Rybczynski, Tad

Working Paper

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IUI Working Paper, No. 216

Provided in Cooperation with:
Research Institute of Industrial Economics (IFN), Stockholm

Suggested Citation: Rybczynski, Tad (1989) : Innovative Activity and Venture Financing: Japan, the U.S. and Europe, IUI Working Paper, No. 216, The Research Institute of Industrial Economics (IUI), Stockholm

This Version is available at:
https://hdl.handle.net/10419/95015

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No. 216, 1988

INNOVATIVE ACTIVITY AND VENTURE FINANCING: JAPAN, THE U.S. AND EUROPE

by

Tad Rybczynski

Paper prepared for the IUI Conference on
Markets for Innovation, Ownership and Control,
June 12–16, 1988, at Grand Hotel, Saltsjöbaden

May, 1989

INNOVATIVE ACTIVITY AND VENTURE FINANCING: JAPAN, THE U.S. AND EUROPE

The role of venture financing in assisting and furthering innovation is a subject which, to my knowledge at least, has not been discussed very extensively, especially within the Schumpeterian framework of dynamic change. The aim of this paper is to try to place it in such a perspective with special reference to the developments in the three major industrial groupings and the way modern economic theory looks at it. It tries to do so by discussing the concept of innovations and specifying what are the features of firms undertaking them by reference to the type of products produced, capital incentive, market position and size. These characteristics are then related to the three stages of economic growth, agricultural economy, industrial economy and de-industrialised economy. A stylised picture of the evolution of the financial system is put forward which is linked to stages of economic growth, with reference to the main industrial countries. Following this growth framework a highly compressed picture of venture capital industry is given and its present characteristics. The concluding section contains a few comments on the links between the venture capital industry, the financial industry and economic development.

The Meaning and Measurement of Innovations

In approaching this task, it is useful - as is quite normal in this type of exercise - to start with a definition of innovative activity. The one I favour is used by Small Business Administration in the U.S., which defines innovation as "the process that begins with an invention, proceeds with the development of the invention, and results in the introduction of a new product, process or service to the market place". This definition formally links innovative activity to the markets, and explicitly classifies such activities within the category of private goods. Implicit in this approach, and consistent

with the Schumpeterian thinking, is that the creation, adoption and spread of new technologies involves transaction costs and uncertainty, which are at the heart of the process of economic advance; secondly that it inevitably necessitates changes and adaptations in organisational forms. I would like also to stress that this approach abstracts from the problem of governmental support of all the financing of R & D and accepts that such funding is undertaken either when such activities are regarded as in the public interest, for governments' own purposes (e.g. defence), or where there are significant external economies, that is to say where the performer of research cannot capture the benefits of his work.

Closely linked to the financing of innovation is the problem of how to measure such activity. The two basic approaches employed for this purpose include the measurement of input or output. Inasmuch as the former type of measurement tends to rely to a large extent on R & D spending, it does not and cannot take account of the results of such expenditures and therefore is subject to numerous reservations and qualifications. The latter method, which has tended to rely on patents, is likewise subject to important qualifications because a large proportion of patents do not prove to be innovations and many innovations are never patented.

In a recent study, Z. Acs and D.B. Audretsch of Berlin - referred to here as "A & A" - have developed a new method to measure innovations. This uses the so-called "innovation rate", which relates the absolute number of innovations (as defined by Small Business Administration) to the number of employees and arrives at the number of successful innovations per employee. This measure is intended to help examine how innovations made by small firms - defined as those with fewer than 500 employees - compare with those made by large firms - defined as those with more than 500 employees. Aware of the fact that this

standardisation of innovations on the basis of employees may have a bias resulting from differences in capital intensity in cases where large firms are more heavily capitalised, leading in turn to the over-statement of the innovation rate, or because the innovation rate may affect the size of firms, they also measure innovation rates by relating them to sales. When they relate the two ratios they find, however, that the correlation between them is fairly strong (0.707).

Who are the Innovators?

I mention the problem of measurement because it bears directly on the question, who are the innovators - small firms or large firms? This is linked to the question of the role and function of venture financing. The hypothesis adopted by Schumpeter - as spelt out in his "Capitalism, Socialism and Democracy" and which has been examined at length in numerous studies - was that large firms carry out the bulk of innovative activity and that large firms are more innovative than small firms. This view was the natural extension of Schumpeter's second fundamental tenet that imperfect competition - or in modern terminology, oligopolistic competition - is an integral element of the development of the dynamic capitalist economy.

Applying their method, A & A have tried to test the Schumpeterian hypothesis in a modified version to take account of the links between size, innovation and imperfect competition. Their conclusion was that in concentrated markets where the large firms can and do impose significant entry barriers, the large firms should have the relative advantage in innovations and that per contra, in the markets characterised by competitive pressures the small firms will have the innovative advantage. However, as pointed out by A & A, there are three aspects of market structure which influence the relative advantage of large

and small firms, and therefore the way they are financed. These are the stage of development of industry as defined by reference to the product life-cycle, the existence of barriers to entry, and the size and distribution of firms. All of them change as industry expands or contracts in absolute, and also sometimes in relative, terms.

The concept of the product life-cycle, when there is no standardised product, implies that the product design changes rapidly and that product process is fairly labour intensive, relying on highly skilled labour. It follows that during the early stages of life-cycle, innovative opportunities for small companies are great but they decline as industry moves into a mature phase and standardised products take over, and when capital intensity increases. A high degree of concentration, which endows participants with market power and the potential for obtaining economic rents - normally held by large firms - is also associated with a large degree of product differentiations and economies of scale in promotion facilities and is especially true of advertising intensive industries. In this case large firms can be expected to have an innovative advantage over smaller companies. Finally the scale of economies in production, normally in capital intensive industries, provide scope economies for R & D and the imposition of barriers to small firms.

Using the 1982 data on innovations in the U.S. produced by the Small Business Administration, and taking account of imperfect competition by reference to capital-output ratios, the four-firm concentration ratios, the advertising to sales ratios and the stage of industry life-cycle (embodied in the relationship between the growth rate and human capital as reflected in the proportion of professional workers to total employment and total innovation rate), A & A conclude first that industries which are capital intensive, concentrated and

advertising intensive tend to favour large firms with a relative advantage in innovations, and that small firms have an innovative advantage in industries in the early stages of life-cycle where total innovations and the use of skilled labour play a large role and where large firms account for a high share of the market; secondly, that inasmuch as the manufacturing industry, as described statistically, comprises firms involved in activities and products subject to different degrees of competition, different economies of scale and scope and in different stages of life-cycle, there is bound to be a large degree of disparity in innovation between firms; and finally that consequently "although the small manufacturing firms' innovation rate exceeds that of large firms, in many industries large firms are more innovative, just as in many others small firms are more innovative".

It should be stressed that these interesting and important conclusions provide no more than a snapshot of a position at a certain point of time in the development of a mature industrialised economy. This picture is not concerned with the dynamics of innovation in an economy whose character is changing and where financing arrangements likewise change. Nevertheless, it provides valuable and illuminating help in the understanding of the process of development and its financing.

Innovation and Economic Growth

There is now broad agreement that the process of economic development involves first the transformation of an agrarian economy into an industrial economy, and that this stage of development is followed by the phase of de-industrialisation and the transformation of an industrial economy into a service economy. The move from an agrarian economy involves a reduction in the relative, and only sometimes in the absolute, size of the agricultural sector whether

measured by its output or the proportion of labour it employs. During that stage the economic structure changes because of the increasing importance of investment in industry involving the employment of new savings in this segment of the economy. Such investments include mainly those in infra-structure, i.e. transport and public utilities, heavy capital intensive industries, industries which tend to produce standardised products, enjoy economies of scale in production, and have had, and exercise, a substantial degree of market power providing them with an incentive and also economies of scope for R & D. Also during that phase of economic advance - until industrialisation begins to lose its momentum - the life-cycle of various products, final and intermediate, is rather long. As a result, as suggested by A & A, the bulk of activities and the bulk of R & D and innovative activity is in the hands of large firms. It was this view of economic advance, based on industrialisation which dominated the world scene until recently, which was behind the Schumpeterian analysis. It is therefore not surprising that he concluded that innovative activity is to be undertaken mainly by large firms.

As mature industrial economies move into the stage of de-industrialisation, the structure of an economy changes again. This change involves a decline in the relative and absolute importance of industry and a rise in the services industry. Secondly, the structure of industry in mature economies likewise alters; the capital intensive industries are phased out and replaced by rapidly innovating and less capital intensive industries producing an increasing number of goods with a short life-cycle; finally, the service industries also undergo transformation in that they become somewhat more capital intensive and in that innovative firms producing new services increase in relative importance.

Using the A & A analytical approach, one would expect that during this phase of economic advance there should be a shift of innovative and R & D activity away from large firms towards medium and small sized firms. That this is what happened is in fact shown by the A & A examination, which looks at the U.S. when the American economy had entered the phase of de-industrialisation.

This approach to economic development, R & D and innovation throws a valuable light on the role played both by finance in general and venture financing in particular.

Historical Background

Venture financing as such - defined as the provision of risk capital in expectation of high financial rewards - has a long history. Prior to the Industrial, and preceding it the Agricultural, Revolution it is exemplified by English charter companies of the Middle Ages, the Hansa League activities, Lloyds of London, merchant ventures and indeed various project financing undertaken by merchants of the Italian City States, and merchant banks in England and various Continental countries. Such financing had little to do with technological innovation as such activity was at that time of negligible importance. While innovation started acquiring momentum following the Industrial Revolution, the role of venture financing until a quarter of a century or so ago depended on the nature of the financial system. Broadly speaking, during that period venture financing was supplied either by rich individuals directly or through financial intermediaries, or to a small degree by universal banks, such as those which existed and exist now in Germany, Austria and Switzerland, by way of participations.

At the risk of simplifying, I want to introduce here a highly stylised view of the evolution of the financial system, which in many ways is also linked, though imperfectly, to the process of economic advance. In the same way that economic advance involves the change of an agricultural economy into an industrial one and its subsequent transformation into a de-industrialised and service-oriented one, a financial system can be said to move initially from a bank-oriented type into a market-oriented type, changing later into a securitised system. The basic feature in a bank-oriented system is that the bulk of new savings needed for investment is collected and transmitted to ultimate fund users by banks, which also monitor the performance of the fund users using new savings. Such savings tend to be channelled almost entirely in the form of loans, though as mentioned later, in countries with a bank-oriented system but with universal banks such institutions also provide risk capital by way of "participations". In the market-oriented phase non-financial firms rely increasingly on external funds obtained directly from ultimate savers, and also from long-term savings collecting institutions such as life assurance companies, using capital and other financial markets. During that phase the performance of the savings users firms is monitored increasingly by capital markets and institutions directly linked to them such as rating agencies. In the securitised phase the dependence of non-financial firms, and indeed also of financial enterprises, including deposit accepting institutions, on funds raised through the capital markets increases rapidly. This in turn results in financial markets, with capital markets at their centre, assuming growing significance and also exercising a monitoring function, together with organisations such as rating agencies. Furthermore in this phase of development the centre of gravity of the activities of financial markets, and above all capital markets, moves away from the transmission of new savings to the operation of markets for corporate control, and the provision of funds for new technologically-based small and middle sized enterprises.

Broadly speaking until World War II and 20 years following it, all the major industrial countries except for the U.S. had a bank-oriented financial system. During that period the only difference between the U.S. on the one side and other industrial countries except for the U.K. on the other was that some of the countries on the Continent of Europe had a universal banking system, where banks would undertake all financial functions, and others a government-imposed specialised system with different institutions performing different functions. The U.K. had a specialised system which evolved naturally as a result of informal and self-imposed restrictions. The U.S., in contrast, had a market-oriented system with strict separation between deposit banking and investment banking introduced by way of Glass-Steagell legislation after the 1929 crash. Japan at that time also had a system combining the features of the English and the Continental system with a few powerful Zaibatus, or groupings of financial and industrial interests, dominating the scene.

During that phase risk capital in countries with universal banking systems was provided on a very limited scale by banks, and in the U.S. by rich individuals wishing to use their savings in a risk taking way. In countries with a specialised financial system, such as the U.K. and France, venture capital tended to be obtained from within the family, friends, rich individuals who were put in touch with new entrepreneurs by solicitors, accountants and some financial institutions such as merchant banks in Britain and Banques d'Affaires in France, and from retained profits of established companies. In countries with universal banks, such as Germany, venture capital was provided not only by rich individuals and from within family members, but also from banks which took equity stakes, i.e. participations. Universal banks doing so themselves often sought promising investment projects and backed entrepreneurs whom they deemed capable of successfully managing them - the latter also sharing in ownership.

It must be emphasised here that until the '30s, and often later, bank-oriented financial systems, dominated either by universal banks or specialised financial institutions, were associated with owners being managers as well and exercising full control. Venture capital financing therefore tended to be limited to the provision of seminal finance by a limited number of fund providers or by universal banks behaving in an active or quasi active way, but later relying to a large extent on retained profits. Although the debate about the active and passive role of banks in industrial development during that period still continues, the writer's interpretation of evidence is that by and large the venture financing of innovation at that time was very limited, and that the bulk of finance used for such purposes had been generated internally by existing companies or obtained in an ad hoc way from rich individuals. This position appears to have persisted until the '60s with certain exceptions which need not be mentioned here.

In retrospect this should not be surprising. As mentioned before, during that period the now mature countries were still industrialising and the main driving force in the process of economic development involved large investments in capital intensive industries dominated by large firms which, in accordance with the A & A thesis, accounted for the bulk of innovative activity. It was not until the '60s that de-industrialisation started gaining momentum, first in the U.S. and then in the U.K., and only in recent years in the countries on the Continent of Europe, and Japan. This development has been associated with shifts in economic structure involving the growing importance of high technology and service-based industries, and the growing significance of small and medium sized enterprises undertaking an increasing share of innovations and R & D spending and the rise of the modern venture capital industry acting in a seminal and propelling way. Accompanying this process has been a marked change in the

nature of the financial system, the U.S. system having moved decisively from a market-oriented phase into a securitised phase, and the U.K. following in its steps with a certain time lag. The financial system on the Continent of Europe is now moving into the market-oriented phase and assuming some of the features of the securitised system. Japan is following a similar path, but as in the past is developing its own special features.

Thus the entry of the mature Western economies into the de-industrialisation and service industries-based phase of economic development, and the evolution of the financial system linked to it - the latter responding to it and in turn propelling and influencing the direction and pace of change in the economic structure - are the two basic features of the changes now taking place. The emergence of the new and separately identifiable venture capital industry is one of the two integral elements of this process, the other being the market for corporate control whose role falls outside the scope of this paper. The only comment that must be made here is that a well developed market for corporate control facilitates and helps to phase out uncompetitive and not viable firms and industries, and that the venture capital and associated markets assist to replace them.

The Venture Capital Industry in Major Countries

The birthplace of the modern specialised venture capital industry, comprising mainly private enterprises - some of which may have official support - but which are designed to provide risk capital, is the U.S. The modern industry's beginning can be traced to the decade of the '60s when in addition to the Small Business Investment Companies (SBICs), which borrow their funds from the SBA and banks and tend to lend to small companies rather than buying their shares, there also appeared venture capital firms, set up by financial

institutions such as bank holding companies and pension funds, as well as by large industrial corporations. Although there are now several hundreds of regional and minor venture capital firms, the bulk of business is in the hands of some 120 companies or so. Having established itself in the '60s, the industry's size measured by the funds under its control grew slowly to reach some US$ 2.5 billion by 1977, when its expansion started gaining momentum rapidly, to reach a level some 10-fold higher in the following ten years, the funds under its control amounting at the end of 1987 to some US$ 25 billion. The rapid growth in the 10 years following 1977 was helped by changes in the regulations of pension funds in 1978 which allowed managers to take greater risks, by the lowering of capital gains taxes and also the rapid process of securitisation of the financial system of which the relaxation of various capital market operating rules, including those affecting the secondary markets, was one element.

By now the U.S. industry is dominated by independent firms which account for nearly three-quarters of the industry's pool of capital, with specialised subsidiaries controlling some 20% and the SBICs the remainder. It is interesting to note that many of the independent venture capital companies have evolved from SBICs and that in the last 10 years the former have themselves increasingly tended to obtain stock exchange listing, enabling them to raise additional funds on capital markets.

It would be remiss of me not to compare the funds controlled by venture capital with the total of equity funds and the contribution the venture capital industry makes to investment. At the time of writing (May 1988) the value of the venture capital pool was equivalent to about one-half a percentage point of the market value of equities listed on the U.S. stock exchanges. The commitments by venture capital industry for capital expenditure, which amounted

last year to some US$ 5 billion, were equivalent to about 1 1/4% of total capital expenditure. The relatively small size of the separately identifiable venture capital industry, and its contribution to capital spending, however, tend to underscore its importance, influence and impact. Inasmuch as venture capital companies concentrate on what may be described as "acorns bound to grow into giants some time tomorrow", and which generate, screen and diffuse new technology, they perform the seminal function in the process of growth and adjustment. I will refer to this later.

Compared with the U.S., the European venture industry is small, both in absolute and relative terms. At the end of 1985 the pool of venture capital in Europe amounted to some US$ 6.5 billion. Of this, 3/5ths or 60% represents the U.K. venture capital industry, and the remainder that in the 10 Continental countries. Among the latter the Netherlands, Germany and France had 10%, 8% and 7% market shares respectively with the remaining six countries accounting for the rest.

The relatively under-developed state of the venture capital industry in Europe, except for the U.K., reflects the fact that the process of de-industrialisation has so far been very slow on the Continent of Europe and that the financial systems are only now being moved into the market-oriented phase. As a result, the transformation of the structure of the economy has been very slow, leading also to high unemployment.

In the U.K. the venture capital industry has expanded strongly since 1979. At the end of 1987 there were in the U.K. some 125 venture capital companies of which about 60 were "captive" companies, that is to say subsidiaries of banks and other financial institutions, including those concerned with venture

companies established under the Business Expansion Schemes, and about 65 independent companies also comprising those concerned with businesses established under the BES. While the BES concept, first introduced in 1981, had quite an important impact, the reductions in capital gains and the transformation of the British financial system into a securitised one have been instrumental in helping industry to grow rapidly, the second important factor being the introduction of the unlisted securities market and of the third tier market.

In the Netherlands, the second most important country in Europe, venture capital started in the early '70s mainly as a result of direct help provided by the Government, which set up a special guarantee fund in 1981. Its growth was further assisted by the creation by the Amsterdam Stock Exchange of the Parallel Market, the second market with less demanding listing requirements especially for young and small companies. The remarkable feature of the Dutch venture capital industry, now comprising some 65 companies, divided into those effectively controlled by the Government and independent ones, is that while at the beginning of the present decade the former accounted for three-quarters of the total, their share has now fallen to around 40%.

The French capital venture industry, the third most important in Europe, is fairly young. Its rapid expansion did not occur until the '80s, when mutual venture capital funds (Fonds Commune de Placement a Risque - FCPR) were introduced with the benefit of tax concessions, followed by special tax reliefs in 1985 to risk capital companies (Societes de Capital Risque - SCR) and the creation of the Seconde Marche or second tier securities markets. It is estimated that at the end of last year there were some 70 venture capital companies, with the banks and insurance companies still providing the bulk of the funds.

In Germany the industry did not receive recognition until the mid-'80s. As the awareness of the opportunities it offers became recognised at the end of last year, the industry came to control funds of US$ 0.70 billion and its activities have been growing rapidly. Two events helped its expansion. They were the creation in 1987 of the new second (regulated) market (Geregelten Mark) and the expansion of the unregulated market (Telefon Verkern) comparable to the U.S. OTC market. Banks are still the main suppliers of funds, accounting for over 50% of the total, with the share of corporate investments amounting to around 20%.

In Italy the industry is still passing through the birth pangs. The very under-developed stage reflects the dominance of the bank-oriented system as well as the virtually new beginning of industrialisation.

Taking now the third major industrial country, viz Japan. At present Japan has 81 venture capital companies, as compared with 8 in 1972. The funds they command amounted at the end of last year to US$ 1.4 billion. The bulk of them, however, is in the hands of the 10 largest companies affiliated to banks and security houses, which have an easy access to additional funds if they so wish. Their investment also has tended to be very conservative, involving the provision of funds to the already well-established companies connected to the larger groupings. In contrast, very few small individual companies have also been risk averse, but this is not surprising in view of the liquidation of nearly 40 of them after the October crash.

Activity of the Venture Capital Industry

The venture capital industry is now in a fully mature phase in the U.S., the adolescent stage in the U.K. but still experiencing the pains of early growth on the Continent of Europe. It is becoming formalised and institutionalised and is now gaining a distinct place in the financial system. Its main concern is the financing of small and middle sized companies from their establishment until they assume the size where they can raise external finance on large and well-established capital markets. This business involves the provision of funds for start-up companies; for expansion, including funds for the introduction of new products; and for second round developments when growth gathers strength. Along with the clearly identified financing requirements as outlined before, other types may also be needed, such as pre-start or city finance especially needed in the case of R & D. It also extends at the other side to the now rapidly expanding area of providing leverage buy-out finance for mature firms in the process of de-conglomeration. The interplay between these types of finance differs from country to country depending on the fiscal arrangements, the degree of Government involvement, and willingness to assume risk.

Statistics about use of funds by the venture capital industry indicate, subject to marked differences among various countries, that the emphasis until recently tended to be on the provision of funds for technologically-based companies mainly in computers, computer software, electronics, communications, industrial equipment, robotics and bio-technology, and also areas where funds tended to place emphasis on comparative advantage, such as deer farming, fish exporting, meat packing and similar areas. One additional fact deserving mention is that the scope of industry is becoming increasingly international. The number of cross-border investments and joint ventures are increasing, especially in Europe, but this is also becoming true of

Japan and the U.S. Also the growing importance of buy-out transactions is indicative of the new demands linked not to the creation of new enterprises, but to the re-structuring of the old ones and the attempts of the industry to help this process.

The broad lessons that can be drawn from the experience of the last 20 years or so are that to be viable and to play the rightful role, two conditions must be present. The first is that there must be a highly developed, broad and deep capital market providing easy exit routes to investors enabling them to realise their profits, reflecting the risk taken. Such conditions are present when the financial system becomes a form of a securitised one. The second condition is that the fiscal regime must be tilted in the direction favouring realisation of capital gains, which creates a favourable climate for risk taking.

Venture Capital Economics and Finance and Development

The modern view is that efficiency of capital and other financial markets is the necessary condition for the smooth and effective functioning of the capital markets in the economy. By efficiency of capital markets is meant that prices embody all available information. The three basic functions that financial markets perform are firstly the right allocation of resources, that is to say to the users where they earn the optimum risk-adjusted rate of return (allocative efficiency); secondly, that they re-direct smoothly existing resources in the direction where changes in the demand and supply require it, in response to technological change, changes in taste and comparative advantage (dynamic efficiency); and finally, ensuring that the process of collecting and employing new savings, as well as that of transferring the control and ownership of old savings embodied in real and financial assets (corporate control market), is carried out at the least (real) cost.

The venture capital industry, which links the financing of new firms and the re-structuring of old industries (by way of buy-outs) by expanding the scope of the financial markets, improves the allocative efficiency, enhances dynamic efficiency and helps to raise the operational efficiency of the financial industry. In the Schumpeterian dynamic framework, modified to take account of the shift of innovative activity from mainly large firms in the phase of industrialisation to medium sized and small firms in the phase of de-industrialisation, it facilitates the process of transforming the industrial and mature economic structure into the service economies. In doing so it forms an integral element of the process of change without which adjustment and growth could not be achieved smoothly.