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Bridging the Financing Gap for Pro-Poor Innovation:

Towards a Framework

Lina Sonne*

Abstract
In many developing countries, pro-poor entrepreneurship and innovation is facing a financing gap. Such innovation suffers from a lack of finance especially from the mainstream (or core) of the financial system. Instead, the little support that exists comes from alternative sources at the periphery of the financial system. This substantial gap in finance for rural PEBI, which remains unexplored, is the focus of this paper. To start, a number of barriers to access to finance are considered, from which a conceptual framework is constructed. The framework considers the financial system as made up of a core (the banks) and a periphery, where the way knowledge flows within the system, the type of knowledge that can be accessed and accumulated, and the kind of relationships that exists matter. It is suggested that at the core, path dependence and institutional lock-in together with a closed network of similar knowledge types and a dependence on collateral rather than relationships, result in a rigid and a closed system. The periphery organisations are better able to obtain and act on new knowledge (and provide finance) for a number of reasons which form the basis for a set of insufficient but necessary (INUS) condition. Accordingly, the organisations may posit the following characteristics: a dynamic and flexible approach to finance; a wide network of actors with varied knowledge; relationship focused; an emphasis on tacit knowledge, feedback loops and learning; ability to innovate close to users; and a systemic and integrated approach to finance.

Keywords: Pro-poor innovation, entrepreneurship, rural innovation, financing innovation, financing entrepreneurship

JEL: O16, O18, O31, R51 I

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1. Introduction

Innovation[1], even in emerging economies, generally conjures up images of high-tech, urban-based manufacturing technologies at the innovation frontier. However, of particular interest, in developing countries, is rural innovation, since it is in rural areas that most of the poor live. Pro-poor innovation in rural areas is more likely to occur through small-scale ventures and entrepreneurs than industrial research and development. One of the main factors affecting entrepreneur-based innovation is finance.

However, despite government programmes, bank networks as well as other alternative finance such as venture capital, evidence on rural finance suggests that entrepreneurs in general, but especially innovative entrepreneurs in rural areas that do not possess large assets are finding accessing finance particularly cumbersome (Basu, 2006; Beck et al., 2006a; Beck and Demirguc-Kunt, 2008; Beck and de la Torre, 2007; Claessens, 2005; Demirguc-Kunt et al., 2008; Helms, 2006; Peachey and Roe, 2006; Tejerina et al., 2006). There must be barriers at work within the core of the financial system which prevents adequate financing of pro-poor entrepreneur-based innovation. Nevertheless, outside the mainstream financial system, organisations, notably in microfinance, have been able to provide finance for clients that were previously considered 'unbankable' and without financial access.[2] There are also other types of financing organisations that have started to bridge the financing gaps such livelihood promotion organisations, micro venture capital, social merchant banks and incubators. There is thus a gap in financing created by the reluctance of core or mainstream financial organisations such as banks to provide finance.

The first part of the paper therefore considers reasons for this 'gap', by exploring a number of barriers to finance for entrepreneur-based innovation. To shed light on what factors make it possible for some organisations outside of the mainstream financial system to bridge this gap and provide finance for pro-poor entrepreneur-based innovation, the second part will draw on knowledge flows and network theory to sketch a framework that describes how it is possible that some organisations exist outside of the mainstream financial arrangements that appear to be filling this gap by overcoming the barrier highlighted in the first part. The third part discusses the differences between the core and the periphery organisations and constructs a number of conditions that help explaining why some organisations at the periphery are able to finance pro-poor entrepreneur-based innovation.

The main contribution of this paper is thus to provide a framework, based on knowledge flows within the financial system, to explain how organisations operate differently at the core and at the periphery of the financial system, and a number of conditions which show how periphery organisations are able to provide finance, when the core organisations are not.

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[1] Innovation is defined as the continuous process of upgrading using new knowledge or the new combination of existing knowledge, that is new to the local area (Hall, 2003; Spielman, 2005). The innovation process thus emerges from a system of actors whose interactions, behaviour and learning are conditioned by institutions (Freeman, 1987; Lundvall, 1992; Edquist, 1997).

[2] Bhatt (1995) notes that innovation in finance is more likely to come from informal sources of finance than formal finance, which are then in a better position to support alternative investments.

2. Barriers to Finance for Innovating Entrepreneurs

This section will look at some of the reasons why there is little finance available for pro-poor entrepreneur-based innovation. One major argument is, of course, that it is not profitable. There is some truth in this as banks often find it difficult to cover costs in rural areas because of the high cost of lending relative to the size of the loan. Credit is generally borrowed in small amounts but with high frequency, which drives up administrative and due diligence costs for banks. This situation is further aggravated by a heterogeneous client base spread over a sizeable geographic area, which together with high illiteracy increase the monitoring costs for banks post loan (Basu, 2006; Helms, 2006). However, as the microfinance movement among others have shown, it is possible for financial institutions to provide small-scale firms and entrepreneurs with finance in a sustainable manner. Furthermore, the emerging funds investing in pro-poor innovation and entrepreneurship such as Acumen worldwide, and Aavishkaar and Seedfund in India, suggest there is potential or profit making. Further evidence in the ability to provide smaller scale finance for entrepreneurs profitably is provided by the microfinance movement.

Several other arguments exist, however, to explain the lack of available finance. First credit may be rationed due to information problems. Second, there is uncertainty related to innovation focussed investments. Third, to combat such risk the financial intermediaries may rely on collateral, and relationship based finance that can lead to financial exclusion. Fourth, the demand for finance may not be clearly visible and finally the financial system itself may affect the flow of credit in a number of ways due to regulatory issues and government policy, legal barriers and contract enforcement, information flow and the physical infrastructure underlying the system. The result could be flows of finance moving from rural to urban areas, directed credit that is diverted and inertia and institutional lock-in. Fifth, politically motivated rent-seeking has an effect on where finance flows, though this is outside the scope of this paper.

The remainder of this section will outline and discuss each of these five arguments identified as barriers to understand what impact they have on the availability of finance for pro-poor entrepreneur-based innovation.

2.1 Asymmetric Information and Credit Rationing

The perceived risk of lending by the providers of finance is a major reason for the shortage of available credit. One argument posits that such perceived risk is due to problems related to a lack of information about borrowers. Hoff et al. (1993) find that

> "features of rural credit markets in developing countries can be understood as responses to the problems of screening, incentives and enforcement" (Hoff et al., 1993:45).

In perfect markets there should be no shortage of credit, since interest rates will adjust until supply of finance meets demand. However considering the difficulty of obtaining credit for both rural entrepreneurs and especially, poor entrepreneurs, this may not be the case.

According to asymmetric information theory, the lender may not have the same information or knowledge about the creditworthiness, the actual intended use of the loan and the likelihood of repayment as the loan applicant has himself. Due to such disparity in information, it can be difficult to distinguish bad loan applicants, or lemons according to

Akerlof (1970) from good borrowers. Therefore a market failure occurs since credit may not be available to potential borrowers because credit is restricted to certain categories of borrowers (Stiglitz and Weiss, 1981). Stiglitz and Weiss (1981) posit that the interest rate banks charge in part to screen good from bad borrowers, affect the risk of the pool of applicants in two ways. It may sort potential applicants- adverse selection- and it may affect the actions of the actual borrowers- incentives, or moral hazard. The inability of banks to distinguish between good borrowers and lemons leads to higher interest rates which in turn results in good borrowers looking elsewhere as loans are becoming increasingly expensive. The bank is therefore left with a pool of applicants with a lower probability of repaying the more expensive loan so that the average risk profile of the applicants increases. The inability of bankers to distinguish the lemons from good applicants result in overall higher costs for all applicants because the higher rates will in part take into account that some will default in the future. A willingness to accept high interest rates may therefore signal a low probability of repaying. The result is a process of adverse selection. A second effect of the increasingly expensive loan is that since the loan is costly and the borrower may not be able to repay, the loan once taken may be spent on an investment that is riskier than the borrower had initially intended. It follows, according to the concept of moral hazard, that economic agents maximise their own utility to the detriment of others when they do not have to bear the full consequences for their actions because of uncertainty and incomplete contracting. In other words, moral hazard suggests that higher interest rates work as an incentive for borrowers to choose, on average, riskier projects because the potential pay-off is higher.[3] Stiglitz and Weiss (1981) conclude that as interest rates increase, the average risk of the pool of borrowers rises whilst, at the same time, the bank's profits decrease. It follows that banks' expected return may increase less rapidly than the interest rates they charge so that at a point the return to the bank from increased interest rates would decrease. Banks would therefore prefer not to take on new borrowers willing to pay a higher interest rate and instead stay with the present portfolio of borrowers. Those denied credit will be unable to obtain credit even if they are ready to pay increased rates of interest. Credit is therefore rationed for risky as well non risky potential borrowers.

2.2 Uncertainty of Innovation and Entrepreneurship

There are two types of market failure that can explain why there is a lack of investment in innovation and entrepreneurship related activities. Firstly, the appropriability argument suggests it is particularly difficult to recover investments in innovation as others may be able to copy the technology at a much cheaper rate. Firms may therefore prefer to invest themselves (i.e. internal finance) rather than relying on external investments in order to avoid having to make information publicly available (Leland and Pyle, 1977). In fact keeping information private outweighs the importance of attracting external finance (Myers and Majluf, 1984).

The second market failure building on Arrow (1962) occurs when innovation activities rely on external sources of finance. When the private rate of return expected by the

[3] Such moral hazard problem was first highlighted in the insurance market by Arrow (1962).

entrepreneur differs from the cost of capital (or private rate of return) of the external financier, there is a wedge between the two rates of return (Hall, 2002:2). Therefore,

> "unless an inventor is already wealthy, or firms already profitable, some innovations will fail to be provided purely because the cost of external capital is too high, even when they would pass the private returns hurdle if funds were available at a 'normal' interest rate" (Hall, 2002:3-4).

The reasons for the higher expected private rates of return for the external investor are related to information problems associated with the characteristics of innovative activities. Drawing on Hall (2002)'s depiction of high-tech, R&D intensive industries, there are three important characteristics to note. Firstly, the workforce of the innovative firm creates an intangible asset which is the firm's knowledge base that will be the future basis of a firm's profits. As the knowledge is mainly tacit, it will be held by the workforce, and it is difficult to assess or measure such knowledge. Secondly, innovative activity is uncertain by nature and the greatest amount of uncertainty occurs at the early stages. Thirdly, investments in innovation are not one-off inputs of funding, but are made over time and during this time new information becomes available. This information can change and reduce the uncertainty of the output. The investment decision is therefore reassessed over time, as is for example noticeable in venture capital financing which is provided according to milestones, and in separate rounds of financing.

Adding to these characteristics of innovation investment, are additional attributes that entrepreneurs and small-scale firms possess that result in them being perceived as particularly risky. First, the competitive environment is more uncertain than for larger established firms and their rate of return is more variable. Second, new and smaller firms are comparatively less well equipped with human and capital resources to deal with economic shocks and business challenges. Third, inadequate business practises and accounting systems results in unreliable information which undermines their accountability and trustworthiness as regards profitability and repayment probability.

It follows from the lack of information that investors such as banks cannot fully differentiate between good and bad R&D projects, i.e. which ones are or are not the lemons, it becomes difficult to attract funding (Leland and Pyle, 1977; Myers and Majluf, 1984). This informational problem results in a funding gap as banks either perceive risks to be higher than they are, or do not understand how to monitor and evaluate such activities appropriately.

Bougheas (2004), however, argues that bank funding is feasible provided banks are able to renegotiate terms of contracting, and if the banks are willing to monitor the investment. In fact because of the intangible nature of the assets, banks have a high incentive to monitor (Bougheas, 2004).

2.3 Collateral, Relationships and Financial Exclusion

When screening for risks through arm's length financial intermediation does not work, other strategies have been employed such as relying on collateral as well as relationship based lending. Both measures can effectively exclude good potential customers such as entrepreneurs and small firms.

2.3.1 Relationships

By relying on established ties, through networks and personal relationships, banks minimise risk. Networks can overcome information problems by sharing information within a group and more easily enforce contracts (Biggs and Shah, 2006). The authors show that a positive externality of network membership for SMEs in Africa is better access to finance in the form of supplier credit (Biggs and Shah, 2006). However, by the same token, being excluded from a network can erect severe barriers to financial and other business development sources.

An alternative to wider networks are closer relationships between financiers and clients. Banks use consecutive contracts as a way to build up a relationship of trust, and to gather information. Petersen and Rajan (1994) study the benefit of such a lending relationship and find, using small business data, that the main advantage of building relationships with institutional creditors is the increased availability of finance. They note that borrowing by small firms is very concentrated and explain this in two ways. Firstly, the availability of finance increases as a firm buys more financial services from a certain bank, which results in small firms increasingly concentrating their borrowing with that one lender to receive better financial services. Secondly, relationship-based financing reduces the lender's expected information costs. However, the greater concentration simultaneously increases the lender's informational monopoly over clients so the lower costs are unlikely to be shared with the borrower, other than making finance more readily available (Petersen and Rajan, 1994).

The concept of concentrating finance with one lender, building up a relationship can be seen in informal finance too. Aleem (1993) surveyed moneylenders in Pakistan and found that they spend much time and effort on screening applicants and will reject one in two potential borrowers. 'Relationship specific capital' is then built up between lender and borrower so that the borrower knows it would take a lot more effort to borrow money somewhere else where that capital would have to be established all over again whilst the lender prefers to lend to somebody he has built up a relationship with and therefore excludes new borrowers.

2.3.2 Collateral

The use of collateral is a common risk-mitigating tool which banks generally rely heavily on, in order to deal with information problems and repayment incentives. The use of collateral can partially off-set potential losses in case of default and reduce the likelihood of asymmetric information as well as moral hazard occurring.

Bester (1985) shows, for example, that credit rationing will not occur if banks use collateral requirements as well as interest rates to screen the risk-level of potential investments. This is because investors who run a lower risk of bankruptcy are more willing to accept increased collateral for a reduction in the rate of interest compared with higher risk applicants. Therefore, self selection mechanisms will occur which sort risky investments from less risky investments. Furthermore, the moral hazard problem is reduced as the borrower with collateral is less likely to make risk-seeking investments. The problem is of course that few pro-poor entrepreneurs and small-scale firms have access to adequate collateral. According to surveys on entrepreneurs and SME's, collateral is in fact the biggest barrier to accessing enterprise finance (Zavatta, 2008). The problem of collateral for innovation focussed firms and entrepreneurs, is further aggravated by the nature of the innovation process that provides few tangible assets

that can be offered as a collateral (Zavatta, 2008). Furthermore, the lack of clearly defined, and enforced, property rights, in many developing countries further reduces the possibility of providing sufficient collateral (Helms, 2006; Robinson, 2001). Nevertheless, in microfinance, recent approaches have seen more flexibility as regards collateral, shifting from demanding collateral to cover a potential loan default, to demanding a collateral that provides a high enough deterrent to default on a loan (Cull et al., 2006).

2.4 Invisible Demand

The demand for financial products and services may not be immediately visible. At least two reasons may be distinguished from the supply-side: an old-fashioned view that the poor are not interested in, or able to handle credit; and an equally backward assumption that informal financial markets are nearly perfectly competitive and thus cover the demand for rural finance. That poor people do not have the pre-requisite knowledge to handle credit is an old, and faulty, view, as noted by Zeller (2003). That the poor are bank and credit worthy has been shown extensively by the success and very low default rates of microfinance (Morduch, 1998; Yunus, 1999). The related viewpoint that informal markets such as moneylenders are near to perfectly competitive and adequately cover rural financial demand (Pischke, 1991; Pischke et al., 1983) has also been disproved by microfinance, but still exists today (Robinson, 2001). Apart from exorbitant interest rates, informal finance providers offer limited services, often at short term.

On the demand side, an actual lack of demand could be caused by the high transaction costs of accessing finance for borrowers, a lack of suitable services and products as well as a general urban bias in banking and banking policies. Transaction costs for poor people in rural areas to access loans are often high. The procedure of acquiring a loan can be lengthy and time consuming with plenty of bureaucratic hurdles that often involves several return trips to the financial institutions. A cross-country survey finds that physical infrastructure such as communication and electricity has a significant impact on credit access and can explain cross-country variations regarding banking barriers (Beck et al., 2006a). In addition, the documentation requirements are often rigorous, and geographic centralisation of decision making further reduces physical presence and ease of access in rural areas (Beck et al., 2006a). This results in both direct transportation costs but also opportunity costs in form of loss of income.

The problem is further aggravated by the tendency by bank officials to demand bribes for loan processing. Basu (2005) found for instance that a third of borrowers of finance in rural India have to pay a bribe. Furthermore, loan products are often limited in scope whilst the terms of the loans are inflexible The result is a limited range of products that do not take into account the borrowers needs and therefore makes formal finance less attractive to the rural poor (Basu, 2006; Goodland et al., 1999).

2.5 The Flows and Set-up of the Financial System

There is a lack of finance available for pro-poor entrepreneur-based innovation in rural areas, yet there appears to be plenty of finance flowing into the system, there are three reasons put forward to explain this enigma.

2.5.1 Financial Flow from Rural to Urban

A reason for the lack of finance in rural areas is the net flow of finance form rural to urban areas. After the green revolution there was a general shift in development focus from rural areas and small-holder agriculture to urban based manufacturing by many governments. Lipton (1997) argued that the two gaps that already existed in income and output as well as efficiency of capital were widening.[4] This gap was further widened by urban biased policies that suppressed rural prices in order to keep prices low in urban areas. The end effect, according to Lipton (1997), was that resources were transferred from rural to urban areas, and from the poor to the relatively less poor. Trade and tax policies effectively discriminated against agriculture due to an urban bias (Lipton, 1977; Lipton and Eastwood, 2000). Furthermore, the expectation that the withdrawal of state-originated credit would be offset by an influx of private funds did not materialise (World Bank, 1986) as there turned out to be strong linkage effects between public and private investments that saw private investments plummet once public funding withdrew, causing a decrease on agricultural investment of 20% in real terms from 1978 to 1986 (World Bank, 1986:61).

More recently this rural/urban price differences have reduced, however the urban bias remains in the significantly larger public investments in goods, services and infrastructure in urban areas (Lipton and Eastwood, 2000).

2.5.2 Legal and Regulatory Framework

The efficiency with which financial institutions can overcome asymmetric information issues depend on the contractual (legal and enforcement) and informational[5] (transparency and information access) framework within which they operate as more efficient systems allow financial institutions to better assess loan applicants (Beck et al., 2006a). Where the regulatory framework is in place, weak contract enforcement or a complicated and cumbersome legal framework can still obstruct the efficient allocation of financial flows since there are fewer incentives to follow Government policy and directives (Berger and Udell, 2006). Furthermore, without the assigning and enforcement of property rights, contracting and enforcement are more problematic.

Finally, Beck, Demirguc-Kunt and Maksimovic, (2006b) show that firms in countries with strong property rights alongside a developed financial system are able to attract

[4] This was due to a cycle that started with low capital availability which caused low productivity in rural areas as farmers were unable to invest in improved production tools and techniques. This in turn resulted in low rural income which in turn lowered the capacity to save in rural areas. Of course low savings resulted in low capital availability.

[5] Udell and Berger (2006) emphasise the importance of the information environment such as accounting information and credit ranking tools as components of loan contracting and risk assessment.

substantially more external finance, whilst firms in less developed countries are more likely to rely on informal sources or government sponsored credit programmes.

2.5.3 Inertia and Institutional Lock-in

There is considerable inertia in bank lending which results in a lack of finance for clients that have unusual projects to finance, such as innovation which may require increased due diligence. Banerjee, Cole and Duflo (2005), use quantitative analysis to show that this inertia is likely due to incentive issues having its roots in the perception that lending to entrepreneurs and small firms, and other unconventional or risky customers would increase the likelihood of being investigated for bad loans, if the client defaults, as well as laziness and risk aversion. The inertia is noticeable in the lack of compliance with pro-poor lending requirements, as noted by Nair (2006) on a study about India. This is likely due to the low level of threat that non-compliance fines pose. The end result is that finance flows in the system but even when it is earmarked for certain types of borrowers or clients, it 'disappears' off through investment or lending to areas other than what was initially the intention.

At the same time, whilst increasingly specialised tools and techniques for cash flow analysis and evaluation of potential borrowers reduces the lender's risk by more accurately predicting risk and ability to repay (Bhatt, 1995), it can result in institutional lock-in. Kiggundu (2006) points to the issue of institutional lock-in occurring because the specialisation is likely to result in difficulties when bankers are confronted with a potential borrower different from the borrowers they usually deal with.

This section has noted that the mainstream financial institutions are unable to provide finance for entrepreneur-based innovation for a number of reasons. The next section will therefore go on to discuss why the mainstream organisations, such as banks, are not providing finance, whilst organisations operating outside of mainstream finance are able to do so, by focussing on knowledge flows within the financial system.

3. Exploring the Lack of Finance Using Knowledge Flows

Whilst the mainstream, or the 'core', of the financial system, that is, the banks, are unable to provide finance for entrepreneur-based innovation, organisations outside of the mainstream, or at the 'periphery' of the financial system are able to do so. It could therefore be suggested that these organisations operating at the periphery must be innovating, and thus access different knowledge or use knowledge differently, to circumvent or reduce the problems faced by the banks. The following section will discuss this by considering the financial system as having a core and a periphery, and explaining the differences in the way the organisations operate and are able to provide finance through knowledge flows and networks.

3.1 A Core-Periphery System

One way to conceptualise the financial system is through a sectoral innovation system (Malerba, 2004). The concept has evolved from the national innovation system idea which stipulates that the innovation process emerges from a system of actors whose behaviour, interactions and patterns of learning are shaped by institutions, by which is meant habits, practices, norms and routines. The institutions make up the "organizational architecture" (Coriat and Weinstein, 2002) of the innovation system and it is the interaction between these institutions that result in change. It defines the functions and interactions of all participants in the system. Institutions provide governance of, and mechanisms for, learning and knowledge creation and transfer between different actors within the system. Institutions determine "the speed, quality and magnitude" of the innovation process (Berdegue, 2005). Combining forms of knowledge, continuous learning and institutions therefore take centre stage (Edquist, 1997; Freeman, 1987; Lundvall, 1992; Nelson, 1993; Nelson and Winter, 1982). The systems concept is central as the:

> "main process of innovation must be viewed as a series of changes in a complete system" (Kline and Rosenberg, 1986: 275).

Consider then the financial system as a sectoral system of innovation (Malerba, 2004) with a core and a periphery. The core-periphery structure is generally comprised of a dense and cohesive core and a periphery that is sparse, even disconnected (Borgatti and Everett, 2000). In a technical core-periphery structure, the core distinction can be made in two ways. Firstly, the vertical, backwards linkages from the periphery generally lead to the core as the periphery is dependent on inputs, both goods and knowledge. However, the core is not dependent on the periphery despite the existence of a few linkages from periphery to core. Instead the core is

> "a largely self sustaining combination that may generate growth and stability for the system as a whole" (Arora, 2009: 31).

Secondly, the knowledge on which the periphery uses stems from the core, whilst the core is not dependent on the knowledge on which the periphery is based (Arora, 2009). It follows therefore that the periphery, in most cases, depends on the core for innovation and growth as:

> "elements in the core are connected to each other in a positive feedback loop: changes in one core element send reinforcing signals to other core elements". This positive

> reinforcement makes the core self-sustaining and gives it the dynamism to support innovation in peripheral elements"(Arora, 2009:3).

Though when the system has stabilised and matured, it may become difficult to sustain the rate of knowledge accumulation which in turn will affect the willingness to seek out new and better solutions in the system, resulting in stagnation of both innovation and knowledge flows (Arora, 2009).

Turning, to the financial system, it is evident that the core no longer appears to be driving innovation and knowledge accumulation in the system. It has matured into a stable system with little dynamism or willingness to change or acquire new knowledge. Instead, new knowledge accumulation and innovation appears to take place at the periphery of the financial system. Among these organisations, there is a greater need and drive to find new solutions to problems not solved by the core and innovative activities take place to a grater extent than at the core. What is more, the periphery organisations not only appear to innovate more, but are able to find solutions that a more suitable than the core organisations do. Nevertheless, the periphery organisations are still dependent on the core for certain inputs such as credit, whilst the core is not yet, to a great extent, dependent on periphery organisations. Two questions then arise. Firstly, why is the core of the financial system unable to accumulate useful knowledge and innovate and thus provide finance when organisations at the periphery are able to do so? Secondly, how can the periphery organisations continue this innovation and knowledge accumulation process and resulting provision of finance? To answer this, the next section will consider knowledge.

3.2 Tacit and Codified Knowledge

When considering the sources of knowledge that flow in the system, it may be natural to emphasise knowledge that is written down, or codified. However, plenty of knowledge that assists in understanding the codified variety, is not articulated, or written down: it is tacit. For instance, a farmer may have codified knowledge of the technicalities of harvesting potatoes in the form of manuals, agricultural experts and schooling. However, having worked on the same land for many years, his tacit knowledge may tell him which field, or in what part of a field to start because of, for example, the quality or composition of the soil in perhaps relation to the drainage of that field. Such knowledge has not been written down, and may indeed be very costly and time consuming to articulate, but it is nevertheless knowledge that has a great impact on the efficiency with which the farmer can use his codified knowledge of the harvesting process.

The knowledge that flows between parts of the system can change in nature from tacit, i.e. unarticulated to codified, that is, articulated and written down, using language and codes (Cowan et al., 2000). If the farmer would like somebody else to do the harvesting for him, the knowledge of how to do so would have to be transferred. The codified knowledge would be relatively cheap to transfer. However, transferring the tacit knowledge would pose certain problems. It may not be a problem if the transfer of the knowledge is not too distant, perhaps to his son, who has spent many years helping out on the farm. His son would have picked up plenty of the tacit knowledge over time and would have a similar background which would

make it more probable that he would use his knowledge in a similar way to his father and thus reach similar conclusions. However, knowledge of a tacit form is expensive to transfer, especially over longer distances to, for example, a new arrival with little prior experience of harvesting. The farmer may therefore attempt articulating his knowledge of where to begin the harvesting. In other words, codify his tacit knowledge and create a 'codebook' (Cowan and Foray, 1997).

Such a process of codification would entail building a model, creating a language for that model and articulating the messages that form part of the codification (Cowan and Foray, 1997). It can be a costly endeavour, especially when the knowledge is difficult to articulate, for instance requiring a new code or language. Nevertheless, once knowledge is codified, it is much easier to transfer. Just as with the example of the son of the farmer interpreting knowledge in much the same way as his father, the opposite is true of people with different backgrounds within an organisation. An organisation, such as a bank could therefore be expected to rely increasingly on codified knowledge as it grows (increasing number of heterogeneous staff) and matures (using a more stable codification process) to make sure information is read in the intended way.

> "Since internal communication channels can be designed, their structure can be chosen with a view to cost minimisation. In particular, the efficiency of a channel can be increased by suitable choice of a code. This term is used both literally and metaphorically. It refers to all the known ways, whether or not inscribed in formal rules, for conveying information. As is well known from information theory, the optimal code will depend upon a priori distribution of possible signals, as well as upon the costs of communicating differingly coded signals" (Arrow, 1974:55).

Coding could therefore be expected to have two economic implications: firstly, it would decrease (but not completely eliminate) the increasing cost to scale of operation resulting from communication costs. Increasing scale means increased specialisation, which in turn means that the organisation's staff:

> "will be accumulating differing types of skills in information-processing, learning (acquiring capital) in the areas in which they are specialising and unlearning elsewhere. As a result, communicating among them become more difficult and the codes used in their intercommunication have to become more complex" (Arrow, 1974: 55).

It follows that codifying knowledge allows for a greater number of knowledge sources to be pooled together. Secondly, codification creates intrinsic irreversible capital commitment of the organisation since an individual learning the code of the organisation is an irreversible investment (Arrow, 1974). It could therefore be expected that banks at the core of the financial system have codified much of their knowledge in order to communicate more easily. For the same reason, periphery financial organisations may be relatively new and still in a state of change which would mean they still relay to a great extent on tacit knowledge.

Between organisations too, codes ease communication, and as Arrow (Arrow, 1974) suggests, organisations roles become increasingly specialised resulting in more complex codes. Such codes built up over times would encourage a sector or group of organisations to learn in a certain way. In a state of change, various models and codes may exist among organisations. Codification can thus be seen

> "as an investment good: a contribution to the resolution of the competition among variant languages and models. It is in this context that we can expect to find situations of 'excess codification'. That is to say, the accumulation of successive generation of codes can prevent the development of radically new knowledge simply because explicating and understanding it would require entirely new codes" (Cowan et al., 2000: 247-248).

If the cost of building a code occurs in one generation

> "during a period of change [when] infrastructure is developed, languages and models are built, learned and standardised, and a community of agents with shared tacit knowledge grows" (Cowan et al., 2000:248)

then it can be expected that a subsequent generation reaps the benefits and there will be:

> "an intergenerational externality problem which can result in a lack of adequate private (or social) incentives for allocating resources to the development of more powerful codes and systemising those that already exist" (Cowan et al., 2000: 249).

Furthermore, the increasing number of organisations and actors using the codification will decrease learning costs.

However, the codification of knowledge to ease communication in and between an organisation has side effects since the codification to a great extent relies on what has previously been codified, i.e. history. An implication of this is that the actual pursuit of efficiency in communication through codification may in actual fact lead to rigidity in the system, a lack of response to creativity and future changes (Arrow, 1974:49; Cowan et al., 2000). In other words,

> "codified knowledge can be a potent 'carrier of history' –encapsulating influenced of essentially transient and possibly extraneous natures that were present in the circumstances prevailing when particular codes took shape. Having that power, it can become a source of 'lock in' to obsolete conceptual schemes, and to technological and organisational systems that are built around those" (Cowan et al., 2000: 248).

What follows is excess inertia in the stable system as there is less flexibility. This rigidity is an effect of the system having been built up in the previous period when the knowledge environment was unstable. Thus, the core of the financial system will, once it has reached a steady state, gravitate towards rigidity in their modus operandi. Codification has at this point stopped improving communication efficiency and instead made the financial intermediary wary of new approaches to finance or new types of clients or projects.

Even tacit knowledge can lead to rigidity in a mature organisation or system. For instance, a financial institution may act in a certain way through conventions and collective memory for. Using the 'Washington consensus' as an example, Cowan et al. (2000) note that:

> "The IMF for example, has nowhere written that there is only one prescription for all the monetary and financial ills of the world's developing and transition economies; but, its advisers, in dispensing 'identikit' loan conditions, evidently behaved as if such a 'code' has been promulgated. Such uncodified but stable bodies of knowledge and practice, in which the particular epistemic community's members silently concur, will often find us as a test for admission to the group or a signal of group membership to the outside agents"(Cowan et al., 2000: 233).

Hence what has happened at IMF as with many other maturing organisations, is that the need for a certain codes has imposed a uniform requirement on the staff of the organisations. Even when not explicitly written down, intermediaries at the core of the financial system, appear to believe in much the same way of providing finance. For instance, despite no rules stopping banks lending to certain projects, and even encouragement from Government, banks can be extremely hesitant in changing their approaches, client base or lending methods. Arrow (Arrow, 1974) concludes that the staff are thus:

> "specialised in the information capable of being transmitted by the codes, so that, in a process already described, they learn more in the direction of their activity and become less efficient in acquiring and transmitting information not easily fitted into the code. Hence, the organisation itself serves to mould the behaviour of its members" (Arrow, 1974:56-57).

Such institutional 'lock in' is often caused by path dependence, which means that it can be expected that an institution, organisation or system will be constrained by its historical context (David, 1994). History therefore matters because of the role of the historical experience, including particular events, in shaping mutually consistent expectations. Furthermore, complex organisations looking to fit with bigger structures (such as the financial system) need to make choices that feet with these and therefore constraints are imposed (David, 1994). Path dependency can then result in particular avenues being taken or solutions chosen due to what is considered 'correct' at the time. What follows is that:

> "the organisational structure can become 'locked in' to a comparatively narrow subset of routines, goals and future growth trajectories" (David, 1994:214).

Again, it is noticeable that such path dependence leads to inertia in the system. Cowan and Gunby (1996) for instance, found that choices made at an early stage regarding pest management technology greatly influenced and reinforced later choices. The technology is then locked in and it becomes very difficult to make the switch to a different technology even if that one has been proven to be superior.

It can be concluded that even if the new knowledge is considered better, there are still many constraints on its adoption and use.

> "The resistance to new propositioned knowledge is to be expected in any society, but its degree of success depends on the standards by which society judges it and the tightness of the knowledge- that is, how strongly it is confirmed by these standards and becomes part of the 'consensus' (Mokyr, 2002: 227).

The impact on the financial system then, is that formal financial institutions that make up its core are rigid, institutionally locked in and unwilling to innovate. Formal financial dealers or intermediaries are often reluctant to change to new technologies or methods because of preconceived risks or costs. Therefore informal dealers operating much more on personal information, contacts and knowledge are in a better position to identify new opportunities. In fact, markets with new products tend to be created and nurtured by informal dealers rather than formal (Bhatt, 1995).

3.3 Knowledge Types and Networks

The knowledge flowing in the financial system stems from actors. Actors are those individuals or groups of individuals who are able to influence outcomes and cause change. The importance and role of each actor can change over time and often individuals can play a more decisive role than a team or an organisation. Actors include for example suppliers, traders, wholesalers, end users, financiers, cooperatives, competitors, entrepreneurs, NGOs, Government and rural clients.

These actors have embodied knowledge and skills. Therefore, knowledge types are spread across actors (Arora, 2009). Because knowledge is spread across actors, interaction is required for the knowledge types to mix. Therefore, knowledge types, or actors, interacting in a way governed by institutions create innovation. It is thus this collaborative knowledge accumulation and learning process that forms the basis of the innovative activity (Arora, 2009). The performance of an innovation process is a function of the structure of its knowledge sharing network. The consequence of this would be that innovation is a social process and that networks hold a central position as it is through networks that new relations of knowledge types form that result in knowledge sharing and this innovation.

There are intuitively three reasons why networks are of importance to the innovation process (Arora, 2009): firstly, innovation is the result of new combinations of diverse knowledge types that somehow must interact in order to provide a coherent whole (Rosenberg, 1976 in Arora, 2009); secondly, there is no single actor that can have all the necessary expertise for an innovation process or system which means that networks are necessary in order to both share information and make sure the system functions; thirdly, such networks are vital in order for non-codified, i.e. tacit knowledge, to travel throughout the system. Such knowledge may flow between experts, between experts and end users, or between end users, and as has been noted previously, flow more easily through close interaction. A point to emphasise here is the importance of user-user interaction for innovation (Hippel, 1988). Manufacturers or producers have conventionally been the focal point as the functional source of innovation. However, as Hippel (1988) notes, users and suppliers can also act as innovators or provide central input to the process of innovation. The functional role of an actor is determined by the functional relationship (as a manufacturer, supplier or end user) in the innovation process through which they derive benefits (Hippel, 1988). Therefore, the role can change over time and innovation. Whilst a user will innovate to gain personal benefits from an improved product, process or service, the producer is more likely to look to a market of several users with similar requirements. Furthermore, lead users often have the best understanding of new challenges and needs (Hippel and Riggs, 1996) and they are characterised by an expectation to benefit significantly from the innovation they are involved with and are generally ahead of the rest of the market (Hippel and Riggs, 1996). By acting as a lead user in the financial system therefore, an organisation at the periphery is able to circumvent discrepancies between what intermediaries supply and what their clients demand. An innovating organisation as a lead user is additionally in a better position to acquire and use tacit knowledge to create, monitor and evaluate financial models supporting innovation.

Just as codification leads not only to better communication but also rigidity, embeddedness and social networks can also lead to an actual seal from information flowing

outside of the network. It therefore leads to reducing the adaptive capacity an individual or an organisation possesses (Uzzi, 1997). Therefore, organisations such as banks may be in fact closed off from information flowing freely outside of their close network.

Furthermore, when networks are made up of similar actors, such a close banking network or academic network, they are likely to bring very similar knowledge types. Therefore they are unlikely to yield the same level of knowledge accumulation that could occur from a wider network made up of actors from different backgrounds. Because of this, it could be assumed that networks at the core of the financial system, who all use similar codification to share knowledge, would gain less in terms of innovation and knowledge accumulation, from their networks, than would an organisation operating at the periphery which may be part of a wider and more varied network. New useful knowledge would be more likely to occur from the periphery of a network than the core of it which again would suggest that wider networks of actors, as used by the periphery organisations would be more useful.

A final point about networks is that certain organisations or individuals can act as 'go-between's', which is a role that the periphery organisations could be expected to take on since these organisations are able to match new clients with finance. Uzzi (1999) notes that when existing embedded ties within a network links with new partners, go-betweens can help deepening the relationship between the new actors by establishing mutual trust and reciprocity. Therefore, the clout held by an organisation working for the financing of pro-poor innovation could assisting in building up ties between previously separated actors. Furthermore, by setting expectations for trust and reciprocity, the organisation can move around the problem that is often solved with collateral and high interest rates in arm's length finance.

Having discussed in detail why the core of the financial system is unable to accumulate useful knowledge whilst the periphery organisations are able to do so due to the way in which knowledge flows within a system depending on the type of knowledge, the kind of network it flows through, trust and relationship that exists, and the ability of organisations to accumulate new knowledge, the next section will contrast the flow of knowledge in the periphery and core financial institutions.

4. Periphery vs. Mainstream Organisations: Bridging the Gap

Following the discussion of the previous sections, it is clear that the core and the periphery of the financial system operate in different ways and this has an impact on their level of innovation in the provision of finance, and by extension to what extent they are willing and able to support pro-poor entrepreneur-based innovation.

The core has over time matured into a stable system that has become rigid. Instead of positive feedback loops reinforcing the dynamic and knowledge-accumulating system, the core is reinforcing its rigidity and lack of flexibility. The result is a stagnation of innovation and knowledge accumulation. The periphery, on the other hand, is still evolving and dynamic, and manages to therefore support knowledge accumulation and the innovation process.

The organisations at the core and the periphery are relying on different sorts of information. Whilst the matured and stable core is to a great extent using codified knowledge to share information widely in a cost efficient manner, the periphery is relying more on tacit knowledge. Though tacit knowledge is more expensive to transfer and requires close, face-to-face interaction, it is more likely to highlight new challenges that organisations would need to deal with. The periphery organisations are therefore in a better position to act on context specific or local knowledge that either is too new or, too difficult to articulate to have been codified. This reliance on tacit knowledge thus allows the periphery organisations to adapt their models quicker, which in turn puts them in a better position to deal with asymmetric information since the gap between their knowledge and that of their clients' reduces. It also provides periphery organisations with a better understanding of demands – which may be invisible to organisations that rely on more formal information channels and knowledge flows.

The codification of knowledge at the core has further implications as a carrier of history resulting in both path dependence and institutional and behavioural lock-in. This in turn leads to rigidity in the system, and inertia. The financial intermediaries at the core are locked in to the same way of doing business, such as lending using the arm's length finance approach, as they have always done. To change to a new type of lending behaviour would cause disruptions throughout the core system as the interconnected parts of the organisations that provide finance are all geared towards the traditional arm's length transactions approach. Thus, such rigidity and institutional lock-in, act as a barrier to innovation. The periphery organisations, however, do not suffer from history to the same extent, as they were set up only very recently and have not used the more established approaches to providing finance. Therefore, history and path dependence do not act as a severe barrier to further innovation and change for the periphery organisations, unlike the core. Rather, the periphery organisations are much more flexible in nature. Such flexibility allows them to keep a more 'open mind' and able to react on and incorporate new knowledge and information as there are no previous codes that lock them in to a certain way of doing business or thinking.

As a result of the codification of knowledge as well as path dependency and institutional lock-in, the core is likely to operate in an environment with a network of very similar knowledge types. Since the network is made up of similar knowledge, it is unlikely to lead to much new knowledge accumulation and innovation. The structure of the network is likely to be closed at the core, due to the modus operandi which further reinforces the limited types of

knowledge available. At the periphery the story is quite the opposite with a network structure that is wide and open, therefore including a far wider range of knowledge types. These knowledge types are of different (sectoral, geographical and professional) sources, providing a much more stimulating mixture of knowledge than the core, which results in improved knowledge accumulation and innovation, as well as a better understanding of the operating environment which in turn affects expected risks. Among these links, the periphery is likely to rely on backward linkages from the core (for example credit in some cases, or lending infrastructure). Furthermore, asymmetric risk is reduced, whilst the organisations reduce the perceived risks of investing in innovation and entrepreneurship since they are able to gather more varied knowledge that is likely to result in better informed decisions. At the same time an open network, as seen at the periphery, ensures that organisations and individuals are accessing knowledge that flows outside of their immediate knowledge network. The periphery organisations can therefore be expected to work around already established flows of knowledge, to increase their knowledge accumulation. The core, however, which operates a more closed network, is likely to be sealed off from information that flows outside of their network.

A further point related to the network of knowledge types and improved understanding of the risks involved in investing in innovation, is that the periphery organisations are able to use their extensive and varied networks to provide new services outside of their own direct capabilities. They are able to do so by acting as 'go-betweens', building relationships and transferring trust between two parties, such as an entrepreneur and a financial intermediary or a supplier of inputs, that were not previously directly connected. By acting as a go-between, as well as building up a reputation for such a role, the organisations at the periphery are able to break down barriers caused by exclusive relationships that the rural poor would not be able to enter individually, and connect knowledge types and actors that would previously not have interacted. Relying on relationships to a great extent also reduces the need for collateral. The core does not possess this ability and since institutional lock-in refrain it from interacting with new clients, the organisations at the core can neither provide services directly, nor act as a go-betweens, linking these un-serviced clients to another intermediary that would provide such services.

Finally, the periphery organisations are closer to the users than are the organisations at the core of the financial system. This closeness coupled with their reliance on tacit knowledge makes them more likely to see financial innovation from the point of view of the end users, and interact more with users in the innovation process. In certain respects they are the actual users, in the user-producer relationships that exist between them and the organisations at the core. In this sense these organisations can be thought of as lead user innovators of finance. The periphery organisations have direct experience of the financial products and models that the core lack and are therefore in a better position to improve existing models by innovating at the user end. They are also able to more rapidly detect demand that was previously invisible. That puts them in a unique position to understand what actual works on the ground and what suits their clients.

Having noted that there is a distinct difference in the way organisations at the core and at the periphery are operating in terms of the stability and dynamism of the system, the reliance on different kinds of knowledge, the importance of history in contributing to path dependence and institutional lock-in, the variety of knowledge types in their networks, the reliance on relationships and the tendency to be innovating, the final section below will elaborate on conditions under which finance can be provided for rural pro-poor entrepreneur-based innovation.

In a system, such as the financial system, many conditions are interrelated. Some conditions, or factors, are known whilst others are not. Therefore, it is difficult to know exactly which factor, or factors, affects access to finance for pro-poor entrepreneur-based innovation. There may be many variables, in which case the exact combination of factors is likely to be unknown. It follows that singling out one variable as the reason for a lack of finance for entrepreneur-based innovation is not useful since that one factor would be heavily constrained by other unknown, but interrelated, variables in the system that have not been accounted for. Given that there are no mathematical or statistical tools that can aid in singling out such necessary and sufficient conditions for the provision of finance, this paper instead turns to probabilistic conditions that can form the basis for causal attributions in real world settings, such as in the financial system. Such conditions are an

> "insufficient but necessary part of a condition which is itself unnecessary but sufficient for the result" (Mackie, 1974:245).

These INUS conditions can then be used to undertake causal attribution in a model. The paper has noted that knowledge accumulation and innovation are important for the provision of finance to customers outside of the mainstream group of borrowers. Linking the reasons (barriers) for the apparent gap in finance from section 2 with the arguments why some organisations can overcome these barriers in section 3, and the way in which the core and periphery act differently, as discussed in this section, a list can be formed of INUS conditions related to the ability to provide pro-poor entrepreneur-based innovation finance. It is likely that these conditions will be more evident among the organisations at the periphery, whilst (mostly) lacking at the core. Furthermore, it is likely that these conditions are evident to different extent and in different shapes in the various organisations at the periphery, and not all organisations need to necessarily fulfil all the conditions.

Flexible and Dynamic

By using a flexible approach to finance, the organisation avoids being 'stuck in history' or institutionally locked in. Instead they can look at new problems and challenges without such barriers. The dynamism additionally means that organisations are quicker to adapt to new situations and more open to new ideas.

A Wide Network of Actors with Varied Knowledge

By having access to a wide network of different knowledge types (from end users and NGOs, to banks at the core and academia, for example), organisations can access expertise to deal with, and better evaluate the risk of potential endeavours or clients. A wide network provides new knowledge that can be used to improve existing models of finance. In addition, it is likely that

the core of the financial system plays a role as supplier of finance to the periphery since the periphery organisations probably cannot access enough finance among themselves.

Relationships Improve Risk Profile and Replaces Collateral

By relying heavily on relationships, an organisation can provide a wider range of services than can organisations that operate in isolation. This can improve the risk profile of clients as well as the organisation's portfolio, and reduce the need for collateral. Furthermore, by acting as a 'go-between', organisations can use their relationships to transfer trust to its clients and therefore do away with some of the risk the normally require collateral in arm's length finance.

Tacit Knowledge, Feedback Loops and Learning

By emphasising tacit knowledge, rather than simply codified knowledge, organisations can access 'newer' knowledge. By doing so, they are more likely to understand a local or new situation and the related financial needs, for which their financial models can then be adjusted. Mechanisms for feedback need to be in place so that the organisation can acquire, use and learn from new knowledge and information.

Lead User Innovation

By acting as a lead user in the financial system, the organisations are able to circumvent discrepancies between what organisations at the core supply and what clients demand. The organisations rely on backwards linkages to the core to access finance, which they in turn provide on different conditions to clients that cannot access finance from the core directly. An innovator as a lead user is additionally in a better position to evaluate the usefulness of a certain model.

A Systemic, Integrated Approach to Finance

An organisation operating as part of a system is in a better position to deal with risk because it can focus its support model on a particular niche of that system, knowing that other intermediaries will complement that service. Such an organisation is more likely to support entrepreneur-based innovation efficiently since operating in a systemic manner requires it to be dynamic, and changing in nature.

Furthermore, an integrated approach provides different kinds, or different combinations, of financial and non-financial support. It recognises that such non-financial support not only provides for the most efficient use of the financial services, but also reduces client risk. In doing so, it reduces the portfolio risk of the organisation too. Moreover, at the sector level, an integrated approach means that these organisations are involved in financing innovation beyond directly dealing with clients. The organisations therefore have an impact on the environment in which it operates and by improving the external environment, the organisations are likely to improve their internal operations too.

5. Conclusion

This paper began by outlining a number of reasons why there may not be finance available for innovative activities among small firms and entrepreneurs, assuming that it is not simply because it is impossible to make a profit. First, credit may be rationed due to information problems. Second, there is uncertainty related to innovation focussed investments. Third, to combat such (perceived) risk the financial intermediaries may rely on collateral and relationship-based finance that can lead to financial exclusion. Fourth, the demand for finance may not be clearly visible since accessing finance may be too cumbersome and/or expensive for rural entrepreneurs. Fifth, the financial system itself may affect the flow of credit in a number of ways due to regulatory issues and government policy, legal barriers and contract enforcement, information flow and the physical infrastructure supporting the system.

Considering the financial system as made up of a core and a periphery, the paper went on to suggest that the way tacit and codified knowledge flows within the system and the knowledge types that can be accessed through networks matter. So do the trust and relationship that exists, and the ability of organisations to accumulate new knowledge.

This analysis was taken a step further in the third section where the knowledge flows at the core were contrasted with those at the periphery of the financial system. At the core, path dependence and institutional lock-in together with a closed network of similar knowledge types and a dependence on arm's length transactions and collateral, rather than relationships resulted in rigidity and a closed system. The periphery organisations however, were able to avoid these issues for a number of reasons which form the basis for the INUS conditions in the final part of this paper. The INUS conditions posit that finance is available when organisations within the system (or part of the system as is the case of the periphery) posit, in different ways, some, but not necessarily all, of the following characteristics: dynamic and flexible approach to finance; a wide network of actors with varied knowledge; relationship focused (because it reduces the risk profile as well as the need for collateral); an emphasis on tacit knowledge, feedback loops and learning; ability to innovate close to or with the end user thus acting as a lead user innovator; and finally by adopting a systemic and integrated approach to finance.

The main contribution of this paper was thus a framework which details a novel way of conceptualising why there appears to be a lack of finance supporting pro-poor entrepreneur-based innovation, as well as giving some reasons why there are organisations that are able to circumvent these problems and a number of conditions under which finance is available.

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