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Christensen, Jesper Lindgaard; Drejer, Ina

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Finance and Innovation System or Chaos

DRUID Working Paper

*by
Christensen & Drejer*

March 1998



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1. Getting started¹

“My main conclusion is that we still do not know enough about the workings of national innovation systems to design effective policies for improving the flow of finance - and technology transfers - to SMEs. ...it may be that we should be promoting the role of intermediaries and brokers in the financing and technology transfer process, if research can identify effective means for doing so”. (Bannock, 1995, p.8)

The above is part of the conclusion made by one of the speakers at the EIMs workshop on Innovation Financing in Luxembourg, december 1995. It points out that more research is still needed in order to know how to improve financing of innovation in european nations. This is echoed in The Green Paper on Innovation from The Commission of december 1995 in which it is stated that

“The Community’s ability to innovate depends largely on the effectiveness of its innovation financing system.....Financing is the obstacle to innovation most often quoted by firms, whatever their size, in all Member States of the European Union and in virtually all sectors.....the results of SME surveys show that the European innovation financing system is full of holes,.....(p.28-29)

Thus, it is recognized that innovation financing is very important in promoting innovation. It is also pointed out that more research is needed to guide the policies. This expressed need is in contrast to the limited amount of research within the area. Although there has been some contributions (e.g. Prakke, 1988, Dosi, 1990, Christensen, 1992, OECD, 1993, 1996a) most of these are limited in scope and/or focus on a specific set of problems like the development of the venture capital industry.

There are several reasons for this deficiency. One is probably the intrinsic impossibility of estimating the optimal level of innovation financing. Financial institutions function as selection mechanisms by not financing projects assessed as not commercially viable. However, this assessment is an ex ante selection based on guesses about the future whereas the actual outcome is only possible to measure ex post. In other words there should be financial barriers to innovation but it is not possible to estimate to which degree there should be barriers. This impossibility mean that arguments for market failure and policy action towards correcting these failures are empirically shaky and therefore often based on deduction.

Another reason why studies on this issue are few is that it is rarely possible to separate the financing of innovation and financing of the firm as a whole. When financiers assess a project proposal they take into consideration what is the viability of all the activities (in some cases including possible other potential businesses of this potential customer like insurance) of the firm and not just the innovation project. This complicates studies of innovation financing.

Finally, one should also mention the lack of statistics. This goes not only for the limited information in the data we have on some of the areas relevant for innovation financing (like in different surveys of barriers to innovation) but also for what we have statistics for at all. There is no doubt, for instance, that the informal venture capital and the corporate venture capital is of great importance. However, we are not in a position to quantify the importance of these sources and the policies aimed at improving access to these sources are sparse.

¹ This paper builds on work done in a research project for The European Commission. It is part of a TSER-project called Innovation Systems and European Integration (ISE). A draft report is due by the end of february and is to be presented in Athens in march. Due to space limits this paper present selected issues from the work on the draft report. Likewise we have reduced the number of countries dealt with. We have also chosen to limit the amount of statistics in this presentation, mainly due to space limits.

Our ambition with the present study is to add to the existing pool of knowledge on innovation financing in a way that could contribute to the design of effective means of improving innovation financing.

We try to fulfill this ambition in the following way:

First, it is important to specify the institutional context of innovation financing. Different financial systems support different types of investments differently. We shall in our first analysis consider what types of interaction/transactions are promoted in each system. The process of European integration and the consequences for innovation has been investigated previously. Here we highlight some of the basic properties and changes of financial systems in the past ten years in order to investigate if there is a similar integration process with respect to financial systems. The general belief is that many European countries have moved towards the UK/US-mode of financial system. In other words there is a convergence trend of financial systems. We expect to get closer to the hard facts behind this belief. The hypothesis underlying the research is that the macro aspects and the micro aspects of the problem are interrelated. It matters for the interaction between borrower and lender what the institutional context is. This in turn has a great impact on innovation.

In order to arrive at some policy conclusions we then consider the scope for policies through discussion on how to change financial systems or in other words explanations to why national financial systems differ.

Third, 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.

Fourth, we shall embark on one specific institutional arrangement for innovation financing. At least in its original concept the venture capital industry is adequate for innovation financing. A closer look may reveal pros and cons of this solution.

As mentioned our agenda is to see the findings in relation to policy. Before going too far in policy recommendations one should bear in mind that it is not the only task of the financial system to finance innovations- far from it. But given the increasing importance of firms not being static in a dynamic world, and given the importance of innovation in growth and job creation, governments are interested in promoting innovations. It is an important policy issue precisely what type of financial system Europe need in order to promote innovations? Is there a "best practice", or should financial systems entail several of the features of both market based and credit based systems in order to improve the dynamics and limit sensibility of the system?

2. A picture of financial systems²

2.1. Introduction

In this section we shall take a closer look upon differences between national financial systems: This is an intermediary step towards discussing the ability of different systems to support different types of investments and different types of firms. After a mainly quantitative description of differences between national financial systems in some major European countries³ and the US and Japan, which typically are presented as representative countries of different types of financial systems, we turn to discuss qualitative features of different systems in section three.

2.2. A taxonomy and description of financial systems

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

2 We thank John Zysman for valuable comments on this section.

3 France, Italy, Netherlands, Spain and United Kingdom. Germany is not included due to lack of detailed data.

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

In a stylized *capital market based* system stocks and bonds are the predominant source of long-term industrial funds. 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 (Zysman, 1983, p. 70-72).

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. 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 a major source of funding for high risk/uncertain projects in the market based systems.⁴ In the credit based systems, intrapreneurship (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:

- i) whether it is possible to find distinctive features of national financial systems as described in table 2.1 below, and
- ii) whether the differences between the systems have changed in the past decade.

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

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	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 (including speculation) determine key prices	Markets are imperfectly cleared by prices

Source: Zysman, 1983; OECD, 1993.

2.2.1. 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. Financial institutions tend to allow firms a higher debt/equity ratio because monitoring of firms is easier - and more necessary (Christensen, 1992, p. 151).

⁴ See section 5 for a more elaborate discussion of venture capital.

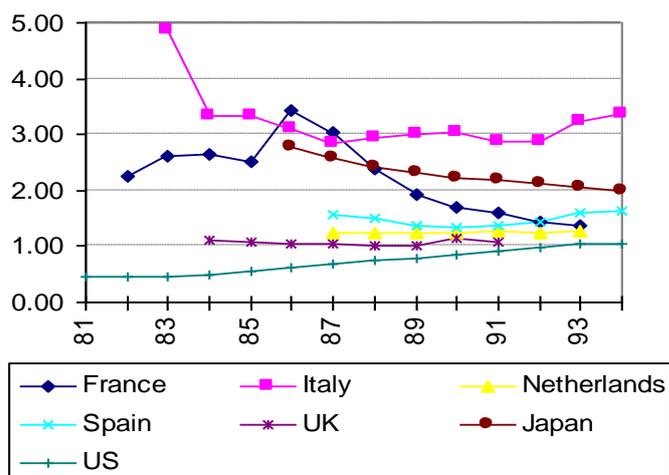


Figure 2.1 reveals that the difference in debt/equity ratios between the major European countries (with the exception of Italy which has a disproportionately high number of very small firms) and the US and Japan has decreased radically since the mid-80's. Looking at the initial capital structure the US stands out with a very low debt to equity ratio, which is characteristic for market based systems. The debt to equity ratio in the Netherlands and United Kingdom is just above 1, and combined with the fact that bank financing amount to just 10-15 per cent of total liabilities in these countries, this indicates a market based structure for these countries as well. Italy, Japan and France have debt to equity ratios above 2

in the early 1980's - a clear indication of a credit based system, while Spain is in between but with bank and trade credits accounting for 40 per cent of total liabilities, which is a quite strong credit orientation.

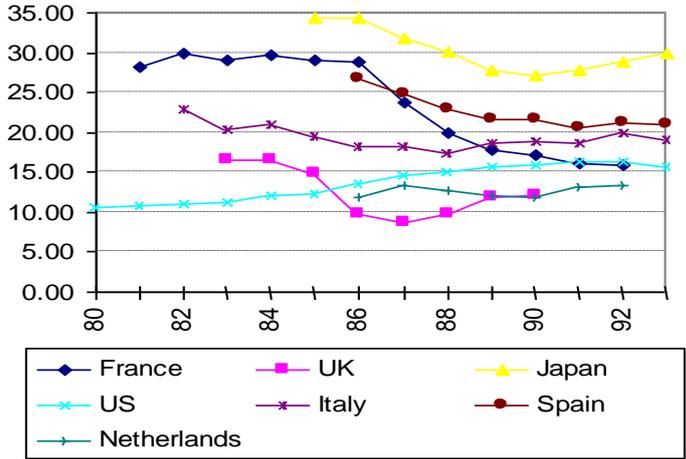
The general picture is one of convergence where countries starting out with a high debt to equity ratio experiences an increase in equity, which reduces the debt to equity ratio,⁵ while the US, which has the lowest debt/equity ratio during the whole period, experiences an increase in the ratio due to 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. This development is making it increasingly more difficult to make a clear distinction between credit based and market based financial systems based on the debt/equity ratio alone.

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 show 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.

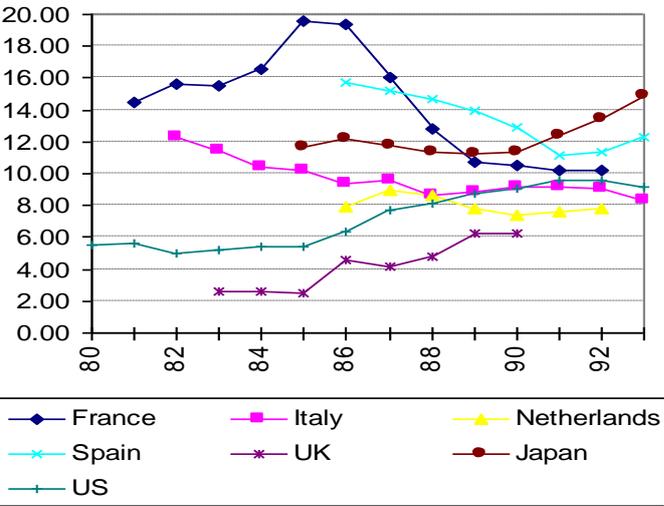
5 An economic factor behind the tendency towards a decreasing debt to equity ratio in the majority of countries is a decreasing ratio of inflation in the 1980's in all countries involved in the analysis (OECD, 1996a). The tendency is expected to continue due to an increased demand for security - as expressed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

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, Japan, 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 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 - and the exceptional role of Japan - which was evident from figure 2.2 showing the relative importance of total bank credit to total liabilities, is also evident here.

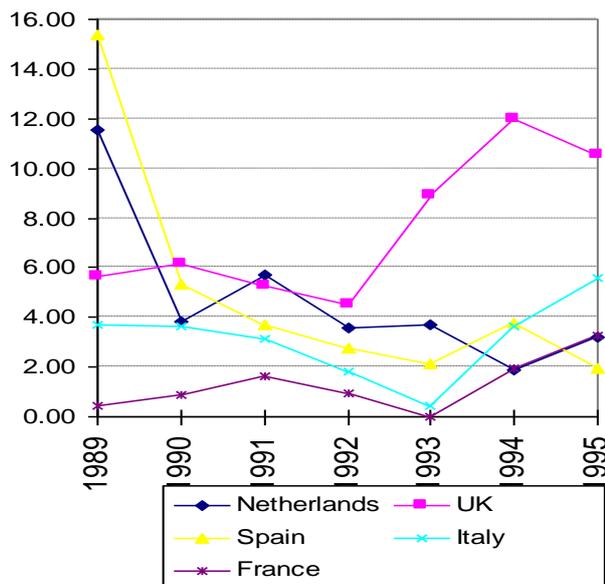


The development indicates that the countries traditionally characterised as having credit based financial systems, with the exception of Japan, are moving towards a situation with less importance played by long-term bank credits. This is a consequence of bank credits playing a diminishing overall role since an analysis of bank credits alone show that long-terminism is being more predominant.⁶

2.2.2 Equity markets⁷

6 Calculated from OECD Financial Statistics, part III 1993 and 1994.

7 This section only concerns the major European countries since data is not available for the US and Japan.

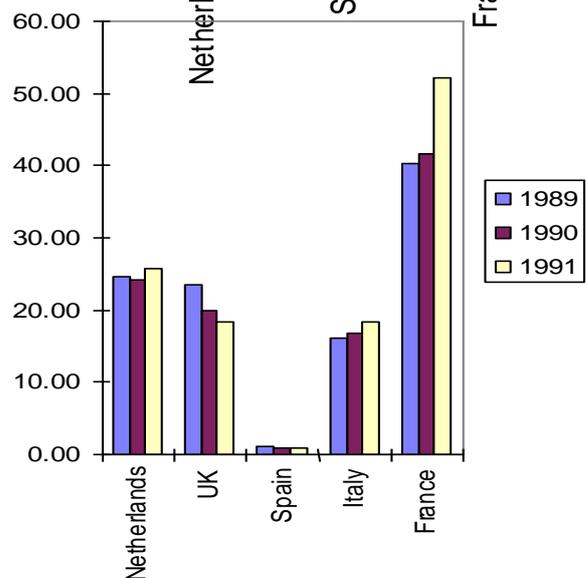
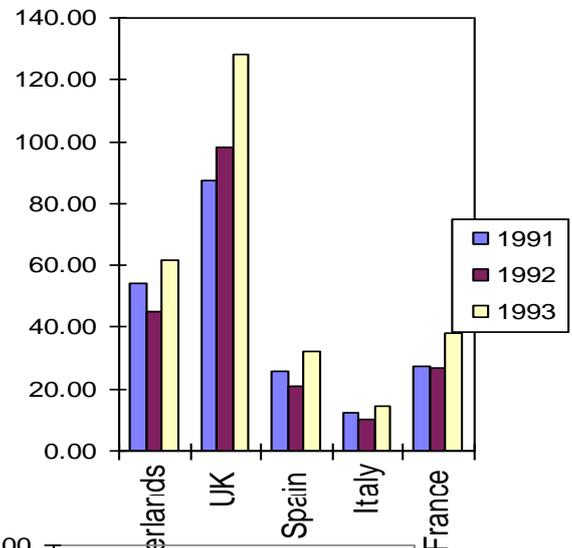


Debt and bank credits are just one side of the story about characteristics of financial systems, the other side being equity markets. Figure 2.4 illustrates the size of the equity markets by measuring the domestic equity in relation to GDP. UK stands out with a

domestic equity equal to GDP in 1992 and remarkably larger than GDP in 1993. The high level of domestic equity in the UK is in accordance with the low debt to equity ratio illustrated in figure 2.1.

Using another indicator we can verify the impression from figure 2.4: The UK equity market is the fastest growing market. Figure 2.5 show a growth rate of 10 per cent per annum from 1993 to 1995. The remaining countries show more moderate growth rates - in the Dutch and Spanish cases after very high growth ratio in the late 1980's.

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. There are considerable differences between the other (traditionally credit based) European countries when considering the importance of equity markets, but the characterisation of the Netherlands as a market based system is being confirmed.



The equity market cannot be explored by listed shares only though. Figure 2.6 shows the size of the domestic markets for traded shares on parallel or unlisted markets measured as number of companies with shares traded on these markets as a percentage of total number of companies on listed securities markets.⁸ France has the largest parallel and unlisted markets compared to the listed market, while the Netherlands, United Kingdom and Italy have markets amounting to 15-25 per cent of the listed markets. Unlisted and parallel markets play a very small role in Spain, but as illustrated in figure 2.7 the markets grew rapidly in 1989-'90.

The quite developed parallel and unlisted markets for especially France could be interpreted as an indication of

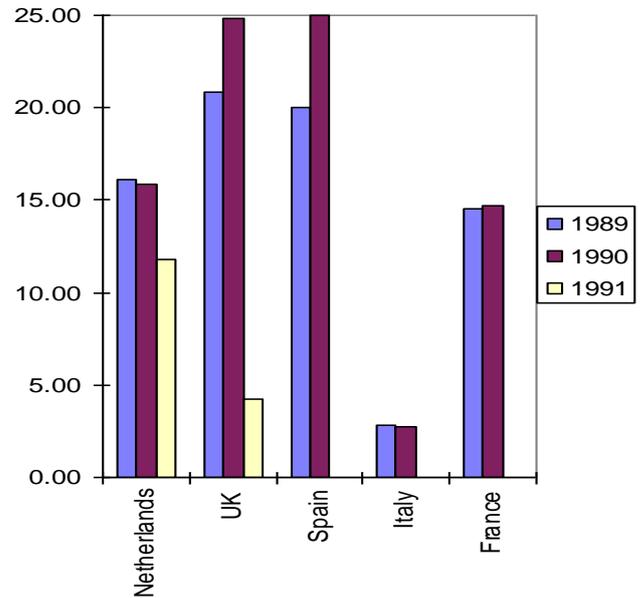
⁸ When the parallel and unlisted markets are considered small numbers makes the percentages very sensitive.

a potential for a stronger market orientation, i.e. a further evening out of the differences between what used to be credit based and market based financial systems.

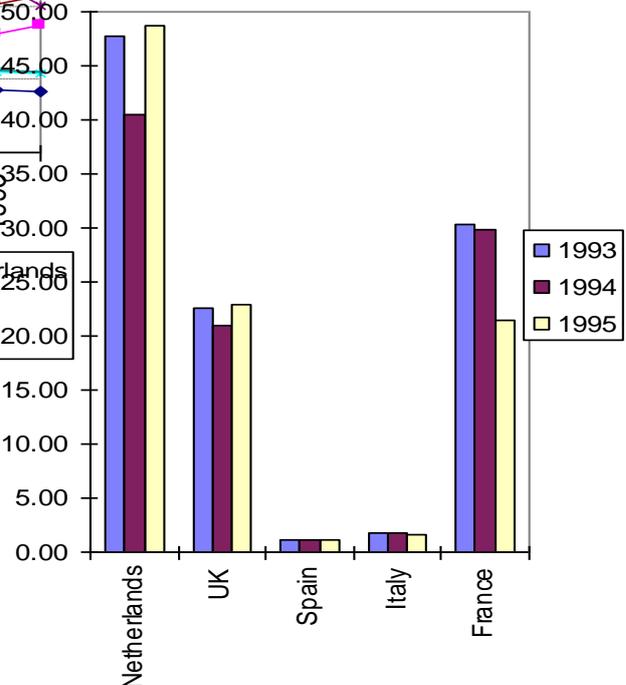
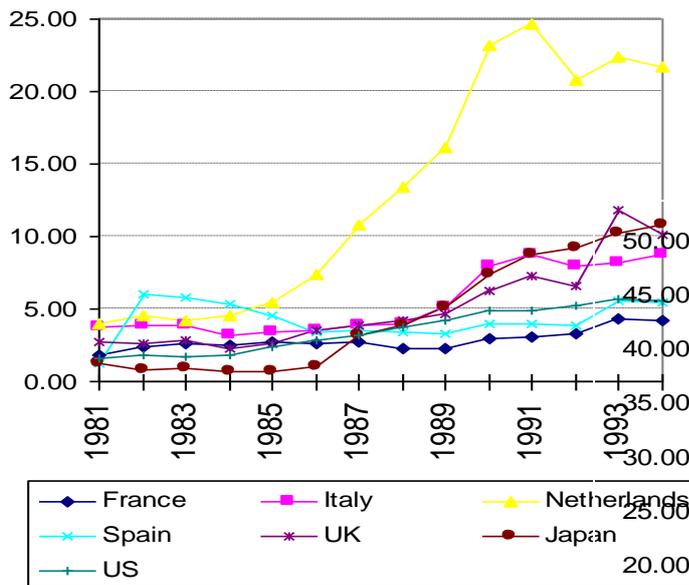
2.2.3 Integration and internationalisation

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 liberalisation 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 inter-nationalisation of bank credits (figure 2.8) indicates that internationalisation 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.



The time series available for internationalisation of equity markets are shorter than for bank credits which 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. Foreign companies play a disappearingly small role in Spain and Italy where the equity markets are quite small and undeveloped.

2.3 Concluding remarks

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.

Even though there are clear 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. 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 reregulation. 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 table 2.XX). 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 nations. 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 explanation.

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 in that a relatively large number of small and medium sized firms mean high costs on monitoring and credit judgement compared to the volume of lending. Asymmetries in information is likely to be higher when operating in new, foreign markets, and many firms want non-standardized services. Industrial finance is thus both labour-intense and 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 Knight,

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 extent 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 dysfunctional 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 dysfunctional 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. 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 Japanese banking sector is also heavily regulated - probably even more regulated than the U.K. banks. 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.

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 the firm is relatively new with no track record.

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.⁹ 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.¹⁰ 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 som principle modes of functioning of the financial systems and their ability to finance different kinds of investments. We thus turn from a mainly structural 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. We discuss the internal finance, financing through intermediaries and financing through markets.

⁹ 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.

¹⁰ Knight and Morgan (eds., 1997) is one recent collection of articles describing a number of national financial systems.

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 transactions¹¹.

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 channeled 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 monitoring and reporting requirements are more thorough than in the corresponding market governance mechanism.¹²

11 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.

12 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 opportunistical behaviour is less likely to occur and presumably is

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. In industries such as biotech and electronics product life cycles are often short and degrees of radicality 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 as conservatism may be particular damaging towards such major shifts in technology. Well-established screening and monitoring capabilities thus tend to be hostile to financing more radical, new innovations. This is in contrast to the market based financing mechanism, here we do not see the same rigidity in financing new start-ups based on high technology.

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 wide spread 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 undiserable. It could also be argued that most likely this step would require an increased number of bank supervisors and administration.

less costly when it does. Finally, internal financing rules out any legal problems connected to ex post adjustment.

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 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.¹³

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 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 may also

¹³ 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.

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 of strategy was 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. It may well be that policies aimed at some objectives do not coincide with improving innovation financing. This may justify macropolicies, however 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 recognized 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.

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