and lowering commissions, partly as a consequence of further competition for volume between themselves. All the market-dependent brokers described the spread as inadequate to make trading at any other than very large volume profitable and commission levels as too low. Those brokers who depended on specialist trading rather than corporate services nevertheless betrayed short-term optimism of a kind noted in other centres. Their optimism appeared directly to contradict their previous assertions about the health of the market. Although analysis of CSE membership was not to hand at the time of the interviews, the loss of small firms by cessation of business, as opposed to absorption by banks, would appear to create the right circumstances for the 'starving population' effect also described and modelled in Chapter 5.

The Danish market would appear to be well placed to allow the formation of new, small broking firms by 'calving' out of larger financial institutions. Transparency is greater than in other centres examined and relatively small regulatory changes would be required to increase it still further to deal with the distortions described above. The market authorities do not appear to be unduly influenced by the large banks. Market reform and innovation is not a topic that has to be avoided. Although the derivatives market in Denmark was not studied, its existence and active development clearly shows that the Danish authorities are aware of the close relationship between the provision of immediacy and information demanded by institutional investors and the health of the market for the underlying securities. Initiatives specifically discussed included a Nordic Exchange, a European regional exchange, new investment trusts to cater for the expansion of privately funded pension arrangements, the promotion of

equity investment to small savers and extension of the electronic trading system.

In summary there is little reason to question the validity and viability of the Danish model. The only remaining area of development potential, aside from derivatives, is the increased use of the market for domestic equity issue and trading. This possibility is, however, highly dependent on the attitudes of corporate finance executives and private investors to equity, as well as upon general business conditions in the medium term.

It is to be doubted whether the overall form of the CSE could be easily replicated in an emerging market without benefit of the underpinning large bond volume, not least because of the resources required to generate and enforce the regulatory regime and create trading systems that actively promote increased and sustained turnover volume. Those resources are available to the Danish exchange authorities in the form of the surplus from the operation of their information and trading 'business'. They are therefore firmly established in a virtuous circle which others may seek to emulate but which is intrinsically difficult to establish.

CHAPTER 8: THE LISBON AND OPORTO EXCHANGES AND PORTUGUESE SECURITIES

MARKET

INTRODUCTION

In this century Portugal has suffered the loss of a colonial empire and the trauma of an officer-led revolution in April 1974 following many years of slow impoverishment under the right-wing dictatorship of Dr. Salazar. Conventional socialist governments followed and the country was able to take the road towards integration with its accession to the then EC in 1986. These events have each marked the character and evolution of its securities market, based on the twin exchanges of Lisbon and Oporto, in distinctive ways. The history of the market is briefly reviewed in the next section. A principal reason for studying the Portuguese securities market has been useful comparison with emergent smaller countries of central and eastern Europe. The World Bank, for example, has used Portugal as a benchmark for assessing the position and prospects of these countries (IVDC [1992]).

Problems facing the market relate to the maintenance of validity and viability in the face of increasing competition from other European financial centres. Contemporary issues are discussed in the section of that title, followed by a formal presentation of the structure of the Lisbon market. The Oporto market was not visited and was regarded as essentially a satellite exchange. Very recent developments (FINT [1995]/2) have again changed the relationship between the two centres. All securities trading will henceforth take place in Lisbon, with derivatives trading in Oporto. This change, too recent to analyse here, can, it may be conjectured, hardly encourage hope for the longer term future of Oporto. In the final two sections the results of a survey based on structured interviews with brokers, bankers and the

market authorities carried out in Lisbon in December 1992 are first presented and then analysed in the context of market dependent brokers on the Lisbon Stock Exchange.

Section 8.1: Historical Background

Portugal's overseas possessions were secured very early on in the colonial era, as a result of exploration and the search for trade opportunities, rather than in a fit of absence of mind or through competition for imperial power. In Portugal's case also, the long decline from loss of colonial power and wealth has yet to be fully compensated by substitution of the apparatus of a modern industrial economy. The country remains underdeveloped relative to the rest of Europe. One factor that has been held to be a cause of slow autonomous development was the notorious 1903 Methuen Treaty with Britain, which regulated trade in textiles and port wine, hindered the development of a Portuguese woollen textile industry and led to widespread ownership and control of Portuguese firms by British interests. (Czerwensky [1978]). Only in 1973, for example, did the telephone system revert from British to Portuguese ownership. Economic development was interrupted by the officers' revolution of April 1974 to such an extent that the Bourse did not reopen until 1976 for bonds and (February) 1977 for equities. Even then, the low prices that were quoted for securities issued under pressure in chaotic conditions shortly before closure in 1973 were the cause of an immediate crisis and low levels of public confidence for a long period thereafter. The site, until very recently, of the Lisbon Bolsa de Valores on the harbour front in the Praca do Commercio echoes its position in the history of a formerly prosperous trading nation. The removal of the exchange to a technologically advanced but much less resonant out-of-town centre fortunately occurred after the fieldwork visit in 1992.

The need for fundamental economic reconstruction for which neither domestic capital nor foreign investment was available made liberalisation a slow process. Bank assets were effectively nationalised and only in 1994 did traditional banking families reappear to reclaim their patrimony following re-privatisation, begun in 1989.

The bourse was "able to restart from zero" (IVDC [1992]) after steps toward further liberalisation were taken in 1985 prior to EC entry. Between that date and 1992 most trading was in short (by continental European standards) bonds of 5-7 years' duration at most. Exacting IMF-imposed capital controls, first put in place in 1978, began to be loosened in 1989-90. At the time of the fieldwork visit longer term issues were planned and the equities market was expanding rapidly, accompanied by strong foreign interest in both bonds and equities: complete liberalisation of all markets had in fact formally occurred in the previous week.

Section 8.2: Contemporary Issues

The establishment of a single nationwide market from 6th September 1991 allowed dematerialisation of settlement and custody arrangements in the hands of a service company INTERBOLSA, which also manages the computer trading system TRADIS and the Securities Central Depositary. The existence of both bearer and registered stocks as well as a mixture of both paper and electronic issues (15 of the former and 13 of the latter at the end of 1991) creates a particularly complicated mix for a small market. This has not prevented rapid growth of trading volume however, but led to a significant decline in OTC trading (60% of turnover in 1990 reducing to 24% by end-1991). The main consequence of reform was an immediate 69% increase in equity trading turnover and 270% growth in bond volume. In the bond market two coincident factors

obscure the relationship between this growth and any proximate cause in the form of lower transaction costs (including increased information supply). In 1991 extensive foreign interest swamped both the Spanish and Portuguese markets due to expectations of capital gains on bond holdings as interest rates in the two countries converged to the EC average: a development which did not, in the event, take place. Having only just been weaned from a policy of maintaining artificially high domestic interest rates, characteristic of developing countries until the 1980s (van Agtmael [1984]), the authorities were obliged to institute a system of prior approval for foreign purchases of index-linked bonds by the Bank of Portugal, in order to mitigate the effect of capital inflows on domestic money supply. Portugal was at the time suffering an inflation rate of 11.4% and overheating evidenced by historically very low unemployment at 4.1%. This development was widely understood in the international investment community as a necessary response to excessive foreign speculative interest and does not subsequently appear to have affected the general status of the Lisbon market. Non-residents were allowed to buy floating rate government bonds (Fips) again from October 1992 and allowed to enter the domestic money market from the beginning of 1993 (FINT [1992]/3). A second bond market factor linked to but obscuring the direct effect of exchange reform was the introduction of a new dealer category, the Treasury Bond Specialists, known as OEVTs (Operadores Especializados em Valores do Tesouro). This innovation was a direct response on the part of the government to the perceived lack of marketmaking experience and capacity in Lisbon (IVDC [1992]).

In the equity market a further factor making for difficulty in assessing the immediate impact of reform was the use made of the opportunity to conduct a number of privatisation issues. Five issues

were handled in special bourse sessions devoted to their placement, turning over 137 bn Escudos, approximately 7% of all trading for the year 1991.

The volume of foreign direct investment into the Portuguese economy has had a large economic effect, but three interviewees, engaged in conversations on this topic outside the framework of the structured interviews, confessed their inability to assess the influence of the very large capital flows involved on the markets of the Lisbon and Oporto exchanges. FDI flows had risen over five years from USD 0.164 bn in 1986 to USD 5.527 bn in 1991, sufficient to account for a proportion of the inflation, over-full employment (in the context of the region) and difficulty in controlling the money supply currently being experienced. The level of direct investment was subsequently noted to have fallen to USD 4.375 for 1992 however (FINT [1993]/1).

Section 8.3: The Structure of the Lisbon and Oporto Market

Following the regulatory and organisational reforms of early 1991 the Official Market, creating a national quotation for securities formerly listed on either or both of the Lisbon and Oporto exchanges, was inaugurated on 23rd July of that year. The Second Market, for regional and small-to-medium size companies was not introduced until January 1992. In the meantime, in October 1991, the Market without Quotation took over from the old unofficial market and informal trading in these securities was banned from the exchange floors.

Two daily fixings now occur for all markets, one for the computer trading system and another for the open-outcry on the exchange floor. The price fixing is designed to maximise volume, clearing as many

unfilled orders as possible. The 'automatic' fix is carried out by the screen trading system and a floor fixing occurs at 1300 hrs each day. Prices remained uniform between fixings, except that 'interest' may be expressed in securities by notifying the market supervisor without revealing either the quantity or the side of the market in which interest is expressed. In screen trading a five minute period is allowed for a decision to effect a trade, during which time the orders are exposed on-screen. Screens remain active until 1700 hrs each day. Bond trading volume accounts for over 70% of total market activity in money terms, and of that, public debt accounted for 84% of 1991 turnover. All public debt is in bearer form, creating security and custodianship problems. Private debt is approximately 20% registered and 80% bearer (IVDC [1992]). In the equity markets bank shares accounted for 56% of turnover in 1991 (45% in 1990). The size of this sector and the large increase over the reform period is an indicator of the potential for a few large liquid issues accompanied by a rich information supply to generate very large trading volumes.

The settlement period was formerly three days but was increased to four days after large amounts of foreign interest began to be shown in the Lisbon exchange by foreign houses. The T+4 settlement period still limits risk-free short trading. Nearly all trading income is based on commission. A ministerial order of 6th June 1991 reduced nearly all of the transaction fees on Treasury bonds, but both of the two interviewees asked about this in some detail felt that the increase in volume resulting from all the changes of the eighteen month period to end-1992 left no doubt that the net effect on the health of the market and the income available from trading activity had been extremely beneficial. New equity issues in the previous year had declined by a quarter over the 1990 level (to 281 bn escudos) and further declines

were expected to be reported for the year just ending. This was felt to have little to do with the state of the exchange however, reflecting instead a combination of uncertainty about the economic conjuncture and the well-known tendency of initial public offerings to be bunched around a forecast index peak. Some dissatisfaction was expressed with the structure of the first and second markets in equities. The fact that the second market was defined to be regional clashed with its vocation as a point of entry for smaller firms. As a result some firms obtained their first quotation in the national market. It was considered (IVDC [1992]) that the point of entry for all firms should have been a national second market, with no regional distinction, with promotion to the official market following in due course where appropriate. There was no similar problem with the unquoted market. On the electronic system brokers can see only the best six prices and are not aware of the volumes being traded among the 47 securities on the system. A market supervisor is able to call a trading halt if conditions are judged to have become unstable. All orders must, in general, be brought to the exchange floor and exposed to the market. If not taken up they may then be crossed with others held by the house. Trades taking place outside the exchange are subject to turnover tax and must be reported.

Three stands on the exchange floor are divided by the markets they sustain. One disadvantage of this arrangement, admitted by the market authorities and mentioned by several interviewees, is the need to provide three representatives from each house on the exchange floor to cover all markets despite often thin trading.

Section 8.4: Regulatory Issues

Consolidation and reform of the national market are recent innovations in Portugal. Contemporary developments have therefore to be assessed against two competing possibilities, namely the likelihood of long term significance against the immediate playing out of the after-effects of reform as the system moves to a new position. The Securities Market Code was established only in April 1991 (Decree-Law 142-A/91) and although some of the measures it enshrined had already been incorporated into market operations the changes were sufficiently fundamental as to mark a break with much previous practice. The Securities Market Commission (Comissão do Mercado de Valores Mobiliários - or CMVM) assumed control of the supervision, regulation and - worthy of special note - promotion, of the Portuguese market from May 1991. At the same time a nationwide market was inaugurated, linking the Lisbon and Oporto exchanges in a single computer system to ensure identical prices and exposure and allow the adoption of continuous trading. In January 1992 the Lisbon and Oporto Stock Exchanges Association was set up as a private non-profit organisation to manage and run the Exchange. Recent developments in Oporto have since modified the position however.

The Central Securities Depository was set up to ensure that registration and disclosure requirements could be met without the need for securities to pass into the hands of their owners. The need for reform was underlined by the flight from the country of a leading broker, Mr Pedro Caldeira, with debts of 400 mn Escudos in July 1992. Interviewees did not wish to discuss Mr Caldeira and showed evidence of sensitivity on the subject. The reason became clear later when the broker was successfully extradited from the US (FINT [1993]/2).

Portugal remains a heavily regulated market. The classic tension between regulating an easily manipulated small market and offering an attractive environment for foreign investors remains. The former president of the CMVM, Mr. Fernando Costa Lima, said on his resignation in February 1995 that there remained open opposition from "vested interests, when they do not want the rule of law to prevail over the law of the market" (FINT [1995]/2). In his view the opportunity to liberalise lay in the globalisation and harmonisation of financial markets. It may be doubted whether this is the view of market participants however. Portugal has taken an active interest in a European level market but its only concrete manifestation, the Euroquote project, was finally cancelled at the Aalborg (Denmark) meeting on 5th July 1991 following disagreement among members of the Eurolist project. The continuing strength of the regional bourse movement and active national market reform programmes elsewhere in Europe provides evidence of continuing independence of mind among market participants themselves. That view was shared by most interviewees in Lisbon.

Section 8.5: Information Expansion

It was not possible to form an impression of the rate of expansion of publicly available information in Lisbon although newspaper purchases revealed a quantity of comment commensurate with that to be found in other European centres. As noted below there was considerable public activity at the Bourse, including uptake of the daily quotation bulletin, not seen elsewhere. The advantage of a conspicuous public position has now been lost by transfer of the exchange away from the city centre however.

The events of 1974 were preceded by inflation in a narrow market, leading to a price explosion and collapse. This pattern was repeated in 1986-87. Private investors had stayed out of the market as a result in spite of Portugal's very high personal savings ratio. There had however recently been an explosion of funds and instruments, accompanied by large demand from the banks for database information supplied by the Exchange. The yield curve was incomplete and the possibilities of investment, and hence arbitrage, over a wide range of maturities were still limited (IVDC [1992]).

The author found the market authorities very willing to supply information, but unable to generate detailed information about trading volume and prices prior to 1985. This is consistent with the recent history of the Lisbon market as described above and information prior to 1985 is in any case unlikely to afford satisfactory comparisons with later periods. The Lisbon Exchange ran 5,586 hours of training courses in 1992 and a series of conferences and courses was promoted through universities and the Institute of Banking Studies (IVDC [1992]). Public interest was evident during the four day fieldwork visit, with the public gallery full at most times, especially at price fixing. The similarly laid out public facilities at the Brussels Bourse visited some months earlier were forlorn by comparison.

Section 8.6: Survey Results

Interviews were conducted with a total of eight individuals representing two broking firms, two banks and the Lisbon Stock Exchange. One interview was conducted jointly with two individuals, both principals of a prominent independent equities trading house. Because of the small number of participants in the market and the public discussion of reform that was taking place at the time of the

interviews, it has not been considered appropriate to identify individual views with the type of organisation expressing them, apart from the market authorities themselves, although the source of an opinion may be inferred in some cases. Wherever a judgement is expressed in the following sections, and throughout, it has been informed by these interviews.

Section 8.7: The Position and Prospects of Market Dependent Brokers

In January 1992 the number of brokers was raised to 20 (10 in each of Oporto and Lisbon) from the original four who had survived closure and remained in business after 1974. By end-1992 only 11 dealers and 6 broking firms were left, one having become bankrupt and two others merged but retaining multiple seats. Of the remaining 17, most had also fallen under the control of banks, with only 2-3 considered by interviewees to have remained independent. A detailed analysis of the process of ownership change was supplied in confidence but is not reproduced here. The fact that Stock Exchange seats are sold and are now again in short supply has both advantages and dangers.

One advantage is that the possessor of a seat, who may be a small broker or a specialist at risk of being dominated by larger institutions, can maintain a position in the deliberations of the market authorities without fear. One organisation interviewed was currently withholding agreement to a reform proposal on changes to bond trading, promoted by the banks, as means of applying pressure for other changes which large institutional exchange members were not inclined to concede. As in other markets the large-scale presence of banks (whether they were larger or smaller banks did not appear to be an issue) was regarded as an actual problem by dealers and a potential problem by the market authorities. One interviewee offered an estimate

of 65% of market capitalisation on the two exchanges taken together as being in the portfolios owned or managed by banking institutions. A recent IMF report had concluded that the Portuguese banking system was in fact underlent, indicating too great an emphasis on portfolio investment of banking funds as against commercial lending against security or otherwise. On the other hand the Portuguese securities market grew by 30% during 1992 and the market authorities were unable to say with any certainty that the financial sector as a whole would remain stable enough to be allowed to continue to develop naturally (IVDC [1992]). Subsequent developments may have encouraged greater optimism. In fact the Lisbon Exchange National Continuous Index (BVL-INC) rose by 53% during 1993 and a further 7.4% in 1994. Both rises were underpinned by volume increases in both bond and equity markets which, taken together, rose by 97% and 34% in each of the two years respectively (FINT [1995]/2). Another later development, whose outcome cannot be assessed here, is the decision to move straight to global equity issues in future privatisations. In May 1995 25% of Portugal Telecom was offered simultaneously in New York, London and Lisbon. Future similar issues are planned (FINT [1994]/2) with results likely to be significant for trading volume in the Lisbon market.

The chief disadvantage to small brokers cited in 1992 was the need to rely entirely on commission income for lack of capital to take positions. The financial institutions were able to take positions and not particularly concerned about commission levels. In Lisbon the market has therefore divided into a majority of market-independent agents as defined in this study and a pressurised minority of small market-dependent houses struggling to meet the needs of technology, increased specialisation and market segmentation.

Another disadvantage is that once a seat passes into the hands of an institution it is likely to remain there. Private individuals and syndicates must both find the price and periodically risk losing seats on the retirement or incapacity of individuals or the breakup of a small firm. The London connection remained an important element of business for the independent houses.

Banks were also known to place orders through independents as a means of concealing their intentions and the size of the transactions involved from their rivals. The number of banks domiciled in Lisbon was well in excess of the number of exchange seats, let alone the number actually available for purchase at any one time. Independent houses were thus the only acceptable agencies available for executing the trades of many smaller banks.

Interviewees representing market-dependent brokers all mentioned the effect of withholding tax in suppressing overseas investor interest. Bank interviewees agreed with the proposition but did not mention it of their own volition or appear to consider it a problem. The Portuguese Ministry of Finance was not in fact to announce an end to the 20% withholding tax until October 14th 1993 (ECON [1993]/1) with the reform not taking effect until 1994. Many larger financial centres still retain a withholding tax, but this is usually coupled with the existence of large numbers of institutions and sufficient liquidity to avoid the impost. The practice of 'coupon-washing' (selling a bond before coupon date to a tax-exempt institution while simultaneously arranging its repurchase) is one standard method of doing so. It may be supposed, but could not be confirmed, that Portuguese banks had access to methods of avoiding withholding tax that market-dependent houses were not able to offer.

Recent reforms had worked in favour of market-dependent houses by reducing back office costs dramatically in the wake of dematerialisation. One broker had reduced staff from 30 at the last trading peak to 10 employees at the time of interview. It was stated that a large increase in trading volume would be required to prevent even this total declining further, particularly once it was no longer necessary to send up to three representatives to the exchange each day to cover floor trading. Dematerialisation had reduced both physical and information risk. At one time it had often been necessary, in the broking house just quoted, to keep up to \$10 million equivalent in bearer securities in office safes overnight.

Another source of support for market-dependent firms was the direct participation of industrial groups providing both capital and a 'tied' source of client business. The chief concern of several interviewees remained however that, although many advantages could be cited for retaining an important role for independent houses in the Lisbon market, the intensity of ongoing demand for the small number of exchange seats available could wipe out the independents by accident, or reduce them to the kind of rump to be found in Vienna.

CONCLUSION

Changes which have occurred since the fieldwork was conducted do not appear to have invalidated the judgements expressed above. The Portuguese market continues to be affected by internal structural change and external turbulence. The failure of economic turbulence to create crises for the operation of the exchange is evidence for the strength of ongoing reform. On the other hand, even in the absence of external stress, structural weaknesses should be expected to express

themselves only in the medium term and be measured by secular decline in volume. This is not observed at present and both the validity and the viability of the market seem to be beyond doubt. Development potential is restricted by relatively modest levels of wealth within Portugal and the small size and low international profile of the market. This fact is reflected in the decision to make global rather than purely national share issues for major privatisations. The reduction of the Oporto exchange to a derivatives market would seem to foretell its eventual closure, but this is an issue beyond the scope of the present study.

INTRODUCTION

Interest in studying the Austrian securities market lies in the apparent contradiction between a healthy economy and a securities market renowned for its closed and, by modern standards, unhealthy structure. Another focus is the relationship with the neighbouring German economy and its securities markets. This aspect has already been pursued in some detail in Chapter 6 during the examination of Vienna's trading volume. Austria is also at the geographical centre of events in the former 'eastern' Europe and strongly connected with the Budapest stock market (see Chapter 10 for details of the relationship). Not least, the Vienna market is simply the most interesting of all Europe's markets to study. It reflects the history and culture of the country, as well as the economy as a whole, in remaining efficient in spite of complex, one might almost say Byzantine, arrangements for the conduct of its affairs. Evidence for efficiency is to be found in the fact that the Austrian market (eventually) responds to all the demands made upon it and, as the econometric results of Chapter 6 show, has strong long-term behavioural characteristics similar to the apparently much better organised Danish market. How this comes to be the case is the question motivating the study.

Section 9.1: Historical background

Maria Theresia set up a Vienna Bourse in 1761 and again in 1771 on the advice of her President of the Court of Accounts, the not-inappropriately named Graf Zinzendorf, to restructure the finances of the state and restrict abuses in the interest of investors. It was,

then, a government-instituted monopoly market for the exchange of government securities. Business was transacted with officially appointed brokers. The latter had an obligation of presence and were not allowed to trade for their own account. They were required to provide a daily price listing. None of these conditions is significantly different today. The Bourse grew on this basis and moved in 1802 to its own premises. War with Napoleon required money, which was obligingly printed, reducing the quoted value of some Austrian government securities to 12% of their face value by 1812. This was ascribed to the machinations of the market and led to market access being restricted and the appointment of a Bourse Commission, ultimately without effect. This result also remains unsurprising today.

Between 1818 and 1842 when a few railway companies began to be quoted, the only share available in Vienna was that of the Austrian National Bank. Today, bank shares continue to predominate. Closure occasioned by the revolutionary events of 1848 was followed by further recriminations and restrictions on entry which only served to drive trading onto the streets. The 1771 Imperial Patent was long out of date and a new Exchange Act finally came into force in 1855, with an 18 member regulatory Chamber and a first measure of autonomy for the market.

Although the market was no longer a money-machine for the state, exaggerated expectations continued to plague its extension into private capital provision. The 1873 Vienna International Exhibition occasioned the last triumph of optimistic expectation over reality, to be followed by general collapse amid the contraction of bank credit. The Bourse closed amid violent scenes. To this day the Viennese remain

suspicious of large-scale economic optimism and its expression in the form of grandiose exhibitions: the city, in a referendum in 1992, declined to celebrate the millenium with 'Expo 2000' at a time when the stock market was once again in disrepute.

By 1875 a new Stock and Commodity Exchange Act gave Vienna more autonomy within a framework of state sanctions and, until 1914, development was less crisis-ridden. The 1875 Act remained the basis for regulating the Austrian market until 1989, a late date in the calendar of stock market reforms. Vienna, until recently alone in its region, nevertheless remains important for the whole of this corner of Europe. Until recently it has also remained mainly what it was 200 years earlier, namely a financing instrument for the public purse and large institutions.

By the early 1970s, of the 78 listed domestic shares, only 3 were actively traded (Perimooser, Steyr-Puch and Semperit) in a 'Spitzenmarkt', a remainder market, dealing only in those securities not traded directly between financial institutions outside the Bourse. For 18 years to 1984 no new companies were listed and the Official List was reduced by those choosing to delist. In this year two companies were introduced. In 1985, the Austrian market was 'discovered' by an American financial journalist, Jim Rogers, and prices rose 130%, with volumes increasing by a factor of six. Tax reforms followed in 1986, as did new listings on the back of the bull market that endured in one form or another for four further years. In the period 1990-1992 ensued collapse and stagnation, the latter strongly connected to lack of confidence in the mechanisms of the market itself, which has only recently, during 1993, begun to be addressed on the basis of proposals developed at the height of the difficulties in early-to-mid 1992.

Vienna is still a remainder market, but the lack of transparency and opportunity for insider dealing that such a market offers has finally been publicly acknowledged. The recognition has been slow, as demonstrated by the fact that creeping reform has been under way for many years. Each stage has been announced as the set of measures necessary to rehabilitate and modernise the Vienna Bourse, only to be followed a year or two later by another. The continuing attitudes of market participants, as revealed by empirical research as well as by the evidence of the public prints, are not entirely reassuring however. The VIP (Vienna Insiders' Party), as it has been dubbed, is perhaps best represented by a reported comment of one of its members, "There is no such thing as insider trading in Vienna. Here we are all insiders": traders in Viennese banks and on the Schottenring floor will ensure that they always benefit first from seeing the order flow. The success of reform here cannot be measured by any immediate increase in trading interest such as might be induced by an improvement in returns following on a tax or other change, but by whether a long term, stable increase in trading volume over a range of securities, including private equity, is achieved.

Section 9.2: Contemporary Issues

Vienna's vocation, as a potentially important financial centre for the whole of south-eastern Europe, has been firmly recognised, but to date equally firmly missed. One focus of interest for the empirical research on the development of the Vienna Bourse has accordingly been the wide gap between its aspirations and opportunities on the one hand, and the historically unsuccessful efforts of its authorities and participants on the other, to create a respected national exchange capable of doing more than channel public funding and provide a

playground for a clique of bank-based dealers. The possible outcomes of the latest attempt to bridge the gap remain unclear.

The chief problem facing the Vienna Stock Exchange is that of reconciling the necessity for reform with the interests of its market-independent members, the banks and other credit institutions in which Austria is rich. These institutions have either not needed the market or have benefited from its structural deficiencies. Private groups and individuals within the financial institutions, and possibly outside them, have also benefited from trading on privileged information, particularly information about order flow.

In the course of the empirical research, the status quo was vigorously defended by individual respondents, mainly on the ground that it worked well for all the parties and interests involved. This was stated, blandly or vehemently according to the tenor of the discussion, but always categorically, as if unlikely to be challenged by others, as was indeed the case. The circle of parties and interests has now widened well beyond the membership of the Vienna Exchange however, creating an absolute necessity for reform.

The wider circle of interests impinging on the conduct of securities trading in Austria includes the necessity to comply with EC Directives; public opinion, increasingly aware of deficiencies exposed by scandal and adverse public comment; the not necessarily valid, but real, perception of the outside world that Austria must be an important centre for opportunities connected with the redevelopment of central and eastern Europe; liquidity-driven investment surges, which have drawn attention to the problems of a market into which foreign investors have often thrust money without detailed prior knowledge

and, finally, the rapid expansion of published comment, financial promotion and a general increase of financial awareness on the part of the public. This last has, ironically, to a large extent been generated by the member banks of the Vienna exchange themselves, through two mechanisms. First, they have actively promoted and disseminated financial information about investment opportunities of all kinds to attract custom. Second, they have for a number of years been involved in a massive restructuring process through mergers to reduce an acknowledged over-banked, over-branched national infrastructure. This process has generated widespread discussion as well as numerous well-publicised conflicts, failures and scandals.

Finally, the liberalisation of eastern Europe released an early wave of optimism in Austria which later collapsed, partly due to belated realisation that profits would not flow quickly, partly because the Vienna exchange did not inspire enough confidence to retain anything other than high-risk opportunistic interest. The understanding that large gains will one day occur, but that the boat may again be missed, particularly as regards confidence on the part of foreign investors if respectability is not achieved, is another factor militating for the acceptance of reform by those who might otherwise prefer to continue to fish profitably in the small Viennese pool.

Section 9.3: The structure of the Austrian market

The Vienna Bourse has three trading sections, excluding its commodities exchange and the recently introduced derivatives market. It is not mandatory to trade on the exchange and the market exists for those orders that cannot be matched outside it. The markets are organised, in outline, as follows:

1. The Official Market is characterised by strict listing requirements, intermediation by Official Brokers ("Sensale") and a periodic open outcry auction system. The Official Brokers are not allowed to trade for their own account and are fundamentally market officials charged with facilitating price discovery at least once per trading session, and smoothing the process of transactions in crowd ('consecutive price') trading thereafter. Price movements of more than 5% in any one session are inhibited by the right to revoke orders if that limit is exceeded and the Official Broker may scale down orders to ensure balance between the "Geld" (bid) and "Brief" (offer) sides of the market.

2. The Semi-Official Market, the second market, is characterised by reduced listing requirements and the participation of 'non-official' or independent commercial brokers. These are intermediaries rewarded by commission rather than dealers for their own account. Consecutive prices (i.e. continuous price fixing) is intended to operate in the semi-official market, but in fact a single price is usually determined and maintained for the whole of the trading session. Non-official brokers must be qualified by a period of five years' previous activity either within the exchange or in the securities department of a member bank.

3. The Unregulated Market is characterised by the curious single listing requirement that the securities' print quality be up to the standard set by the VSE and that the application for listing be made, not by the issuer, but by a proposer and seconder drawn from the ranks of exchange members. In this market free brokers operate a market-making system similar to that in the German 'Freiverkehr' free market, under an arrangement adopted by the Council of the VSE only in 1990.

Settlement takes place outside the exchange under the aegis of the Austrian Control Bank AG, an institution set up for the purpose and within which both cash settlement and clearing arrangements exist. A weekly 'account' is maintained with settlement of transaction details following on Monday and delivery on Thursday of the following week.

Delivery usually constitutes offsetting entries in the central depositary system, rather than physical delivery of printed securities. Actual payment of outstanding account balances takes place on the second Monday following the business week, so that, in terms of the 'Group of Thirty' settlement criteria, Vienna operates a 'T+14' system.

Section 9.4: Regulatory issues

Regulation of the Austrian market reflects two previously mentioned structural features of the country and its single Vienna exchange respectively. The closely interwoven ('verflechtet') nature of political, administrative and business institutions produces congruity between the aims of the exchange authorities and the aims of the regulators. And the constitution of the exchange ensures personal dominance by bank directors. The second largest contingent represented on its Council, ignoring the group representing the commodities segment of the Vienna Stock and Commodities Exchange, are the appointees of the Finance Ministry and the central bank.

Some idea of the strength of the weighting is given by Table 1.
showing council membership:

Table 1.

Constituency I Banks 16 members, who must be directors of
member banks

II Independent brokers	1 member
III Official brokers	1 member
IV Floor dealer	1 member (floor dealers are the representatives of banks)
V Commodity exchange	5 members
 Federal Finance Ministry	 2 members
Central Bank	1 member
 TOTAL	 27 members

Independent (non-official) brokers may deal only in the semi-official (geregelter Freiverkehr) secondary market, which effectively prevents them from offering trading and specialist services in the larger official market. The cause of the problem lies not in the regulation of the exchange, but in Austrian banking law which prescribes that only institutions holding a banking charter may trade in securities. The role of independent brokers is thereby further restricted to acting as simple intermediaries for dealings which must ultimately involve a member bank. Since, on the other hand, direct dealing between principals may take place off-exchange, there is no incentive, either on the part of the non-official dealers themselves or the

regulatory authorities, to widen the scope of exchange trading to include more active participation by more entrepreneurial, market-dependent brokers. Intermediaries do not compete with one another and for most securities traded on the exchange, uniform prices (i.e. one price established per trading day) are the rule. The English-language version of the Exchange's official publication on its structure remarks "The American system of separate banking institutions or of having proper (sic) brokerage houses does not exist in Austria". This turns out to be a mistranslation of the original German version (eigene Brokerhäuser) but rather neatly states the position.

Banks trade on behalf of clients for commission, but have the option to use their own inventories. Not being required to trade across the exchange, much less is known about the dealings of banks, which are effectively 'over-the-counter' for the most part. This reduces the amount of evidence available to support claims of market distortion or insider dealing but increases the probability that it will occur. This was freely admitted by respondents as if it were a theoretical consideration but one not likely to have any effect in practice. The researcher considers that this reply reflected a disingenuous attitude to the whole matter. An exception is reported below.

All of the above factors are cited as regulatory rather than trading issues because, by virtue of its regulatory structure, the Vienna market appears to be incapable of the reforms that would produce greater transparency, and hence the regular, stable trading volumes indispensable for viability, as a byproduct of more open access. The kind of reform being engineered today merely introduces restrictions on improper dealing activity and penalties for insider trading. There is no evidence that reform of this type actually reduces the incidence

of impropriety. Improved concealment would be as likely as better behaviour to account for any recorded improvement. And in Vienna one is not dealing not with an acknowledged problem but with a set of market practices that have hitherto constituted normality. The suspicion must remain that the authorities have done enough to satisfy requirements for EC entry and silence public criticism, but no more.

Section 9.5: Information expansion

Increased public awareness of savings and investment possibilities has been a basic objective of banking promotion for many years. Most interview respondents characterised the increase in press and periodical coverage as 'great' rather than 'some' in the period 1986-1992. Two described it as 'explosive', but coupled this opinion with the view that scandal rather than investment information supplied the main source of interest. Visits to bank branches in Salzburg and Vienna revealed large amounts of investment promotion material on display and available on request.

Material collected from one Salzburg bank branch was analysed. Included were prospectuses for airport and (Danube) port privatisations, a variety of company reports, brochures for investment clubs and investment hotlines as well as bank reviews and offprints of articles by economic specialists, resulting in a two-kilogram package. A wide range of investment magazines was on sale.

The two main Vienna broadsheet dailies offer two views of the financial world. At the time fieldwork was conducted (and on the

occasion of many other visits to Vienna) the conservative 'Die Presse' maintained the bland line recognisable from interview responses. The other, 'Der Standard' carried stories and letters critical of bourse practices. Die Presse is owned by the Bundeswirtschaftskammer (BWK, the national chamber of trade, with close links to the higher echelons of business and government).

Section 9.6: Survey results

Interviews were conducted with eight organisations; the Vienna Bourse, major banks (3), private banks (2) and a specialist financial institution responsible for coordinating the bond issues of a number of large public bodies, plus one of the few remaining private brokers. Twelve interviews in all were carried out, eight based on the structured questionnaire and four with other individuals to whom the researcher was handed on for further discussion about (a) trading practice on the Vienna Bourse and (b) new stock markets in central and eastern Europe. The respondents based in major banks maintained a uniform line, restricting their responses to views that translated as a broad assertion that the Vienna market functioned to their entire satisfaction. It was maintained that sufficient information flowed from the floor-based price setting process conducted by the official brokers and daily reporting of bargains concluded for them to be assured that the market itself was efficient, transparent and undistorted. Interviewees found it difficult to respond to the suggestion that the market should serve other purposes than a kind of liaison function among themselves. One considered the proposition impertinent, reflecting the researcher's 'obvious lack of experience' of the way business was conducted in Vienna. Others conceded that there was a problem arising from established practice. The point was

generally accompanied by a complacent gesture, being a matter of no great importance other than to market participants, they being the only parties concerned.

A particularly disingenuous attitude was revealed towards the Vienna market by one major member of the exchange. On the same day that a former Official Broker ('Sensal') of the Vienna Bourse, now head of a major energy group, was railing against corrupt market practice in the columns of 'Der Standard', the researcher was handed a university seminar presentation on the Vienna Bourse by its author. The document presented conventional arguments for transparency and efficiency without referring to the fact that these qualities were notoriously absent from the Vienna market and not addressed by the round of reforms at that time (August 1992) under public discussion. The proposals that form the basis for the reforms presently under way (1993-94) were issued one month earlier than the date of interview in 1992, but were not referred to by any respondents. Most would have been aware of them at the time or have participated in their preparation. A copy was supplied on request to the researcher only some months later, when public discussion had begun and newspaper articles began to mention it ('Konzept Finanzmarkt Österreich', Österreichische Kontrollbank AG, Vienna, July 1992).

The two private banks interviewed responded very much as parties outside the mainstream of Bourse activity. Arrangements with other, mainly larger, banks allowed them to transact most business directly, not through the Bourse, even though both were members. One private bank was completely unabashed in proposing to push particular forms of market organisation on the new exchanges in eastern Europe in order to improve the chances of selling its own software systems to the new

markets. At the time of interview it was abundantly clear that these systems were dependent on market institutions such as effective custody and settlements arrangements that were hardly to be found anywhere in eastern Europe and difficult to legislate for, let alone implement, in the circumstances of the time. The published reason for marketing these systems energetically was "to leverage the investment we have sunk into software development for the Austrian market by reproducing that market elsewhere." ('Organisational structure for securities markets in eastern Europe', Effectinvestbank, Vienna, November 1991).

The director of a nationally important non-bank financial institution visited agreed to a discussion of the problem of market manipulation in a lengthy second meeting, held on the day after the formal, structured interview had been completed. Confidentiality about techniques was insisted upon, but consent given to characterise the situation as follows: "The banks first arrange the market and then say to the client, 'well, you see, that's the way the market is at the moment'". During this meeting, detailed corroboration was obtained of many of the conclusions inferred from the responses of other respondents, as discussed above.

One small market-dependent broker was visited for formal interview and informal discussions to follow. The partner interviewed confirmed only the outline of the market structure reflected in official descriptions. It was put to him that there were few opportunities for in the Vienna market, either in the corporate finance area or in equity trading. He agreed, using a formula observed in other centres, namely that the run-down or closure of other brokers had yielded useful clients and business, giving grounds for optimism about the

future. Partnership with a small bank was the single development area at the time, leading to systematic channelling of broking business. Of the six independent brokers (Freimakler) in Vienna, three were controlled by larger banks. The respondent confirmed that a non-reply and a negative reply to requests for interview by the other two were due to imminent retirement of their principals and possible closure.

Section 9.7: The position and prospects of market-dependent brokers

Many independently expressed opinions contribute to the conclusion that the structure of the Vienna exchange and its trading practices may be held directly responsible for the low volume and poor reputation of the market, apart from discrete episodes of activity stimulated by external events. Vienna has participated in the overall rise in volume of market trading during the 1980s, but its development has not been synchronised with that of other centres and the rise has not been sustained.

The market is effectively controlled by its market-independent participants who have little interest in promoting it, beyond servicing high-volume institutional securities trading interest from abroad when opportunity offers. The narrowness of the interests represented in the governance of the Vienna exchange seems likely to ensure that the market remains marginal in the eyes of foreign institutional investors due to its reputation. It remains inadequate for the purposes of mobilising personal saving or raising equity capital by virtue of the banks interposed between it and the saving public and business firms alike. The lack of independent brokers to supply entrepreneurial initiative in trading and specialist services to encourage wider participation is a factor in this disconnection

between the securities market and the economy at large, apart from large-scale public and private bond finance.

If the market authorities are not able or willing to promote the wider business development of the bourse and the independent brokers are too few, too small and too poorly represented on the governing body to induce change, then a vicious rather than a virtuous circle would seem to have been closed for the foreseeable future. That future does however include growth episodes of the kind that occurred during 1993, where the growth of volume was sufficient to provide material and motivational support for a change of heart. On the other hand it is difficult to see in contemporary events a pattern that has not already occurred at one time or another in the history of the Vienna exchange. And on each previous occasion bursts of activity have been followed by periods of stagnation.

Finally, a barrier has been put in the way of new genuinely market-dependent brokers that was not there before. Participation now requires a high level of investment in information technology, greater efficiency in settlement and greater sophistication in trading simultaneously on derivative and underlying securities markets. For a group of participants restricted to commission based operations in a small part of the market, the incentive to found new firms is absent.

A NOTE ON EXTENSION OF AUSTRIAN BOND TRADING TO LONDON

In the course of studying developments in the Vienna market, attention was drawn at several points by respondents to bond dealing for Austrian clients carried on outside Austria. This turned out in the main to refer to the overseas operations of Austrian institutions,

mainly in London. As a result a number of visits, four in all, were made to examine the operations of the main independent London broker active in the field.

Although now independently operated in London and capitalised partly from outside the United Kingdom (but not from Austria), the firm was originally the United Kingdom trading arm of a major Austrian bank, set up as a profit centre in London for the purpose. The operation turned out to be difficult to operate and less than profitable. It was, as a result, bought out by its dealing principals and has continued to operate as an independent entity. The net result had been a loss of commission income and trading presence for Vienna and a gain to London, without the underlying pattern of bond trades being affected. The purpose of the investigation was to determine the cause of this bond trading activity and gain experience of dealing practice. Two directors of the firm made themselves available for informal conversation as dealing was in progress and the use of a dealing room position was offered for several half-day sessions, including the use of Reuters and Bloomberg services, to observe the market and follow individual transactions in the period October-December 1992. The results were as follows:

- 1) Several technical features of the operation made London-based trading less costly than Vienna-based dealings. Telephone charges between dealers and to information services (including the rest of Europe) were at local call rates for example.
- 2) Trading in London began earlier than in Frankfurt, often an advantage in securing urgent execution of a market order.

- 3) The clients were mainly banks carrying out 'nostro' (own account) bond dealings in European centres, notably Spain and Portugal, although corporate bonds were on occasion sought on a worldwide basis. The basis of dealing was commission or a spread on covered bond trades. In other words both a buyer and a seller were required to be committed before a bargain was executed, but the broking firm was on occasion liable for the market risk inherent in a price change in the interval of up to two trading days between purchase and delivery.
- 4) Private client business was out of the question in London. It was estimated that up to four staff would need to be added (to a firm of four dealers and two administrative staff) to cater for regulatory requirements. This would not have been the case in Vienna.
- 5) Proposed capital adequacy requirements were regarded as 'ridiculous' by the firm's principals, given the very small risks borne by the firm (see 3. above) and the existence of large-scale funds from client banks to which agreed recourse existed. Membership of ISMA (International Securities Management Association) was also an effective guarantee of confidence and probity.
- 6) Opportunities for gaining new clients occurred in London that would not have occurred in Vienna, particularly the opportunity to offer potential clients 'pass-ons' in new issues (i.e. passed on at the issue price) as an inducement to trade on better terms later.

7) The information environment in London was superior, there was less to fear from market 'arrangements' and such practices as front-running.

CONCLUSION

The Austrian market does not offer an example to be followed, but rather illustrates a number of difficulties better avoided by aspirant national exchanges. Its validity cannot be questioned, having survived countless crises for 200 years, currently performing a useful if limited function, valued by its participants and currently in course of reform. Its viability has often been publicly questioned, including during 1992, the period during which most fieldwork in Vienna was completed. Its potential however remains to be realised: it is not a source of immediacy, does not produce large amounts of useful information and is unattractive to the corporate sector as a source of risk capital through initial public offerings. Turnover volume has suffered wide swings of a long-term nature, varying even in recent years between unstable boom conditions not related to underlying prospects and moribundity accompanied by public criticism. The few market-dependent brokers lead a precarious existence. There is evidence of relatively easy 'calving' of new firms out of existing large credit institutions. New firms have, however, tended to take the form of investment banking entities and become involved in financial scandal. The Vienna Stock Exchange and its member institutions share in the closely interlinked structure of government, politics and national economic affairs which is characteristic of Austria. The system features close personal relationships and individuals simultaneously exercising multiple rôles in political, administrative, economic and business organisations. In many contexts the Austrian model of political and economic management is admirable and has been

successful in maintaining the country's prosperity and influence over a long period. The national model is undergoing rapid transformation under the influence of internal political pressure and Europe-wide economic and other developments. It may be held that multiple rôles and close personal relationships running across institutional boundaries are inimical to the development of transparency in securities markets. This appears to have been the case in Austria. The problem has been publicly identified and made the subject of reforming efforts. The present research took place during the period of problem recognition, policy formulation and early efforts at implementation. Thus accrues some advantage in immediacy and directness of observation but no opportunity to pronounce on the outcome.

CHAPTER 10: OTHER MARKETS STUDIED

INTRODUCTION

In this chapter are discussed the findings of visits to the Amsterdam, Brussels and Budapest Stock Exchanges, and to the then-nascent Prague and Bratislava financial centres. One other exchange not visited, namely Warsaw, is examined briefly on the basis of its trading volume statistics, which are striking. Visits were also paid to each of two German regional exchanges, Hamburg and Bremen. Each exchange was found to exhibit individual characteristics that provided insights into different aspects of the study as a whole. Amsterdam represented an efficient exchange suffering loss of turnover volume to other centres but acting vigorously to restore its position. Brussels furnished an example of an old-fashioned, bank-dominated exchange with too many traditional brokers, under pressure from technological and financial change. Budapest is attempting to develop a conventional modern exchange to underpin its liberalised economy, but frustrated by the problems of the Hungarian economy and its own poorly balanced structure of trading instruments. Prague was, and is, a tiny market swamped by large numbers of privatisation issues. Bratislava started life under the influence of Prague but today suffers political interference in its own and listed companies' affairs. Warsaw has suffered the problems of being a narrow equity market in a rapidly developing free economy without benefit of a broad, deep, underpinning bond market to stabilise it against boom and bust. The German regionals in 1992 were suffering from greatly exaggerated reports of their death, but continue to flourish. We begin with Amsterdam, visited in 1992 and 1994.

Section 10.1: AMSTERDAM

10.1.1: Historical background

The Netherlands East India Company founded in 1602 was the first in the world to offer its shares to the public and have them traded in a market. Trading in shares was treated as an adjunct to commodity trading. Indeed the Amsterdam Bourse occupied the same building as the Commodity Exchange until early in the 20th century.

By the mid-1750's 44 securities were being traded, including 25 republic and provincial bond issues and three domestic equities. Modern observers have been surprised by the self-organising ability of emergent markets, but the case of Amsterdam shows that these elements have in fact always been present. This early example of the rôle of confidence and information in promoting market development has been studied in some detail by Neal [1990].

In 1877 the first attempt was made to ensure that all trading was carried out only by members of a unified Stock Exchange organisation, but this was never entirely satisfactory until the market obtained its own building in 1907 and could control physical access to the floor (Kutscher [1976]). Since 1947 it has been a legal requirement that all securities trading is restricted to Exchange members.

10.1.2: Contemporary issues

The Amsterdam exchange was first visited in July 1992 for the purpose of establishing comparisons between small national markets with a mainly domestic rôle and those with an international rather than domestic orientation. Amsterdam, like Brussels, falls into the latter class.

An extensive formal interview was conducted with the manager of the Information Department, whose views on the problems and prospects for the market were secured, plus informal discussions later with brokers.

The Amsterdam market was at that time based on a system of specialists, the 'hoekmen' who divide up the sections of the market after the fashion of jobbers on the London market before 1986. The international dimension of the market permitted far more 'hoekmen' to operate than would be necessary for a purely domestic market. On the other hand, the number of very large multinational companies based in the Netherlands required a sophisticated market to enable trading in their equity to be retained in Amsterdam. Thus an international rôle for the market was more of a necessity than a strategic option or a matter of historical tradition.

The specialist system had proved to be sufficiently flexible and efficient in terms of transaction costs, but had failed to halt a steady drift of trade volume to London that had now reached alarming proportions. The small size of the 'hoekman' firms meant that each was individually able to obtain enough business to be unwilling to consider change, particularly in view of their monopoly specialist position, which valued each firm higher than its business volume would warrant. The specialists were undercapitalised, introducing a bias in the direction of small, covered trades, with the result that it was precisely the larger bargains required by international fund managers that were increasingly being made in London. Outside brokers were much more competitive than the specialists and had invested heavily in technological support and the provision of services. The banks on the other hand obviously had no difficulty with capital and could undertake exposure during the settlement period, hold inventory and

take long positions if they wished. In practice however they used the market principally only as required by their mainstream business and did not acknowledge a responsibility to support the exchange.

During the course of the interview and other discussions it became clear that while the trading and regulatory system and other aspects of exchange organisation was regarded as entirely satisfactory from a mechanical point of view, there was a serious problem of who was to 'look after the shop'. A working party of exchange members had been set up to consider reform but no decisions had been taken. There was a certain amount of friction between the 'hoekmen' who wished to protect their position and privileges, the outside brokers who were suffering loss of both trading and advisory business and the banks who had no particular motivation to act.

The reform process in Amsterdam was observed over the two-year period which followed, on the basis of press reporting and comment in business and professional periodicals, followed by a further visit for confirmation of the changes, which were finally agreed in March 1994. The reforms, briefly, consisted of further specialisation among the 'hoekmen' which would give them a monopoly in their allocated stocks but demand that they deal in them at any size. Other exchange members would be able to subscribe to the capital of the 'hoekmen' firms - henceforward to be known as 'specialists' after the example of the NYSE - in order to ensure an adequate capital base for operations that would now require exposure. The market would nevertheless remain order-driven rather than marketmaker-based. The top 30 stocks on the Amsterdam exchange were to be divided among 17 firms and form a separate market sector. The remaining market in equities would be served by an automatic screen trading system with much wider access

for brokers, retaining an order-driven market for this sector also. Hoekmen firms who decided to withdraw from the market were to be compensated by a block grant based on earnings over the preceding 2.5 years, paid for out of fees charged to the new monopoly specialists (FINT [1993]/1]). A two-tier system for government bonds had already been introduced in October 1993 with some return of business from London already experienced (FINT [1993]/2).

The further visit was made to Amsterdam in April 1994 in order to secure an authoritative view on the reformed system at the time of its introduction. An interview was conducted with the principal of a major broking firm who was also a member of the Amsterdam Stock Exchange's reform committee. Fresh official information setting out the new position was obtained from the market authorities and has been described briefly above. The main opinion expressed at interview was that the reforms appeared to have been opposed, in most cases on principle, by both brokers and banks, but had in the end been accepted because of the overwhelming perceived risk of damage to the Dutch market by steady loss of volume to London. The banks demanded more immediacy in the market but were themselves reluctant to provide it, particularly in the case of small domestic companies.

The brokers did not like the new capital requirement: 500,000 guilders to become an agent, FLS1,000,000 for a market principal and FLS2,500,000 for a bank. Larger brokers like the firm interviewed had to opt for bank status in order to reduce the cost of bridging finance during the settlement period. The new system would however allow economies of scale to those participants who took advantage of the possibility to offer a wide range of services that had not been possible before, due to narrow specialisation. Custodial services,

settlement, corporate finance, portfolio management and all the related dealing could now be handled within a single house.

In the present market small brokers had about 35% share, one bank, ABN AMRO, had 30% and the rest was divided up between other banks and brokers. Under the new arrangements it was thought likely that both this large bank share and the proportion of business done by smaller brokers and specialists would fall, the market being divided up instead between a relatively small number of institutions. Competition would steadily raise the threshold level for new participants: even today it was extremely difficult for a new independent to enter the Amsterdam market as the respondent had done in 1982 as a member of a small private partnership. A capital of around 2 million guilders was currently about the critical level and this would rise rapidly. The difficulty for the respondent's organisation and, it was stated, a number of others, was to remain above the critical level and 'swim' in the new market. A further difficulty was marketing pressure from the banks, due to their promotional spending power, their captive client base and their monopoly of their clients' ear in terms of advice. The respondent considered that banks were able to get away with offering a large amount of misinformation to their clients and the public due to their privileged position and clients' uncritical acceptance of their pronouncements. Brokers in the Netherlands were not considered the obverse of this coin, but themselves rather respected as members of the financial community. Nevertheless an asymmetry of means and of regard for their financial advice continued to place them at a disadvantage.

Domestic investment volume was not sufficient to support a reasonably efficient market in even substantial Dutch firms who were not

household names abroad. It was therefore important for the market as a whole to maintain levels of international investor interest.

There is absolutely no reason to doubt the viability and validity of the Amsterdam market, nor its ability to exploit development potential (in the present case by recovering lost ground). The strongest evidence for these assertions is the fact that the reforms now in place were instigated and executed for the common good in spite of operating against vested interests on all sides and being quite vigorously opposed as such.

Section 10.2: BRUSSELS

10.2.1: Historical background

The word 'Bourse' derives from the arms of the Chevalier van der Buerse, which featured three purses and hung outside his house in Bruges, a house which was used for a variety of mercantile purposes, giving rise to the expression 'going to the (house of the) purses'. The Antwerp Bourse is thought to have existed as a commodity exchange since 1515, being referred to as an institution in an edict of the French king Henry II in 1549 and continued its existence, somewhat overshadowed by Amsterdam, until 1801 when the region we now call Belgium acquired a public market ('Bourse de Fonds Publics') established by Napoleonic decree at Brussels. Only after the revolution of 1831 had established the Kingdom of Belgium did Brussels become the site of a truly national bourse.

Brussels profited from and contributed to Belgium's industrialisation as one of the earliest continental countries to develop a large iron and steel industry and as a late coloniser in the Congo. The world's first large holding companies were a Belgian invention and remain a feature of the country's financial landscape. By the outbreak of the first World War however, the boards of the 'Holdings' had become stuffed with retired politicians and were no longer at the leading edge of industrial enterprise.

With its industrial and colonial networks, the Brussels Bourse enjoyed a golden period immediately before 1914, but was unable to protect investors from the false markets of the inflationary period and the inevitable crash and depression which followed. A Royal Commission worked from 1930 to produce the Commercial Code on which a thoroughly

reformed Bourse was re-established in 1935. A monopoly was re-established for the exchange in trading all but the largest blocks of securities and strict rules introduced for the conduct of brokers (Schwarzer [1976]).

The post-Congo period was also marked by internationalisation and this remains a characteristic of the Belgian equity market. The bond market by contrast, although large because of high and sustained levels of government borrowing, remained until recently largely a domestic concern despite being one of the largest in Europe in terms of issue volume. This has been held to be due to Belgium's intricate tax arrangements (FINT [1994]/5), adding to foreign investors' transaction and information costs. The bond market had been subjected to an ongoing reform process in 1989 but, apart from reduced broker numbers, its results were not evident at the time of fieldwork visits.

10.2.2: Contemporary issues

The Brussels Bourse was visited in July 1992 for similar reasons to Amsterdam, namely to assess the position of an internationally oriented small exchange under competition from abroad, as opposed to that of a mainly domestic market. Formal interviews were conducted with two members (jointly) of the exchange's technical staff and with senior managers/directors with securities trading responsibilities in three commercial banks. Two of the banks were large household-name full service institutions. The third was a private client specialist with extensive portfolio management business. All were active on the Brussels Bourse and many other European markets. Formal enquiries were made about their activities and policies on the basis of the standard questionnaire developed for this purpose and applied in other centres.

The results of all interviews may be stated briefly. The banks regarded their securities trading as a mechanical process without regard to the market as a whole. In all cases they dealt through broking firms with whom they had close connections and, significantly, were not willing to expand on the nature of the connection. The interviewees did not appear to be aware that the situation was already in the public domain. The banks' activities in buying up small brokers in order to obtain access to the computer-based trading system while at the same time preferring to use the bourse at arm's length for their own trading needs was the subject of a newspaper report in October 1991 (FINT [1991]/1). All interviewees, both banks and exchange authorities, agreed that the main distinguishing feature of the Brussels Bourse was the severe rundown in the number of broking firms due to the external reforms applied to the bond market and to the stock exchange itself by the Belgian finance minister Phillippe Maystadt since 1989. Undertaken in order to widen the investor base and reduce the cost of financing a large and increasing budget deficit, the reforms introduced in 1990 had removed stockbrokers' monopoly on exchange dealing, required their incorporation as limited liability companies, reduced fees and commissions by an average of 30%, allowed foreign investors to take interest payments gross of tax, reduced withholding tax for residents from 25% to 10% (FINT [1991]/2) and set in train the organisation of a new settlement system (Belarfi) and the introduction of a futures market (Belfox). The latter had just opened at the time of the visits, the former was delayed by technical and organisational factors. Among these factors was cited the inadequate financial resources of the Brussels Bourse. Listing fees were among the lowest in Europe and unable to provide a source of income for the exchange as was common elsewhere in Europe.

The number of broker firms had reduced from 200 in 1989 to 115 in late 1991 (FINT [1991]/1) and were 74 at the time of the visit in mid-1992. As a footnote, the visible evidence of this process was to be observed in the shabby and neglected exchange floor of the Bourse, in public view from the entrance portico, itself infested with loungers and drinkers, where the last of the old-style brokers occupied small folding tables for the day's session. Only further within and invisible to the public was a more salubrious modern environment supporting the apparatus of screen-based trading.

By 1994 the bond market reforms were substantially complete, but had achieved more for the Belgian finance ministry than for the market, with spreads and commissions in line with other European markets and a wider range of maturities able to be offered to foreign and domestic investors. It must be concluded that the Belgian market remains both viable and valid for its purpose and unlikely to become stagnant because of high government borrowing, in spite of the Maastricht Treaty conditions. It continues, as many observers have noted (see for example FINT [1994]/5) to neglect a large part of its development potential due to the inability of its participants to work together. Brussels is apparently controlled by brokers rather than by banks, although, as in many other markets, it can be increasingly difficult to identify who controls the brokers.

Section 10.3: BUDAPEST

10.3.1: Introduction

The Budapest Stock Exchange (BSE) reopened after a break of 42 years on 21st June 1990, the first to do so among the formerly socialist countries of central and eastern Europe. A pilot inter-bank market ('Stock Exchange Days') in bonds had operated since 1988, following legislation liberalising securities trading by banks. At the opening 380 bonds and 20 equity issues were opened for trading by the founding forty security firm members.

The close historic connection with Austria, plus the obvious difficulty of private placement under a socialist regime have always made Vienna a second home for Hungarian investors, both resident and expatriate. An early disadvantage for the Budapest market was therefore the early listing of a number of companies on the Vienna Bourse. Prices were equalised by arbitrage but possession of a Vienna listing automatically upgraded companies such as Ibusz (the well known travel and tourism company) above purely domestic Hungarian issues with off-putting ex-socialist names like Agrimpex, particularly as regards foreign interest. Foreign investors were, and remain, more prepared to deal in the Austrian than in the Hungarian market for Hungarian equity issues. For the exchange a practical operating disadvantage from the start was the necessity to wait for the price from Vienna to be established and become known each day before trading in Budapest could effectively begin (FINT [1990]/1).

10.3.2: Contemporary issues

A first visit was paid to Budapest in July 1992. Interviews were conducted with a major bank as described below and with a group of brokers and officials at the Budapest Stock Exchange.

An outside view of the new Budapest exchange was secured at interview with a director of a large domestic commercial bank. In his view the market was too narrow and volatile, with the continuing fall in the index due to the failure of the exchange to establish its viability, particularly as regards a worthwhile bond market. Broking was a new profession and although admission tests were to be welcomed and individual brokers were basically honest, there was a great deal still to be done. Information expansion had run well ahead of what the market could deliver: several daily papers, daily radio and television bulletins and a wealth of analytical material all based their message on 'western' perceptions of how stock markets should be expected to perform. The result was public suspicion rather than enthusiasm. The bank had been a founding member of the exchange but had now withdrawn, taking the view that participation was administratively burdensome with insufficient prospect of useful returns. The bank's own equity portfolio consisted of only 40-50 companies since trustee-status limitations on holdings applied. No more than 10% of the equity of any one company was held. Enforced debt/equity swaps were "unfortunately common" and accounted for many holdings that had arisen as a result of privatising companies that were basically insolvent.

Bank guaranteed bond emissions were now beginning to replace bank credit but were regarded as a stopgap by the interviewee, rather than as a major future development affecting trading volume on the Budapest exchange. This and other opinion expressed has to be evaluated against

the fact that the interviewee's bank, along with several others, itself became insolvent a few months later.

At the Exchange the discussions were conducted semi-serially, with a great deal of interruption and debate. The end result, supported by official documentation and other material obtained from the BSE and elsewhere, nevertheless allowed a clear picture of the aims and aspirations of the exchange and its position at the time to emerge.

Rapid change in the Hungarian market and the impressionistic nature of the data have since eroded the value of the information obtained. The following analysis of the contemporary (1995) position is therefore based on two further visits to Budapest. As will be seen in the next section, the Budapest Stock Exchange is organised on liberal lines that do not unduly favour market-independent participants and is capable of processing considerable volume. Automatic computer-based trading was introduced in March 1994. Volume remains a principal problem of the BSE however, for reasons that the exchange itself cannot influence to any great extent. The elections in 1994 did not move the country back towards socialism, but slowed an already tardy privatisation process and reinforced levels of welfare provision that were already too high under the more conservative government of the late Jozsef Antall. This situation contrasts with the hope expressed by interviewees in 1992, that the BSE was gearing up for rapid privatisation and a large increase in primary debt and equity issues. Three factors strongly inimical to investment may be identified as continuing to inhibit the development of the Hungarian securities market. They are discussed below: the official statistics are drawn from Kornai [1994].

First, there is ground for believing that consumer price inflation has become entrenched in Hungary and incorporated in the expectations of the borrowing, investing and general public alike. In the private sector, portfolio borrowers are real investors for return, aware of the inflation and contraction risk. In the public sector the borrower is government with a vested interest in reducing the repayment burden of its debt, if necessary through inflation.

Between 1980 and 1987 the annual rate of inflation moved in the range 5.3% - 9.1% annually with no regular trend. Since 1991 the rates have moved in the range 16.6% - 23% with no trend, a level usually considered likely to risk endemic high levels of inflation or a runaway inflation. The present government has been widely seen as insufficiently secure in its mandate for it to tackle inflation aggressively. A programme was nevertheless introduced on March 12th 1995 (MISC [1995]/1), beginning with an exchange devaluation and import surcharges; both likely to increase the rate of consumer inflation in the short run unless trade elasticities conveniently obey the Marshall Lerner condition.

Second, while Hungarian per capita GDP is only 20% of the average for the countries of the OECD, Hungary lies at 140% above the OECD average for the proportion of per capita GDP spent on welfare; a proportion exceeded only by the Netherlands, Sweden, Denmark and Norway.

Third, real interest rates were only significantly positive, at 2%, for one month (July 1992) in the entire period January 1992 - March 1994. The most recent maximum, at minus 12%, was recorded in January 1993, the figures having moved, apparently cyclically, through the range -12.5% to +2% in the whole period mentioned (Kornai [1994]).

This is, of course, a prime disadvantage to a securities market (van Agtmael [1984]).

In the course of further visits to Budapest in September 1994 and February 1995 interviews were conducted with a director of a major insurance company active in the Hungarian market and senior managers from three industrial companies, all privatised from state ownership. The following points emerged:

1. Small banks are now at considerable and increasing risk of takeover by larger ones. Companies and brokers who have relied on the flexibility, the connections or the specialised expertise of the smaller banks, particularly in private placement, may lose these advantages in the process. It is no longer appropriate to choose a bank on service grounds. In both the banking and securities trading sector it is better to play safe with larger, well-capitalised institutions. There may well be a flight to security with loss of flexibility and, in the longer run, loss of the institutions able to provide it.
2. The government's financing requirement is crowding out the private sector in a large-scale way. Also the tax system treats leasing as borrowing where the primary motivation is financial.

Back to back finance with foreign partners (foreign currency deposit in Budapest as security for a domestic forint loan) has become the favoured way of obtaining finance for companies, avoiding both crowding out for the borrower and domestic inflation concerns for the foreign lender. This does not help the development of the stock market.

The BSE has provided a wide range of investment instruments and facilities and promoted them vigorously. Public offerings on the Budapest exchange have benefitted from first class advice. Because of Hungary's excellent general economic and enterprise record until recently, many of the world's leading investment bankers have featured in offer announcements, led by Credit Suisse-First Boston (CSFB) with a major presence in Budapest (FINT [1994]/2).

10.3.3: The structure of the Hungarian market

The Hungarian Stock Exchange, the governing body, is autonomous and self-regulating under the terms of the enabling Act on Securities (No. IV of 1990) and externally monitored by the State Securities Supervisory Board which issues trading licences to securities firms in the form of limited liability companies meeting capital, technical and personal qualification requirements.

Two types of bonds exist: those traded but not registered, and those registered and traded. The former require a nominal issue capital minimum of HUF 10 million of which a 'float' of 10% must be made available to the public. This is a rather minimal float requirement and applies also to equities, where the issue minimum however is HUF 100 million. Registered securities exhibit the same structure but with higher minima: for equities a minimum of HUF 200 million with a 25% float, for example.

Trading is carried out along traditional non-Nasdaq US rather than Austro-German lines, with continuous auction by open outcry. Brokers face technical examinations before being admitted to the exchange.

Licensed brokers may trade for their own account but are barred from doing so until they have made best efforts to execute client orders. Brokers are required to accept client orders. Spot trading, futures and options bargains are all possible. Limited insider trading rules are operated with the right of the exchange authorities to suspend trading in a suspect security for up to three days.

Of the forty founding members a wide mixture of market-independent and market-dependent firms was to be found. The only practical method of assessing into which category into which any one firm fell was its registered capital (MISC [1990]/1). The banks were predictably (but not necessarily) capitalised in the billions, some intermediate-sized firms were capitalised at around HUF 500 million and the remainder typically in the range HUF 5-100 million. On the basis of first eliminating all small-capital firms with a known banking name such as Girozentrale in the title and treating the rest as market-dependent, a figure of 12 market-dependent and 28 market-independent broking firms was arrived at. This was confirmed by two Stock Exchange interviewees. By end-1992 the number of licensed brokers had grown to 48 (ECON [1992]/1) but liquidity and volume had declined to the point where only 3 (of 21) equities attracted regular trading (FINT [1992]/2).

The first longer-term fixed issue bond, a dollar convertible with a coupon of 16%, was not issued until December 1992 (redemption 1997): with a second tranche to be marketed internationally it was immediately dubbed a "paprika" in international bond market jargon (FINT [1992]/1). The true significance of the issue however lay in it being the first commitment to a fixed term, fixed interest, externally convertible issue from any former socialist-bloc country.

Short term commercial paper trading was introduced in January 1993

with a single-firm issue (FINT [1993]/2). Foreign financial institutions were permitted to list forint-denominated securities in Budapest from March 1994. The first group of institutions included the IMF, IFC, IBRD and EBRD as well as a number of regional development banking institutions from other parts of the world (FINT [1994]/4).

Open-outcry trading was supplemented, but not replaced, by a screen-based trading system in 1993. The system is similar to the Copenhagen limit order book system described in Chapter 7, but is in fact the Nordex system used by Sweden and Norway (FINT [1992]/3). As noted above, this system was further extended in March 1994.

10.3.4: Regulatory issues

The Budapest Stock Exchange enjoys a similar experience to many, more mature western European exchanges as regards both insider trading and diversion of turnover. The latter, diversion to Vienna, has already been discussed, but since the destination market has experienced its own regulatory difficulties, no regulatory issues of the 'lightness versus tightness' variety arise.

There is evidence that the Budapest authorities are prepared to act on suspicious trading 'events' however. In late 1993 the State Securities Supervisor asked the police to investigate dealings in a company, Novotrade, and has itself investigated trading in a major company, Danubius Hotels.

Section 10.4: HAMBURG and BREMEN

Interviews with the chief executives of the Hamburg Stock Exchange and the Bremen exchange were carried out in July 1992. The purpose of the interviews was to discuss the role of the Hamburg and Bremen exchanges as small regional bourses:

1. in the context of the spatial 'horizon' of equity issuers and investors
2. as an institution offering the facilities normally associated with a single national exchange for a region, under competition from the centre, Frankfurt.

The interviews predated the formation of the German national stock exchange some months later. At the time the demise of the German regional exchanges was widely forecast but has not since transpired. Although it does not form part of this study, the vigorous promotion and subsequent continuing success of the German regional exchanges is extremely relevant to the potential of smaller national exchanges and is continuing to be monitored with a view to further research at a later date. Both of the exchanges visited regarded themselves as part of the strong Hanseatic trading tradition. As such, with Munich, they should be regarded as the most strongly independent of all the German regional bourses. The main findings of the interviews are reported below.

Both interviewees were clear that many potential equity issuers would be prepared to float companies or issue further equity on their regional exchange where they would not do so in Frankfurt. From London, Frankfurt is often viewed as a sleepy provincial exchange, (more often on grounds of its extremely restricted opening hours than any other factor). From Hamburg and Bremen it is seen as a centre of

banking power, insensitive to the aspirations of individual firms.

Both interviewees were quite definite in placing this high on their list of justifications for the continuance of their market.

A second factor regarded as significant was the larger role of the independent brokers ('Freimakler') and the Official Broker ('Amtlicher Makler') in the regional exchanges. The advantage of the independent brokers' position was to be 'more short term in their thinking than the banks, but better able to enable a fair price to be set'. The rôle of the official broker was to ensure an orderly market, particularly as regards the fair and sequential presentation of the order flow. In the first market ('Geregelter Markt'), prices are set by the Official Broker at the call-over. In the second market ('Freiverkehr') the brokers themselves establish the price. The practice is uniform throughout the country, but only in the regional exchanges was the balance of broker and banker power regarded as more equitable than Frankfurt.

Neither interviewee considered that the regional exchanges were more likely to attract savers and larger private investors than Frankfurt, with the exception of placements in recognisably local or regional companies. There is a far higher proportion of such companies in Germany than in the United Kingdom. It is usual in routine press coverage for the name of a company to be coupled with its headquarters location, together, often, with its proprietors' names and family connections.

There was no arbitrage between centres and, at the time of the visits, conversion to a nationwide screen-based trading system was in progress. It was concluded at the time that, whatever the threat to

the future existence of the regional exchanges, there was little reason to doubt their viability, confirmed by visible evidence of activity and a high level of technological support and material infrastructure. Their validity remains open to question for several reasons:

1. The interviewees were interested parties defending a position under threat from competition and national reform.
2. There was no opportunity to corroborate interviewees' assertions with regard to investors and issuers.
3. At the time of interview new issues were at a low ebb. They were expected to revive but did not in fact do so for nearly two years afterwards.
4. Much of the detailed content of subsequent market reforms, particularly the formation of the national stock exchange organisation was unclear at the time.

Finally, there was little evidence of unexploited development potential. Small savers are still notably absent from the German stock market. This cannot be regarded as unexploited potential however, since enormous efforts are expended in attempting to break the mould of saving tradition. As already noted in Austria, the banks were ready to furnish kilos of market-oriented literature although, on this occasion, no advantage was taken of the facility.

Section 10.5: PRAGUE

INTRODUCTION

A first visit to Prague was made in August 1991 to discuss the organisation of the proposed stock exchange. At that time the national Chamber of Commerce was interested in sponsoring the institution and an interview was conducted with a senior executive on the subject. It became obvious in the course of discussion that the Chamber was more interested in retaining its position and privileges than in facilitating securities trading. The discussion turned largely on proposed registration procedures, and what would need to be done to prevent foreign companies 'making inroads into the Czech economy'.

A second visit was made in July 1993, in the course of which interviews were conducted with representatives of two banks. At that time the stock exchange was grappling with its own formation problems and no representative was willing to be interviewed. Telephone opinions were sought from representatives of several Prague-based broking firms, British, American and Czech. They proved to be highly contradictory in describing both what was happening and the prospects for the immediate future of what were, by then, two, competing halves of a fledgling market. The replies are therefore not reported here.

During the course of visits for other purposes in May and June 1994, the opportunity was taken to take forward discussions with one of the bank executives originally interviewed and to put questions to the chairman of a large holding company (Motokov). The results of the latter discussion are reported further below. The discussion and analysis in the following section is based on all of the above interviews, enquiries and discussions, together with press and

periodical material gathered at the time and as well as that collected as part of the overall monitoring referred to in Chapter 1.

10.5.1: Establishment of the Prague market

Three factors distinguish the Czech market for securities from those of its neighbours in Poland and Hungary. First, the market's development has been led by the need to provide a trading mechanism for an existing, ongoing mass privatisation process. Warsaw and Budapest both developed 'entrepreneurial' exchanges - in Hungary virtually single-handed through the personal efforts of Ms. Ilona Hardy - but are now having to endure a lengthening period of stagnation as privatisation programmes waver under continuing political and economic uncertainty.

Second, the economic surroundings, notably lower levels of consumer price inflation, less external debt and a smaller fall in industrial production following liberalisation than in the other two countries, together with widespread confidence in the general economic policy direction espoused by the Prime Minister, Vaclav Klaus, all contributed to an absence of obvious barriers to progress. A circle of interlocking mutual debt between companies remained largely unbroken however. Any great injections of cash into individual domestic companies, whether from stock market flotation or bank credit, may well end up somewhere else entirely, as the credit cycle unravels on the basis of pressure for settlement. Withholding of supply and lien on goods, even threats of violence or criminal damage were not uncommon. This view was confirmed in discussion with a number of company managers in Prague, interviewed in connection with a separate research project. Legal claims were currently taking two to three

years to come to court. Direct negotiation or direct action were preferred methods of obtaining satisfaction. The bank view, stated several times, was that while no-one had funds, the status quo could be maintained: if funds became suddenly more plentiful a chaotic situation could develop.

Third, by virtue of the lack of any reforming culture before 1990, political transformation has been more radical and more rapid than in the other two countries, as well as being disrupted by the separation of the former Czechoslovakia into two sovereign republics at the beginning of 1993. At the political level there was, according to interviewees who ventured a view, a straight split between old guard and reformist ministers, almost irrespective of their formal political allegiances. The will of Vaclav Klaus had tended to prevail, to the general relief of the business and financial community. Rapidity of change and resistance to it in the legislative and administrative infrastructure, has been most responsible for the actual course of events in relation to the establishment of a securities market. Legislation to enable the formation of a federal stock exchange was blocked in Parliament by Slovak deputies in 1991. The Slovak republic, not yet sovereign, legislated for an exchange in Bratislava which was set up in the same year by a group of banks and insurance companies. The present situation of the Bratislava exchange is summarised in a note at the end of this section.

In July 1991, informal trading between banks began in Prague, initially in a single bond of the Komercni Banka (ECON [1991]/1). On October 1st of that year the distribution of coupons for the first 'small' privatisation commenced. The second, 'large' privatisation took place between June and December 1992 (FINT[1993]/5). The Prague

Stock exchange (PSE) formally opened on 6th April 1993 before listing arrangements were completed. Dealing desks were provided for up to 32 representatives of the 53 founding registered brokers, with a supporting staff of 30. The French CAC system was supplied with funding from the French government. The operation, although technically well-equipped, thus commenced as an informal unlisted market. The proximate cause of the hasty opening was that a rival market, the screen-based over-the-counter RM trading system was about to start up its own business. Due to legislative and administrative delays, the two unlisted markets began to compete with one another, rather than operating in different spheres. The number of potential investors was large, since by mid-1993 8.5 million Czech and Slovak coupon holders held interests in 1,500 companies (FINT [1993]/4). The activities of the large number of investment funds set up to manage or buy out the holdings of private citizens had also long been cause for concern, both locally and internationally (FINT [1992]/4,5), requiring transparency in dealing and publicly visible methods of price determination as a matter of political as well as business urgency.

10.5.2: Contemporary issues

By the time of further visits in mid-1994 the PSE was divided into a listed and an official unquoted securities market, with the OTC market still served by the RM (now RM-S) system. Prices of over 1,200 companies were listed. The English language Prague Post was reorganising and expanding its financial pages almost weekly (MISC [1994]/1). Five market indexes were provided. The overall presentation of the Prague market in the Czech, German and English language press was unrecognisable from a year before.

A central securities registry, the Centre for Securities was in the course of being established. By end-1994 the details of its operation were available, along with evidence of early problems (FINT [1995]/1). Shareholders' holdings are registered in 'dematerialised' form but a separate registry holds printed share certificates. Share transactions are legally binding only from the time at which the registers are amended. This has led to the practice of dealing at the Centre, rather than on the exchange, at prices that are privately agreed and not disclosed. Amendments to the securities trading legislation are in train to require the quantity and price of these off-exchange dealings to be reported in the interests of greater transparency.

For reasons given at the outset, the validity of the Czech market cannot be doubted. It was held by most interviewees to be the only mechanism that could have created transparency sufficient to maintain the general credibility of a voucher privatisation involving an initial public participation measured in millions. Transparency in this sense is understood to mean merely the existence of a price, awareness that a market exists and that securities can be exchanged or encashed if required. The average private citizen's holding has been widely estimated to be only KC3,000 (about £70) and thus of symbolic or political rather than trading importance to the individual.

The viability of the Czech securities market remains an open question, but one on which an opinion can be offered with some confidence. Unlike Hungary there is no obvious single market to which diversion by drift can take place. The economic dynamism of the Czech Republic seems likely to continue to make the 'waves' on which most market-dependent participants thrive, and, finally there is a healthy balance among the interests involved. Banks appear to dominate, but they are

counterbalanced by the representation of a very wide range of foreign financial institutions. This in turn is balanced among US, British, German, Swiss and Austrian, even Japanese interests, to an extent greater than elsewhere in central and eastern Europe (FINT [1994]/6,7).

Development potential may be held to be large, not least because the growth from trading a single bank bond in 1991 to becoming the largest new stock market in the liberalising countries of central and eastern Europe has been achieved rapidly, without excess in the form of boom and bust. The stability of government policy in the direction of developing a 'standard' western economy (the term is generally attributed to Vaclav Klaus) may be held to be sufficient to offset the political risk associated with long delays in legislating for new circumstances as they arise. The level of organisation in the market, with attendant long term growth of trading volume, may be expected to improve rather than deteriorate therefore.

10.5.3: A note on Bratislava

Three official trading systems exist in Bratislava, the Stock Exchange itself, an options exchange and the RM-S computer trading system intended to cope with trading associated with the large number of small holdings resulting from voucher privatisations carried out along similar lines to those in the Czech Republic. Lack of regulation and associated poor transparency sets a limit to investor confidence; the almost-complete proposed regulatory system was one of many legislative victims of the September 1994 elections which returned the Meciar government to power in a doubtful coalition unlikely to be able to carry through detailed programmes satisfactorily. About 50 stocks are

traded actively, creating sufficient liquidity for a valid market. Trading is largely carried out by the large investment funds which have appeared to 'mop up' private holdings. These funds themselves suffer from liquidity problems, having devoted all of their resources to acquiring privatisation equity, leaving little cash for active trading based on market opportunity. Those that were liquid enough to sustain trading on the Bratislava exchange have been exposed to government interference as a direct result. One large fund (VUB Kupon) was suspended from trading in April 1995. Another has been closed down by the finance ministry. Political opposition to investment funds is understood to be based on the fact that they had begun to enforce management change in the companies they now owned. The managers of these former, or still partly state-owned, enterprises continue to be part of the machinery supporting the Meciar government (FINT [1995]/2).

Despite being able to quote over 500 companies, over 90% of share trading is carried on outside the Bratislava Exchange, leaving daily equity turnover on the exchange only the equivalent of at most \$US150,000. Only 13 companies have a full listing and only four major bond issues had been carried out to end-1994.

Section 10.6: WARSAW

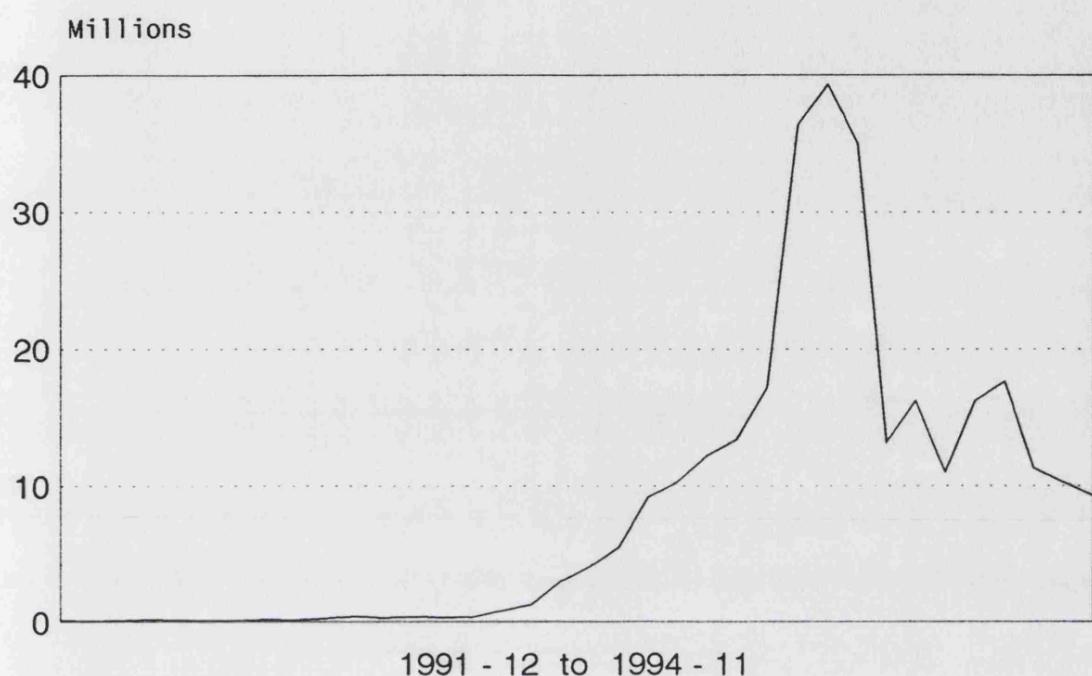
The Warsaw exchange opening in 1991 was marked by the distribution of pairs of red braces to traders. Subsequent development of the exchange has revealed the gesture to be prophetic, its progress having resembled more the tabloid mythology of stock markets than the mundane reality of other centres. This profile is the reason for providing a brief note on the Polish market. Vivid economic growth accompanied by bouts of inflation everywhere creates increasing demand for assets whose values will not erode (van Agtmael [1984]). Real estate is not an easy option while the terms of ownership are unclear and capital flight abroad is difficult in the face of currency restrictions and lack of other transferable assets. To these factors must be added the desire of some owners of Polish commercial assets, acquired under a variety of circumstances from the state, to liquidate them and realise essentially speculative gains. Finally, the absence of established bond markets, which do not possess scope to gyrate in the same way as equity markets and act as an indicator of sensible limits to returns, can allow equity volatility to get out of hand (von Rosen [1991]).

These conditions in Poland, amplified by wide swings in inflation and changes in the level of external debt have led to the trading volume variations shown in Figure 1.

Figure 1. POLAND EQUITY TURNOVER

POLAND EQUITY TURNOVER

Monthly bargains recorded in zlotys



source: Naradovy Bank Polsky

The results were first treated by commentators as evidence of *economic boom (and bust)* but are now more soberly regarded as market events, as they would be in western economies, and as such are of interest for this study.

CONCLUSION

The case of the Warsaw exchange demonstrates in an extreme form the intrinsic flexibility and adaptability of securities markets in the face of turbulence. Markets do not require great resource inputs for their creation, nor for the initial stages of recovery and reform after a disastrous episode. Hence they are able to survive massive change and are, indeed, particularly good at doing so. Smaller, newer markets are more flexible than older, larger ones in that the resources required to make changes are smaller and vested interests are less able to resist the required initiatives.

This general conclusion is echoed for all the markets considered in this chapter. It leads to the corollary that, for larger markets, the real risk to their medium term viability lies in slower speed of response. If a market reacts quickly, whether in terms of trading activity or structural adaptation to any situation, then it will recover. There is no situation short of crippling legislative or other interference that cannot be dealt with, provided that traders still wish to trade and reform is accepted as necessary. If an underlying problem is not dealt with promptly however, then trading volume will decline. With it will decline, first, resources in the form of income, inhibiting action, then the will to reform itself, in face of conflict

and competition for orders in a shrinking market. Finally, the constituency for reform within the ranks of the surviving market participants may well be lost by the disappearance of the market-dependent sector.

Amsterdam and Brussels, the largest markets in this part of the study represent the two contrasting approaches. Amsterdam has been proactive and is maintaining its position. That of Brussels remains doubtful, reforms having been made too slowly, in a piecemeal fashion and without removing the underlying structural problems of a market that can only remain viable by remaining international but persists in retaining a structure tailored to the domestic banking interest and government financing needs.

As for the smaller markets of central Europe, they are able to cope satisfactorily with enormous levels of change because they are small and pragmatically managed and do not possess the inertia of established interest groups able to stand out for a long time against reform. All markets however benefit today from being very well-informed about all aspects of their competitors' experience: as in other spheres of politics, economics and business, much more is now known about what has to be done to stay in the game, allowing less scope for unexposed conservatism and inertia and for institutions to survive at the expense of the processes they exist to facilitate. That theme is further explored in Chapter 11.

PART THREE

CHAPTER 11: RECENT DEVELOPMENTS, SUMMARY AND SYNTHESIS OF CONCLUSIONS

INTRODUCTION

In this chapter we summarise the results of the empirical research described in Part II and derive conclusions therefrom, based on the objectives of the thesis, the hypotheses and definitions of criteria and the review of relevant literature set out in Part I.

The objectives of the research, it will be recalled, were to understand the rationale for the formation, revival and/or continuance of small national and regional securities markets in Europe; to establish criteria for their validity, viability and potential for further development; to identify trading practices and structures most likely to favour stability and growth and, finally, to assess the rôle of securities turnover volume as a factor in determining the success or otherwise of selected markets. All the above are examined primarily over the medium term: the short term is considered to be of less relevance to the life of the institutions concerned and the long term is difficult to define in a world where securities markets may range from permanent structures to ephemeral, dormant or periodically non-existent institutions and processes.

The hypotheses tested have been:

1. that external economic gains accrue to the promotion of viable, valid markets, motivating research and justifying policy attention;
2. that internal gains on the other hand tend to accrue to dominant participants to the detriment of the market as a whole;

3. that reform, particularly the removal of entry barriers, may be held to work against this abuse of market power;
4. that individual acts of reform produce only temporary improvement requiring continuous change as a prerequisite for continued viability;
5. that spatial perceptions, particularly on the part of equity issuers and investors, work in favour of national and regional markets and, finally,
6. that market processes need to be identified as having a separate existence from the institutions that normally embody them, in order to make reform easier to achieve.

To facilitate arrival at conclusions on all these issues, the discussion in Part I passed by way of the choice of appropriate small European markets for study and the information resources and research methodologies to be employed, through a brief survey of recent developments in the structure of world markets, to selection of relevant criteria for examining the chosen geographical grouping in more detail. For the purpose of comparison with the approach taken in this thesis, two classical approaches in the literature, - the international financial institutional approach represented by van Agtmael [1984] and the academic market economics approach of Baumol [1966] - were presented in some detail.

In Chapter 3 the wider theoretical literature on the functioning of capital markets was surveyed. The topics considered of most importance for the present purpose were price discovery, market efficiency and the rôle of information. The determinants of volume were considered as a separate matter in Chapter 4 where, the discussion in the literature being essentially unresolved on the question of whether trading should

or should not take place, a simple model was developed demonstrating the motivation to trade in primary and secondary markets on the part of investing individuals and issuing firms.

Part I concluded with an examination of securities markets considered as economic institutions, initially from the essentially North American viewpoint adopted in most of the theoretical and empirical literature and then specifically to recent experience in the European arena. As in the case of volume determination, it was found necessary to develop fresh models of the phenomena actually observed.

Part II concerned itself with reporting the conduct and results of two independent lines of empirical research. The first, in Chapter 6, examined in detail the evolution of bond trading volume and equity turnover in selected markets over two decades to 1993 and looked for relationships between the data of these markets over time. The second approach, recorded in Chapters 7 to 10, was a questionnaire and interview based institutional study of the same markets, plus others, directed towards understanding the relationships between different groups of market participants and the effect of those relationships on the conduct of the market, on reform processes and on the evolution of trading volume - in short, upon the viability, validity and development potential of each market as a whole over the medium term.

Before proceeding to a synthesis of the results and conclusions derived from the work as a whole, it is appropriate to emphasise the temporal context. The main fieldwork for the institutional study was completed in mid-1992, with subsequent updating visits to financial centres carried out to mid-1995. The principal econometric study was based on data from the period 1971-1993, with certain series reported to later dates. The dates chosen for study of contemporary phenomena

are to some extent arbitrary by definition of 'contemporary', and the time period chosen for the quantitative data cannot allow them to be considered a representative sample of a continuous linear process. The two decades and more of the econometric study cover a period of accelerating trading volume with both a beginning and, apparently, an end. In the absence of forecast indications to the contrary it is possible to assert that both the start and the finish of the era of massive volume growth in what are now called 'cash' (as opposed to derivative) markets are encompassed by the study. Derivative markets themselves and the cash markets of high-growth economies outside Europe may furnish the next wave of large-scale volume growth. There is little evidence that the new markets of liberalised eastern Europe will grow rapidly, although there are, of course, massive surges to be observed from time to time under the influence of speculation in narrow equity markets (as Warsaw) or large-scale privatisations (as Prague).

Market reforms and a variety of trading developments were similarly the understood, if somewhat unstable, background of the first round of formal interviews in each market, conducted during a period of intensive activity in those areas. What was perhaps not fully appreciated at the time by either the present researcher or the market participants, was the extent to which the frequency of reforms and new trading developments would accelerate in the future. In markets such as Copenhagen, where reform had been undertaken, the sense was of assimilating those reforms, perhaps modifying them to deal with perceived problems, and then continuing as before. In markets like Vienna, where reform was overdue, the sense was of a need to enact reform (and then continue as before...). From the perspective of 1995, with accumulating hindsight, it is evident that the pace of

development is still accelerating. Reforms are still treated as single steps in the life of each market, but there is an increasing awareness that these steps will become ever more frequent and may become virtually continuous under competitive and technological pressure.

Since the research began, three other factors have assumed greater importance. They are the growing tendency of governments to run larger budget deficits requiring to be efficiently funded; the related need to fund pension provision rather than meeting increasing national pension burdens out of current revenue and, finally, the enormous development of derivatives markets and the risk to stability in banking and financial systems associated with their operations.

New research would be required to assess the future position of small European securities markets as these trends develop, perhaps using the present work as the starting point and benchmark. It has been possible to give some indication of the scale and volume of events here by presenting evidence of recent reports and announcements affecting European markets. Table 1 furnishes a chronology of reported developments since the beginning of 1992. Of particular interest is the stream of announcements from German regional bourses (not all reported here) confirming their intention to resist absorption by Frankfurt, and strongly supporting the hypothesis of a spatial horizon in the investment community. The only conclusion that could have been supported by the original interviews in Bremen, Hamburg and elsewhere would have been that the sentiments expressed were defiance, shortly to give way to resignation in the face of pressure to centralise the German market. Although that pressure continues, the outcome is much less clear and the German regional exchanges remain very much in business. They retain many attributes of the smaller national

exchanges examined in the rest of the thesis and their progress therefore continues to be of interest. A string of new bourse openings in smaller countries and the large numbers of reforms to trading systems, market structures, regulation and settlement (by no means all reported here) form the main burden of the table.

With this essential context in mind we then turn to the results and conclusions of the research and literature review, beginning with the latter.

Table 1. CHRONOLOGY OF RECENT EVENTS

1992	Valletta	Bourse opened [WELT/1994/1]
	Nicosia	Bourse opened [FINT/1992/1]
	Tashkent	Bourse opened [MISC/1993/1]
1993		
Jan	Frankfurt	German bourses unified into Deutsche Börse AG [FINT/1994/2]
Jun	Bratislava	Bourse opened [MISC/1993/3]
Sept	Budapest	First major insider trading prosecution [MISC/1993/2]
	Vilnius	Bourse opened, Paris-model trading system [MISC/1993/1, FINT/1993/1]
Dec	Istanbul	Major trading, settlement and custody reforms introduced [FINT/1994/8]
1994		
Apr	Milan	Trading system reform and T+5 settlement introduced [FINT/1994/5]
Jun	Amsterdam	Major Bourse reform [FINT/1994/1]
	Lisbon	Major bourse reform [FINT/1994/6]
Aug	Frankfurt	Insider trading regulation introduced in Germany [FINT/1994/3]
Nov	Milan	First insider trading prosecution in Italy [FINT/1994/4]
Dec	Bremen	Listing conditions and trading reforms announced [WELT/1994/2,3]
Dec	Stuttgart	First French stock listed on a German regional [WELT/1994/4]
1995		
Jan-	Bratislava	Listing, trading and participation 'reforms' introduced by Meciar government to restrict privatisation [FINT 1995/3]
Apr		
Feb	Berlin	Trading reforms announced [WELT/1995/1]
Feb	Stuttgart	Trading reforms announced [WELT/1995/2]
Mar	Moscow	Regulatory Commission announced to register and license stock exchanges in Russian Federation [MISC/1995/1]
Jun	Frankfurt	Trading system reforms announced [FINT/1995/1]
Jun	Moldova	Bourse opened [FINT/1995/2]
	Zurich	Swiss exchanges introduced electronic trading [FINT/1994/7]
Jul	Riga	Bourse opened [FINT/1995/8]
Nov	Bucharest	Bourse opened [FINT/1995/9]

Section 11.1 Conclusions from Part I

While trading volume may be held to determine the medium term prospects of securities markets, it was pointed out in Chapter 2 that the causality is reversed in the short term: volume is generated by the success of the market in offering opportunities to investors and traders to detect and pursue prospective gains. This consideration motivated a study of the literature of price discovery, returns generation, securities markets' relationship to the real economy and market microstructure, in order to find out to what extent small European markets examined do, in fact, reflect the underlying economy of their country and generate patterns of returns that are consistent with those obtainable in larger markets. The conclusion is that, as elsewhere, the relationship with the underlying economy is somewhat loose. Market cycles are not synchronous with economic cycles but a general relationship, whereby securities markets lead real markets by up to half-a-cycle, may be discerned wherever the economy is large enough and stable enough to generate definable cycles. As regards returns generation the Friedmannesque hypothesis - 'there is no such thing as a free lunch' - is strongly supported. In other words, the risk-return relationship is generally maintained across all markets, with local differences attributable to poor information or communications quickly traded out, once identified. The fact that comprehensive market information, rapidly communicated, is now the norm - anything else now being qualified as 'poor' - is itself a commentary on the advance of technology and the degree of organisation of the securities industry worldwide.

The liberalising (in journalistic parlance 'emerging') economies, among which only a restricted number in Europe have been studied for

this research, represent a large, anomalous class where market structures and the availability of information can still be classed as 'poor' by the new world standard. Market structures are poor because equity markets are often narrow, unsupported by large, liquid, bond markets but influenced by very large scale political, economic and market factors, notably privatisation, which overshadow their often modest and embryonic institutions. There is, on the other hand, no reason to doubt that these markets are anomalous in the sense that the same forces are working upon them as operate within all established markets large and small, as discussed in Chapters 2 to 5. They may, in general, be expected to approach US and western European norms in due course.

A caveat must of course be entered for retrograde cases. Recent developments in Slovakia for example (see Table 1.) represent a case of 'reform' moving in the wrong direction under political influence. Far more encouraging is the evidence of a World Bank study published since the present research was completed. Annual economic growth rates over 18 years in 42 countries were, reported as on average 1.6% greater in those countries classified as 'liquid' by virtue of possessing reasonably accessible stock markets than in those not so endowed [WELT 1995/3].

The price-volume relationship and the determinants of volume in the medium term were examined in Chapter 4 and a somewhat different conclusion reached from that noted in parts of the literature. In general, previous authors have noted the dynamic response relationship of price to volume and vice versa and attributed the overall behaviour of the system to an attempt to extract returns from information about real events, the order flow, the behaviour of other traders and so on. Since the models used to inform the debate are largely constructed to

be solved in equilibrium, the question arises as to whether any trading at all would take place in equilibrium. As every trader knows, equilibrium is never arrived at, but this is the result of untidiness in the real world and not a sufficient answer for theoretical purposes. In this study we have substituted a variant of a model in which a single agent, by virtue of progressing through a human life cycle and possessing different wealth and preferences at each stage, cannot come to equilibrium. This is sufficient to generate trading in an event-free world. The 'waves' that generate trading in the real world, particularly in large bond markets, are created by a not-dissimilar process, although nominally event-driven. The cash-flow situation and prospects of large financial institutions, for instance, are constantly altering, not least because of demographic change, which in turn represents the aggregate of all individual life-cycle stages. Their response is to change the liquidity profile and risk structure of their portfolios to match, by extensive trading.

Finally in Part I, the structure of the securities industry and investor behaviour was examined against the background of evidence from European securities markets. The conclusions reached may be summarised as indicating that all markets yield broadly comparable returns and behave in a similar manner in the very short run, given their varying degrees of informational efficiency. In the medium term their status, reputation and specialisms operate on the levels of trading volume achieved and determine the degree of use made of them by investors and traders. Status in particular is determined by the balance struck between the lightness and the effectiveness of regulation; by the existence of local, attractive instruments (German Pfandbriefe, Danish bullet bonds, British equities); by tradition,

including journalistic tradition, and by indirect trading links between institutions in different markets. Direct links remain few but are multiplying at the present time. Stockholm for example is the only market in Europe to allow foreign institutions actually to become domestic exchange members and UBS is the only institution to take advantage of the fact: Austria only recently (1995) allowed foreign banks to bid at auction for government bond issues. The most recent phenomenon observed is a wave of agreements between derivatives exchanges which have not formed part of the present research, but, as indicated earlier, may be expected to take up the running in large-scale development activity.

As with trading volume it was found necessary to supplement the models to be found in the formal literature with forms consistent with the findings from the empirical research and with market activity as described in the informal literature and press reports. It was concluded that the minimal broking firm size had increased from one to about six members, largely (a) because of the need for technology used to trade, to research and to process information in support of trading activity and (b) to be represented in more than one place at the same time - often simultaneously in two or more parts of a trading floor as well as at office quotation and trading screens. Senior partners in broking firms seemed to spend a great deal of time on business reorganisation and development connected with reform and extra competition, rather than on transacting routine broking business as formerly. The process of change and concomitant workload is by no means exhausted. For example, the Canadian CATS trading system found in many European exchanges at the time of the empirical research and then mini-computer based, is shortly to be released in a PC version, allowing dealers to conduct screen-based business anywhere, including, ironically, the exchange floor.

The formal literature of market microstructure contains many studies comparing market forms – continuous versus intermittent auction, dealer versus marketmaker and so on – without reaching a definite conclusion on which is to be preferred outside of a prior, closely restricted theoretical context. It has been shown that nearly all market forms are equivalent under certain assumptions (the exception being marketmaking on the London model). The informal literature cited in this study, anecdotal evidence in the form of responses to questions outside the formal questionnaire reported in Chapters 7 to 10 in the empirical research itself, all support the same conclusion in a looser form, namely that, in small markets, the market form does not matter, provided that it offers an efficient, competitive platform for the activity of that marketplace (Roell, 1991). Pagano and Roell (1990) give a comprehensive analysis of the theoretical issues underpinning this view, supported by empirical evidence from European exchanges and a review of separate work by Roell (1986, 1989). Formal discussion and evidence of the influence of variation in market structure are to be found in Section 5.2.3. In larger markets the issue is clouded by such considerations as block trading, capital adequacy and continuous liquidity which are less important in the centres studied here, as evidenced by the tendency to make special arrangements for them outside the main market; by splitting the market rather than reforming the main market (see, for example, Copenhagen Stock Exchange Annual Report 1993, p.7, among others, as well as Pagano and Roell (1990) p.49). Even in larger centres, the form of market adopted for small firm equity is widely disputed. The contemporary debate over AIM and Tradepoint in London, the Paris 'new market' and the form that the new Easdaq and other proposed markets might take, provides further evidence of diversity of views [FINT 1995/4, 5, 6, 7].

By a reading of contemporary literature and anecdotal evidence from informal contacts, later confirmed by the empirical research, two additional factors were found to operate in European markets. First, there exists a process of new firm creation out of, and extinction and absorption by, larger institutions. This process is the principal means of maintaining a varied fauna of market organisms as markets contract and expand in the longer term. Examples were cited, and continue to emerge, as evidence of 'calving' (by analogy with the glacial process of the same name) in a warm market climate. A winter snow of small firms obliged to integrate with larger, longer-lived institutions constitutes the other side of the same coin. It was observed that the risk to small firms appeared not to be noticed by them however, and a model, based on the starving population paradigm, explaining apparently insouciant behaviour in the face of continued contraction of the broking industry, was developed and tested by simulation.

The foregoing conclusions developed in Part I and set out in more detail at the end of the relevant chapters, were used to analyse the evidence obtained from the empirical described in Part II, and whose results are next discussed.

In closing on Part I, it should be noted that there was a strong connection between the evidence of contemporary reporting in the press and specialist market literature and the later testimony of individual direct interviews conducted as part of the empirical research. The models developed ab initio or extended from the versions in the formal literature, were originally chosen as a response to a reading of the informal literature, but satisfactorily withstood exposure to direct use within the empirical research. In other words respondents recognised the models and could relate them to their own market. This

experience supports the further conclusion that, by and large, the professional press and practitioner literature of securities markets is well-informed and a useful source of evidence about the real structure and behaviour of markets: it supports and is supported by direct testimony. Due care was nevertheless taken, using practical experience and requests for evidence, to filter for 'market myths' propagated by the same means. The large category of informal literature designed to entertain, interest and motivate investors, not always easy to separate from more reliable material, was carefully filtered out. There was no evidence from reading or research that markets ever 'strode' to reach new highs or 'responded' to general situations in the anthropomorphic manner suggested by some commentators in every language and every centre visited. The popular working rule '*post hoc, ergo propter hoc*' and its associated functional form, belief in the validity of technical analysis ('chartism'), was avoided wherever possible in the search for explanations of market behaviour.

Section 11.2 Conclusions from Part II - Econometrics

The econometric research described in Chapter 6 was designed, first, to assess the validity and information content of price, volume and associated economic data from each of the three national markets studied (Denmark, Austria, Germany); second, to test for seasonality, stationarity and the existence of correlations, and, third, to attempt to construct a satisfactory model of the data generating process for equity trading volume.

The data were found to be stationary in first differences of logarithms or levels and a number of weak correlations identified.

Very weak seasonality was also identified in correlograms but was not sufficient to fail tests or, as a matter of judgement, to require filtering by dummies. In other words, the short-run (monthly) dynamics of the models was not considered to be affected by weak annual patterns: this would not have been the case if the study was primarily concerned with returns generation, when seasonal patterns would, at some threshold, offer the possibility of excess returns.

Error correction models of the Danish and Austrian markets were developed, with closely related parameters and coefficients. The German market also showed strongly similar features, leading to the conclusion that all three markets behaved in a similar manner as regards the response of bond trading volume and equity turnover to stimuli. The final model treated equity turnover as the dependent variable, strongly related to bond trading volume. This led to the conclusion that all three markets were essentially driven by bond trading considerations, with the equity market accommodating the resultant need for overall portfolio balancing.

Section 11.3 Conclusions from Part II – Survey and Final Assessment

In this section we attempt to draw together the threads of the entire study and consider what conclusions may be drawn by considering the results from all markets under a variety of topic headings, each related to the appropriate hypotheses set out in Chapter 1.

11.3.1. Trade Volume and Relative Strengths of Market Participants

The importance of trading volume for the development of small markets is the focus of this section, relating to the first hypothesis of this study, that volume is the prime determinant of market health, the second, that channelling market share to certain participants is deleterious to market health and the fourth, that continuity of reform is essential for longer-term progress. There are three aspects to the case:

- (a) the distribution of trade among groups of market participants is important for maintaining a balance of power among them and, ultimately, for the survival of each, while,
- (b) exposure of orders to the market promotes greater informational efficiency, and hence more trading opportunities.
- (c) the ability of the market authorities to insist on business being put through the market increases their financial and managerial strength to reform and develop the market.

The Danish market offers the closest approach to an ideal model under all three headings. Increases in trading attendant on reform improved the visibility of market opportunities and generated further business. This conclusion is strongly confirmed by the econometric results for

both Copenhagen and Vienna: in the former case the improvement is continuous, in the latter spasmodic, but visible. When added to the Lisbon case, where large 'waves' of activity followed the joint occurrence of reform and large privatisation issues, there would appear to be considerable support for the view that continuity of reform is the key to development. Further reform in Denmark did not however eliminate the power of the market-independent participants to capture the order flow in bonds, as the survey results show. There is a remarkable disparity of views between market-independent and market-dependent participants as regards price formation, trading volume and spreads and commissions (Introduction to Part II, Table 2, Section 2). Even in Denmark it has been possible to create, at least partially, a secondary market with its own structure of prices, spreads and commission levels. In all the secondary centres studied, with the exception of Amsterdam and the German regionals (where only the view of the market authorities is represented) the pattern of response is the same although insufficient numbers prevent a tabular analysis.

In Vienna none of the three aspects of the case is favourable. The market is effectively in the hands of the market-independent sector; their ability to trade extensively outside the market vitiates the value of trading information and the market authorities are neither independent nor have a strong pecuniary interest in order flow through the market. In neither Copenhagen nor Vienna is equity turnover sufficiently important to count in the overall trading volume, or to sway the balance of power away from the market independent group towards the smaller brokers who have most to offer clients in this area. Lisbon offers a similar scenario, but with an important difference. Bond trading still predominates and the banks have again penetrated the ranks of the broking community after seat

redistributions in 1990, but the process of economic transformation, including privatisation and foreign investment interest, has created more equity trading and related services than in the two more mature centres. The ratio of bond to equity trading is only 10:1 in Lisbon as opposed to 60:1 in Copenhagen and 12:1 (reported) in Vienna, as shown in Table 1. of the Introduction to Part II. The Lisbon case also translates with ease to Budapest and Prague, where interest in the markets is maintained by equity and equity-related dealing, the bond market has yet to develop, and openings exist for market-dependent participants. In all cases however, under-developed equity markets result in high levels of short and long term volume volatility.

Survey respondents in all countries looked to the future restructuring of pension funding arrangements to remedy the situation by creating greater interest in efficient portfolios with a substantial equity weighting. This is reflected in the large shift of view recorded in survey responses (Introduction to Part II, Table 2, Section 11) as between 'past and present' and 'future'. No such shift was expected in small saver participation (Table 2, Section 8).

It is thus a conclusion of this study, on the evidence of all the countries surveyed, that maintaining high trading volume is the best means to promote a balanced, healthy diversity of participants. Ensuring that all trades are exposed to the market, or, at the very least (block trades excluded) reported in full and immediately, is the best way of promoting higher volume and offering opportunities to all classes of trader.

11.3.2. Technology, Internationalisation and 'Process'

In this section we discuss the above elements in the context of ease of entry as a precondition for market health, as set out in the third hypothesis of the study; as it affects the spatial perception, or sense of place, identified in the fifth hypothesis; and as regards processes replacing institutions as the vehicle for market activity, the subject of the sixth hypothesis. Transformation was strongly under way in all centres, at the time of the original fieldwork and continues apace driven mainly by technological advance and increasing international business. Spatial perceptions are essentially a more conservative force, but continue to operate (ECON [1996/1]).

Technology has however demolished the claim that a 'presence' bourse is essential for the development of new exchanges (von Rosen, 1990) and trading floors continue to shrink and/or disappear in all European centres. This is an appropriate starting point for the discussion.

As is often the case with the introduction of new technology, the old and the new persist side-by-side. In the centres studied this has been more of a hindrance and a barrier to entry for small firms than the introduction of technology per se. The need for a firm size minimum of approximately six persons in all centres has already been discussed in Section 5.5.2. In those centres where presence was required (Vienna, Amsterdam, Lisbon, Brussels (very limited time) and the German regionals) the active principals' time tended to be taken up by floor dealing. Elsewhere (Copenhagen, Prague (still evolving) and Budapest) principals could deal, provide client services and supervise administration and back-office operations, all at the same time. This constitutes a considerable advantage of technology, allowing all functions to be performed from one desk, which far outweighs its cost.

It was further seen in London (Note in Section 9.7) that world-market levels of information efficiency, probity and security can also be achieved in a small office by on-screen information services, data and voice recording and direct communication to arrange banking facilities, settlement and custody. All of this goes a long way to explain the disappearance of trading floors and the rapid adoption of complex technology observed in all centres, even where severe currency and other financial restrictions obtained (since completion of research these are much eased in the Czech Republic but remain a problem in Hungary and, to some extent, in Portugal). The migration of entire trading systems such as CATS to smaller platforms, even PCs encourages the uptake of technology. Promotion by the Paris Bourse of its CAC system among transition countries, accompanied by generous financial and technical aid, has been a further force for the widespread immediate adoption of electronic trading, with no presence requirement from the outset, in these countries.

Technology rather obviously promotes processes above institutions, as exemplified by frequent, detailed, undifferentiated references to the technology and trading systems to be found in the annual reports and descriptive documentation supplied by all centres and reported in some detail in Chapters 7 - 10. Small markets are now obliged to organise their trading arrangements around the capabilities of the software they have purchased. Hardware also remains a problem, despite the move to personal computers and workstations referred to above. This is because, increasingly, market systems are expected to run on fault-tolerant hardware, which recovers, restores damaged data files and continues to function automatically, following power failures and other interruptions. Provided that transactions are securely recorded, this is not a problem traders need cater for, but is essential for the

central parts of the trading system operated by the market authorities. For the authorities in turn it is not a question of cost; at the level of the whole market the cost of proprietary systems is modest; but of loss of freedom to adopt other than standard systems. The alternative, tailor-made systems are too costly for small markets to contemplate and fraught with risk. The calamitous experience of the London market in its attempts to create a system to match its institutions, rather than the other way round, is notorious.

In a similar vein, although markets may be segregated for the purposes of indicating the quality of the securities offered in each of them, it is increasingly illogical to restrict participation in those markets to certain groups of dealers or brokers. Once trading is on-screen, almost automatically, the number of those able to see a screen and hence observe the market continuously, whether dealing or not, increases without limit. This removes any ground for placing the market in the hands of a small group of cognoscenti, who have every motivation to restrict entry to their circle. Apart from issues of qualification, capital adequacy and so on, there is no reason why markets should not be open to all. This is already the case in Copenhagen, Lisbon, Brussels, Budapest and Prague, but not in Vienna and the German exchanges where the *Freimakler* are restricted to one market. Amsterdam is a somewhat special case because of its international vocation, needing (post-reform) to offer the services of well-capitalised specialists for institutional investors. The downside risk of easier market access is however that the market-independent institutions can move in. The one virtue of the *Freimakler* was, as the name suggests, their freedom or independence from the larger institutions. On the other hand this freedom has long been eroded. At the time of the Bremen fieldwork visit a significant part of the

discussion concerned the recent (mid-1992) takeover of a major Munich broker by S. G Warbourg: this was regarded, vainly as it turned out, as a sad, one-off occurrence. In the majority of markets however, as stated, the problem does not arise and falls within the general rubric of maintaining a healthy balance of participants across the whole market. Lisbon has to be mentioned as a special case where the supply of seats constitutes a severe barrier to entry of a different kind: the problem is discussed in Section 8.7. It is remarkable that the usual suspect for criticism as regards difficulty of entry, capital adequacy requirements, was not cited as important by any respondent (Table 2., Section 7). The recorded response in Lisbon relates to seat price, not capital. In detailed discussion with market-dependent participants it turned out that they were either engaged exclusively in commission transactions or covered trades, or had banking affiliations that qualified under capital adequacy rules, or were registered as banks exclusively for the purpose of their securities trading. In every centre except Vienna, capital adequacy rules were currently under discussion but respondents expected no future difficulty. This is to be compared with insider trading regulation where the rules were regarded as onerous whenever the question was raised. Responses are tabulated under 'other restrictions' in Table 2, Section 7, where insider trading was the prime issue raised. Overall the prime barrier to entry was regarded as inability to access the order flow (meaning bonds), except Lisbon, as already discussed.

We turn now to internationalisation, but apply to it the specific appellation of 'other countries', rather than the world as a whole. The tabular summary of survey results (Introduction to Part II, Table 2., Section 4.) clearly shows that only the banks insisted on a 'world view'. The responses of interviewees to a standard question are not

regarded as especially significant evidence in this regard and was directly contradicted by their failure to give examples, or even mention, more than national or (supranational) regional issues, apart from such obvious matters as trade diversion, usually to London.

Region and country were cited as their main interest much more frequently by the market-dependent participants, both as shown in Section 4 of the table, and in the smaller centres not summarised in this way. In Copenhagen there was frequent reference to the rest of Scandinavia, plus London, but nowhere else. In Austria 'the rest of the world' was used as a sounding board to amplify the fact that Vienna was different, rather than discussed as a real place, in a manner reminiscent of some British discussion of Europe. Even imminent EU entry and the then-explosive developments in eastern Europe were dismissed as irrelevant to the Vienna market. To some extent this has in fact remained the case, although new research would be required to establish the contemporary facts. Lisbon alone showed real interest and concern for its place in the world and this has since been evidenced by the 'global' placement of its privatisation issues, reorganisation of the Lisbon and Oporto exchanges to reflect international investor requirements and continuing reform. Lisbon is also unique in having a weak regional identity: this is understandable, since its one neighbour, Spain, is regarded as a rival and a threat more than a partner. Prague and Budapest have not moved beyond a dichotomous psychology induced by needing and promoting, but also resenting, foreign investment interest. It is not yet possible to discuss the long term position. Brussels and Amsterdam are both established international exchanges with different perspectives on their national rôle. In Belgium the national rôle is to finance the public deficit, in doing so creating a large, internationally

attractive bond market. The large *holdings* (internationally operating companies) are either firmly held in portfolios or also traded internationally. In The Netherlands the *raison d'être* for an international exchange is the need to finance and provide a secondary market for the Dutch multinational companies, the rest of the domestic economy being relatively insignificant in stock market terms.

All of these considerations militate against a truly international perspective on the part of the markets studied and point instead to a strong sense of place and to local (i.e. national) perspectives and motivations in almost every area. The celebrated 'globalisation' of securities markets has, as yet, failed to materialise, except as regards the trading out of obvious differences in returns and the practice of Markowitz diversification among international fund managers. Recent surveys, postdating this research and the analysis based on it, indicate that this remains true, but commentators continue to forecast that "investors should soon start gobbling up foreign shares in record numbers" (ECON [1996/1]). The article just cited, by the way, takes an average annual return for the period 1970-95 to make its point that returns could be improved by further diversification. The econometric and other evidence of this study shows that two completely different epochs are thereby forcibly entrained, possibly three if one includes the emergence of eastern Europe, rendering the conclusion less than useful.

The evidence of the study, however diffuse, is that spatial perspectives remain important. New national securities markets continue to open at a rate of one every three months in Europe and the territories of the former Soviet Union alone. With the exception of increasing co-operation among futures and options markets not covered

by this study, even the most limited regional international co-operation in Europe is hard to see, let alone the internationalisation of trading. A new market, EASDAQ, is of course to open in September 1996, but the fact of its opening is not evidence of its likely success. The evidence required would be the rapid uptake of equity trading, extending to the small and medium-sized companies that constitute the major part of the private-sector economic activity of most small countries in Europe. Bond trading is of course effectively international by virtue of the structure of interest rates and currency parities: differences are widely observed to be traded out by covered interest arbitrage (Shapiro, 1992). Larger multinational enterprises are increasingly cross-listed on the major and some minor exchanges, but there is as yet no evidence that this has produced any marked effect on their general performance, or indeed their visibility. Rather the reverse may be true: those exchanges already deemed to be likely to generate investor interest, both local and international, would seem to be offer themselves as the target for listing applications, rather than those which 'might' produce results.

An end to geography through global financial integration has been posited by O'Brien (1991). Like Lord Kelvin before him, announcing the imminent end of the study of physics just before the quantum revolution, O'Brien was writing at the onset of a vigorous outbreak of 'geography' which, it was evident as early as 1989, required close examination and reflection upon its possible consequences. He delivers his conclusions however, with the opening remark "This paper has sped across many subjects and has raised many issues without even attempting the further analytical task of gauging the extent of change". To be fair, the burden of his argument is concerned with the world financial system and the rôle of freer (sic) capital flows in

allowing change to be managed, rather than the development of smaller national securities markets. This broader topic has been more fully discussed in Chapter 2, Section 2.1. As stated elsewhere in Chapter 1, variety and richness sustained by geography, in this case the spatial distribution of different, historically evolved economic and commercial cultures, has inspired the present research. Predicting outcomes that differ radically from established patterns seems to remain a risky activity. A personal observation based on this and considerable research in the transition economies beginning in 1990 and continuing, is that, if anything, patterns of business behaviour developed during the 19th century, modified but as often amplified as attenuated by large political changes during the inter-war period, are re-establishing themselves in central and eastern Europe. For a full discussion of this thesis with supporting evidence and empirical research see Webb (1996). This work echoes O'Brien in one respect: "Long-standing relationships between finance and commerce cannot be changed quickly without radically upsetting the macro and the micro economy" (O'Brien, 1991, p. 115). Elsewhere: "Eventually, local exchanges will find that their ability to control trading in the more local companies will prevail, whereas the stocks of international companies will be traded more widely" (op. cit. p. 103). This is a continuation, not the end, of geography. On the other hand one simply cannot find evidence for the assertion which follows: "Undermining the efforts of any exchange to preserve its historic position is the fact that its members, ultimately, will migrate to the most profitable market, with few geographical loyalties." (op. cit. p.103). This may well be true of some investors, but not of stock exchange members and even that process, trade diversion, as the case of Amsterdam shows, can be reversed by reform. Amsterdam has regained popularity and, in 1996 (to April), with a 14% rise, has posted the largest price gains

of any European bourse (WELT [1996/2]). That is actually evidence for resumed geographical loyalty, since it has never been suggested that Amsterdam is clearly more attractive than London in its own right. It is, finally, rare, as noted elsewhere, for broking firms to be members of more than one exchange, still less to migrate from one to another.

It is also a conclusion of this study that there is a certain *pre-existing* lack of geography, and indeed of history after their initial formation, among securities markets. Their vocation was mostly established in the 17th century as a result of three phenomena: (a) the beginning of massive world trade in the modern sense, requiring cargos to be financed and traded, (b) the invention of the joint-stock company and (c) technological advance and scale increases in the conduct of warfare and empire building, requiring increasingly large amounts of finance to be raised. The basis was reinforced by the industrial revolution, notably in financing railway development, but eroded by the frequency of episodes of scandal, collapse and dormancy. Historical developments have been traced briefly in this study country-by-country. They are not a superfluous element of the presentation and show clearly the origins of each exchange in one or more of the above factors and, in particular, a strong tendency for the original flavour imparted by those origins, to persist unchanged. The timeless logic of securities trading itself, the attitudes of market participants and the central function of information (see Neal, 1990 for an exposition of these topics in the context of the Amsterdam market over a three-hundred year period) make the examination of every market a curiously *déjà-vu* experience for the observer: one has, in the end to restrain the urge to write down the answer to a question before it has been delivered. These similarities have been noted

extensively in Chapters 7 - 10 and refer not to a real absence, or end, of geography, but of universality in the subject matter. This universality is not that of the investment literature, but that of awkward mixtures of large and small traders in often extremely imperfect markets where definitions of immediacy and liquidity developed from NYSE data apply in only the most rudimentary fashion, if at all. Financial markets in small countries are, it may be asserted, more the product of their surrounding economic environment than a generator of it, certainly in the eyes of their participants. It is here that geography and recent history make their mark. Poland and the Czech Republic are coping with privatisation and need equity markets for this purpose while lacking the bond markets that lend them stability. Romania, Bulgaria and Slovenia, to name only those familiar on the ground to the present researcher, but not part of this study, are in the same position and variously preparing or scrambling to get started. Slovenia has run a 'toy' exchange in Ljubljana for some years, more or less purely to train personnel and acquire experience, while Romania is hastily trying to put a market in place before privatisation overtakes it. Slovakia is backtracking and Hungary, despite efforts to create a fully fledged institution in the Budapest Stock Exchange, still cannot generate volume due to its external borrowing versus foreign direct investment conundrum, coupled with high welfare spending, high inflation and negative real interest rates. These are all, in the modern, comprehensive sense of the term 'geographical' considerations. Convergence may eventually remove some of them, but it is likely to take many years. Only then can 'sense of place' or national perspective be isolated for examination as a factor on its own. In the established markets there is an equal predominance of national and regional considerations in any discussion of market matters that leaves little doubt about the spatial perspectives of

participants. Indeed, dare one say, an equally spatially-biassed perspective is to be observed in the English-speaking world. Reference has already been made in Section 5.4.1 to American authors citing non-American practice (non-exclusion of banks from securities trading) as 'peculiar' when in fact it applies commonly in Europe and most of the rest of the world. The British financial press commonly lumps together 'the continental bourses' as one. And adequately functional national markets are sometimes referred to as 'under-developed' while doing a far better job as secondary markets for small and medium-sized enterprise than London. It is a fact of geography that America is large but only one of history that London is an international centre. The former will not change but the latter may well do so: geographically and in some other respects, London lies on the periphery of Europe. As with humans, it is the fate of those who become part of history, to end up becoming merely part of geography.

11.3.3. The rôle of banking in small national securities markets

At the time of the research fieldwork, the banks which formed the backbone of the market-independent sector sample were a mixture of credit and universal banking institutions, the latter in the German *Hausbank* tradition rather than the more recent multi-purpose financial institutions ascribed a universal banking rôle in the English speaking world. In Denmark, Portugal and Belgium credit banking appeared to predominate, in Austria, naturally, German-style universal banking. In the Czech Republic and Hungary state control was too recent or still present, allowing no judgement to be made. There was no detectable difference between the two groupings among responses given at interview, even in Germany. The distinction has, accordingly, not been

pursued in great detail. In all centres it was considered that small and medium sized firms were under-capitalised (this expression, *Eigenkapitalmangel*, being preferred to the usual 'overgeared' or its equivalent). The question has been discussed in more detail for each market in Chapters 7 - 10. There is evidence from elsewhere, outside this study, that universal banking does not automatically lead to restricted development of securities markets (Lewis, 1996), citing the case of Switzerland. The converse is claimed here, namely that a credit banking environment does not necessarily lead to more rapid development of small securities markets, as confirmed by the non-committal or negative responses to section 9 of the questionnaire in Table 2. The exception is Vienna where, as has been remarked in a different context "They would say that, wouldn't they". For future reference, developments since the conclusion of this research are worth noting. The main Danish banks are reportedly moving rapidly in the direction of universal banking with a new service orientation and financial offerings (FINT [1996/1]), while, in the Czech Republic, the banks are also moving in the direction of the German model, much to the disgust of the major US institutions who have expended much effort to impose their own philosophy (FINT [1996/2]). We have already reported the absorption of smaller banks by larger ones in Hungary (Section 10.3) but stressed the significance of US influence. That situation has now been overtaken by the very recent 'panic' privatisation and sell-off of the Hungarian banks to all comers, including, it is reported, Russian interests (MISC [1996/1]). In the spirit of the discussion in Section 11.3.2, the immediate facts merely confuse the issue and one must rely upon a model of likely future development for guidance on the outturn. On the basis of other research in the region, cited above, and frequent visits to Budapest

and other centres, the author prefers to forecast eventual reversion to the German and Austrian-centred central European universal banking tradition for all the centres discussed except Lisbon, albeit with considerable modification of that tradition and some sort of convergence with US and British practice. The course of this evolution lies outside the present study. In Portugal, the traditional hegemony of the banking families expropriated in 1974 seems at least arguably likely to be re-established, but the situation is unclear at present.

Banking business in the countries studied does have a great deal to do with the predominance of bond markets. For example, in April 1996 alone, three Danish banks announced that the main component of their increased profit in 1995 has been derived from securities trading (FINT [1996/4,5,6]). Markets studies exhibited differing degrees of bond predominance, as the following summary table 2 shows (detailed figures are given in the Introduction to Part II, Table 1):

Table 2.

MARKET	BOND MARKET SIZE RELATIVE TO EQUITY	BOND MARKET PREDOMINANCE
Amsterdam	Large	Weak
Bratislava	Small	Strong
Brussels	Large	Strong
Budapest	Small	Strong
Copenhagen	Large	Strong
Lisbon	Large	Strong
Prague	Small	Weak
Vienna	Large	Strong

source: own interview and econometric data, central bank reports

In those markets where bond dominance is strong, banks are the dominant participants and brokers are relatively weak. It was observed that whenever bond dominance was temporarily reduced by increased enthusiasm for equity, numbers of market-dependent broking firms

increased, only to reduce again when bonds again predominated. See for example Chapter 7, Figure 1. The available statistics do not reveal this trend clearly, since although the process of broking firm formation is clearly visible, reabsorption by larger institutions is not. The cases of Copenhagen and Lisbon were examined in detail on the basis of information volunteered by interviewees: in other cases the situation was either not clear cut or not easy to demonstrate. In Brussels, for example, it is well-known, but not well-documented, that many brokers operate exclusively for particular banks and that their successor-firms have continued the tradition even after many amalgamations and disappearances from among the original population of one-man broking firms. Evidence of considerable tension between market-dependent and market-independent participants and the influence of this conflict on reform, hence on the position and prospects of each market in the medium term was one of the main results of the institutional study. Where the problem was serious, as in Vienna and, potentially, in Lisbon, it was concluded that the viability and validity of the markets were capable of being fatally undermined and that their development potential would remain restricted. At the time of the original research it appeared that recognition or otherwise of the existence of the problem would be the main determinant of the outcome. Since 1992 however the intensification of competition between exchanges and the large number of reforms and structural changes, evidenced in part by Table 1, has given the entire subject of competitive reform a very high public profile. That has in turn resulted in greater willingness to admit and debate shortcomings in public, with resulting benefits for easing the process of reform. The public prints give no special advantage to larger organisations, especially if they are fewer in number and less inclined to be vociferous than smaller fry. Indeed if, like the German and Austrian

banks (among others) at the present time, they are subject to a steady stream of adverse publicity for their general trading policies and practices, there may be a general presumption of resistance to reform in order to exploit securities market dominance.

We conclude therefore with directions of debate rather than final rest positions with regard to the two main strands of this enquiry. With regard to the development of trading volume and its implications for sustained viability of smaller markets, it remains to be seen whether the main era of secular expansion is over, to be replaced with growth in derivative markets or in cash markets outside Europe. Small markets will, of course, continue to open, but maintained high rates of growth are more questionable. With regard to institutional development it is already clear that single-step, large-scale reform, whether actual, in dispute or in prospect is no longer regarded as the end of the matter in most centres. The reform process has become a question of continuously refining the 'product features' of competing securities markets, observing the results and trying again. A future research project in this area would therefore more closely resemble the study of an industry and its products, with the success or otherwise of member firms as one of the outcomes. The equivalents of domestic and foreign competition as well as mergers and acquisitions are in many cases possible. Germany offers the spectacle of competing domestic exchanges; Portugal has seen the 'acquisition' and sidelining of Oporto by Lisbon. The new Europe-wide NASDAQ equivalents, separate small firm equity markets and the removal of exchange monopoly status (as proposed in Denmark) threaten traditional exchange institutions.

Very few of the questions addressed by this thesis can therefore be regarded as finally closed: rather the conclusions reached here should

regarded as milestones serving the purpose of recording, on the one hand, how much ground has been covered by securities markets in the last quarter-century and, on the other, what places have yet to be visited on the road to evolving a stable set of institutions and trading arrangements that will serve the needs of smaller European economies in the longer term.

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IVDC Interview material and other direct contacts with citation
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8/1992/1 Mr J. C. Rodrigues da Costa.

As discussed in the text, confidentiality was specifically requested by most interviewees. The exception is Mr J. C. Rodrigues da Costa of the Bolsa de Valores de Lisboa who offered a large amount of time and support and whose views on behalf of the Lisbon authorities are cited under this reference.

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A P P E N D I C E S

APPENDIX ONE: STANDARD QUESTIONNAIRE TO SUPPORT STRUCTURED INTERVIEWS

VALIDITY OF THE NATIONAL MARKET

Is the market dependent on special situations for its existence or volume maintenance ?

as regards:

- tax bias
- government deficit
- funding
- privatisation
- property values
- foreign investor
- interest
- interest rate differentials with other countries
- inter-bank trading on small margins

Does activity in the public market and the information thereby generated reflect the extent of securities trading ?

as regards:

- price formation
- trading volume
- spreads and commissions
- fundamental value of securities
- price sensitive information

What taxes and pension funding arrangements affect the type of instruments traded, trading volume and clientèle, now and in the future ?

as regards:

- turnover tax
- capital gains tax
- inheritance tax
- pension funding arrangements
- any others

VIABILITY OF THE NATIONAL MARKET

What is your spread of interests ?

as regards:

- countries
- types of business transacted
- types of client sought
- specialised instruments and markets
- other services provided

What is your organisation's relationship with its parent bank, if any ?

as regards:

- organisation structure and control
- source of securities trading business

- source of new issue business
- source of client/market information
- capital resource

Is the Bourse well organised, regulated and promoted ?

as regards:

- broking
- finance for business
- small savers
- the level of volume
- public opinion
- balancing the interests of market participants

Are there effective limits to market participation ?

as regards:

- absolute numbers of brokers
- sale of seats or capital requirement
- technological base required
- other restrictions

What is the level of small saver/private investor participation in markets, directly or indirectly ?

Is the equity market soundly based ?

as regards:

- new issues
- finance for small and medium size business
- liquidity of individual stocks
- small savers and private investors
- flow of publicly available information

Is there significant trade diversion abroad ?

as regards:

- particular instruments, issuers or investors
- the past, present or future
- domestic investors' funds moving abroad

POTENTIAL OF THE NATIONAL MARKET

What is the minimum size of private client portfolio you would agree to manage ?

- with a fee
- without a fee

How large is the funded pension schemes sector ?

- in the past and at present
- in future ?

What measures could the market authorities, participants, investors, other financial intermediaries and issuers take to increase trading volume ?

as regards:

(all relevant instruments and sectors here taken in turn, depending on the market and respondent interviewed)

APPENDIX TWO: PROGRAM LISTING, UTILVEST.BAS

```

'***** UTILVEST.BAS *****

'UTILVEST.BAS created 930409/1600
'950407/0720 950406/1345
'***** Models inter-period investment decisions and trading volume
'***** DEFINITIONS *****
DECLARE FUNCTION SOLVE! (TAAA!, TBBB!, TCCC!, TDDD!, XP!, YP!)

'A = 0: B = 1: C = 5.5: D = -.333

'ERIC = SOLVE(A, B, C, D, E, F)
'CLS : PRINT E, F;

'INPUT YENO$
A: *****
    RANDOMIZE TIMER
    CLS
    LOCATE 1, 1: INPUT GRAPHWHICH

    SELECT CASE GRAPHWHICH

    CASE 1

        DURATION = 110
        PERIODS = DURATION - 1
        RESOLUTION = 4
        FASSETS = 1: GASSETS = 1

        PRICE1 = 1: PRICE2 = 1
        BASRATE = .15
        REALRATE = .2          'real return

        STARTAT = 0: UNIT = .01: POWER = 20
        RHO = .15: GRHO = .15

    CASE 2

        DURATION = 200
        PERIODS = DURATION - 1
        RESOLUTION = 3
        FASSETS = 1: GASSETS = 1

        PRICE1 = 1: PRICE2 = 1
        BASRATE = .15
        REALRATE = .2          'real return

        STARTAT = 0: UNIT = .01: POWER = 20
        GRHO = .15

    END SELECT

    DIM VECTOR(1048, 4), GVECTOR(1048, 4), PERIOD(DURATION, 19)
    PERIOD(1, 1) = FASSETS: PERIOD(1, 5) = FASSETS
    PERIOD(1, 7) = GASSETS: PERIOD(1, 9) = .5: PERIOD(1, 8) = .5

    ***** GRAPHICS SETUP *****

    CLS : GOSUB BOXDRAW
    LINE (ORIGX, 48)-(MAXX, 48): LINE (DURATION * RESOLUTION, MAXY)-(DURATION
    * RESOLUTION, 48)

```

```

SELECT CASE GRAPHWHICH
CASE 1
LOCATE 23, 10: PRINT " ASSETS           CONSUM           BONDS";
LOCATE 22, 10: PRINT " RISK PROFILE     REQUIRED RETURN   EQUITY";
LOCATE 22, 68: PRINT "VOLUME"
CIRCLE (50, 10), 1, 6: CIRCLE (200, 10), 1, 14: CIRCLE (350, 10), 1, 13
CIRCLE (50, 30), 1, 10: CIRCLE (200, 30), 1, 11: CIRCLE (350, 30), 1, 15
CIRCLE (500, 30), 1, 12

VSCALE = 20: HSCALE = 1      'GRAPHIC SCALING
VSCALF = 100: HSCALF = RESOLUTION
VATTEN = .2

CASE 2
LOCATE 23, 10: PRINT " ASSETS           CONSUM           BONDS";
LOCATE 22, 10: PRINT " RISK PROFILE     REQUIRED RETURN   EQUITY";
LOCATE 22, 68: PRINT "VOLUME"
CIRCLE (50, 10), 1, 6: CIRCLE (200, 10), 1, 14: CIRCLE (350, 10), 1, 13
CIRCLE (50, 30), 1, 10: CIRCLE (200, 30), 1, 11: CIRCLE (350, 30), 1, 15
CIRCLE (500, 30), 1, 12

VSCALE = 20: HSCALE = 1      'GRAPHIC SCALING
VSCALF = 100: HSCALF = RESOLUTION
VATTEN = .3

END SELECT
***** MAIN LINE CODE *****
B: *****MAIN
LOOP*****
FOR N = 1 TO PERIODS
SELECT CASE GRAPHWHICH
CASE 1

IF N = 1 THEN
  PERIOD(N, 4) = BASRATE: PERIOD(0, 5) = 1: PERIOD(0, 6) = 0
  PERIOD(0, 0) = .01
  END IF
CURRATE = PERIOD(N, 4)
C = STARTAT: K = 0: TOGLB = 0
CLIMIT = (FASSETS * PRICE2) + (FASSETS * CURRATE)
ARRAYLEN = CLIMIT / UNIT
IF FASSETS >= 1 THEN
  'determine risk appetite=premium required as an increasing function
  'of wealth subject to diminishing utility
  COEFFR = ((.01 * N) ^ 2 - (.01 * N) ^ 3) * .1
  COEFFA = .01 * (2 - (1 / FASSETS))
  RISKP = (COEFFR + COEFFA) '* ((FASSETS - EQUITY) / FASSETS)
  'optional equity weight damping
  'determine bond/equity portfolio composition
  NEWRATE = BASRATE + RISKP
  IF NEWRATE < REALRATE THEN
    EQUITY = FASSETS * (NEWRATE - BASRATE) / (REALRATE - BASRATE)
  ELSE EQUITY = FASSETS
  END IF
  IF EQUITY < 0 THEN EQUITY = 0'*****
  BONDS = FASSETS - EQUITY
  PERIOD(N, 5) = BONDS: PERIOD(N, 6) = EQUITY
  ELSE NEWRATE = BASRATE: PERIOD(N, 5) = FASSETS: PERIOD(N, 6) = 0
  END IF
  IF N > 1 THEN
    PERIOD(N, 10) = ABS(PERIOD(N, 5) - PERIOD(N - 1, 5))'bond trade volume
    PERIOD(N, 11) = ABS(PERIOD(N, 6) - PERIOD(N - 1, 6))'equity trade volume
  END IF
  PERIOD(N + 1, 4) = NEWRATE

```

```

WHILE TOGLB = 0 AND C < CLIMIT - UNIT
C = C + UNIT
K = K + 1
'determine utility of current consumption
VECTOR(K, 1) = ((C ^ (1 - RHO)) / (1 - RHO))
'tradeoff rate against future consumption
PRICE = ((BONDS * PRICE1) + (EQUITY * PRICE2)) / (BONDS + EQUITY)

HORIZON = POWER / FASSETS
'a long horizon of discounted future returns is required to induce a
'level of investment sufficient to grow capital fast - equivalent to
'foregoing all consumption until capital can continue to grow with a
'consumption slice removed from income: as assets grow the horizon
'can be reduced: makes no difference to the dynamics but represents
'a hungry (high power) or consuming (low power) investor: if an
'initial endowment sufficient for moderate consumption is provided
'this parameter is not required.
PERIOD(N, 3) = HORIZON
TRADEOFF = (1 + (NEWRATE / PRICE)) ^ HORIZON

'utility of future consumption given up for present consumption
VECTOR(K, 2) = (((CLIMIT - C) * TRADEOFF) ^ (1 - RHO)) / (1 - RHO)
VECTOR(K, 4) = CLIMIT - C: VECTOR(K, 3) = C 'ie assets/consumption level
'determine point where consumption equals current income
'find maximum for sum of utilities and mark location
'to determine asset level retained in vector 4
USUM = VECTOR(K, 1) + VECTOR(K, 2)
IF USUM > MAXU THEN
  MAXU = USUM: MAXL = K + 1
ELSEIF TOGLB = 0 THEN TOGLB = 1: PERIOD(N, 2) = MAXU
END IF
WEND
FASSETS = VECTOR(MAXL, 4)
CONSUM = VECTOR(MAXL, 3)
IF N < PERIODS THEN PERIOD(N + 1, 1) = FASSETS
  'store this period consumption
PERIOD(N, 0) = CONSUM
PERIOD(N, 2) = MAXU: MAXU = 0: MAXL = 0

C:   *****CORPORATE FINANCE*****
CASE 2

IF N = 1 THEN
  PERIOD(N, 14) = REALRATE
END IF

IF N < PERIODS THEN 'PERIOD(N, 7) >= 1 AND N < PERIODS THEN
  COEFG = (.005 * N) ^ 2 - (.005 * N) ^ 3

  '^time profile risk function
  FACTOR = SQR((SQR(SQR(PERIOD(N, 7))))) )
  GREALRATE = BASRATE + ((REALRATE - BASRATE) / FACTOR)
  '^diminishing returns to assets
  RISKGP = ((REALRATE - BASRATE) / (GREALRATE - BASRATE)) * (1 + COEFG)
  POT = GREALRATE * PERIOD(N, 7)
  GEARISK = (1 + ((PERIOD(N, 8) / PERIOD(N, 9))))
  COVERISK = 1 + (PERIOD(N, 18) / POT)
  INTEREST = PERIOD(N, 8) * BASRATE
  BONDRISK = GEARISK * COVERISK
  RISKINDEX = BONDRISK * RISKGP
  SPARE = POT - INTEREST

  IF SPARE > 0 THEN
    DIVRATE = BASRATE * RISKGP

```

```

DIVID = DIVRATE * PERIOD(N, 9)
ELSE DIVID = 0
END IF
SPARE = SPARE - DIVID

NEWBONGS = (SPARE / BASRATE) / (BONDRISK * RISKGP ^ 5)
BONGS = PERIOD(N, 8) + NEWBONGS
IF BONGS < 0 THEN BONGS = 0
EQUITG = PERIOD(N, 9) + SPARE
PERIOD(N + 1, 9) = EQUITG
PERIOD(N + 1, 8) = BONGS
PERIOD(N + 1, 7) = PERIOD(N + 1, 8) + PERIOD(N + 1, 9)
PERIOD(N + 1, 18) = INTEREST
TRADVOL = ABS(PERIOD(N + 1, 8) - PERIOD(N, 8)) + ABS(PERIOD(N + 1, 9) -
PERIOD(N, 9))
END IF
PERIOD(N, 17) = DIVID: PERIOD(N, 16) = INVEST
'LOCATE 2, 50: PRINT SPACE$(20): LOCATE 2, 50: PRINT "SPARE "; SPARE;
'LOCATE 3, 50: PRINT SPACE$(20): LOCATE 3, 50: PRINT "ASSETS"; PERIOD(N,
7);
'LOCATE 4, 50: PRINT SPACE$(20): LOCATE 4, 50: PRINT "EQUI "; PERIOD(N,
9);
'LOCATE 5, 50: PRINT SPACE$(20): LOCATE 5, 50: PRINT "DEBT "; PERIOD(N,
8);
'LOCATE 6, 50: PRINT SPACE$(20): LOCATE 6, 50: PRINT "GREAL "; GREALRATE;
'LOCATE 7, 50: PRINT SPACE$(20): LOCATE 7, 50: PRINT "DIVID "; DIVRATE;
'LOCATE 8, 50: PRINT SPACE$(20): LOCATE 8, 50: PRINT "BRISK "; BONDRISK;
'LOCATE 9, 50: PRINT SPACE$(20): LOCATE 9, 50: PRINT "DRISK "; RISKGP;
'LOCATE 10, 50: PRINT SPACE$(20): LOCATE 10, 50: PRINT "GRISK"; GEARISK;
'LOCATE 11, 50: PRINT SPACE$(20): LOCATE 10, 50: PRINT "COEFF"; COEFG;
'LOCATE 20, 50: INPUT YENO$
```

END SELECT

'*****

SELECT CASE GRAPHWHICH

CASE 1

```

CIRCLE (N * HSCALF, (PERIOD(N, 1) * VATTEN * VSCALF) + 50), 1, 6'assets
CIRCLE (N * HSCALF, (PERIOD(N, 0) * VATTEN * VSCALF) + 50), 1, 14'consum
CIRCLE (N * HSCALF, (PERIOD(N, 4) * 10 * VSCALF) + 50), 1, 11'rate
CIRCLE (N * HSCALF, (PERIOD(N, 5) * VATTEN * VSCALF) + 50), 1, 13'bonds
CIRCLE (N * HSCALF, (PERIOD(N, 6) * VATTEN * VSCALF) + 50), 1, 15'equity
CIRCLE (N * HSCALF, (PERIOD(N, 10) + PERIOD(N, 11) * VSCALF) + 50), 1,
```

12'returns

CASE 2

```

CIRCLE (N * HSCALF, (TRADVOL * VATTEN * VSCALF * 4) + 50), 1, 12'
CIRCLE (N * HSCALF, (PERIOD(N, 8) * VATTEN * VSCALF) + 50), 1, 13'bonds
CIRCLE (N * HSCALF, (PERIOD(N, 9) * VATTEN * VSCALF) + 50), 1, 15'equity
CIRCLE (N * HSCALF, (RISKINDEX * 50 + 60)), 1, 12'
```

END SELECT

NEXT N

```

'*****END MAIN LOOP*****
GOTO FIN
'***** END OF MAIN LINE CODE*****
'*****
```

APPENDIX THREE:PROGRAM LISTING, STARVATA.BAS

```

DECLARE FUNCTION CASES! (AAA!, BBB!, CCC!, DDD!, ELASTD!, ELASTS!, XP!, YP!)
DECLARE FUNCTION MAPPER! (PRICE0!, DEM0!, SUPPLY0!, VOLUME0!, ELASTD!, I!)
DECLARE FUNCTION ERRExit! ()
'*****
'*STARVATA.BAS created 930101/1415
'
'******
'*Models starvation process of a population of (broking firms)
'
'******
'******
'******
'*DEFINITIONS *****
'*MAIN LINE CODE *****
'*MAIN LINE CODE *****
CLS : RANDOMIZE TIMER
ORIGVOL = 320: DOWNBY = 300
DIM FIRMS(14, 4), VECTOR(320, 4)
SIZER = 4      'FIRM SIZE AND FIXED COST STEPS
FOR I = 1 TO 14  ' 2 @ LEVEL 4, 4 @ LEVEL 2 AND 8 @ LEVEL 1
  IF I = 3 THEN SIZER = 2 ELSE IF I = 7 THEN SIZER = 1
  FIRMS(I, 1) = SIZER:                                ' SET FIRM SIZES
  BLOB = INT((RND / 10 + .1) * 100)
  FIRMS(I, 2) = BLOB / 100                            'RANGE 0.1-0.2 EFFICIENCY
  'LOCATE I, 1: PRINT FIRMS(I, 1); " "; BLOB;
  NEXT I

FOR I = ORIGVOL TO ORIGVOL - DOWNBY STEP -1      ' RUN MAIN MODEL LOOP
  VOLUME = I '+ INT((RND * 4) - 2)      ' RANGE +/- 1
  SIZTOT = 0: PROFTOT = 0
  FOR J = 1 TO 14
    SIZTOT = SIZTOT + FIRMS(J, 1)
    NEXT J
  IF SIZTOT <= 0 THEN GOTO FIN
  SHARE = VOLUME / SIZTOT
  FOR J = 1 TO 14
    FIRMS(J, 3) = FIRMS(J, 2) * FIRMS(J, 1) * SHARE - FIRMS(J, 1)
    'PROFIT = EFFICIENCY * SIZE * SHARE - FIXCOST
    IF FIRMS(J, 3) < 0 AND FIRMS(J, 1) > 0 THEN
      FIRMS(J, 1) = FIRMS(J, 1) - 1
    END IF
    PROFTOT = PROFTOT + FIRMS(J, 3)
    NEXT J
  K = K + 1
  VECTOR(K, 1) = INT(((I / ORIGVOL) / (SIZTOT / 24)) * 100)
  VECTOR(K, 2) = INT((PROFTOT / SIZTOT) * 100)
  VECTOR(K, 3) = SIZTOT
  VECTOR(K, 4) = PROFTOT
  VECTOR(K, 0) = INT((PROFTOT / I) * 100)
  'FOR J = 1 TO 14
  '  LOCATE J, COL + 16: PRINT " ";
  '  LOCATE J, COL + 12: PRINT FIRMS(J, 1); " ";
  '  NEXT J
  'LOCATE 16, COL + 16: PRINT " ";
  'LOCATE 16, COL + 12: PRINT VECTOR(K, 1);
  'IF COL < 60 THEN COL = COL + 4 ELSE COL = 0
  NEXT I
  'LOCATE 25, 1: INPUT YENO$

GOSUB BOXDRAW
LINE (ORIGX, 48)-(MAXX, 48)
FOR I = 1 TO DOWNBY
  PSET (I * 2, (VECTOR(I, 0) * 2) + 50), 10      'PROFIT/VOLUME
  LINE (I * 2, (VECTOR(I - 1, 1) * 2) + 50)-(I * 2, (VECTOR(I, 1) *

```



```

PRICE0 = AAA + DEMO * BBB
IF DEMO < 0 THEN DEMO = 0
IF PRICE0 < 0 THEN PRICE0 = 1
IF DEMO > SUPPLY0 THEN VOLUME0 = SUPPLY0 ELSE VOLUME0 = DEMO
ELSE      *****DEMAND<=SUPPLY ****
PRICE0 = AAA + DEMO * BBB
DEMO = INT(DEMO + (SUPPLY - DEMO) * ELASTD)
IF DEMO > SUPPLY0 THEN VOLUME0 = SUPPLY0 ELSE VOLUME0 = DEMO
IF DEMO < 0 THEN DEMO = 0
IF PRICE0 < 0 THEN PRICE0 = 1
END IF
NUUDGE = 0
IF NUDGE = 1 THEN
  SCREEN 0, 0
  PRINT "DEMAND SUPPLY VOLUME PRICE ELAST-D ELAST-S"
  PRINT DEMO; " "; SUPPLY0; " "; VOLUME0; " "; PRICE0; " ";
  PRINT ELASTD; " "; ELASTS; " ";
  IF INKEY$ = "" THEN GOTO HERE
ELSE
  PSET (DEM1, DEMO), 4: PSET (PRICE1, PRICE0), 11
  , LINE (DEM1, PRICE1)-(DEMO, PRICE0), 14
  ERIC = MAPPER(PRICE0, DEMO, SUPPLY0, VOLUME0, ELASTD, I)

HERE:

```

```

ELASTD;
ELASTS;
PRICE0;
DEMO;
VOLUME0;
SUPPLY0;
END IF
DEM2 = DEM1: DEM1 = DEMO:
PRICE2 = PRICE1: PRICE1 = PRICE0
VOLUME2 = VOLUME1: VOLUME1 = VOLUME0:
SUPPLY2 = SUPPLY1: SUPPLY1 = SUPPLY0
IF EXIC = 1 THEN EXIC = 0: GOTO FUNXIT

```

RESERR1: NEXT I

CASE 2

```

FOR I = 1 TO 250
  IF I = 1 THEN DEM1 = XP: SUP1 = XP: PRICE1 = YP
  ELASTD = AAA / PRICE1: ELASTS = 1
  DEMO = (PRICE1 - AAA) / BBB
  SUPPLY0 = (PRICE1 - CCC) / DDD
  IF SUPPLY0 < 0 THEN SUPPLY0 = 0
  IF DEMO > SUPPLY0 THEN
    DEMO = DEMO + (DEMO - SUPPLY0) * ELASTD
  IF DEMO < 0 THEN DEMO = 0
  PRICE0 = AAA + SUPPLY0 * BBB
  IF PRICE0 < 0 THEN PRICE0 = 0
  VOLUME0 = SUPPLY0
  ELSE
    DEMO = DEMO + (DEMO - SUPPLY0) * ELASTD
  IF DEMO < 0 THEN DEMO = 0
  VOLUME0 = DEMO
  PRICE0 = AAA + BBB * DEMO
  IF PRICE0 < 1 THEN PRICE0 = 1

```

```

        END IF
IF NUDGE = 1 THEN
SCREEN 0, 0
PRINT "DEMAND SUPPLY VOLUME PRICE ELAST-D ELAST-S"
PRINT DEMO; " "; SUPPLY0; " "; VOLUME0; " "; PRICE0; " ";
PRINT ELASTD; " "; ELASTS; " ";
YERE: IF INKEY$ = "" THEN GOTO YERE
ELSE
    PSET (DEM1, DEM0), 4: PSET (PRICE1, PRICE0), 11
    LINE (DEM1, PRICE1)-(DEM0, PRICE0), 14
    ERIC = MAPPER(PRICE0, DEM0, SUPPLY0, VOLUME0, ELASTD, I)
END IF
DEM2 = DEM1: DEM1 = DEM0:
PRICE2 = PRICE1: PRICE1 = PRICE0
VOLUME2 = VOLUME1: VOLUME1 = VOLUME0:
SUPPLY2 = SUPPLY1: SUPPLY1 = SUPPLY0
IF EXIC = 1 THEN EXIC = 0: GOTO FUNXIT

```

NEXT I

END SELECT

FUNXIT: END FUNCTION

FUNCTION ERREXIT

END FUNCTION

```

FUNCTION MAPPER (PRICE0, DEM0, SUPPLY0, VOLUME0, ELASTD, I) STATIC
CLS : SCREEN 9: COLOR , 2
VIEW (100, 230)-(600, 330)      ' PHASE SPACE
WINDOW (0, 0)-(500, 200)
LINE (0, 0)-(500, 200), , B
LINE (I * 2, PRICE1)-(I * 2, PRICE0)
LINE (I * 2, DEM1)-(I * 2, DEM0), 14, , &H8888

```

```

ORIGX = 0: ORIGY = 0: MAXX = 300: MAXY = 200
VIEW (0, 20)-(300, 220)          ' TIME SERIES
WINDOW (0, 0)-(300, 200)
'CLS 1
LINE (ORIGX, ORIGY)-(ORIGX, MAXY)
LINE (ORIGX, ORIGY)-(MAXX, ORIGY)
LINE (MAXX, ORIGY)-(MAXX, MAXY)
LINE (ORIGX, MAXY)-(MAXX, MAXY)
LINE (ORIGX, AA)-(MAXX, AA + MAXX * BB), , , &H8888
LINE (ORIGX, CC)-(MAXX, CC + MAXX * DD), , , &H8888
LINE (ORIGX, AAA)-(MAXX, AAA + MAXX * BBB)
LINE (ORIGX, CCC)-(MAXX, CCC + MAXX * DDD)
CIRCLE (XP, YP), 3: CIRCLE (OXP, OYP), 3

```

MAXIT: PRICE1 = PRICE0: DEM1 = DEM0: SUPPLY1 = SUPPLY0: VOLUME1 = VOLUME0

END FUNCTION

```

FUNCTION SOLVE (AAA, BBB, CCC, DDD, XP, YP) STATIC
***** SOLVE SIMULTANEOUSLY *****
OYP = YP: OXP = XP
IF ABS(BBB) - ABS(CCC) = 0 AND BBB <> 0 THEN
    YP = (AAA + CCC) / 2
    XP = (YP - AAA) / BBB      'slopes equal
ELSEIF BBB = 0 THEN

```

```

    ' YP = ((BBB * CCC) - (DDD * AAA)) / (BBB - DDD)
    ' XP = (YP - CCC) / DDD
    YP = AAA
    XP = (AAA - CCC) * DDD      'slope zero
ELSEIF DDD = 0 AND BBB <> 0 THEN
    YP = CCC
    XP = (CCC - AAA) * BBB
ELSEIF DDD <> 0 THEN
    YP = ((BBB * CCC) - (DDD * AAA)) / (BBB - DDD)
    XP = (YP - CCC) / (DDD)
END IF

YP = INT(YP + .5)
XP = INT(XP + .5)
LOCATE 1, 20: PRYNT SPACE$(19);
LOCATE 1, 20: PRINT XP, YP;
SOLVE = 0

```

END FUNCTION