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Many thanks to the members of the Centre for the Study of African Economies and the Ghanaian Statistical Service who were involved in the fifth wave of the Ghanaian Manufacturing Enterprise Survey.

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Abigail Barr

ABSTRACT

This paper focuses on the networks of business-related contacts that are built and maintained by manufacturing entrepreneurs in sub-Saharan Africa. It describes the various functions that such networks perform, explaining why each function is important given the environment in which the enterprises are operating, and looks at the extent to which collective action is either necessary or desirable for their fulfilment. Data from the Ghanaian manufacturing sector suggests that networks are more commonly valued because they provide access to information about new technologies, trading opportunities and the conduct of others than because they provide a basis for collective action. Further, where functions can be performed either collectively or through bilateral interactions, the latter is more likely. This notwithstanding, there is evidence that the networks can provide support for both socially beneficial and socially detrimental collective action.

I INTRODUCTION

This paper focuses on the networks of business-related contacts that are built and maintained by manufacturing entrepreneurs in sub-Saharan Africa. It describes the various functions that such networks perform, explaining why each function is important given the environment in which the enterprises are operating and looks at the extent to which collective action is either necessary or desirable for their fulfilment. Data from the Ghanaian manufacturing sector suggests that networks are more commonly valued by member entrepreneurs because they provide access to information about new technologies and trading opportunities and about the conduct of others in the marketplace than because they provide a basis for collective action. Further, where functions can be performed either collectively or through bilateral interactions, the latter is more likely. Consider, for example, the role of networks in contract enforcement. While it is found that networks provide a conduit for information about the trustworthiness of agents and as a result support multilateral deterrence of untrustworthy behaviour, there is no evidence that this deterrence requires or takes the form of collective action. Rather, it is the outcome of a series of bilateral information exchanges and unilateral decisions.

Because of the greater incidence of bilateral interaction and lesser incidence of collective action, I refrain from referring to the entrepreneurial networks as groups.[1] This notwithstanding, there is evidence that the networks can both contain and provide support for groups of agents acting collectively. In this regard networks are particularly important to small-scale entrepreneurs for whom one of the consequences of capital market imperfections is that economies of scale can only be reaped collectively. There is some indirect evidence that networks support not only socially beneficial but also socially detrimental collective action in the form of collusive pricing agreements. Interestingly, here multilateral punishment tends also to be collectively co-ordinated.

The paper is divided into four sections. Following this introduction, Section 2 draws on the existing literature to describe the various functions that

[1] Groups have been defined as 'individuals or entities which undertake activities together and collectively interface with the market' (Heyer, Stewart and Thorp, 1998: 2).

entrepreneurial networks perform and define the conditions under which each function is most likely to benefit their members. In addition, for each function I ask whether collective action is either necessary or desirable for its fulfilment. Then in Section 3, I present the findings of a survey of Ghanaian manufacturing entrepreneurs. In the light of these findings, in Section 4 I draw my conclusions.

II ENTREPRENEURIAL NETWORKS AND THEIR FUNCTIONS

Entrepreneurial networks, like all networks, are made up of bilateral relationships or ties between pairs of members. Theoretically, networks can be closed in the sense that a boundary that is not crossed by any ties can be drawn around the set of all members. However, more generally they are unbounded and any particular network can be distinguished only by a relatively high frequency of interaction or intensity of ties between its members. Within entrepreneurial networks ties are formed and dissolved over time depending on the changing nature of the individual members' social and economic circumstances and in general it is the desire to maintain ties rather than formal rules that regulates their behaviour. As we shall see, this decentralized mode of operation pervades almost all aspects of the networks' functioning and, to some extent defines their functional comparative advantage.

Networks improve enterprise performance primarily by facilitating flows of information. In so doing they can help reduce the search costs associated with finding trading partners, identifying new market opportunities, and establishing the fair price for inputs and outputs (Burt, 1992; Kranton, 1996). They can also help reduce the search costs associated with the acquisition of new technologies. Brautigam (1997) describes how Igbo entrepreneurs in eastern Nigeria use their international networks to identify and source new machinery and equipment, while Gravrilis (1989) and Schrader (1992) show that, even between competing enterprises, engineering personnel request and provide answers to technical questions as part of a process of reciprocal exchange. In the developed countries of the west networks represent one of many conduits through which information is transmitted. Burt (1992) argues that in this context networks act as a filter helping individual entrepreneurs focus on the information that is most relevant to their situation. In contrast, for many entrepreneurs in developing countries networks are likely to be the only source of such information. Throughout this literature the emphasis is on

bilateral interactions within decentralized networks—an entrepreneur hears a piece of information from a contact and shares it with her other contacts who share it with their contacts and so on, or the entrepreneurs respond to requests from each other for specific information as and when required. Collective action can improve the efficiency of information flows under certain conditions. Consider, for example, a system of extension workers visiting farmer associations. This arrangement is likely to be more efficient than visits to individual farmers and/or relying on word of mouth through networks. In this case, however, new technical knowledge is flowing from a central research unit to a widely disbursed population. In the context of manufacturing it is more a case of finding a match with respect to exchange partners or technologies—the knowledge both starts out and remains disbursed. Here, it is not easy to see how collective action could improve efficiency.

Networks can also reduce transaction costs by improving contract discipline. Here, once again the primary role of the network is to convey information, although in this case the information is about other entrepreneurs. In developing countries the ability of one entrepreneur to assess the contractual performance of another is greatly hindered by the high incidence of under-performance. Fafchamps (1996: 428) argues that this is a reflection of both the uncertain nature of the environment in which the enterprises operate and the tendency for poor performance to 'ripple through the system'. An entrepreneur suffering cash flow or production problems due to the under-performance of one trading partner often has no option but to renege on agreements with others. Within such an environment entrepreneurs need to be flexible. When under-performance is unavoidable, punishment is inappropriate and the threat of punishment not useful as a deterrent. This environment can, however, harbour malfeasance. If entrepreneurs are able to pass any under-performance off as unavoidable, they can renege on contracts at will. This malfeasant behaviour needs to be controlled and, given that it is a matter of choice, could be deterred by the threat of punishment. Networks can reduce asymmetries in information about the circumstances and conduct of others and thereby help entrepreneurs distinguish between malfeasance and unavoidable under-performance. Once such distinctions are possible, punishments and threats of punishment can be made and malfeasance deterred.

The type and severity of the punishment that can be meted out and, more importantly, credibly threatened also depends on the functioning of the network. When pairs of entrepreneurs trade repeatedly over time threats of

unilateral punishment, such as withdrawal from trade, in the event of malfeasance may be credible and sufficient deterrents (Fudenberg and Maskin, 1986). In contrast, in the context of a network punishments can be multilateral, e.g., there can be withdrawal from trade by both the victim and the other network members (Kandori, 1992; Raub and Weesie, 1990). The resulting punishment may be harsher and may therefore deter malfeasance that cannot be deterred through unilateral punishment, although both the harshness of the punishment and thus the extent to which malfeasance can be curbed depends on the effectiveness of the network at reducing information asymmetries and co-ordinating punishments. Perfect co-ordination of punishments can be achieved only if the members of the network take decisions and act collectively. However, as Kandori (1992) and Greif (1993) show, this is not necessary for multilateral punishment. Both decision-making and information-sharing can be decentralized. It is not even necessary for pairs of agents in the network to trade repeatedly as long as each agent has repeated interactions within the set of agents as a whole (Kandori, 1992). This notwithstanding, the higher the level of collectivity within the network the more effective it will be at supporting multilateral punishments.

Because of their capacity to reduce information asymmetries and aid in contract enforcement, networks are particularly important as a basis for informal insurance (Fafchamps, 1992; Chamlee, 1993; Lund, 1996) and informal credit arrangements (Yotopoulos and Floro, 1992; Ottati, 1994; Lund, 1996). Informal insurance arrangements can take two forms; they can involve the giving of assistance (financial or otherwise) to people in need, or they can involve flexibility in trade and lending-related contracts. It has already been established that there is no point in punishing trading partners who under-perform through no fault of their own. The case for such lenience is strengthened if agents expect to be treated with similar lenience if and when the situation is reversed. In this way the risks associated with specialization and trade as well as those relating to criminal activity and environmental factors can be shared. Fafchamps (1996) provides evidence of such contractual flexibility between trading partners in Ghana, while Bigsten *et al.* (1998) use data from several sub-Saharan countries to show that it is more likely to occur within the context of long-standing relationships. Although in an agricultural rather than a manufacturing context, Udry (1994) provides evidence of similar flexibility within credit relationships in northern Nigeria.

The need to use networks to reduce information asymmetries and thereby improve contract discipline in goods, credit and insurance markets is particularly important when the state is either unable or unwilling to provide

an efficient and impartial legal system and when agents have difficulty distinguishing themselves one from another (Greif, 1996). Thus enterprises in developing countries in general and the numerous small enterprises in particular are more likely to rely on their networks for this purpose. This notwithstanding, as Granovetter (1985) has argued and Macaulay (1963) has shown, even when enterprises have access to a formal legal system and the ability to distinguish themselves one from another, they often choose to use their networks to ensure contract discipline. So, while the need to use networks to enforce contract discipline may diminish as we move from small to large enterprises the incidence of use may remain unchanged.

I have argued that collective action is not necessary for networks to fulfil many of their functions. This notwithstanding networks can provide a basis for such action. The experimental economics literature provides strong evidence that communication increases co-operation in the creation of public goods (Ledyard, 1995). Similarly, the empirical literature on the provision of local public goods and the performance of peasant committees in rural areas of developing countries indicates that greater social interaction leads to higher levels of co-operation (White and Runge, 1995; Gaspart *et al*., 1996; Molinas, 1998). In the context of manufacturing in developing countries, evidence of a causal link between networking and collective action is harder to find. It has been argued that the dense networks of inter-relations within the industrial districts of the Third Italy contributed to their economic success by providing a basis for co-operation and collective action (Becattini, 1990; Brusco, 1990; Pyke and Sengenberger, 1990; Sengenberger and Pyke, 1992). However, the corresponding literature on small firm clusters on developing countries (Schmitz, 1995; Nadvi, 1994) provides little evidence of such a link. Brautigam's (1997) work on the Igbo in eastern Nigeria is one exception. She describes how these manufacturers use their ethnic networks as a basis for collective action aimed at supplying local infrastructure. Her work illustrates the particular value of networks as a basis for collective action in areas where the government, for whatever reason, is not providing local public goods. Networks may also be of particular value to small enterprises as a basis for collective action: in isolation they can be frustrated by indivisibilities in machinery and disadvantaged by the need to buy raw materials in small quantities and their inability to meet large orders, whereas collectively they can reap the economies of scale associated with each of these situations.

Both networking and the collective action that it supports yield positive returns for those agents who are directly involved (Ledyard, 1995; White and Runge, 1995; Gaspart *et al*., 1996; Barr, forthcoming; Molinas, 1998).

However, the external effects, i.e., the effect on those agents not directly involved, can be either positive or negative (Barr, 1998). Networking activities and collective actions that yield negative external effects are usually described as rent-seeking activities. The link between networking and rent-seeking in the form of collusion was famously pointed out by Adam Smith (quoted in Granovetter, 1985: 484) who noted that 'people of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices.' Olson (1982) describes how collective action through associations can be used to protect vested interests and to bring pressure to bare on governments to make policy changes that benefit members at the expense of wider society. Similarly individual rent-seeking through networks often involves the securing of favours from bureaucrats and politicians. Those favours may take the form of preferential treatment with respect to licences, planning permissions and government contracts or the passing on of information about planned changes in policy. Allocative efficiency will suffer as a result of such activities. However, while interaction between entrepreneurs and government can have a negative effect on the economy as a whole (Mauro, 1995; Bardhan, 1997), it can also have a beneficial effect. A thriving civil society can improve the accountability of government thereby inducing it to adopt better policies and provide better services (Putnam, 1993; Brusco, 1990; Knack and Keefer, 1997).

Collusion is most likely to occur in markets dominated by small numbers of large-scale producers. The likelihood of an enterprise seeking favours and information from and about bureaucrats and politicians depends on the value they place on the favours. In general, larger enterprises that have the capacity to meet government contracts and require licences and planning permissions in order to conduct their business are more likely to use their networks in this way. They are also more likely to value their networks as a source of information about government policies as they have a greater tendency to be affected by such policies: exchange rate and interest rate movements affect exporters, those using significant quantities of imported raw materials, and borrowers on formal financial markets.

The relative advantages of groups supporting collective action and networks supporting bilateral interaction differ for each of the functions described above. First, when the objective is to reduce the search costs associated with input and output markets and technologies, groups have no advantage and may even have disadvantages over networks. Second, while contracts relating to the trade of goods and informal credit and insurance arrangements can be

enforced within networks they are more easily enforced within groups. Third, by definition collective actions are performed by groups. However, the groups are likely to have emerged from, be embedded within, and be supported by networks. Being embedded within a network may increase the extent to which collective as opposed to individual objectives are pursued by group members. Finally, rent-seeking can take many forms: collusion and lobbying require collective action whereas favour-seeking from bureaucrats and politicians is more likely to be conducted in a decentralized manner.

III GHANAIAN ENTREPRENEURIAL NETWORKS

Earlier statistical regression analyses indicated that Ghanaian manufacturing enterprise performance is positively affected by the networks that their entrepreneurs build and maintain (Barr, forthcoming). Variations in entrepreneurial networks account for 37 per cent of the variation in productivity between small (up to 30 employees) and large (more than 30 employees) enterprises. Only variations in the capital-labour ratio explain a larger share (46 per cent). Further, a one per cent increase in the number of contacts maintained by an entrepreneur is associated with a 0.34 per cent increase in productivity, while a one per cent increase in the number of contacts maintained by an entrepreneur's contacts is associated with a 0.11 per cent increase in the same performance indicator. Increases in the diversity of the contacts that the entrepreneurs maintained have an even more profound effects on performance. This work also provided indirect evidence relating to the function of the networks. The larger and more diverse the networks the better they are at facilitating flows of technical knowledge between enterprises. This notwithstanding, small enterprises appeared not to face the same returns to increasing network size and contact diversity as their larger counterparts (Barr, 1998). Hence, they tended to maintain smaller, less diverse, and more cohesive networks, i.e., the best type of networks for reducing information asymmetries. Entrepreneurs not using formal insurance and credit tended to build this type of network, suggesting that they may be associated with informal insurance and credit arrangements.

In this paper I take a very different approach in order to further investigate what functions the networks are performing. Instead of relying on statistical regressions to reveal the patterns in the data and thus indirectly indicate network function, the sampled entrepreneurs are asked directly why they value their networks. The answers are presented in cross-tabulations and

discussed in conjunction with other data relating to the environment in which the entrepreneurs operate.

The data was collected during the fifth round of the Ghanaian Manufacturing Enterprise Survey which was funded by the Department for International Development and conducted by the Centre for the Study of African Economies in collaboration with the Ghana Statistical Service. The round was implemented during the last quarter of 1998 and covers a sample of 195 enterprises. It is important to note that this sample is not representative. Larger enterprises are significantly over represented. For this reason it is not always appropriate to treat sample averages and proportions as estimates of the corresponding population parameters, especially when the environmental and behavioural variables under analysis vary with enterprise size. In order to alert the reader to instances where this is the case, all of the tables contain separate estimates for small enterprises (between 1 and 30 employees) and large enterprises (more than 30 employees). Indicators of the statistical significance of differences between the estimates for the two groups are also given. Interviews were conducted in 104 and 91 enterprises in the two size categories respectively. For those parts of the questionnaire that relate to networking and other aspects of business strategy the preferred respondent was the individual with most power over the day-to-day running and forward planning of the business. For the small enterprises this was usually the owner. For the large enterprises it was either the owner or the managing director depending on the ownership structure of the business. Below the term entrepreneur is used to refer to both types of decision-maker. As a rule, the distinction between small and large enterprises is mentioned in the text only where significant variation between the two categories is found. As well as guarding against false generalizations this practice serves to highlight the diversity of experience that exists within the Ghanaian manufacturing sector.

Before embarking on a discussion about the functions that a network performs, one needs to develop a working definition of that network. This is particularly important in the context of large sample data collection exercises, where misunderstandings on the part of either members of the enumeration team or the respondents can lead to misinterpretations during data analysis. In order that such misunderstandings might be avoided in the Ghanaian context, efforts were made to define and enumerate the network of each respondent before discussing its function. Reflecting the focus on business-relevant or entrepreneurial networks, the respondents were asked to think about the contacts they maintained in nine categories: entrepreneurs in the same line of business; entrepreneurs in different lines of business; entrepreneurs with

larger businesses; entrepreneurs whose businesses are in other regions of Ghana; entrepreneurs who are based in Ghana, but who are not Ghanaian; entrepreneurs whose businesses are in other countries; bankers; public servants; and politicians. The nine categories were chosen following a piloting exercise, because they encompassed most, although in some cases not all, of the entrepreneurs' business-relevant contacts.[2] In general, however, they do not encompass extended family and rural networks. While not of direct relevance to the entrepreneurs' business activities, these other networks may be important as sources of informal finance and aid in times of crisis. By not including such contact from the numerated networks we can actually find out whether and how their function varies from that of entirely business-relevant contacts.[3] This is reflected in some of the findings presented below.

Once their network had been enumerated, each respondent was asked a series of questions about the functions it was performing. The answers to an initial open question ('Why is your network useful to you?') indicated that 95 per cent of the respondents saw the primary function of their networks as providing access to information. However, it was only by asking a series of more specific questions that the enumerators were able to establish the nature of the information being conveyed and to find out about the other functions of the networks. The entrepreneurs were asked to answer 'yes' or 'no' to twelve specific questions about various functions that their networks might be performing. The answers relating to these questions are reported in Table 1.

The large majority of respondents valued their networks as a means of reducing the search costs associated with product and input markets. Eighty-two per cent of large enterprises and 52 per cent of small enterprises stated that their networks were useful because they provided information about new market opportunities and developments. The existing literature provides no explanation as to why small enterprises are less likely than large ones to value their networks for this reason. One possible explanation is that they face other constraints that restrict their ability to use such information. There may, for example, be fixed costs associated with entry into new markets. This would

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[2] Other categories of contacts that were explored included traditional leaders, employees and representatives of non-governmental organizations and military leaders. In the case of the former, all the entrepreneurs stated that they were of no relevance to their business activity. In the case of the latter two categories very few entrepreneurs had such contacts.

[3] Note that such contacts are not deliberately excluded from the numerated networks. If a family member also falls into one of the nine categories listed above then he or she will be included.

also explain why small enterprises tend to serve end users in local markets and are less likely to export or sell to government than their larger counterparts.

TABLE 1
PERCEIVED NETWORK FUNCTIONS

	Small enterprises	Large enterprises	All
Proportion of entrepreneurs who perceive their networks as useful because they…			
provide access to market information	0.56	0.82 ***	0.66
provide access to technical information	0.57	0.70 *	0.62
provide access to information on the trustworthiness of trading partners	0.46	0.60 *	0.52
provide support to their family in times of crisis	0.30	0.20	0.26
are a source of small, short-term loans	0.29	0.08 ***	0.21
are a basis for working together to meet large orders	0.35	0.22 *	0.30
are a basis for sub-contracting arrangements	0.25	0.32	0.27
are a basis for equipment sharing arrangements	0.07	0.02 *	0.05
are a basis for joint raw material purchase arrangements	0.18	0.10	0.15
provide access to information on government policy	0.29	0.55 ***	0.39
help when dealing with bureaucracy	0.21	0.52 ***	0.32
Proportion of entrepreneurs who perceive of others as using their networks to collude	0.23	0.23	0.23

Source: data drawn from the fifth wave of the Ghanaian Manufacturing Enterprise Survey.
Note: this table is based on information provided by 157 (97 with small enterprises, 60 with large enterprises). Information on the perceptions of others using their networks to collude was available for only 155 entrepreneurs (96 with small enterprises, 59 with large enterprises). *** = difference significant at the 1 per cent level; ** = difference significant at the 5 per cent level; * = difference significant at the 10 per cent level.

A similar proportion of the respondents valued their networks as a means of reducing the search costs associated with the acquisition of new technology. Seventy per cent of large and 57 per cent of small enterprises considered their networks to be useful because they provided information about new techniques and designs and about where to get new types of machinery and equipment. Access to technical information via other media is severely limited in Ghana. While several institutions have been set up to address this problem, they receive little funding and provide very little useful information or technological support (Lall, Navaretti, Teitel and Wignaraja, 1994). Data from

earlier rounds of the Ghanaian survey indicate that only large enterprises make use of these institutions and only then for the testing and certification of goods. Lall, Navaretti, Teitel and Wignaraja (1994: 43) also found that 'R&D effort in Ghana relevant to manufacturing industry is minuscule'. There is some evidence of innovative behaviour (Dawson, 1992), but the innovations tend to be minor and undocumented rendering dissemination by means other than networks unlikely.

TABLE 2
CONFLICTS AND CONFLICT RESOLUTION

	Small enterprises	Large enterprises	All
Proportion of entrepreneurs who, during the last year, had conflicts with trading partners	0.85	0.77	0.81
Proportion of entrepreneurs who usually resolve conflicts by…			
talking directly to the other party themselves	0.84	0.86	0.85
getting someone else to act as a go-between	0.19	0.12	0.16
employing a lawyer and/or going to court	0.08	0.18 **	0.12
involving the police	0.03	0.05	0.04
involving a traditional council or committee	0.01	0.02	0.02
Proportion who have at some time employed a lawyer or taken someone to court	0.12	0.42 ***	0.25

Source: data drawn from the fifth wave of the Ghanaian Manufacturing Enterprise Survey.
Note: proportions relating to conflicts and to actual previous use of lawyers and courts are based on information provided by 193 entrepreneurs (104 with small enterprises, 89 with large enterprises). Proportions relating to usual modes of conflict resolution are based on information provided by (102 with small enterprises, 85 with large enterprises). *** = difference significant at the 1 per cent level; ** = difference significant at the 5 per cent level; * = difference significant at the 10 per cent level.

Another line of questioning relating specifically to sources of information about the machinery and equipment available for importation revealed that individual domestic and foreign suppliers as well as other business contacts were of primary importance, while subscriptions to trade magazines, attendance at trade fares and other impersonal sources are rarely used. In Ghana larger enterprises are more likely to use recently imported technologies, while small enterprises tend to employ well-established, traditional technologies. This might explain why small enterprises are less

likely to value their networks as sources of technical information—the learning opportunities associated with their technologies have generally been exhausted. In contrast, large enterprises using newer technologies may be able to learn from interactions with other enterprises, both local and foreign, adopting similar and more advanced technologies than themselves.

The figures in the first line of Table 2 show how significant a problem contractual under-performance is for Ghanaian manufacturers. During the year leading up to the time of the survey 81 per cent of the sampled enterprises experienced conflicts with trading partners. The data also shows that the entrepreneurs with both small and large enterprises are much more likely to rely on informal modes of conflict resolution than on the formal legal system. When asked how they usually resolved conflicts with existing trading partners 85 per cent of the respondents mentioned that they talked directly to the other party while 16 per cent mentioned getting someone else to act as a go-between. In contrast, only 12 per cent mentioned employing a lawyer or going to court and just 4 per cent mentioned involving the police. There was a significant variation between small and large enterprises only in relation to the use of lawyers and courts. Eighteen per cent of large enterprises in contrast to only 8 per cent of small enterprises mentioned them when asked how they usually resolved conflicts. Similarly 42 per cent of the former and only 12 per cent of the latter had ever actually employed one or the other. Those entrepreneurs who volunteered additional information on this subject were quick to point out that personal involvement and go-betweens were important because they helped establish why the problem had arisen in the first place and whether the other party was really to blame.

Sixty per cent of large and 46 per cent of small enterprises stated that they valued their networks because they provided access to information on the trustworthiness of trading partners (see Table 1). Small enterprises are less likely to value their networks as sources of such information in part because they are more likely to conduct their trade on a cash-for-goods basis (see Table 3). Trading on a cash-for-goods basis is also one of the means by which entrepreneurs learn about the trustworthiness of new trading partners prior to extending credit or taking large orders. Forty-nine per cent of large and 29 per cent of small enterprises reported that they did this. Talking directly with new trading partners was reported by 35 and 48 of large and small enterprises respectively. Taking partial deposits and accepting financial guarantees was reported by 36 per cent and visiting workshops and homes by 16 per cent of all enterprises. The value of networks as distinct from the one-to-one relationships of which they are comprised was emphasized by the 19 per cent

of entrepreneurs who mentioned that they usually talked to others who have previously done business with their new trading partners and accepted personal guarantees from mutual acquaintances. As with conflict resolution, the use of formal institutions as a source of information on trustworthiness is rare among large enterprises (9 per cent) and almost unheard of among small ones (1 per cent). Similarly, 4 per cent of large and no small enterprises mentioned that they relied on the well-established public reputations of new trading partners. These last two indicators reflect the difficulty that Ghanaian enterprises, especially small ones, face when trying to distinguish themselves from others.

TABLE 3
PROTECTION AGAINST OPPORTUNISTIC TRADING PARTNERS

	Small enterprises	Large enterprises	All
Proportion of entrepreneurs conducting sales only on a cash-for-goods basis	0.25	0.15 *	0.21
Average proportion of sales conducted on a cash-for-goods basis	0.68	0.54 ***	0.61
Proportion of entrepreneurs who mentioned each of the following when asked how they usually established the trustworthiness of new trading partners prior to the start of trade not on a cash-for-goods basis…			
talking to them directly	0.48	0.35 *	0.42
trading with them on a cash-for-goods basis for some time first	0.29	0.49 ***	0.39
taking partial deposits / accepting financial guarantees	0.37	0.35	0.36
talking to others who have done business with them / accepting personal guarantees	0.18	0.19	0.19
visiting their workshop and/or home	0.17	0.15	0.16
seeking information from banks and other formal institutions	0.01	0.09 **	0.05
relying on well-established, public reputations of trading partners	0.00	0.04 *	0.02

Source: data drawn from the fifth wave of the Ghanaian Manufacturing Enterprise Survey.
Note: statistics on cash-for-good sales are based on information provided by 190 entrepreneurs (103 with small enterprises, 87 with large enterprises). Data on methods used to establish trustworthiness is available only where the respondent indicated that he/she does, at least sometimes, make efforts to establish trustworthiness. This was the case for 166 entrepreneurs (87 with small enterprises, 79 with large enterprises). *** = difference significant at the 1 per cent level; ** = difference significant at the 5 per cent level; * = difference significant at the 10 per cent level.

TABLE 4
REACTIONS TO PROBLEMS WITH TRADING PARTNERS EXPERIENCED PERSONALLY AND TO PROBLEMS EXPERIENCED BY CONTACTS WITH MUTUAL TRADING PARTNERS

	Small enterprises	Large enterprises	All
Proportion of entrepreneurs who would stop trading or revert to trading on a cash-for-goods basis with a trusted trading partner who had caused them problems	0.54	0.57 *	0.55
Proportion of entrepreneurs who may stop trading or revert to trading on a cash-for-goods basis with a trusted trading partner who had caused them problems depending on the nature of the problem and the importance of the trading relationship	0.21	0.30 *	0.25
Proportion of entrepreneurs who would do nothing in response to a trusted trading partner causing them problems	0.25	0.13 **	0.20
Of those entrepreneurs who would stop trading or revert to trading on a cash-for-goods basis…			
proportion who would respond similarly if the trading partner had caused a problem for one of their contacts	0.59	0.69	0.63
proportion who would take account of the problems a trading partner had caused one of their contacts, but decide how to respond based on their own assessment of the problem and the importance of their own relationship with the offender	0.12	0.18	0.15
proportion who would ignore any problem that a trading partner caused for one of their contacts	0.29	0.13 *	0.22

Source: data drawn from the fifth wave of the Ghanaian Manufacturing Enterprise Survey. Note: this table is based on data provided by 184 entrepreneurs (100 with small enterprises, 84 with large enterprises). The lower half of the table is based on the data provided by the 96 entrepreneurs (51 with small enterprises, 45 with large enterprises) who stated that when they had a problem with a trusted trading partner they either stopped trading with them or reverted to trading on a cash-for-goods basis. ***= difference significant at the 1 per cent level; ** = difference significant at the 5 per cent level, * = difference significant at the 10 per cent level.

The survey data provides us with one further indication that networks are being used to enhance contract discipline. The surveyed entrepreneurs were

asked whether and how they would react to situations of conflict both between themselves and their trading partners and between their contacts and mutual trading partners. The statistics presented in the lower half of Table 4 relate only to those entrepreneurs who stated that they would either stop trading altogether or revert to trading on a cash-for-goods basis following a problem with a trusted trading partner (approximately half of the full sample). When asked what they would do if, instead of experiencing the problem first hand, a mutual trading partner had caused a similar problem for one of their contacts, 63 per cent stated that their response would be similar, i.e., they would either stop trading or revert to trading on a cash-for-goods basis with that trading partner. A further 15 per cent stated that they would take account of their contacts experience but would decide how to respond based on their own assessment of the problem and/or the nature of their own relationship with the offender. Only 22 per cent (13 per cent of large enterprises and 29 per cent of small enterprises) stated that they would ignore problems faced by their contacts when deciding how to behave towards mutual trading partners. There does appear to be a tendency on the part of some entrepreneurs to take heed of the experiences of their contacts and adjust their behaviour towards their established, mutual trading partners accordingly. These results are consistent with the existence of multilateral mechanisms for the punishment and deterrence of opportunistic behaviour. Such mechanisms could be supported by collective action or by a decentralized process of information exchange and unilateral decision-making. Extended interviews with several of the surveyed entrepreneurs suggested that group agreements relating to the punishment of opportunistic behaviour are extremely rare. Entrepreneurs inform their contacts of problems with mutual trading partners for two reasons, as a way of explaining poor contractual performance on their own part and as a warning given in the hope that the favour will be reciprocated. They are not given in the expectation that contacts will join them in a retaliatory action.

The 1998 round of the Ghanaian survey provides very little information on the flexibility of trade or lending-related contracts. The first half of Table 4 indicates that 45 per cent of entrepreneurs either ignore problems caused by trading partners or respond in a way that depends on the nature of the problem and their relationship. However, this data must be treated with caution as we have no indication as to what sort of problem the respondents were calling to mind. Those who stated that they would stop trading or revert to trading on a cash-for-goods basis may be calling more severe problems to mind than those

TABLE 5
FORMAL AND INFORMAL INSURANCE AND CREDIT

	Small enterprises	Large enterprises	All
Proportion using formal insurance at time of survey	0.12	0.86 ***	0.42
Proportion who know people to whom they would provide support in a time of crisis and from whom they would expect support if the roles were reversed	0.73	0.76	0.74
Proportion with either overdraft facilities or loans from formal institutions or both	0.20	0.77 ***	0.47
Proportion without access to formal credit	0.53	0.09 ***	0.32
Proportion who borrow informally	0.42	0.09 ***	0.26

Source: data drawn from the fifth wave of the Ghanaian Manufacturing Enterprise Survey.
Note: proportions using formal insurance are based on information provided by 177 entrepreneurs and managing directors (103 with large enterprises, 74 with small enterprises). Proportions using and with access to formal credit are based on data provided by 194 entrepreneurs (103 with small enterprises, 91 with large enterprises). Those without access to credit include those who have applied for loans unsuccessfully and those who have not applied because the process is too difficult, because they do not expect to succeed, or because they have nothing to offer as collateral. Those who said they did not apply because of the high interest rates have been classified as having access to formal credit. Proportions using informal sources of credit are based on data provided by 193 entrepreneurs (104 small, 89 large). *** = difference significant at the 1 per cent level; ** = difference significant at the 5 per cent level; * = difference significant at the 10 per cent level.

who stated that they would ignore the problem.[4] An additional indication of the role of informal risk-sharing arrangements is provided by data on the motivations of those who are involved in informal lending. In particular, 33 per cent of the entrepreneurs who had made informal loans during the two years preceding the survey referred to the perceived need of the recipient or a sense of responsibility towards the recipient when explaining their actions, while in only 5 per cent of cases could such motivations be ruled out by the answer given. Turning to support in times of crisis, 30 per cent of those with large enterprises and 20 per cent of those with small enterprises regarded their entrepreneurial networks as a source of such support for themselves and their

[4] There is less need for caution when considering the responses to problems experienced by contacts relative to the responses to those experienced first hand because it is reasonable to assume that each entrepreneur called to mind the same or a similar problems in both instances.

families (see Table 5). These figures are surprisingly low, especially for small enterprises, only 12 per cent of whom use formal insurance. However, recall that during the interviews, entrepreneurial networks were defined to include only other entrepreneurs, bankers, politicians and bureaucrats. When asked a more general question about whether they knew people to whom they would provide assistance in a time of crisis and from whom they would expect assistance if the roles were reversed, 73 per cent of small enterprises and 76 per cent of large enterprises answered affirmatively. These results suggest that networks other than the enumerated entrepreneurial networks are more commonly viewed as sources of support in times of crisis by Ghanaian entrepreneurs. Note that while many small enterprises depend solely on their networks for support, large enterprises, 86 per cent of whom use formal insurance, tend to combine both formal and informal sources.

There is similar evidence that small enterprises use networks other than their entrepreneurial networks as sources of informal credit. While 42 per cent used informal credit during the two years preceding the survey, only 29 per cent thought of their entrepreneurial networks as a source. In contrast, far fewer large enterprises (9 per cent) used informal credit during the preceding two years and roughly the same proportion thought of their entrepreneurial networks as a source (8 per cent). The relative importance of networks as a source of informal credit to small enterprises reflects their poor access to formal credit. Only 20 per cent of the small enterprises have either an overdraft facility or a formal loan. Further, employing a technique devised by Dercon (1995), that involves answers to questions about loan applications and reasons for not applying for loans, we find that 53 per cent of small enterprises are without access to formal credit. In contrast, 77 per cent of large enterprises have either an overdraft or a loan, while only 9 per cent are without access to formal credit.

When asked whether their networks provided a basis for various forms of collective action the entrepreneurs responded as follows: 32 per cent of large enterprises and 25 per cent of small enterprises have at some point had sub-contracting arrangements with their contacts; 22 per cent and 35 per cent respectively have at times worked with their contacts to meet large orders; 10 per cent and 18 per cent respectively sometimes place bulk orders for raw materials with their contacts; and 2 per cent and 7 per cent respectively have had equipment sharing arrangements with their contacts. An open question about additional uses to which entrepreneurial networks could be put revealed no evidence of other forms of collective action. Note the greater tendency for small enterprises to be involved in forms of collective action that resolve

indivisibilities or reduce fixed costs. Only in the case of sub-contracting, which usually takes the form of a bilateral arrangement between two enterprises rather than involving a collective, were large enterprises more likely than small to be involved. In general the reported collective activities involve small groups of entrepreneurs belonging to the same network rather than entire networks. Examples of order sharing arrangements include one-off export orders for rattan furniture and batik dresses and caftans. These may involve quite large numbers of enterprises. Equipment-sharing tends to be on a somewhat more ad hoc basis. Small-scale furniture manufacturers often lend more specialized tools to one another on a reciprocal basis, while more affluent metalworking entrepreneurs might purchase expensive pieces of equipment knowing that they can rent them to neighbouring firms from time to time and thereby recoup their investment. Joint ownership of equipment is rare. Joint raw material purchasing arrangements are usually co-ordinated by business associations to which often quite large numbers of entrepreneurs belong. In general these associations are quite distinct from their members' entrepreneurial networks. It is unusual for an entrepreneur to include all of their association's members among their contacts, while in all but a few cases they include many non-members. The importance of distinguishing between the entrepreneurs' associations and their networks is best illustrated by an incident described by many of the small-scale bakers in the sample. Many of the bakers were supplied with a bad lot of flour that was bought collectively through their associations. Subsequently the association committees were charged with the duty of negotiating compensation for their members. Compensation was secured, but in several cases was not passed on to the members by the committee. Instead, the committee members absconded with the funds. Many of the bakers who had received compensation, aware that others had been less fortunate, mentioned the value of being part of the same network as the committee members, of knowing their families and sharing mutual acquaintances. In effect, they recognized the value of their networks as a means of controlling the committee members and ensuring that they acted in accordance with their role as representatives of the collective or group.

The figures relating to entrepreneurial involvement in collective action need to be viewed with caution. With the exception of the purchasing of flour by bakery associations, the collective activities described above occur only occasionally. The overall picture for Ghanaian manufacturing corresponds closely to Schmitz (1995) and Nadvi's (1994) conclusions for manufacturing sectors throughout the developing world; there is very little on-going collective action. One need spend only a few hours in the industrial areas of Accra or Kumasi to see that there are many areas of economic activity in

which economies of scale exist but are not being reaped because enterprises are too small and groups acting collectively have not formed. This is probably because collective action is costly in terms of individual effort and is often undermined by free-rider problems. This is another area in which networks have the comparative advantage: they tend to be immune to free rider problems. Many of the interviewed entrepreneurs referred to the role of reciprocity in the functioning of their networks. They saw their networks as both supporting and being maintained by reciprocal exchange. The breakdown of reciprocity was often cited as the primary cause of the end of a network relationship. Thus, while groups may not emerge even when there are clear benefits from them doing so, networks are far more likely to emerge whenever there is a benefit perceived.

Asking direct questions about rent-seeking activities is problematic. There is no guarantee that they will be answered truthfully, while their inclusion in an interview can challenge and erode the trust between enumerator and respondent thus calling into question the accuracy of answers given to other questions. Given the magnitude of the Ghanaian data collection exercise and the importance of the ongoing co-operation of the respondents it seemed prudent to ask only a limited number of indirect questions about such activities and suffer some ambiguity in the resulting data. Three aspects of rent-seeking were explored. First, the entrepreneurs were asked whether they valued their networks as a source of information about changes in government policy. In line with expectations, a significantly greater proportion of large enterprises (55 per cent) than small enterprises (29 per cent) valued their networks for this reason. These responses are open to two interpretations; information about government policy may be sought by agents interested in debate and ensuring government accountability or by entrepreneurs intent on gaining an unfair advantage over their rivals. Answers to a question about whether networks help when dealing with bureaucracy—when trying to get licences, permits, planning permission—are perhaps less ambiguous. However, we have no way of knowing whether networking is the only way to deal with bureaucracy in Ghana or whether it does in fact yield an unfair advantage in terms of preferential treatment. Either way, 52 per cent of large enterprises and 21 per cent of small enterprise valued their networks for this reason. Finally, in order to provide some indication as to whether networks were being used as a basis for collusion over prices, the entrepreneurs were asked whether they knew of anyone in their own line of business who agreed with their contacts to set prices artificially high in order that they might increase their profits. Twenty-three per cent of both small and large enterprises indicated that they were aware of such activities. Interestingly, in-

depth discussions with the few entrepreneurs who admitted voluntarily that they were involved in such arrangements revealed that it is in relation to these socially less acceptable collective activities that we are most likely to find formal rules governing member behaviour and collective punishment. One entrepreneur described how those who endeavoured to undercut their fellow colluders were required to justify their actions to a committee and could be excluded from the arrangement if the justification proved unsatisfactory.

In summary, entrepreneurs in the Ghanaian manufacturing sector are more likely to value their networks as a means of reducing the search costs associated with input and output markets and technologies than as either a means of reducing information asymmetries and thereby enhancing contract discipline or a basis for collective action. Where networks are being used to enhance contract discipline both information exchanges and decisions relating to the punishment of offenders appear to take place in a decentralized manner. There is evidence of collective action within the networks, although membership in the groups involved in such actions tends not to coincide with membership in the networks. The data relating to the use of networks for rent-seeking purposes yields rather ambiguous results. There is some evidence of advantage- and favour-seeking by individual entrepreneurs and of collusion within groups embedded within the networks. However, it is difficult to assess the prevalence of these practices. There is some variation between small and large enterprises with respect to the uses that they perceive their networks performing. Large enterprises are more likely to value their networks as sources of information about markets, technologies, and, perhaps surprisingly, the trustworthiness of others. They are also more likely to value their networks as a source of information about government policy and an aid to dealing with bureaucracy. Small enterprises are more likely to value their networks as a source of informal finance and as a basis for collective action. Given these findings it might be appropriate to conclude that smaller enterprises' networks display a higher degree of collectivity than those of larger enterprises. This conclusion is further supported by the results of the factor analysis presented in Table 6. Here, two independent components have been extracted from the eleven indicators relating to the entrepreneurs' perceptions about the functions that their own networks perform. The first component may be thought of as an access-through-networks variable, while the second relates more closely to the idea of collectivity-through-networks. In general the access variable emphasizes those functions that can be performed in a decentralized manner, whereas the collectivity variable emphasizes those functions that are better performed collectively. Large

enterprises have a significantly higher access score and a significantly lower collectivity score than small ones.

TABLE 6
ACCESS AND COHESION: A FACTOR ANALYSIS BASED ON PERCEIVED NETWORK FUNCTIONS

Network function	Factor 1 Access-through-networks	Factor 2 Cohesion-through-networks
Access to market information	0.412	- 0.172
Access to technical information	0.568	- 0.412
Access to information on the trustworthiness of trading partners	0.635	- 0.267
Support to their family in times of crisis	0.673	- 0.235
Source of small, short-term loans	0.452	0.505
Basis for working together to meet large orders	0.146	0.775
Basis for sub-contracting arrangements	0.627	0.160
Basis for equipment sharing arrangements	0.720	0.008
Basis for joint raw material purchase arrangements	0.424	0.233
Access to information on government policy	0.353	0.411
Help when dealing with bureaucracy	0.530	- 0.211

	Small enterprises	Large enterprises	All
Access-through-networks	- 0.11	0.17	0.00
Cohesion-through-networks	0.34	- 0.54	0.00

Source: data drawn from the fifth wave of the Ghanaian Manufacturing Enterprise Survey. Note: this table is based on information provided by 157 entrepreneurs (97 with large enterprises, 60 with small enterprises). *** = difference significant at the 1 per cent level; ** = difference significant at the 5 per cent level; * = difference significant at the 10 per cent level.

CONCLUSION

The analysis presented in the preceding section of this paper provides empirical support for much of the theoretical literature on the economic role of networks. They reduce search costs, aid in the enforcement of contracts by

circulating information on agents conduct and co-ordinating multilateral punishment in a decentralized manner. As a result of the latter, they also support informal credit and risk-sharing arrangements. Although the evidence is somewhat indirect, there is also support for the much older literature warning that networks can be used for rent-seeking purposes. Finally, there is evidence that networks can provide a basis for collective action, although this is uncommon. Where collective action is not necessary but can nevertheless improve the efficacy of the network under a particular function, collective action tends not to be found. Where there is collective action it tends to involve groups embedded within and supported by the networks rather than the networks as a whole. This generally low level of collective action within networks may be related to the unclear nature of network membership and the absence of formal rules governing the behaviour of those members, i.e., to what Heyer *et al.* (1998) refer to as their informality, for as Ostrom (1990) pointed out *ceteris paribus* collective action is more difficult the less well defined the boundaries of the group.

Finally, there is considerable variation across entrepreneurs with respect to the functions they view their networks as performing and the relative importance of collective action within that portfolio of functions. Further, these variations appear to be related to the nature of the environment in which the entrepreneurs operate. In particular, smaller enterprises that tend to have restricted access to formal credit and insurance and find it difficult to exploit economies of scale tend to maintain more collective networks than their larger counterparts.

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