

D_{ANISH} **R**_{ESearch} **U**_{NIT FOR} **I**_{NDUSTRIAL} **D**_{YNAMICS}

DRUID Working Paper No. 98-24

**Finance and Innovation
System or Chaos**

by
Jesper Lindgaard Christensen
&
Ina Drejer
October 1998

Finance and Innovation System or Chaos*

by

Jesper Lindgaard Christensen, Ina Drejer

IKE Group, Department of Business Studies

Fibigerstraede 4, Aalborg University

9220 Aalborg O, Denmark

e-mail: jlc@business.auc.dk; id@business.auc.dk

Abstract

The present paper discusses an important part of the framework conditions for innovation in a number of European countries (France, Italy, Spain, the Netherlands, the United Kingdom) as well Japan and the United States through a comparison of the development of the financial systems in these countries. The main focus is whether a convergence can be observed between what is traditionally perceived as market based and credit based systems respectively. Based on quantitative statistics it is concluded that a convergence has taken place, and it is becoming increasingly more difficult to divide national financial systems into two main categories based on quantitative data alone. But differences still remain, and the paper continues by discussing reasons for convergence and divergence respectively. These reasons include internationalization, differences in industrial structure, as well as changes in national and international regulation. Before turning to a discussion of the policy perspectives of the observed development the paper discusses the financial systems ability to finance different types of transactions.

Keywords

Financial systems; innovation financing; economic integration and convergence

JEL

G20, O31, P51

** This paper draws on work carried out in relation to a research project for The European Commission. It is part of the TSER-project on Innovation Systems and European Integration (ISE) (PL951029). Due to space limitations this paper presents selected issues from the work on the project. Likewise we have reduced the number of countries dealt with, as well as limited the amount of statistics presented.*

(ISBN87-7873-062-7)

Contents

1. Financing Innovations - the Role of the Institutional Set-Up	1
2. A Picture of Financial Systems	2
2.1 The Importance of Debt and Bank Credits in Financing Firms	3
2.2 Equity Markets	8
2.3 Integration and Internationalisation	10
2.4 Differences still persist	12
3. Explaining the Differences	14
3.1 Reasons for Convergence	14
3.2 The Origin of Financial Systems, Reasons for Divergence and Room for Policies .	15
3.3 Regulation of Financial Systems	17
4. Complicating the Picture - Getting Down to Micro	20
4.1. Introduction	20
4.2. A Micro-View on Financing Different Transactions	21
5. Conclusions and Policy Perspectives	25
References	29

1. Financing Innovations - the Role of the Institutional Set-Up

The ambition of the present paper is to explore the institutional framework for innovation financing as expressed by the financial system.¹ Different financial systems support different types of investments differently.

The process of European integration and the consequences for innovation have been investigated previously (see e.g. Gregersen and Johnson, 1997). In the present paper we highlight some of the basic properties and changes of financial systems in the past decade in order to investigate if a similar integration process is going on with respect to financial systems. The general belief is that many European countries have moved towards the American/British type of financial system and vice versa. In other words it is assumed that there is a convergence trend for financial systems. This paper will look further at this convergence trend: Are there limits to this convergence, and if so, what are the reasons for these limitations? We will also deal with the pros and cons of convergence in a discussion of whether such a thing as a best practice can be identified.

Our method to explore these questions is first to consider the quantitatively measurable differences between national financial systems in section 2 in order to empirically investigate the tendencies for convergence. Section 3 continues with a discussion of why differences between financial systems continues to exist, even though there are clear signs of some degree of convergence. Finally, in section 4, we discuss possible best practices of financial systems with respect to innovation financing by differentiating between different kinds of transactions, different types of firms and different types of capital. In this section we will put a special emphasis on the characteristics of the American system with regards to innovation financing. The paper ends up with a discussion of policy perspectives of the observed development

Before going too far in policy recommendations one should bear in mind that financing innovation is not the only task of the financial system - far from it. But given the increasing importance of firms not being static in a dynamic world, and given the importance of innovation

1

A limited amount of research has been carried out within this area despite the fact that it is widely recognized that innovation financing is very important in promoting innovation. Although there has been some contributions (e.g. Prakke, 1988; Dosi, 1990; Christensen, 1992a and 1992b; OECD, 1993; OECD, 1996) most of these are limited in scope and/or focus on a specific set of problems like the development of the venture capital industry.

in growth and job creation, governments are interested in promoting innovations. Precisely what type of financial system Europe needs in order to promote innovations is an important policy issue. Is there really such a thing as a ‘best practice’, or should financial systems entail several of the features of both the American type and Continental European type systems in order to improve the dynamics and limit sensibility the of the system?

2. A Picture of Financial Systems²

In this section we shall take a closer look upon differences between national financial systems. After a mainly quantitative description of differences between national financial systems in some major European countries³ and the US and Japan, we turn to discuss qualitative features of different systems in section 3.

Financial systems are traditionally divided into two main types (Zysman, 1983; OECD, 1993):

- i) a system based on capital markets, and
- ii) a credit based system.

In a stylized *capital market based* system stocks and bonds are said to be relatively important long-term financing sources for firms. In such a system the central function of bank lending is to serve short-term purposes. Borrower and lender often meet across competitive markets with the help of intermediary institutions. Entrance to and exit from different financial holdings are quite simple processes, making this the most common ways for lenders to execute their influence.

In a stylized *credit based* system capital markets play a relatively weak role in providing long-term capital compared to financial institutions. In credit based systems there are fewer arrangements for an easy exit, which makes financial institutions more loyal to their borrowers.

2 We thank John Zysman for comments on this section.

3 France, Italy, Netherlands, Spain and United Kingdom. Germany, which is traditionally considered as being credit based, is not included due to lack of detailed data.

Table 2.1: A static typology of national financial systems

Major grouping	Market based	Credit based
Countries	US, UK, Netherlands	Japan, France, Italy, Spain
Debt/equity ratio in firms	Relatively low	Relatively high
Major financing instruments	Retained earnings and, to a lesser extent, bonds and new equity issues	Loans and retained earnings
Price mechanism of capital allocation	Market processes determine key prices	Markets are imperfectly cleared by prices

Consequently, “voice” is the common way for lenders to execute influence in customer companies (Zysman, 1983, p. 70-72).

In relation to innovation financing, venture capital is typically an important source of funding for high risk/uncertain projects in the market based systems. In the credit based systems, intra-preneurship (entrepreneurs inside companies, i.e. internal financing) and/or bank consortia play a major role in providing risk capital (OECD, 1993, p. 69).

The purpose of the present section is to explore whether it is possible to find distinctive features of national financial systems as described in table 2.1, and whether the differences between the systems have changed in the past decade.

The countries included in the analysis are divided into the two major groupings on the basis of their characteristics in the initial stage of the period analyzed.

2.1. The Importance of Debt and Bank Credits in Financing Firms

The first feature mentioned in table 2.1 is the debt/equity-ratio. The debt/equity-ratio in credit based financial systems is relatively higher than in market-based systems due to assumed close relationships between lenders and borrowers, and due to the fact that some firms have difficult access to funds on the capital market. In credit based systems financial institutions tend to allow

firms a higher debt/equity ratio because monitoring of firms is easier and more necessary (Christensen, 1992a, p. 151).

Figure 2.1 reveals that the difference in debt/equity ratios between the major European countries and the US and Japan has decreased since the mid-80's. Looking at the initial capital structure the US starts out with a very low debt to equity ratio, which is characteristic for market based systems, but increases the ratio from 0,5 to 1 from the early/mid-1980's to the early/mid-1990's.

The debt to equity ratio in the Netherlands, Spain and the United Kingdom varies between 1 and 1,5. For the Netherlands and the United Kingdom this, combined with the fact that bank financing amount to just 10-15 per cent of total liabilities in these countries, indicates a market based structure. Spain has a debt-equity rate which is almost as low as for the Netherlands and United Kingdom, but bank and trade credits account for 40 per cent of total liabilities, which indicates a quite strong credit orientation.

Italy and Japan have very high debt-equity ratios in the early 1980's, and continue to be well above the other countries throughout the period. The number of years available for France is restricted,

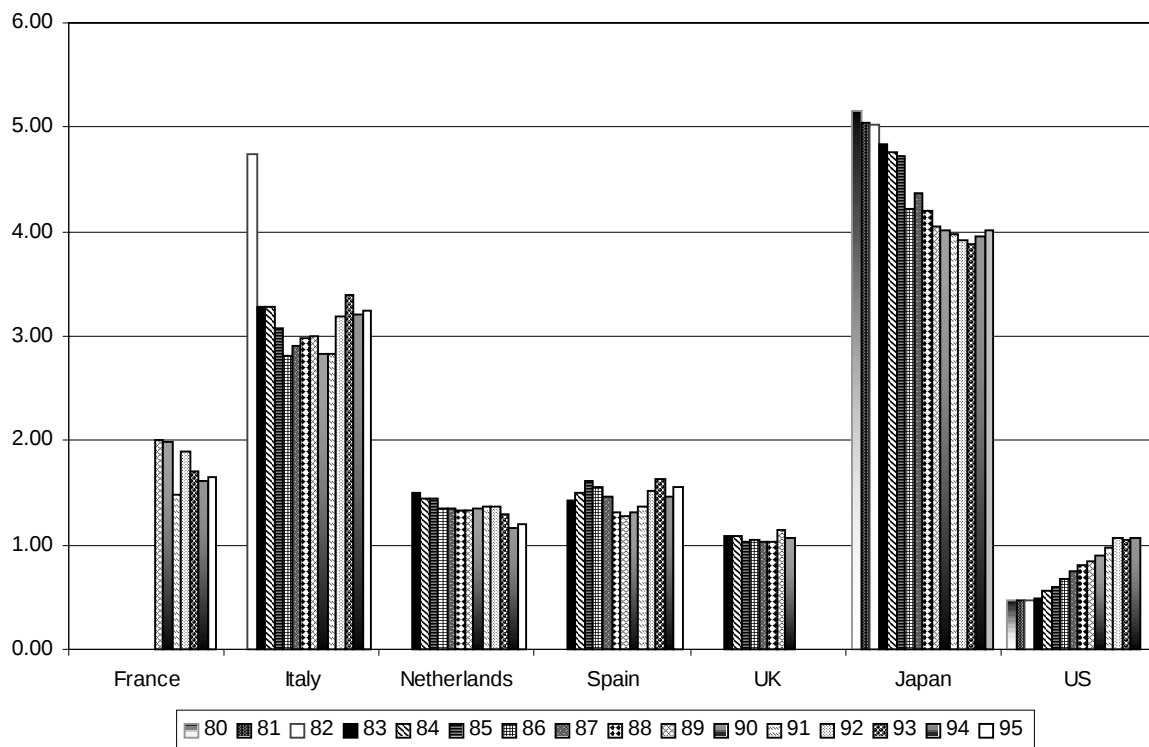


Figure 2.1: Debt/Equity Ratio in Firms

Calculated from OECD, Financial Statistics, part III, 1993-1996.

but in the first half of the 1990's the ratio is close to the Spanish and moving closer to the market based countries.

The general picture is one of convergence where countries starting out with a high debt to equity ratio experiences an increase in equity, which reduces the debt to equity ratio,⁴ while the US, which has the lowest debt/equity ratio during the whole period, experiences an increase in the ratio due to a stagnation in equity and a moderate increase in debt. In the middle group are the UK and Netherlands, where debt and equity have had parallel growth rates in the observed period.

A second factor determining patterns of financial systems is the major financing instruments. According to table 2.1 loans are a major source of capital in credit-based systems, while it, apart from retained earnings, is bonds and new equity issues, which are the most important financing instruments in market based systems.

Figure 2.2 shows the relative importance of bank credits in financing industry measured as short and long term bank credits as a percentage of the total liabilities. A high percentage of bank credits indicates a financial system oriented towards credit, while a low percentage indicates a market based financial system.

4

An economic factor behind the tendency towards a decreasing debt to equity ratio in the majority of countries is a decreasing ratio of inflation in the 1980's in all countries involved in the analysis (OECD, 1996). The tendency is expected to continue due to an increased demand for security - as expressed by low debt/equity ratios - from banks in their loan policies after a number of bank failures in the early 90's.

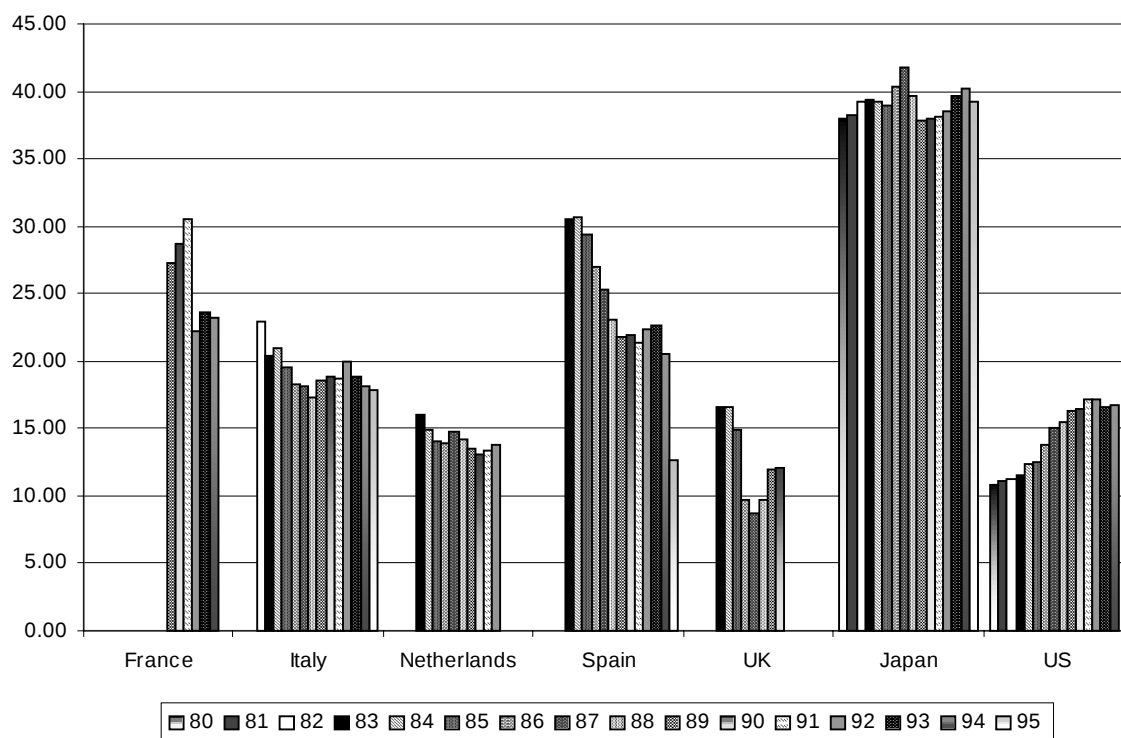


Figure 2.2: The Relative Importance of Bank Credits in Financing Industry
Calculated from OECD, Financial Statistics, part III, 1993-1996.

With the exception of Japan, which is in a category of its own with regards to the relative importance of bank credits, the difference between the countries has diminished since the mid-80's. The decreasing importance of bank credit in France, Spain and, to a lesser degree, Italy (i.e. countries with credit based systems) is due to either a stagnation or slow growth in bank credits, while the US and, to a lesser degree the Netherlands, with their market dominated systems, have had a higher growth rate of bank credits compared to liabilities. The tendency for the UK, which started out with a relatively high importance of bank credit considering the status as a market based system, is less clear since the lack of data from 1990 and onwards makes it impossible to determine whether the growth in the relative importance of bank credits in the late 1980's is a lasting tendency.

Capital markets play a relatively weak role in providing long-term capital compared to financial institutions in credit based systems. Statistics on the share of long term bank credits to total liabilities (figure 2.3) show that the tendency of convergence, which was evident from figure 2.2 showing the relative importance of total bank credit to total liabilities, is also evident here,

except for the case of Japan and France, who seem to have followed a common trend through the last years which is markedly different from the other countries.

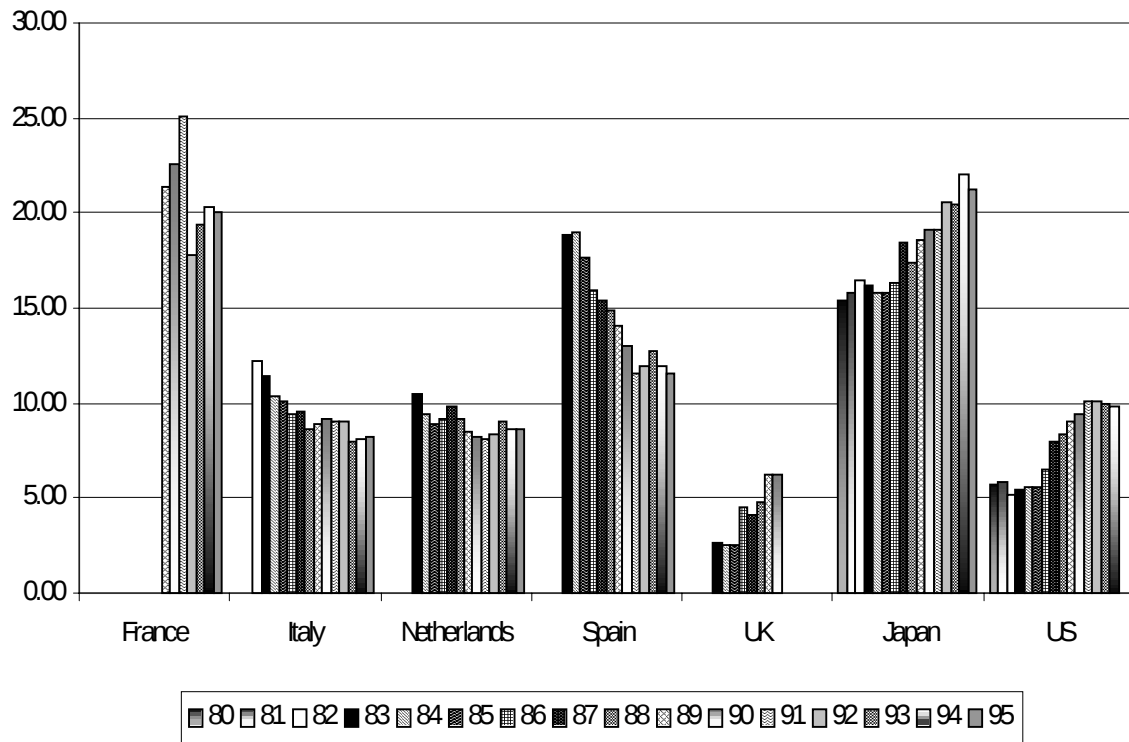


Figure 2.3: The Share of Long Term Bank Credits to Total Liabilities
Calculated from OECD, Financial Statistics, part III, 1993-1996.

The overall development in the figures indicates that the countries traditionally characterized as having credit based financial systems, with the exception of Japan, are moving towards a situation with less importance played by long-term bank credits. This is a consequence of bank credits playing a diminishing overall role since an analysis of bank credits alone show that long-termism is being more predominant. Thus it is becoming increasingly more difficult to divide national financial systems into categories according to the importance of debt and bank credits in financing firms. Japan clearly has an exceptional system with bank credits playing a proportionally large role in financing firms, but in the Western world the picture is becoming increasingly more blurred. *It is worth noticing though, that it is not only the traditionally credit based systems that are changing with regards to the role played by debt and bank credits, also the market based systems are changing, and thus reinforcing the convergence tendency.*

2.2 Equity Markets

Debt and bank credits are just one side of the story about characteristics of financial systems, the other side being equity markets. As illustrated in table 2.1, equity issues is a financing instrument, which is used as a supplement to retained earnings in raising capital in a market based system, i.e. equity markets play a more dominant role in market based systems as compared to credit based systems.

Figure 2.4 illustrates the size of the equity markets in the Netherlands, United Kingdom, Spain, Italy and France by measuring the domestic equity in relation to GDP. Data are only available for the US and Japan for 1996.

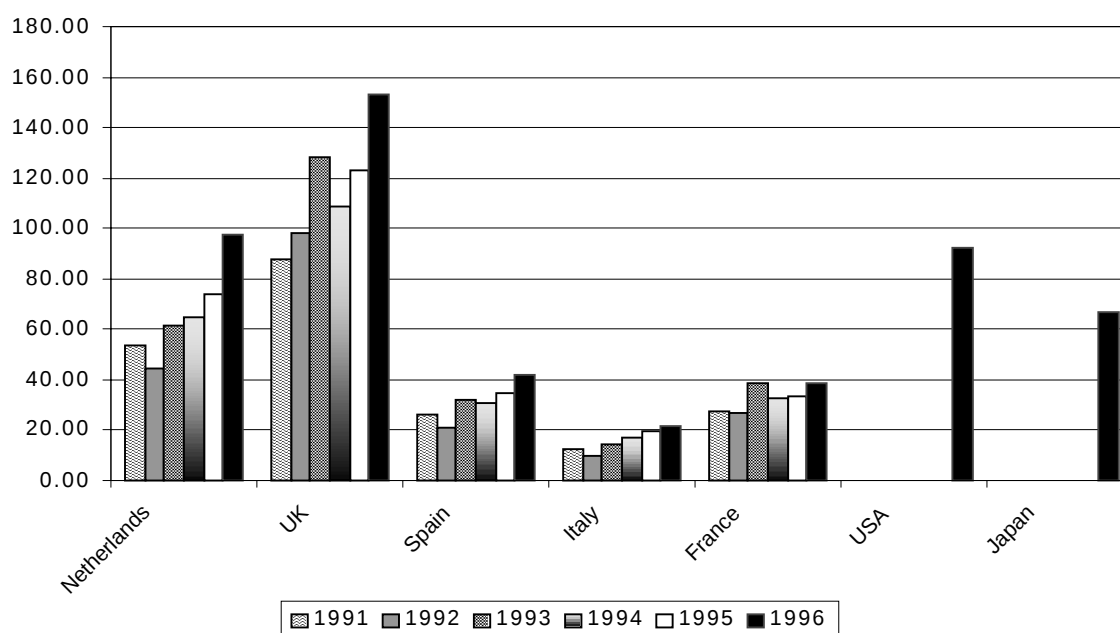


Figure 2.4: Size of Equity Markets: Domestic Equity (Value at Year End) to GDP (Percentage)
 Calculated from European Stock Exchange Statistics, Annual Reports 1992-1997, Eurostat, Yearbook 1997, and International Federation of Stock Exchange Statistics.
 Data for the US and Japan are only available for the most recent year.

UK stands out with a value of domestic equity which exceeded the value of the GDP in 1993 and has remained larger than GDP in the following years. The high level of domestic equity in the UK is in accordance with the low debt to equity ratio illustrated in figure 2.1.

Another indicator verifies the impression from figure 2.4: The UK equity market is the fastest growing market. Figure 2.5 show a growth rate which has risen dramatically since 1992. The remaining countries show more moderate growth rates between 3 and 6 percent per year - in the

Dutch and Spanish cases after very high growth ratios in the late 1980's. It should be noted that the growth rates for in particular Spain, Italy and France, due to the small sizes of their markets, are very sensitive to small absolute changes in the number of firms. The equity market in Japan is rather big when considering the importance of bank credits in the Japanese system.

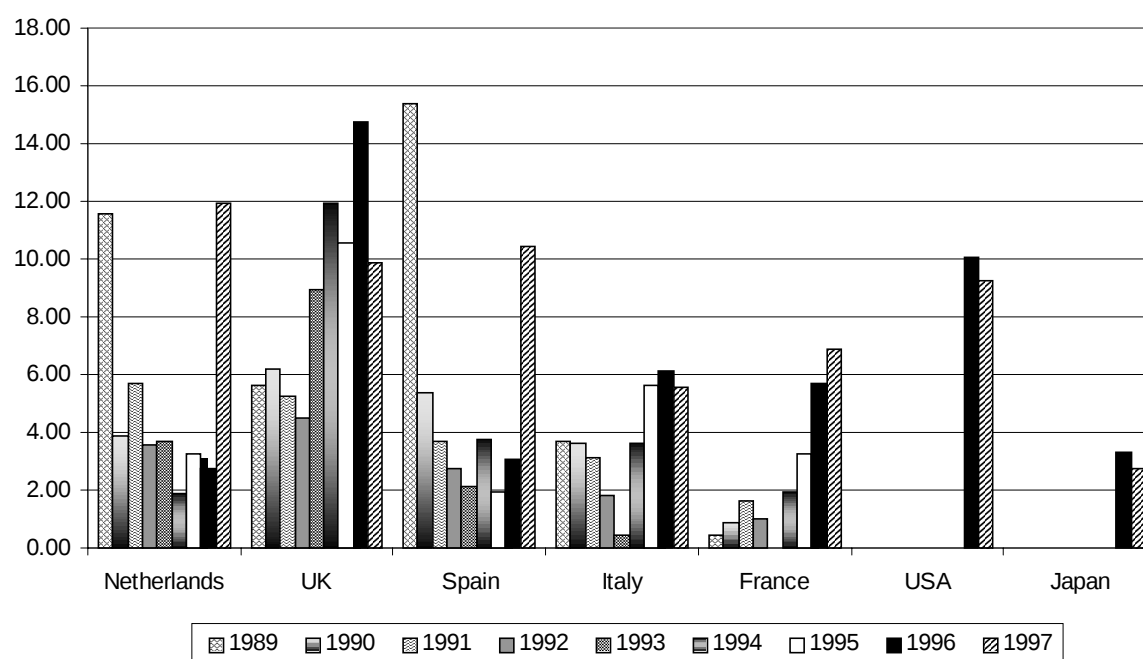


Figure 2.5: Growth of Domestic Equity markets (No. of New Domestic Companies to Total no. of Domestic Companies Listed)

European data calculated from European Stock Exchange Statistics, Annual Reports 1990-1997.

Data for US and Japan calculated from International Federation of Stock Exchanges Statistics.

The fact that UK has the most developed equity market is in accordance with the traditional separation between market based and credit based financial systems. The relatively large size of the equity market in the Netherlands and the United States also confirms the findings in section 2.1.

Figure 2.4 and 2.5 only includes the formal, listed equity markets. Data for the trade with parallel and unlisted securities, which can be of equally great importance for firms needing finance for innovative activities, are not available for a longer period of time. Therefore nothing can be concluded on the development of these markets. But important lessons can still be drawn from the parallel and unlisted securities transactions. It is e.g. interesting to learn that 50% of companies which had shares traded in France in 1991 were to be found on the unlisted or

parallel markets. For the Netherlands the percentage was 25, the UK and Italy were just below 20%, while companies on parallel or unlisted markets account for less than 1 percent in Spain.⁵ There is no obvious relation between the size of the listed securities markets and the extent of parallel and unlisted trade. Likewise there are no common characteristics of the relation between unlisted and listed markets for the credit based systems. If we stick to absolute numbers the number of companies with unlisted and parallel trade with shares on the British market is by far the largest, just as is the case with the listed market.

A serious limitation of this section is that data are only available for the US and Japan for 1996 and 1997. Thus it is difficult to say something about a tendency of convergence. From the limited data available though it seems that the differences between market and credit based systems are more obvious and lasting when studying equity markets compared to the role of bank credits studied in section 2.1.

2.3 Integration and Internationalization

We now turn to the internationalization of the financial markets. The introduction of the European Monetary System (EMS) in 1979 marked the beginning of a process of deregulation and integration through diminishing capital control in Europe. An aimed consequence of the deregulation is that the role played by market mechanisms in determining where economic agents chose to invest and obtain their capital is strengthened. Controls on deposit and lending rates have been relaxed and most controls of foreign currency transactions and international capital movements have been lifted. OECD (1993, p. 43) views liberalization and globalization as enhancing the overall efficacy and flexibility of the financial systems and as introducing more uniformity into national financing conditions.

The fact that most countries have experienced an increasing internationalization of bank credits (figure 2.6) indicates that internationalization and integration has played a role in the development of the credit markets in the past decade. But bank credit is still largely a national affair, especially for the larger countries, while the Netherlands have experienced a drastic increase in foreign bank credits since the mid 80's.

5 Calculated from European Stock Exchange Statistics, Annual Report 1993.

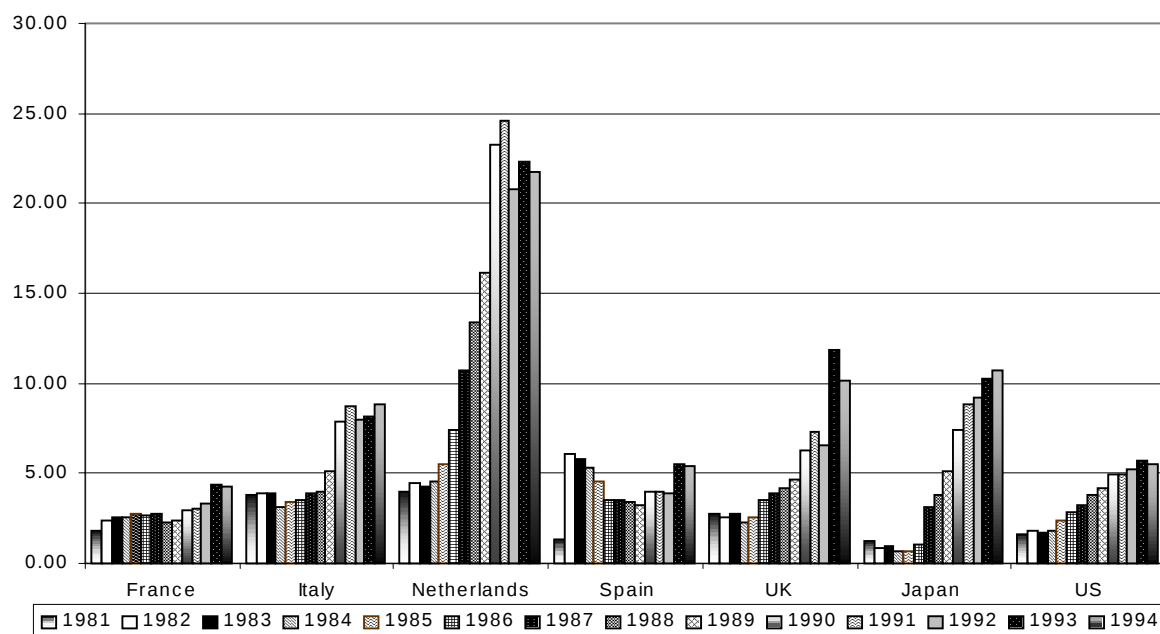


Figure 2.6: Cross-Border Bank Credit to Nonbanks by Residence of Borrower (Percentage of GDP)

Calculated from International Monetary Fund, International Financial Statistics, Yearbook 1995 and OECD, National Accounts, Main Aggregates, 1960-1994.

The time series available for internationalisation of equity markets (fig. 2.7) are shorter than for bank credits, and this hampers the possibilities of analysing the tendency over a longer period of time. Again it is the smallest country, the Netherlands, which shows the highest degree of internationalisation with almost half of the companies listed on the national securities markets being foreign, while the United Kingdom and France have 20 to 30 per cent foreign companies listed on their national securities markets. The American market is numerically very large but it is only moderately internationalised. Foreign companies play a disappearingly small role in Spain and Italy where the equity markets are quite small and undeveloped, as well as in Japan which is not economically integrated with other countries to the same degree as the European countries.

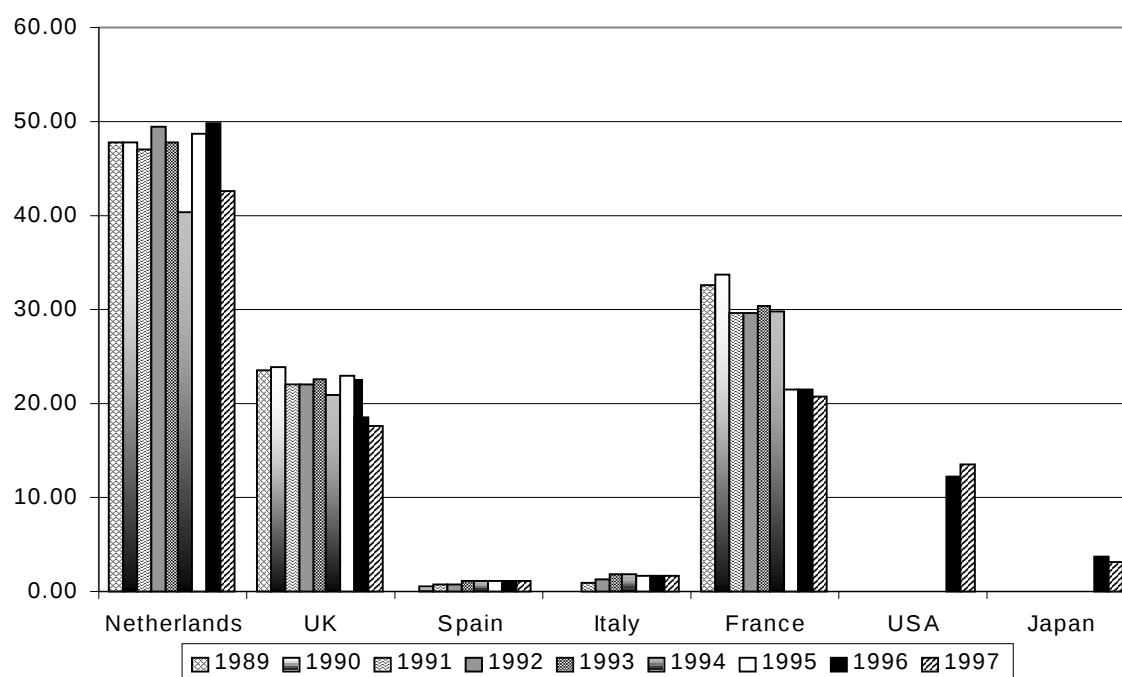


Figure 2.7: No. of foreign Companies to Total no. of Companies Listed on National Securities Markets.

European data calculated from European Stock Exchange Statistics, Annual Report 1990-1997.
Data for US and Japan calculated from International Federation of Stock Exchanges Statistics.

2.4 Differences still persist

The above analysis shows that even though there are reminiscences of two distinctive types of financial systems, it is becoming increasingly more difficult to divide national financial systems into two main categories according to their orientation towards either market transactions or bank credit based on quantitative statistics alone: Both means of raising funds are present in all countries, and there are tendencies of increasing importance of credit in traditional market based systems, and increasing importance of market transactions in traditional credit based systems.

In relation to innovation the set-up of the financial system determines important parts of the framework conditions for innovation financing. The macro conditions affect the micro behavior, thus the set-up of the financial system influences the behavior in relation to investment in innovation. One factor that is often mentioned as crucial for innovation investment is the exit possibilities for early stage investors. If early stage investors do not have a possibility of pulling out of their investments when a more mature phase is reached, it has two possible effects: Funds that could otherwise have been moved into other seed-investment projects are “occupied”; and the willingness to engage in early stage investments in the first place may be effected in a negative direction, if the investor has very few possibilities of exit, and thus only have the

option of engaging in a long-term commitment. A developed market for both listed and unlisted securities is traditionally perceived as one of the best guarantees for exit possibilities. On the other hand, close and stable relations between borrower and lender in a credit based system have been praised for making e.g. banks more willing to engage in long-term credit provision for uncertain projects. Thus even though it is not possible a priori to determine whether a market system is “better” than a credit based system in relation to innovation financing, the two types of systems provide quite different frameworks for innovation financing.

Even though the distinction between market and credit based systems is becoming increasingly more blurred differences still occur, and internationalization has not lead to a total integration of financial markets across borders. And a one-sided movement by the credit based systems towards the American and British type of system cannot be observed, it is rather a case of both types of systems increasing their use of financing means characteristic of their counterpart. In light of possibilities for innovative firms to have their investment plans financed, the crucial question is then whether the convergence process has enhanced the merits of each of the two systems. That is, has e.g. long term commitment increased in market based systems, and have exit possibilities improved in credit based systems? In order to fully answer this question, further - both quantitative and qualitative - data generation is needed, which is beyond the limits of this paper.

Even though there are signs of convergence between national financial systems in quantitative statistics, this cannot be perceived as the total picture of the development of the national financial systems though.

An illustration of qualitative institutional differences is the venture capital industry in Japan, which appear to engage heavily in lending. Actually much of what is characterized as venture capital in Japanese statistics is long term debt. This illustrates that even though the statistics on financial systems show convergence between nations, there may still be differences in the *functioning* of financial markets and financial systems. Even equity organizations in credit-based financial systems may have features stemming from the nature of the credit-based financial system. The reasons why differences still occur are discussed in the following section.

3. Explaining the Differences

Above we have shown that differences between financial systems diminish although they are still there. But we have not explained neither why the differences seem to be still smaller nor why they have not completely disappeared in the past decade. This section attempts to answer these questions.

3.1 Reasons for Convergence

A number of scholars have pointed to the fact that financial systems converge and many claim that they will continue to do so. Arguments for this point of view are based on the trend towards internationalization in general. That is, it is claimed that information technologies render the opportunities for financial institutions to do their trade more or less borderless and around the clock. In addition, the information technology facilitates the introduction and use of financial innovations which often come about as a reaction to regulations.

Very often it is claimed that deregulation is a major force behind convergence. However, careful studies of the development in regulations suggests that what has happened is rather a re-regulation. This means that some regulations have disappeared but others have emerged. In other words a reshuffling of the areas subject to regulation has taken place. In general quantitative controls have been relaxed and the focus of government intervention is now more on support of markets and price setting. This has increased competition at the same time as government intervention has increased (see e.g. Vogels (1996)). Deregulation in itself can therefore not explain convergence.

A second argument for why financial systems converge is the growth of multinationals. These firms are able to reshuffle their capital between divisions and raise capital on financial markets abroad (cf. the increasing amount of cross-border credits displayed in figure 2.7). Some of them even issue their own commercial papers. The growing importance of these multinationals relative to the total capital contribute to wipe out differences between financial systems and make financing sources for these firms more global.

Thirdly, not only the cross-border trade with physical products and related monetary transfers have increased. Especially the pure monetary transfers have increased. One of the reasons

behind this trend is a general increase in risk and a derived wish to use hedging instruments and to diversify portfolios on assets in several countries. The possibilities of this have been facilitated by the development of information technologies.

Finally, it should be mentioned that entry of foreign financial institutions has increased in a long time perspective. This trend has though been more or less intense depending on the part of the financial sector and time period in question. The insurance companies have managed to establish retail networks in many countries as opposed to the mortgage business. The banking sector has tried an internationalisation process but has withdrawn these activities in the first half of the 1990s. Now it seems as if a number of banks are trying again although this is mainly in whole sale international financial services. International expansion in retail financial services is very limited as explained in further detail in the next section.

3.2 Reasons for Divergence

Differences between financial systems today may be explained by factors related to both the quantitative character of the society of which the financial system is a part but also to the nature of the financial system itself. As illustrated above there are still differences between nations although these have diminished. One indication is that there are enduring, significant interest rate differentials between nations⁶. In the following we shall discuss some explanations to why there are differences. These explanations will not so much be related to the specific nations although we recognize there may be specific events in the nations which are important in such an explanation⁷.

6

For example, differences in interest rates between the U.S. and Japan has in 1996 and 1997 been fairly constant at approximately 3½ pct.points.

7

In the historical evolution of financial systems we may find explanations to why the systems are structured the way they are today. For example, in a long-term historical perspective the industry in both the U.S. and the U.K. were more interlinked with banks than nowadays. However, the Glass-Steagall Act in the U.S. in 1933, following the Wall Street collapse made American banks much less involved with firms. Similarly, the British banks desisted from long-term lending to industry after the collapse of some of the major banks in the 1870s. This historical explanation to why systems differ could be expanded. Thus, not only single events but also less visible, cultural differences are important. History matters in the shaping of these differences. This is however, not the place to make such an expansion. In this paper we are primarily concerned with the *development* of the systems during the past 10-15 years.

Some of the most important reasons why there are limits to the convergence process are the following. First of all there are hindrances to a physical establishment of financial institutions abroad. These hindrances include entry costs (building up reputation, knowledge about tax system, legislation and customers) - costs that are substantial for banks in foreign markets - especially in small markets. In particular, customers confidence in foreign banks has proven to be smaller than in a domestic bank. This links to another hindrance which is the funding of the financial institution. Most often access to first order savings are restricted for foreign banks who then have to rely on funding in their home market.

Furthermore, in some countries the structural characteristics of the national industry may be a barrier for foreign banks. For example, a relatively large number of small and medium sized firms mean high costs on monitoring and credit judgement compared to the volume of lending. Furthermore asymmetries in information is likely to be higher when operating in new, foreign markets. Finally, an increasing number of firms wants non-standardized services. Industrial finance is thus both labour-intense and is subject to severe limits to produce the services in a standardized, central manner. This in turn limits the crowding-out of small, national financial institutions by large, internationally active institutions (Vitols, 1995, p.26).

Related to this argument it is likely that differences between nations in their modes and structures of production will mean differences in demand for types and/or amount of capital. For example, demand for capital may be determined by the relative importance of firms who are capital or labour intensive, knowledge based, or if they are based in industries where physical assets can be made liquid and therefore used as collateral.

A very important reason is that - in spite of deregulation of some areas of economic activity and harmonization - regulation of certain areas of the financial systems continue to be national. Thus, Vitols (1995, p.6) list four areas where the state maintains significant regulatory discretion:

- 'the regulation of corporate governance, which involves the relationship between financial institutions and non-financial companies;
- the regulation of household savings, which affects financial institutions' and non-financial companies' access to funds;

the regulation of financial sector internal governance, which affects the goals and capacities of financial institutions; and

the regulation of special-purpose credit institutes, which influences the risk profiles faced by financial institutes or allow the state to directly allocate resources to the non-financial company sector'.

It seems fair to conclude that even if the data in chapter 2 indicate convergence of financial systems, then there are reasons to believe that there are limits to this process. Moreover, conclusions at a very aggregate level needs to be modified. Thus, there are different segments of financial markets, each of them subject to different degrees of internationalisation. It seems as if wholesale markets with universally tradeable securities are largely international, although generally mostly accessible by large firms and governments. These globally traded financial products include foreign exchange (included various hedging instruments), large corporate loans, stock and bond trading, major corporate insurance risks and commodity trading (Morgan and Knights, 1997, p.6). Although these financial markets are often referred to as “global” they are only truly global in one sense of the word, that is prices are set at a global scale and all financial institutions may participate in the market place. But they are not global in geographical terms. In fact, these markets are largely confined to only a few market places, notably London, New York and Tokyo, secondarily Paris and Frankfurt.

Retail markets, on the other hand, persist to be national. This has been discussed above: regulations, distribution patterns and consumer habits vary between countries. In particular the latter explanation - consumer habits - is powerful. This is exemplified by the fact that The European Union has provided legislation for financial institutions to operate on equal terms in markets abroad. However, only a few financial institutions have become truly international in retail financial services.

3.3. Regulation of Financial Systems

A further aspect of regulation is how efficient regulation is in the first place. Seen from a policy perspective it is of utmost importance to what extend regulation is able to change financial systems. Opinions on this issue differ a lot and has done so for long. Thus, Cox (1986, p.14-15) argues that truly, as Zysman (1983) pointed out, governments have to recognize that the

structure of financial systems is a constraint on implementation of policies. The scope of possible policies is limited by the existing institutional set-up of financial systems and policies that are not compatible with this set-up are likely to render disfunctional political conflicts and failure of industrial policy. This allow us to some extent to understand the relative economic successes of post-war Japan, Sweden, France and West Germany. As Cox mentions

"These countries have fashioned policies which have not challenged the structure of the financial system. Other countries - Britain in particular - have attempted to implement industrial policies without the requisite financial structure of controls to facilitate a positive state role, and this has led to disfunctional and economically wasteful political conflict." (ibid., p.14)

But Zysman and Cox do not agree on a fundamental causality in this regard. Whereas Zysman argues that for instance France and Japan have state-led economies due to their credit based, government influenced financial systems, Cox reverses the argument. In his view the credit based, government influenced financial systems in Japan and France are results of a deliberate choice to have state-led economies. The U.S. and the U.K. have capital market systems because they choose not to be state-led economies.

Probably the truth is somewhere in between these arguments. The financial system should not be viewed as an immutable, constraining entity. Governments have scope for changing financial systems and adjust financial institutions to industrial policy rather than adjusting policies to the structures of financial systems. But, on the other hand, such a change does not take place over night. Financial systems have grown in importance relative to the rest of the economy in most of the western economies, and the private part of the financial markets has grown relative to the central banks. In addition, financial systems have become more interrelated than hitherto was the case. Both these facts give a certain inertia in changing financial systems.

Furthermore, this inertia is enhanced by a financial system lock-in effect. This effect has to do with the development of competence and division of labour within financial institutions. If a certain kind of transaction frequently occurs in one type of system, competences and economies of scale in undertaking this transaction will improve further, enhancing competitiveness in that

particular business. Implementing policies that requires new kinds of transactions may be costly because it takes time to build competence in undertaking these transactions efficiently.

Having said this about regulation it is clear that national regulation and legislation differ widely. These differences have important implications for division of labour between financial institutions, for the possibilities of exercising corporate control, for their concentration, capital-reserve requirements and consequently for their industrial investments. In general the capital market oriented financial systems, notably the U.S., impose the most extensive restrictions on banking. The U.K. have a number of restrictions on the market for corporate control. It may sound a bit paradoxical that market oriented systems have such extensive regulations but it reflects that a well-functioning "pure" market requires the establishing of well-defined rules of the game. The Japanese banking sector is also heavily regulated - probably even more regulated than the U.K. banks.

Deregulation may really have negative effects on the financing of corporate investments, but deregulation may also be an advantage. It depends on the specific type of regulation and the specific area which is regulated. As already mentioned regulations exist on how much financial institutions are allowed to be involved in industrial firms. Experience from Germany with universal banking and heavy involvement of banks in non-financial enterprises are of course not completely paritive, but nevertheless it has been claimed throughout the literature that this experience indicates that borrower-lender relationships are enhanced, which in turn may facilitate financing of industrial firms, in particular these cases where assessment of the management team and the future prospects of the firm is essential because collateral cannot be provided, or because assessment of the intangible investments in the firm is relatively difficult without knowing the firm in more detail.

Thus, the ability of German financial institutions to provide firms with long-term debt financing is beyond question. However, there is research indicating that this may be ascribed not only to the nature of the relationships between banks and non-financial enterprises but also to the

regulatory framework.⁸ It has been shown that the German banking system is in fact, strictly regulated but regulated differently than in other countries. It has been debated in the US how the US regulation of ownership and banking could be relaxed and it has been claimed that the German banks lack regulations. On the contrary, the German financial sector is heavily regulated through other regulatory mechanisms than the traditional interest rate controls and financial market segmentation. A prudential, uniform regulation with clear quantitative standards have privileged banks and limited price competition. This in turn, has contributed to financial stability and long term investments (Vitols, 1995/308). In most other countries pension funds and other institutional investors are not allowed to, or limited in, holding a substantial equity stake in non-financial enterprises and they are criticized for being too short termed in their investment policy. Deregulation in such areas may be a step forward with respect to financing long-term investments. Additional explanations relate to the fact that nations differ in the diversification of financial institutions, concentration of capital, the structures of industry and the openness of the economy.

Although we believe that the factors pointed to above are important driving forces in the dynamics of financial systems, then the set of explanations provided here are not giving us the full picture for all countries. To explain the institutional set-up of a single country it is necessary to be much more specific.⁹ A further differentiation of type of transaction and type of firm to be financed is needed.

4. Financing Different Types of Transactions

4.1. Introduction

In this section we discuss some principle modes of functioning of the financial systems and their ability to finance different kinds of investments. We thus turn from a mainly structural

8

Vitols (1995/308) claims that the regulatory framework is more important than the nature of the relationships in this respect. On the other hand it is likely that these two explanations are intertwined.

9

Knights and Morgan (eds., 1997) is one recent collection of articles describing a number of national financial systems.

comparison of financial systems to a view emphasizing the capacity of different financing sources to finance different types of transactions.

More specifically, we discuss what financing mechanisms are better at financing one-time, standard transactions versus more discretionary transactions. In table 2.1. we listed some of the major financing instruments in a typology of financial systems. In the following we discuss the internal finance, financing through intermediaries and financing through markets.

This discussion is used to apply the considerations in chapter 3 and this one closer to the case of innovation financing rather than financing investments in general.

4.2. A Micro-view on Financing Different Transactions

When the financing process concern an uncertain activity agents take appropriate measures to reduce or compensate for the uncertainty in advance. Thus, while making a contract initial uncertainty on what is to follow is substantial. But recognizing that the contract is "incomplete" at the outset, in the sense that not all possible future states of nature are taken into account, makes agents ensure that contracts can be adapted to changing conditions.

The purpose of investment determines the degree of incompleteness of contracts and the likely needs for ex post adjustments. For example, the degree of asset specificity has an impact on whether there is a secondary market for the assets and consequently how worthy they are as collateral. The increasingly large proportion of human capital in production is one example of such specific assets which will induce a high degree of discretionary contracting. Another example is the one-time type of transaction. A third example is innovations, especially more radical innovations.

If a certain type of transaction occurs frequently, the skills to evaluate its likely outcome cost effectively are often available or are generated over time, while the unfamiliar kinds of transaction may incur greater costs for screening and monitoring than anticipated (Neave, 1991, p.27). Learning by doing is, in other words, important as a means of reducing costs in transactions in that some kinds of transactions may be subject to standardization of screening

techniques while other, less frequently occurring transactions, like financing of innovations, may need discretionary treatment.

Whether one or another kind of transaction is regularly occurring or not depends on the specific institutional surroundings. The traditions and production structure of the national industry are thus contributing to what are the most common kinds of transactions. Financiers are likely to be reluctant to enter unfamiliar transactions unless they are relatively certain on the outcome or, the outcome seems to be well over average. Competition may force financial institutions to minimise operating costs and this is mainly possible in familiar transactions¹⁰.

Capabilities to handle these different kinds of transactions differ according to which type of financing mechanism is chosen. In general, the more transactions are characterized by uncertainty and discretion then the more screening and monitoring capabilities are needed (Williamson, 1988). Vice versa frequently occurring standard transactions under risk need limited screening and monitoring, and learning effects are reduced to a minimum.

The *market based* way of financing implies the least developed governance capabilities as continuous supervision is difficult when buyers and sellers in the market are anonymous and dealing on a once and for all basis. The standardized way of trading and the small amount of screening and monitoring possibly make the market way of financing superior in terms of costs. Calculable, homogeneous and simple forms of transactions are thus channelled through this market.

In contrast, financing by *intermediaries* or *internal* financing provides greater capabilities for learning and ex post adjustment of the incomplete contracts resulting from uncertainty. In an intermediary or internally in an organization both initial screening procedures and subsequent

10

Another strategy is to specialize in order to screen only a few types of transactions and to accumulate knowledge in this special activity within the organization.

monitoring and reporting requirements are more thorough than in the corresponding market governance mechanism.¹¹

Arguments on relationship banking vis a vis arms-length financing in the literature thus points to fundamental differences in these two financing mechanisms ability to support different kinds of transactions.

In summation, the preliminary conclusion from the above is that intermediaries or internal financing are the most relevant mechanisms of financing when investing in discretionary investments like innovations because they are better capable dealing with uncertainty compared to the market way of financing. However, it matters if the innovation in question is radically new or if its a minor change, and it matters if the innovation is based upon intangibles which are visible for the market or if it requires a more detailed knowledge of the investments in the firm (marketing and tooling-up expenses are examples of innovation costs which are difficult to assess whereas R&D-expenditures is more visible to the business analyst).

In industries such as pharmaceuticals R&D is a large share of innovation costs and radicality is often high, which means that prior knowledge of establishments is at best sparse. It may even be argued that it is advantageous if there are no established routines of financing such ventures as conservatism may be particular damaging towards such major shifts in technology. Well-established screening and monitoring capabilities could thus tend to be hostile to financing more radical, new innovations. Thus, it could be argued that to the market based financing mechanism do not produce rigidity in financing new start-ups based on high technology. In contrast, credit-based financing is better suited for financing innovations in industries such as mechanical engineering where innovation costs is more integrated with other production costs, and therefore less visible. The market based countries, the U.S. and the U.K., are strong in pharmaceuticals, whereas Japan, Germany and Sweden are strong in mechanical engineering.

11

In principle differences between the intermediary way and the internal way of financing are smaller than those between markets and intermediaries. However, there is a difference, mostly a matter of degree, between capabilities for continuously monitoring. Another difference is that opportunistic behaviour is less likely to occur and presumably is less costly when it does. Finally, internal financing rules out any legal problems connected to ex post adjustment.

However, this conclusion is too general, and may produce odd results if standing alone. For example, venture capital institutions are often said to undertake thorough screening and monitoring of firms. However, venture capital is common exactly in countries with a market based financial system (U.K., U.S., Netherlands). Explaining this seemingly paradox must take three things into account. First, the proportions of the financial systems are important. Thus, in all countries venture capital firms finance only a fraction of investments. Secondly, the actual behaviour of financial institutions is important. Although quantitative information on the different systems may reveal certain differences (an issue dealt with in section 2) it may be that the qualitative aspects of the financial institutions modify the picture. Thirdly, it is important to stress that there are complementarities between the two ways of financing. Financial institutions like venture capital firms, may help the firm to grow to a stage where market based financing becomes relevant. In other words both market-based and credit-based financing mechanisms co-exists in each nation and seen in a dynamic perspective they are often both part of a firms financing sources. The specific combination of markets and institutions is a result of the historical evolution of e.g. the financial regulation, production structure, division of labour between financing mechanisms.

In addition, some of the drawbacks of close relationships should be pointed to:

From the *point of view of society* one could ask: If closer relationships were induced by increased equity participation in industrial firms by financial institutions (cf. the German model, where banks are allowed to hold large equity stakes in firms and the influence on these firms is particular large and enhanced by the proxy vote system), would, then, the overall fragility of the financial system increase as a result? Some observers claim so. Another disadvantage of such relationships could be an increased concentration of economic power which may be politically undesirable. It could also be argued that most likely this step would require an increased number of bank supervisors and administration.

One could also ask if well-established relationships prevent an optimal allocation of capital? If some of the lending is more or less automatically directed to the firms inside established relationships, then the capital may be scarce for firms outside such relationships, which alternatively might have grown into more successful firms and rendered more employment. This may also have consequences for the build-up of competencies. In a volatile industrial

environment it is necessary to have a feeling for possible directions of change. However, if financial institutions spend many of their resources on maintaining old relationships it may be that they lose the insight in recent trends in production outside these relationships and this may harm the evolutionary viability of the industry. This has exactly been the traditional arguments why the U.S. financial system may be able to finance new, risky ventures in spite of its mainly market based character.¹²

5. Conclusions and Policy Perspectives

A central theme in the above discussion has been the ability of financial systems to enhance processes at a micro-level, which are beneficial for innovation financing. More specifically it has been argued that the intrinsic uncertainty in innovations, the importance of interactive learning processes and the tacit knowledge in innovation, points to the need for some degree of relationship banking. Similar arguments have been put forward previously. For instance Colin Mayer (1988, p.1183) claimed that

"The distinctive feature of successful financial systems is their close involvement in industry. A primary characteristic of a market based system is an arm's length relation between investor and firm. There are well documented exceptions, but the basic requirement of a market, that investors be treated equally, acts against the close involvement of any one party. ... The fundamental challenge that faces any institution or government that can affect the practice of finance is to encourage the emergence of closer relationships and to direct the wealth of talent that has now been concentrated in British financial institutions into direct participation in corporate activities. In the process, the apparent attractions of intensifying competition in financial markets may have to be resisted. The benefits of competition may only be attained at the expense of longer term economic prosperity."

Also some recommendations for changing the U.S. financial system go in this direction. For example, a two-year research project by 25 leading U.S. experts pointed to removal of

12 Another explanation could be that business angels finance a substantial part of such new ventures. Financing by business angels is very much hands-on and non-market ways of financing, but it may be an important financing source before the firm is ready for market-based financing.

restrictions on ownership in general, and more specifically it was suggested that restrictions should be removed on joint ownership of debt and equity. Thus, financial institutions should according to this suggestion, be allowed to hold equity for investment purposes in companies to which they provide debt financing (Porter, 1992). It was furthermore suggested that interactions between capital providers and firms are not productive and should be improved:

“Current interactions between institutional investors and managements are too often cat-and-mouse games played around guessing next period’s earnings. What is needed instead are substantive discussions about the long-run competitive position of the company.” (Ibid., p.80)

However, it could be questioned if deficiencies in the financial systems such as short-term pressures on investments, should justify systemic changes. For example, could interaction between borrowers and lenders be enhanced within the institutional and regulatory framework, or are these interactions too dependent upon the general institutional framework?

It is a key argument in the section on driving forces behind convergence/divergence of financial systems, that demand for capital is determined in part by the structure and development of production. This means that the divergence in modes of production may limit convergence of financial systems, vice versa convergence in production may also enhance convergence of the financial systems. However, the convergence of financial systems without links to development of production, is in the long run likely to render dysfunctional financial systems, at least seen from the perspective of financing innovation.

Therefore a universal best practise may not exist as different financing mechanisms are suitable for different types of transactions and firms in different countries. We therefore also argue that it is important to have a differentiated view on financial systems. Generalizations of the ability of financial systems to finance innovations are likely to render conclusions which are too naive. Instead it is important to recognize that some types of investments for example innovations are best supported financially in one way and others by means of different financing types.

It should also be noted that financial systems are diverse. Not only are some of the qualitative features of financial systems hidden in the general statistics as explained in section 2. Also there are features of financing industrial development usually found in credit-based financial systems that exists in market-based systems. For example, some firms in the U.K. have close relationships to one bank, who also see financing that customer as a long-term commitment to support the firm also in times of crises. Vice versa some financial institutions in the credit-based systems (notably pension funds) act more or less as a one-off relationship (traders in shares rather than investors) and banks seek to lend only against collateral rather than the future prospects of the firm and the abilities of the management team.

This behaviour tend to vary over time. For example, banks in Denmark intensified the relationships to firms from the mid-1980s to beginning of 1990s, partly as a result of fierce competition. But huge losses in the banking sector in general (something not specific to Denmark) made many banks change strategy from relationship banking towards more one-off based transactions. This change in strategy was particularly in the small firms segment who experienced increased requirements to collateral and worse personal service in the bank. Consequently the firms began to “shop around” to a larger extent.

The fact that recent studies of innovation activity show that innovation is very different across different size groups and in particular across sectors put more macrooriented policies within this area into perspective. Seen from the perspective of innovation financing the arguments above points to the need for a much more disaggregated policy where for example sectoral differences in innovation processes - and different needs for financial support - are taken into account. This point is reinforced if we adopt the argument above that market-based financial systems have merits in financing high-tech, radically new ventures, whereas credit-based systems may be more suitable for financing continuous, incremental innovations. At a sectoral level the differences could be said to be the ability of market-based systems to stimulate the upspring of new sectors in contrast to the ability of credit-based systems to restructure and strengthen existing sectors. On the other hand it indicates that policies at an EU-level could be difficult should there be a policy for all European firms regardless of the location and type of firm.

Having said this we should recall that determining exactly what is the need for policies is not possible ex ante. But policy makers nevertheless put up both regional, national and super-national programmes for supporting innovation financially. It is widely held in policy circles that there is a market failure with respect to equity finance for small, innovative firms and that some level of effort is necessary. Thus, in The Green Paper of The Commission actions are proposed at both National and Community level. At the national level it is proposed to develop mechanisms for innovation risk insurance especially for technology based firm and encouraging banks to provide long-term loans, including equity loans and to establish partnerships with expert bodies in appraising innovation projects, i.e. expanding the banks competence in relation to innovation financing. Also the need for promoting informal venture capital is included in the proposals by the Commission. The development of stock markets, both national and pan-European, is to be facilitated through directives removing remaining obstacles. Finally different types of funds are suggested at the Community level. On the macro policy level, appropriate fiscal treatments of investments, tax reliefs etc. is recommended (p. 42-4).

The Commission acknowledges that the answer to the innovation financing problem is not to be found in either a credit based or a market based financial system, but that both types of finance has to coexist in order to provide the necessary institutional variety. We hope to have illustrated that many things remain to be done not only in terms of further research but also in terms of policy actions. In spite of problems with identifying the optimal level of intervention surveys generally show a persistent finance gap, especially for innovative firms in seed and early stages, which is likely to have severe hampering effects on industrial development. This emphasize the importance of actions directed towards closing this particular gap. This paper has pointed to some general guidelines for both research and policies. It has particularly emphasized the relationship between the macro- and the microaspects of the problem.

6. References

Bannock, G. (1995): "The economics and politics of corporate and informal venture capital", paper for EIMS workshop on innovation financing, Luxembourg, December 1995.

Christensen, J. L. (1992a): "The Role of Finance in National Systems of Innovation", in Lundvall (ed.): National Systems of Innovation, London, pp. 146-168.

Christensen, J. L. (1992b), "The Role of Finance in Industrial Innovation - Aspects of financial systems, Aalborg, Institute of Production, Aalborg University.

Christensen, J. L. (1997): "Financing Innovation", TSER, European Commission

Cox, A. (1986): "The state, finance and industry", St.Martins, New York.

Dosi, G. (1990): "Finance, Innovation and Industrial Change", JEBO.

European Commission (1995): "Green paper on innovation".

Gregersen, B. and B. Johnson (1997): "European Integration and National Systems of Innovation", TSER-report for the European Commission

Hubbard, R. G. (1990): "Asymmetric information, corporate finance, and investment", Chicago.

Llewellyn, D. T. (1990): "Competition and regulation: Trends in financial systems", Penning- & Valutapolitik, Nr. 4.

Mayer, C. (1988): "New issues in corporate finance", European Economic Review 32, pp. 1167-1189, North-Holland.

Mayer, C. (1990): "Financial Systems, Corporate Finance and Economic Development", in Hubbard (ed.): "Asymmetric information, corporate finance, and investment", Chicago.

Morgan, G. and D. Knights (eds.) (1997): "Regulation and Deregulation in European Financial Services", Macmillan Business.

Neave, E. H. (1991). "The Economic Organisation of a Financial Systems", Guildford, Routledge.

OECD (1993), "National Systems for Financing Innovation", Paris, OECD.

OECD (1996), "Financing Innovation and the role of venture capital", Paris, OECD.

Porter, M.E. (1992): "Capital Disadvantage: America's Failing Capital Investment System, Harvard Business Review, September-October.

Prakke, F. (1988): "The Financing of Technological Innovation" in Heertje (ed.) (1988), "Innovation, Technology and Finance", Blackwell.

Williamson, O. E. (1988): "Corporate finance and corporate governance", The Journal of Finance, Vol. 43, No. 3, July.

Vitols, S. (1995): "Financial systems and industrial policy in Germany and Great Britain: The limits of convergence", WZB Working paper no. 311, nov.

Vitols, S. (1995/308): "Are German Banks Different?", WZB discussion paper.

Vogel, S. K. (1996): "Freer Markets, More Rules", Cornell University Press.

Zysman, J. (1983): "Governments, Markets and Growth - Financial Systems and the Politics of Industrial Change", Cornell University.

Zysman, J. (1995): "National Roots of a "Global" Economy", Revue d'économie Industrielle, No. 71.

Danish **R**esearch **U**nit for **I**ndustrial **D**ynamics

The Research Programme

The DRUID-research programme is organised in 3 different research themes:

- *The firm as a learning organisation*
- *Competence building and inter-firm dynamics*
- *The learning economy and the competitiveness of systems of innovation*

In each of the three areas there is one strategic theoretical and one central empirical and policy oriented orientation.

Theme A: The firm as a learning organisation

The theoretical perspective confronts and combines the resource-based view (Penrose, 1959) with recent approaches where the focus is on learning and the dynamic capabilities of the firm (Dosi, Teece and Winter, 1992). The aim of this theoretical work is to develop an analytical understanding of the firm as a learning organisation.

The empirical and policy issues relate to the nexus technology, productivity, organisational change and human resources. More insight in the dynamic interplay between these factors at the level of the firm is crucial to understand international differences in performance at the macro level in terms of economic growth and employment.

Theme B: Competence building and inter-firm dynamics

The theoretical perspective relates to the dynamics of the inter-firm division of labour and the formation of network relationships between firms. An attempt will be made to develop evolutionary models with Schumpeterian innovations as the motor driving a Marshallian evolution of the division of labour.

The empirical and policy issues relate the formation of knowledge-intensive regional and sectoral networks of firms to competitiveness and structural change. Data on the structure of production will be combined with indicators of knowledge and learning. IO-matrixes which include flows of knowledge and new technologies will be developed and supplemented by data from case-studies and questionnaires.

Theme C: The learning economy and the competitiveness of systems of innovation.

The third theme aims at a stronger conceptual and theoretical base for new concepts such as 'systems of innovation' and 'the learning economy' and to link these concepts to the ecological dimension. The focus is on the interaction between institutional and technical change in a

specified geographical space. An attempt will be made to synthesise theories of economic development emphasising the role of science based-sectors with those emphasising learning-by-producing and the growing knowledge-intensity of all economic activities.

The main empirical and policy issues are related to changes in the local dimensions of innovation and learning. What remains of the relative autonomy of national systems of innovation? Is there a tendency towards convergence or divergence in the specialisation in trade, production, innovation and in the knowledge base itself when we compare regions and nations?

The Ph.D.-programme

There are at present more than 10 Ph.D.-students working in close connection to the DRUID research programme. DRUID organises regularly specific Ph.D-activities such as workshops, seminars and courses, often in a co-operation with other Danish or international institutes. Also important is the role of DRUID as an environment which stimulates the Ph.D.-students to become creative and effective. This involves several elements:

- access to the international network in the form of visiting fellows and visits at the sister institutions
- participation in research projects
- access to supervision of theses
- access to databases

Each year DRUID welcomes a limited number of foreign Ph.D.-students who want to work on subjects and projects close to the core of the DRUID-research programme.

External projects

DRUID-members are involved in projects with external support. One major project which covers several of the elements of the research programme is DISKO; a comparative analysis of the Danish Innovation System; and there are several projects involving international co-operation within EU's 4th Framework Programme. DRUID is open to host other projects as far as they fall within its research profile. Special attention is given to the communication of research results from such projects to a wide set of social actors and policy makers.

DRUID Working Papers

- 96-1 **Lundvall, Bengt-Åke:** The Social Dimension of the Learning Economy. (ISBN 87-7873-000-7)
- 96-2 **Foss, Nicolai J.:** Firms, Incomplete Contracts and Organizational Learning. (ISBN 87-7873-001-5)
- 96-3 **Dalum, Bent and Villumsen, Gert:** Are OECD Export Specialisation Patterns Sticky? Relations to the Convergence-Divergence Debate. (ISBN 87-7873-002-3)
- 96-4 **Foss, Nicolai J:** Austrian and Post-Marshallian Economics: The Bridging Work of George Richardson. (ISBN 87-7873-003-1)
- 96-5 **Andersen, Esben S., Jensen, Anne K., Madsen, Lars and Jørgensen, Martin:** The Nelson and Winter Models Revisited: Prototypes for Computer-Based Reconstruction of Schumpeterian Competition. (ISBN 87-7873-005-8)
- 96-6 **Maskell, Peter:** Learning in the village economy of Denmark. The role of institutions and policy in sustaining competitiveness. (ISBN 87-7873-006-6)
- 96-7 **Foss, Nicolai J. & Christensen, Jens Frøslev:** A Process Approach to Corporate Coherence. (ISBN 87-7873-007-4)
- 96-8 **Foss, Nicolai J.:** Capabilities and the Theory of the Firm. (ISBN 87-7873-008-2)
- 96-9 **Foss, Kirsten:** A transaction cost perspective on the influence of standards on product development: Examples from the fruit and vegetable market. (ISBN 87-7873-009-0)
- 96-10 **Richardson, George B.:** Competition, Innovation and Increasing Returns. (ISBN 87-7873-010-4)
- 96-11 **Maskell, Peter:** Localised low-tech learning in the furniture industry. (ISBN 87-7873-011-2)
- 96-12 **Laursen, Keld:** The Impact of Technological Opportunity on the Dynamics of Trade Performance. (ISBN 87-7873-012-0)
- 96-13 **Andersen, Esben S.:** The Evolution of an Industrial Sector with a Varying Degree of Roundaboutness of Production. (ISBN 87-7873-013-9)

- 96-14 **Dalum, Bent, Laursen, Keld & Villumsen, Gert:** The Long Term Development of OECD Export Specialisation Patterns: De-specialisation and “Stickiness”. (ISBN 87-7873-014-7)
- 96-15 **Foss, Nicolai J.:** Thorstein B. Veblen: Precursor of the Competence-Based Approach to the Firm. (ISBN 87-7873-015-5)
- 96-16 **Gjerding, Allan Næs:** Organisational innovation in the Danish private business sector. (ISBN 87-7873-016-3)
- 96-17 **Lund, Reinhard & Gjerding, Allan Næs:** The flexible company Innovation, work organisation and human resource management. (ISBN 87-7873-017-1)
- 97-1 **Foss, Nicolai J.:** The Resource-Based Perspective: An Assessment and Diagnosis of Problems. (ISBN 87-7873-019-8)
- 97-2 **Langlois, Richard N. & Foss, Nicolai J.:** Capabilities and Governance: the Rebirth of Production in the Theory of Economic Organization. (ISBN 87-7873-020-1)
- 97-3 **Ernst, Dieter:** Partners for the China Circle? The Asian Production Networks of Japanese Electronics Firms. (ISBN 87-7873-022-8)
- 97-4 **Richardson, George B.:** Economic Analysis, Public Policy and the Software Industry. (ISBN 87-7873-023-6)
- 97-5 **Borrus, Michael & Zysman, John:** You Don’t Have to Be A Giant: How The Changing Terms of Competition in Global Markets are Creating New Possibilities For Danish Companies. (ISBN 87-7873-024-4)
- 97-6 **Teubal, Morris.:** Restructuring and Embeddedness of Business Enterprises-Towards an Innovation System Perspective on Diffusion Policy. (ISBN 87-7873-025-2)
- 97-7 **Ernst, Dieter & Guerrieri, Paolo:** International Production Networks and Changing Trade Patterns in East Asia: The case of the Electronics Industry. (ISBN 87-7873-026-0)
- 97-8 **Lazaric, Nathalie & Marengo, Luigi:** Towards a Characterisation of Assets and Knowledge Created in Technological Agreements: Some evidence from the automobile-robotics sector. (ISBN 87-7873-027-9)
- 97-9 **Ernst, Dieter.:** High-Tech Competition Puzzles. How Globalization Affects Firm Behavior and Market Structure in the Electronics Industry. (ISBN 87-7873-028-7)

- 97-10 **Foss, Nicolai J.:** Equilibrium vs Evolution in the Resource-Based Perspective: The Conflicting Legacies of Demsetz and Penrose. (ISBN 87-7873-029-5)
- 97-11 **Foss, Nicolai J.:** Incomplete Contracts and Economic Organisation: Brian Loasby and the Theory of the firm. (ISBN 87-7873-030-9)
- 97-12 **Ernst, Dieter & Lundvall, Bengt-Åke:** Information Technology in The Learning Economy – Challenges for Developing Countries. (ISBN 87-7873-031-7)
- 97-13 **Kristensen, Frank Skov.:** A study of four organisations in different competitive environments. (ISBN 87-7873-032-5)
- 97-14 **Drejer, Ina, Kristensen, Frank Skov & Laursen, Keld:** Studies of Clusters as a Basis for Industrial and Technology Policy in the Danish Economy. (ISBN 87-7873-033-3)
- 97-15 **Laursen, Keld & Drejer, Ina.:** Do Inter-sectoral Linkages Matter for International Export Specialisation? (ISBN 87-7873-034-1)
- 97-16 **Lundvall, Bengt-Åke & Kristensen, Frank Skov.:** Organisational change, innovation and human resource Development as a response to increased competition. (ISBN 87-7873-036-8)
- 98-1 **Præst, Mette.:** An Empirical Model of Firm Behaviour: A dynamic Approach to Competence Accumulation and Strategic Behaviour. (ISBN 87-7873-037-6)
- 98-2 **Ducatel, Ken.:** Learning and skills in the Knowledge Economy. (ISBN 87-7873-038-4)
- 98-3 **Ernst, Dieter.:** What Permits Small Firms to Compete in High-Tech Industries? Inter-Organizational Knowledge Creation in the Taiwanese Computer Industry. (ISBN 87-7873-039-2)
- 98-4 **Christensen, Jens Frøslev.:** The Dynamics of the Diversified Corporation and the Role of Central Management of Technology. (ISBN 87-7873-040-6)
- 98-5 **Valente, Marco.:** Laboratory for Simulation Development. (ISBN 87-7873-041-4)
- 98-6 **Valente, Marco.:** Technological Competition: a Qualitative Product Life Cycle. (ISBN 87-7873-042-2)
- 98-7 **Lam, Alice.:** The Social Embeddedness of Knowledge: Problems of Knowledge Sharing and Organisational Learning in International High-Technology Ventures. (ISBN 87-7873-043-0)

- 98-8 **Jørgensen, Kenneth M.:** Information Technology and Change in Danish Organizations. (ISBN 87-7873-044-9)
- 98-9 **Andersen, Esben Sloth:** Escaping Satiation in an Evolutionary Model of Structural economic Dynamics. (ISBN 87-7873-045-7)
- 98-10 **Foss, Kirsten:** Technological Interdependencies, Specialization and Coordination: A Property Rights Perspective on The Nature of the Firm. (ISBN 87-7873-046-5)
- 98-11 **Andersen, Poul H.:** Organizing International Technological Collaboration in Subcontractor Relationships. An Investigation of the Knowledge-Stickyness Problem. (ISBN 87-7873-047-3)
- 98-12 **Nymark, Søren:** Billeder af strategi i forandringsrige organisatoriske omgivelser: 3 cases fra DISKO studierne. (ISBN 87-7873-048-1)
- 98-13 **Andersen, Esben Sloth:** The Evolution of the Organisation of Industry. (ISBN 87-7873-050-3)
- 98-14 **Foss, Kirsten & Foss, Nicolai J.:** The Market Process and The Firm: Toward a Dynamic Property Rights Perspective. (ISBN 87-7873-051-1)
- 98-15 **Lorenz, Edward.** Societal Effects and the Transfer of Business Practices to Britain and France. (ISBN 87-7873-053-8)
- 98-16 **Ernst, Dieter.** Catching-Up, Crisis and Industrial Upgrading. Evolutionary Aspects of Technological Learning in Korea's Electronics Industry. (ISBN 87-7873-054-6)
- 98-17 **Kaisla, Jukka.** The Market Process and the Emergence of the Firm: Some Indications of Entrepreneurship Under Genuine Uncertainty. (ISBN 87-7873-055-4)
- 98-18 **Laursen, Keld.** Do Export and Technological Specialisation Patterns Co-evolve in Terms of Convergence or Divergence?: Evidence from 19 OECD Countries, 1971-1991. (ISBN 87-7873-056-2)
- 98-19 **Foss, Nicolai J.:** Firms and the Coordination of Knowledge: Some Austrian Insights. (ISBN 87-7873-057-0)
- 98-20 **Mahnke, Volker & Aadne, John Harald:** Process of Strategic Renewal, Competencies, and the Management of Speed. (ISBN 87-7873-058-9)

- 98-21 **Lorenzen, Mark:** Information, cost learning, and trust. Lessons form co-operation and higher-order capabilities amongst geographically proximate firms. (ISBN 87-7873-059-7)
- 98-22 **Lam, Alice:** Tacit Knowledge, Organisational Learning and Innovation: A Societal Perspective. (ISBN 87-7873-060-0)
- 98-23 **Lund, Reinhard:** Organizational and innovative flexibility mechanisms and their impact upon organizational effectiveness. (ISBN 87-7873-061-9)
- 98-24 **Christensen, Jesper Lindgaard & Drejer, Ina:** Finance and Innovation System or Chaos. (ISBN 87-7873-062-7)

Information for subscribers.

Subscription price for 1997 is 600 DKR (about 20 papers). The rate for single issues is 40 DKR. It is possible to make a commitment to an exchange of papers from related departments or research teams. All correspondence concerning the DRUID Working Papers should be send to.

Pernille Wittrup
Fibigerstræde 4
DK-9220 Aalborg OE
Tel. 45 96 35 82 65
Fax. 45 98 15 60 13
E-mail: druid-wp@business.auc.dk