Returns to Social Network Capital Among Traders

Marcel Fafchamps [†] *and Bart Minten* [††]

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Abstract[1]

Using data on agricultural traders in Madagascar, this paper shows that social network capital has a large effect on firm productivity. Better connected traders have significantly larger sales and value added than less connected traders after controlling for physical and human inputs as well as for entrepreneur characteristics. The analysis indicates that three dimensions of social network capital should be distinguished: relationships with other traders, which among other things help firms economize on transactions costs; relationships with potential lenders; and family relationships. We find no evidence that social capital favors collusion.

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† Department of Economics, University of Oxford, Manor Road, Oxford OX1 3UQ (United Kingdom). Tel.: +44-1865-281446. Fax: +44-1865-281447. Email: Marcel.Fafchamps@economics.ox.ac.uk. †† Department of Agricultural and Environmental Economics, Katholiek Universiteit van Leuven, Kardinaal Mercierlaan 92, 3001 Heverlee (Leuven), Belgium. Email: bart.minten@agr.kuleuven.ac.be

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Social sciences have long recognized the role that social capital play in facilitating human interaction (e.g., Coleman (1988), Putnam, Leonardi and Nanetti (1993), Granovetter (1985)). Unlike human capital, however, which now is seen as a fundamental dimension of most economic processes, the concept of social capital has yet been little used in economics (e.g., Narayan and Pritchett (1996), Barr (1997, 1998), Fafchamps (1998), Fafchamps and Lund (1998)) and is still regarded with suspicion by many. This paper contributes to the debate by providing evidence that social capital has a large significant effect on the performance of economic agents separate from those of physical and human capital. We demonstrate that certain types of social networks are more valuable than others and we throw some much needed light on some of the possible channels through which social capital affects economic efficiency.

One of the reasons why economists are weary of using the term social capital is that its meaning is imprecise. From an economist's point of view, there are at least two meanings of the phrase that must be clearly distinguished. The first meaning sees social capital as a 'stock' of trust and an emotional attachment to a group or society at large that facilitate the provision of public goods. Examples of this definition of social capital can be found in the works of Coleman (1988) and Putnam, Leonardi and Nanetti (1993).[2] A second meaning sees social capital as an individual asset that benefits a single individual or firm; this meaning is sometimes referred to as social network capital to emphasize that agents derive benefits from knowing others with whom they form networks of interconnected agents. The work of Granovetter (1995) falls mostly into this category.[3]

The two meanings of social capital are related.[4] Individuals may pursue their self interest

[2] Coleman (1988) argues that kids perform better in school when parents get involved in running the school; Putnam, Leonardi and Nanetti (1993) argue that historical differences in levels of trust between individuals account for the diverging economic experiences of northern and southern Italy because it affects firms' ability to contract with each other. Greif (1994) makes a related point with respect to medieval traders on both sides of the Mediteranean. Further examples can be found in the works of Platteau (1994), Gambetta (1988), Fukuyama (1995), and others.

[3] Granovetter shows that knowing potential employers helps people find a job and that job referrals play a key role in the way labor markets operate. See Montgomery (1991) for a formal model. Relationships have also been documented as facilitating credit, sub-contracting, and just-in-time inventory systems (e.g., Lorenz (1988), Aoki (1984)).

[4] As Knack and Keefer (1997) have argued, interpersonal relations and trust are conceptually and empirically not the same thing. In practice, the traders we spoke to all make a strong link between the two. Past business interaction, provided it is successful, is nearly always a prerequisite for trust. Similarly, when trust is present, it normally

by forming relationships with others to economize on transactions costs -- the second meaning of social capital. This can lead to equilibria in which agents expect others to behave in a trustworthy manner -- the first meaning of social capital. Kranton (1996), for instance, demonstrates how a decentralized network of pairwise interactions can help agents reduce search costs, thereby providing an economic efficiency gain to the group. Drawing upon the work of Ghosh and Ray (1996), Fafchamps (1998) shows that, by sharing information on bad payers in a decentralized manner, agents can lower screening costs. Groups that share information more efficiently are better able to enforce contracts and thus to adapt, expand, and overtake others -- an example of group externality.

Understanding the role that social capital plays in market exchange is not just a playtoy for theorists, it is also crucial for policy, particularly for the design of institutions that support markets. To understand what functions these institutions must provide, it is useful to examine the role that relationships play in actual markets and the different channels through which they assist market exchange (e.g., Barrett (1997a), Knack and Keefer (1997), Schmid and Robison (1995)). To this effect, this paper investigates whether social capital affects the performance of agricultural traders in the island of Madagascar. Markets for agricultural food products in Madagascar were progressively liberalized in the 1980's (e.g., Berg (1989), Dorosh and Bernier (1994), Shuttleworth (1989)), leading to massive trader entry (e.g., Barrett (1997b)). Using detailed data collected on a sample of traders, this paper investigates whether well connected traders sell more and make larger gross profits than others. Section 1 presents the conceptual framework behind our work and briefly discusses the testing strategy. The data and survey methodology are discussed in Section 2. Returns to social capital are estimated and tested in Section 3. Section 4 examines whether social capital favors collusion while Section 5 investigates the channels through which social capital facilitates exchange and raises traders' efficiency. Conclusions are presented at the end.

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manifests itself as an interpersonal relationship. In our analysis, therefore, we do not attempt to disentangle the two although our emphasis is on relationships.

Section 1. Concepts and Testing Strategy

Economists normally think of production as depending on a series of resources under the control of the producing firm. These resources typically include physical and human capital as well as the management capabilities of the firm's owner or board of directors. Production efficiency depends on what takes place within the firm: combining factors of production in ways that maximize output; purchasing inputs in proportions to their relative prices; etc. The way in which the firm relates to the market is supposed not to affect production efficiency. When firms buy and sell on perfect markets, this is the correct approach because the relationships that economic agents have with each other are irrelevant: with full information and perfect enforcement of contracts, agents can change suppliers and clients costlessly in response to minute variations in publicly known prices. Relationships confer no advantage over the market; they have no value.

Ignoring social capital, however, is no longer valid when markets are imperfect. In that case, relationships may convey information that minimize search costs, as in Kranton (1996), or they may facilitate the enforcement of contracts, as in Fafchamps (1998). Thanks to better enforcement of contracts, agents may be able to conduct business in a more efficient manner. Whenever trust is present, agents can lower their guard and economize on transactions costs such as the need to inspect quality before buying or the need to organize payment in cash at the time of delivery. Trust therefore enables agents to place and take orders, pay by check, use invoicing, provide trade credit, and offer warranty -- all features of markets that we take for granted but that are often dramatically absent from liberalized markets in poor countries (e.g., Fafchamps (1996, 1997), Fafchamps and Minten (1999a)). Trust also makes it easier for agents to renegotiate their contractual obligations when problems arise, thereby providing much needed flexibility in dealing with external shocks (e.g., Bigsten et al. (2000)). Finally, it facilitates the circulation of reliable information about technology and market opportunities, as well as the blacklisting of unreliable agents (e.g., Barr (1997, 1998), Greif (1993)). Relationships and social networks may thus enable agents to economize on transactions costs even though they would probably fail to achieve the same level of aggregate efficiency as perfect markets.

The existence of close personal relationships between agents may also facilitate -- or signal -- collusion. It is a commonly held view among African politicians and the public alike that large traders of food products collude to raise consumer prices and reduce producer prices by forming a cartel and stockpiling grain. This view is often at the root of government intervention in agricultural markets.[5] It is thus unclear whether social capital should be viewed as an imperfect response to the absence of perfect markets, or as the cause of market imperfection itself. Which of the two explanations -- collusion or reduction in transactions costs -- is responsible for the success of better connected agents is therefore critical for policy making: if social network capital serves primarily to restrict entry and artificially raise trade margins, it should be combated; if in contrast relationships increase trade efficiency, they should be encouraged.

Having clarified the reasons why network capital may affect competition and efficiency, we now present our testing strategy. The first step is to show that social network capital affects firm performance. Consider a firm with physical, human, and social capital denoted *K*, *H*, and *S*, respectively. Let its production function be denoted:

$$V = F(L, K, H, S) \tag{1}$$

where *V* and *L* stand for value added and labor, respectively. If social capital is irrelevant for the firm's performance -- for instance because markets are nearly perfect or because collusion is not possible -- *S* should have no effect on output once we control for *L*, *K*, and *H*. Suppose, however, that firms with better contacts rotate their working capital faster (e.g., speedier search) or require less labor (e.g., streamlined quality inspection). Social capital *S* should raise the productivity of labor, physical, and human capital; it enters the regression as productivity shifter. If *S* has a significant positive effect on *V*, this shows that firms with more social capital get more return from their labor and physical and human capital.[6] A similar approach is used by Barr (1997).

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[5] The irony is that government interventions often have the effect of restricting competition and favoring politically connected individuals (e.g., Staatz, Dione and Dembele (1989), Morris and Newman (1989), Bevan, Collier and Gunning (1989)).

[6] Note that this approach does not distinguish between productivity gains that are due to network externalities from those that result from returns exclusive to the firm.

For this approach to be convincing, estimation of equation (1) must yield consistent parameter estimates. The usual caveats about the possible endogeneity of social capital and other factors of production apply. It is, for instance, likely that social capital is accumulated over time as traders get to know each other through business interaction.[7] In this respect, social capital is similar to physical capital, which among small firms is typically accumulated over time through reinvestment of past profits (e.g., Bigsten et al. (1999)).[8] The fact that social capital is accumulated over time does not mean it is not important: physical capital is also accumulated over time yet no one doubts that it helps production. But it means that social and physical capital are susceptible of endogeneity bias.[9] Time-invariant factors that raised past profits, such as business acumen and other personal characteristics of the entrepreneur, would also favor the accumulation of physical and social capital. If these time-invariant factors are not observed by the econometrician, this results in omitted variable bias: accumulated factors capture not only their own effect on profits, but also the effect of unobservable characteristics. One way to correct for this bias would be to use panel data. Unfortunately, such data are not available at this point. We therefore resort to an instrumental variable approach. Fortunately, numerous instruments have been collected during the survey in anticipation of this problem. We further seek to minimize omitted variable bias by including additional regressors that may be correlated with social capital and could, if omitted, artificially raise the coefficient on social capital.

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[7] The social capital literature in the social sciences has generally emphasized the idea that socializing has benefits that extend beyond its initial purpose. Social capital is then seen as an 'externality' that facilitates other subsequent exchanges (e.g., Coleman (1988), Putnam, Leonardi and Nanetti (1993)). Although this view is not inconsistent with the approach adopted here, it is not central to our estimation strategy.

[8] It could be argued that social capital differs from physical capital in that it is not deliberately accumulated at a cost to the entrepreneur, but is an automatic by-product of past business activity. In the absence of data on the time and efforts devoted to establishing and maintaining business contacts, it is difficult to evaluate to what extend social capital accumulation is deliberate or not. Discussions with respondents nevertheless suggest that maintaining an extensive and up-to-date network of business contacts is not costless: socializing is time consuming and often involves out-of-pocket expenses such as meals and drinks.

However, even if accumulation was costless and automatic, it would not mean that social capital is useless. Work experience is by and large an automatic by-product of work, yet no one doubts that in many instances it raises productivity. The same reasoning applies to business contacts: they can be useful even if they were obtained at no cost. In our regression analysis, business experience is controlled for separately from social capital. The fact that accumulating and maintaining social contacts is time consuming tends to bias the coefficient of social capital downward because the time the entrepreneur spends on contacts is not subtracted from labor time.

[9] By extension, endogeneity bias may also affect variable inputs such as labor that are adjusted to the level of semi-fixed factors.

Perhaps the definitive way of convincing the reader that network capital matters is to show that it is useful for some of the activities of the firm, and to demonstrate that these activities help the firm's output. After all, economist, as a rule, accept the presence of physical capital and labor in the production function not because these variables have tested free of omitted variable bias, but because economists believe that firms cannot produce without capital and labor. This conviction does not derive from econometric evidence but rather from our understanding of how the world works. The same reasoning applies to social capital. Anyone who has tried to make a living from buying and selling knows that survival in business is impossible without contacts.[10] Although this realization has long reached other social sciences, it is not yet widely accepted in economics.

We therefore examine the channels through which social capital raises individual productivity. One possible channel is through collusion and imperfect competition; another channel is through the reduction of transactions costs. To investigate the first channel, we decompose total value added V into two parts: quantities sold Q and unit margin, that is, for traders, the difference between buying and selling price P_s–P_b. By definition, $V = Q(P_s–P_b)$. We would expect colluding firms to reduce traded volume Q in order to artificially raise P_s and reduce P_b, thereby raising the unit margin P_s–P_b. If social capital raises V through collusion, we would therefore expect it to have a strong positive effect on unit margin and a negative effect on quantities. Such a test is conducted in Section 4.

In contrast, if social capital raises productivity by reducing transactions costs, we should be able to show (1) that social capital helps firms economize on certain transactions costs and (2) that lower transactions costs raise output.[11] To this effect, we investigate several channels through which social capital may facilitate firms' operations. Channel variables, denoted as vec-

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[10] This is so true that the client base of a firm has a legally recognized value as part of its 'goodwill' (e.g., Tadelis (1998)).

[11] This is a conservative test because our data measure an incomplete set of possible roles for relationships. Social capital may matter in other ways that this method does not control for. It could, for instance, economize on the manager's time, thereby enabling the owner/manager to devote more time to other activities, such as running another business or undertaking household chores.

tor *C*, capture the way the firm deals with clients and suppliers. For the first part of our demonstration, we regress *C* on *S*, controlling for other variables susceptive of influencing *C*: if *S* has the right sign and is significant, this serves as evidence that social capital plays a identifiable role in how firms deal with each other. The second part of our demonstration is achieved by expanding equation (1) to include the possible effect of *C* on output:

$$V = F(L, K, H, S; C) \tag{2}$$

Having described the testing strategy, we now turn to the data and estimation itself.

Section 2. The Data

A survey of agricultural traders was conducted in Madagascar in a joint project between IFPRI (the International Food Policy Research Institute) and the local Ministry of Scientific Research (FOFIFA). The first part of the survey was held between May 1997 and August 1997 and collected information on the individual characteristics of traders and on the structure, conduct, and performance of the trading sector. A second series of interviews were conducted between September 1997 and November 1997; they focused on the nature of respondents' relationships with other traders, clients, and suppliers.

The sample design was constructed so as to be as representative as possible of all the traders involved in the whole food marketing chain from producer to consumer, wherever located. Three main agricultural regions were covered (Fianarantsoa, Majunga, and Antananarivo) and the sampling frame within these regions was set up so as to cover traders operating at three different levels:

(1) Traders operating in big and small urban markets in the main town of every province (faritany) and district (fivondronana). These traders are mostly wholesalers, semi-wholesalers, and retailers.

(2) Urban traders located outside the regular markets. These are often bigger traders, processors (e.g., rice millers), and wholesalers.

(3) Traders operating on rural markets at the level of the rural county (firaisana). These are mostly big and small assemblers and itinerant traders. Rural firaisanas were selected through stratified sampling based on agro-ecological characteristics so as to be representative of the various kinds of marketed products and marketing seasons.[12]

The survey focused on traders that marketed locally consumed staples such as rice, cassava, potatoes, beans, and peanuts. The different forms in which these products are marketed were taken into consideration, i.e., paddy and milled rice, maize and maize flour, etc. Traders involved primarily in export crops, fruits, vegetables, and minor crops were excluded. Most surveyed traders -- 67% -- report rice or paddy as the agricultural product they trade most intensively. This reflects the importance of rice as the main staple food in the country. Other most actively traded products are beans and lentils (18% of the sample report them as their main traded product), cassava (5%), potatoes (5%), peanuts (4%), and maize (2%).

A total number of 850 traders were surveyed in the first visit, 739 of whom were interviewed again a few weeks later. The analysis presented here is based on traders that could be located in the second visit.[13] The main characteristics of respondents are summarized in Table 1. Since surveyed firms are traders, total sales are the relevant measure of production. Value added is measured as the difference between total sales and total purchases in value; it represents the total returns to labor, management, and capital. Value added is our preferred measure of output but, because data on margins are subject to measurement error,[14] we use total annual sales as an alternative measure of production.[15]

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[12] The sampling frame was constructed as follows. In each chosen locality (or neighborhood, in the case of the capital city). all wholesalers and large collectors were identified through local authorities, direct observation, and discussion with traders. A census was also taken to enumerate all smaller traders, including store fronts, retailers, and itinerant retailers. A random sample was then drawn. In order to increase intra-sample variation, an effort was made to oversample large traders by instructing enumerators to interview all large traders with a maximum of 20 per locality (one third of the sample). In practice, this maximum was never reached, except in the capital city. Other traders were selected randomly on the basis of the census.

[13] The category of traders which were hardest to trace during the second visit are those who are least formal and have the least permanent form of operation. As a result, small itinerant traders tend to be underrepresented in the results reported here.

[14] Value added is computed by subtracting purchases from sales. Since both are subject to measurement error and the average difference between the two is small, value added is much less precisely estimated than total sales or total purchases. In addition, respondents often are reluctant to divulge their margin for fear that survey data will be used to assess taxes.

[15] By definition, what traders produce is an intermediation service which is best measured by their total sales. Inventories are minimal among surveyed traders and certainly do not extend from one year to the next (e.g., IFPRI (1998)). Using annual sales and value added should thus be largely free of inventory bias.

Detailed information is available on working capital and equipment (mostly weighting equipment), storage capacity and vehicles, utilization of telephones and fax machines, labor, management, human capital, and social capital. The data show that the surveyed businesses are fairly unsophisticated by western standards: average working capital is roughly equivalent to 2,000 US dollars -- a large number compared to the annual per capita GDP of Madagascar which was 230 US dollars in 1997, but very small compared to the turnover of grain trading companies in the U.S. or Europe. The great majority of surveyed traders do not have their own transportation equipment, nor do they use fax machines or even telephones very often. Each trading business has an average of four workers, including the owner/manager. Most respondents work full time in trade and remain traders all year round. On average, they are fairly well educated by Madagascar standards. In Madagascar trade is conducted in Malagasy, the national language which is spoken throughout the island. French is commonly used in the administration and in some (primarily urban) secondary schools. Close to half of the respondents commonly speak a language other than Malagasy -- mostly French.

Information was collected on various dimensions of the respondents' social network: the number of close relatives in agricultural trade; the number of (non-family) traders that respondents know;[16] and the number of friends and family members who can help the business stay afloat in times of trouble. These different dimensions of social capital are correlated, but only imperfectly so. This should enable us to ascertain whether certain dimensions are more important than others. We also observe little or no direct correlation between measures of social network capital and firm size. The coefficient of correlation between annual sales and known traders, for instance is 0.05; it is 0.02 with family traders.[17] The number of known traders is thus not a direct function of sales: small traders may know many others like themselves. Similarly, there is no noticeable correlation between total sales and the number of clients and suppliers known person-

[16] To avoid double counting, the number of close relatives in agricultural trade is subtracted from the reported number of traders known.

[17] Correlation is higher when both variables are measured in logs: 0.34 for traders known; 0.22 for potential lenders.

ally by the trader -- 0.08 and 0.03, respectively -- the reason being that much trade takes place at arms length among both small and large firms.

Section 3. Returns to Social Network Capital

Now that we have a better sense of what the data look like and where they come from, we turn to the econometric analysis. The functional form used for regression analysis is basically a Cobb-Douglas production function and is estimated in log form.[18] Given the Cobb-Douglas functional form, variables such as social capital that potentially raise the efficiency of labor and capital factor out as a Hicksian neutral multiplicative term, i.e., we have:

$$V = (g(S)\,L)^{\alpha}\,(h(S)\,K)^{\beta} = g(S)^{\alpha}\,h(S)^{\beta}\,L^{\alpha}\,K^{\beta} = f(S)\,L^{\alpha}\,K^{\beta} \qquad 3$$

where $g(S)$, $h(S)$, and $f(S)$ are functions that express the effect of social capital S on the efficiency of labor L and capital K. Regressors include (the log of) working capital measured in local currency and labor measured in person-months. Since family workers may be more productive than hired workers due to moral hazard considerations, the share of family workers in the firm's workforce is included as well. Human capital is measured by the trader's years of schooling and years of experience. A dummy is included that takes the value one if the trader speaks more than one a language.[19]

Gender is included to control for various background characteristics (e.g., the difficulty to juggle business and household responsibilities, restricted mobility, physical strength, fear of crime, discrimination). Ethnicity is not included due to the very small number of respondents (9) who stated an ethnicity other than Malagasy. Social capital is measured by the number of (non-family) traders known. Trade experience and social capital are entered in log form to account for the possibility of decreasing marginal returns.[20] Location dummies are added to control for

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[18] We experimented with translog and generalized Leontief formulations but, apparently due to heteroskedasticity, they tend to perform less well than Cobb Douglas in least squares regressions. Quantile regressions on translog or generalized Leontief formulations yield results that are qualitatively similar to Cobb Douglas, i.e., strong positive coefficient on social capital.

[19] Usually French in addition to Malagasy, which all respondents know.

[20] More precisely, the regressor used is the log of the number of traders/years of experience plus one to avoid losing observations with no experience or social capital.

differences in competition and business environment across space. We expect factors of production such as working capital and labor to have a positive and significant effect on output. We also anticipate that measures of human capital such as experience, schooling, and number of languages spoken should have a beneficial effect on productivity, together with social network capital. Gender should enter negatively if women face difficulties entering the more remunerative side of the profession.

The estimation of equation (3) by ordinary least squares is presented in Table 2 for value added and total annual sales, respectively. Results by and large conform with expectations. Working capital and labor have the expected sign and are highly significant. Returns to scale are not significantly different from one. Contrary to expectations, the presence of family members among the firm's labor force is shown to have a large *negative* effect on sales and value added. Family members thus appear to work less hard than hired workers. One likely explanation is that family members are present in the business more to keep company to the owner than to work.[21]

On the human capital side, schooling and business experience of the owner are shown to raise efficiency, a result in line with other empirical evidence that the returns to human capital in non-farm activities is high (e.g., Newman and Gertler (1994), Jolliffe (1996), Yang (1997), Fafchamps and Quisumbing (1998)). Schooling alone is significant, however. Trade experience is significant only if social capital is omitted.[22] One surprising result is that traders who commonly speak a language other than Malagasy do less well than those who only speak the national language.[23] Speaking other languages need not contribute to trader efficiency given that Malagasy is widely spoken throughout the country and is the language of trade. But it should not reduce efficiency. One possible explanation is that those respondents who report speaking French

[21] The owner may also work less when family members are around. Relatives may also be employed as part of a social security system based on kinship, so that the decision to employ them is made without reference to business needs. Yet another possible interpretation is that traders who operate multiple output firms in which trading is tied with farming, processing, and transport, are both more prone to measurement error and more likely to delegate part of their operations to family members.

[22] Table 3 shows that trade experience is the major determinant of the number of traders known. Take together, these results suggest that, for traders, experience is important because it provides opportunities to develop networks.

[23] Similar results obtain if we eliminate all non-native Malagasy, i.e., respondents who describe themselves as Chinese, Indo-Pakistani, or something else: the magnitude and significance of the language variable remain unchanged.

on a regular basis are not fully committed to a career in trade: they hope to get an administrative job in the not-too-distant future and cultivate their French to enhance their chances of getting such a job.[24] Another alternative explanation is that traders who speak several languages have a comparative advantage in other forms of trade, such as import-export. Consequently, they divert part of their attention and effort to other trading activities that are not captured in our measure of sales and value added.

Moving to the emphasis of this paper, results show that social capital raises both total sales and gross margins even after controlling for working capital, labor, and human capital. The estimated coefficient indicates that the effect is large: keeping physical and human capital constant, a doubling of the number of known traders raises sales and value added by 37% and 33%, respectively.[25]

Whether these results are believable of course depends on the possibility of endogeneity bias. We begin by testing whether capital, labor, share of family labor, and social capital can be regarded as exogenous. Human capital and location variables need not be tested since endogeneity is less of a issue. Hausman test results are reported at the bottom of Table 2. We have at our disposal an unusually rich set of instruments. Those used for the test include personal background variables such as age and age squared, various indicators of place of birth, religion, number of brothers and sisters, number of children, profession, education, and business experience of parents, and history of informal lending and borrowing.[26] Most of these variables are beyond the control of respondents or are the result of past activity (e.g., history of lending and borrowing). They should nevertheless influence access to capital, labor, and business contacts. The number of siblings and children, for instance, should determine access to labor. Age and the professional and education background of parents should influence prior exposure to trade and access to capital. Having lent to traders in difficulty in the past is a pointer for individual wealth

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[24] Thanks to Manfred Zeller for pointing this out.

[25] Because social capital is entered as the log (social capital + 1), the elasticity with respect to social capital is computed as coefficient x average social capital /(average social capital +1).

[26] A detailed list of the instruments appears in Table 3.

and willingness to help others. Place of birth and religion are likely to affect socializing patterns and thus the accumulation of social capital.

Instruments are subjected to a Wald exclusion test suggested by Hausman (e.g., Greene (1997), pp. 762).[27] Results suggest that the instruments are valid (except for a marginally significant test result on parents' education and experience).[28] Using these instruments, we then use a Hausman test to assess the exogeneity of capital, labor, and social capital.[29] Exogeneity cannot be rejected but the Hausman test may have low power given the low R^2 in the instrumenting regressions.

In spite of these encouraging results, we still worry that OLS estimates may be biased due to simultaneity bias. If sales are high, traders may raise additional working capital, bring in additional workers, and make more contacts. The share of family labor might also increase if traders rely on family members as supplementary labor during peaks (e.g., Fafchamps (1994)). We therefore reestimate the regression by instrumenting capital, labor, share of family labor, and social capital. Instrumenting regressions are presented in Table 3. Results show that we have sufficiently powerful instruments for identification. At first glance, the list of instrumental variables appears long so that one may fear overfitting. Most instruments, however, are dummy variables while others display little variation. Reported R^2 do not suggest overfitting. Instrumented regressions are presented in Table 4. Albeit less precise, estimates of returns to social capital remains large and significant. If anything, the estimated elasticity of value added with respect to number of traders known has gone up as a result of instrumentation. Other relevant variables such as labor, education, and experience, do not change sign but are no longer significant.

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[27] The test is constructed by regressing the residuals from the regressions presented in Table 2 on potential instruments. The statistic $T\,R^2$ is distributed as a χ^2 with a number of degrees of freedom equal to the number of tested instruments.

[28] Exogeneity of these instruments cannot, however, be rejected with the expanded list of regressors used below, suggesting that the 'false positive' result is a consequence of omitted variable bias, not of endogeneity of the instruments. For this reason, we decided to keep the instruments as listed.

[29] The test is constructed as $(\beta^U-\beta^R)(\Sigma^U-\Sigma^R)^{-1}(\beta^U-\beta^R)$ where β and Σ denote the vector of estimated coefficients and the variance-covariance matrix, respectively, and the superscripts U and R stand for the restricted (efficient but possibly inconsistent) and unrestricted (consistent but possibly inefficient) estimates. As suggested by Hausman, the variance of the residuals from the unrestricted regression is used to compute Σ^R.

To reliably interpret a significant coefficient on social capital as evidence that it boosts productivity, we must be reasonably sure that social capital does not proxy for something else we did not control for. To this effect, we expand the regression to include a more exhaustive list of regressors. Although doing so cannot entirely eliminate the possibility of omitted variable bias, it should reduce it to a large extent. First, we include equipment, storage capacity, and vehicles as additional measures of capital. Second, we include indicators of internal organization -- multiple selling/buying points -- and commitment to the business -- such as whether the entrepreneur is a full-time and year-round trader and is involved in another business as well. Third, we control for the effect of communication equipment such as telephone or fax machine. Fourth, we worry that the number of traders known may but reflect that the surveyed trader is in a 'cozy' relationship with suppliers and clients. To control for this possibility, we include two variables indicating whether the respondent is sole buyer or sole supplier with some of its clients and suppliers.

Fifth, we control for family influences by including the number of relatives in agricultural trade as a separate measure of social capital. We expect relatives in trade to bolster productivity, much in the same way as other forms of social capital. A slightly weaker coefficient could be interpreted as evidence that strong links are less useful than weak links, perhaps because they carry less information (e.g., Granovetter (1995)). We also include startup capital and whether the respondent learned the business on his/her own, as opposed to learning from a relative. Finally, we include an alternative measure of social capital, namely the number of people from whom the respondent could borrow in case of business difficulties.

Simple OLS results are presented in Table 5. Working capital, labor, and number of traders known remain highly significant. In accordance with expectations, storage capacity is shown to have a strong positive effect on value added and/or sales. Traders with multiple selling/buying points are shown to nearly double their sales.[30] Results suggest that access to communication

[29] Non-essential inputs such as equipment, storage capacity, and vehicles are added to the regression equation as log(x+1). This avoids losing observations while remaining consistent with the use of logged sales and gross margins as dependent variables.

[30] Discussions with respondents suggest that the major constraint preventing traders from opening multiple branches is the difficulty to monitor workers and prevent theft and embezzlement (e.g., Fafchamps and Minten

equipment has a very strong effect on productivity. Given that very few respondents use these equipment for agricultural trading purposes,[31] this result should be taken with caution. It may just proxy for intelligence and technological awareness. In agreement with expectations, more competitive relations with clients are associated with lower value added. The opposite, however, holds for suppliers.

Getting back to our main variable of interest, social capital, we see that both the number of traders known and the number of potential lenders help raise productivity. The reason probably is that different types of social capital play different roles. In this case, one serves to facilitate agricultural trade while the other improves rapid access to credit. The magnitude of social capital effects remains large: a doubling of the number of traders known and potential lenders raises sales and gross margins by 19-22% and 18-22%, respectively. Endogeneity tests fail to reject the hypothesis that social capital is exogenous. Hausman test results -- distributed as a χ^2 with 3 degrees of freedom -- are 0.3 (*p* value of 0.960) and 1.44 (*p* value of 0.596) for value added and total sales, respectively. We also conduct a Davidson and MacKinnon endogeneity test (see Davidson and MacKinnon (1993), pp. 236-242).[32] Test results, which are distributed as an *F* statistic with 3 degrees of freedom, are 0.2 (*p* value of 0.995) and 0.48 (*p* value of 0.700). As in the case of Table 4, instrumenting social capital anyway (results not shown) does not affect the results much: the number of traders known is still significant in both the value added and the sales regression; the number of potential lenders is significant in the value added regression.

One dimension of social capital -- the number of close relatives in agricultural trade -- appears with the wrong sign and is significant in the sales regression. This result is difficult to explain. The beginning of an explanation is suggested by the fact that the coefficient is no longer significant when the subsidiary dummy is omitted from the regression, and it gets smaller in

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(1999b)). This issue deserves more research.

[31] Five percent of respondents declare making use of the telephone in their trading business; only a handful ever used a fax machine for business purposes.

[32] The test is constructed by first regressing all potentially endogenous regressors on all the exogenous variables. Predicted values of all potentially endogenous regressors are then added to the regression of interest, together with uninstrumented regressors. Endogeneity is tested as an F test of the joint significance of the predicted regressors.

absolute value when we control for close interaction with businesses held by relatives.[33] This is consistent with the ideas that respondents who have close relatives in trade have trouble mentally disentangling their business from that of their relatives and, as a result, tend to overreport the working capital and equipment that is truly theirs.[34] An alternative explanation is that close relatives burden the respondent's business by insisting on sharing arbitrage gains when they buy and sell from each other.[35] Because so few respondents buy from and sell to relatives, the effect is unlikely to be strong enough to account for the large negative coefficient on relatives in trade. Another possibility is that blurred business boundaries dilute incentives and result in lower unobserved effort. Added to the finding that productivity is higher among traders who learned the business on their own and did not receive coaching from relatives, these results suggest that family relationships do not constitute a productive component of social capital, contrary to what is often assumed (e.g., Granovetter (1995a)). This finding is to be compared to Bigsten et al. (2000), who similarly report that family links account for only a minute portion of relationships in African manufacturing. These issues deserve further investigation.

In spite of our efforts, it is still conceivable that social capital are significant because they proxy for unobserved entrepreneurial traits. For instance, more thrifty and individualistic entrepreneurs might perform better and at the same time accumulate more assets. Altruistic -- and presumably more sociable -- respondents might accumulate more business contacts while at the

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[33] E.g., whether main suppliers and clients are relatives, and whether the respondent raised funds from informal sources -- presumably, relatives as well.

[34] It is, for instance, unclear whether respondents make a sharp distinction between relatives working with them and relatives operating a distinct business -- possibly because family helpers also operate on their own account. If this is the case, total reported labor, which includes family helpers, overestimates actual labor effort. This phenomenon might explain why the coefficient of family labor share is negative and significant. By the same token, relatives who are entrusted with part of the working capital of the respondent might rotate that working capital for their own account, a practice commonly described for agents of Chartered Companies in pre-industrial Africa (e.g., Braudel (1986)). To investigate this possibility, we followed a referee's suggestion and separated the relatives-in-agricultural-trade variable between firms who employ relatives and those that do not. Blurring of firm boundaries should be more severe for firms who employ relatives. We find instead that the variable is most negative and significant among firms that do not employ relatives.

[35] Barr and Oduro (2000), for instance, report that Ghanaian workers employed by relatives earn significantly more than other workers, conditional on their characteristics. This suggests some form of 'favoritism' towards relatives. To investigate this possibility, we regress the buying price for rice on regional dummies, trader category, month of transaction, and family relation with supplier -- 4% of traders report a family link with suppliers. The family relation variable is nearly significant (p-value of .15). We could not run a similar regression for sales given the extremely small proportion of respondents who report selling to family members.

same time attracting more customers. To control for this possibility, we add variables that capture the entrepreneur's propensity to save and proxy for individualism and altruism. These attitudinal variables were elicited by asking respondents to rank various assertions as true or false (see Fafchamps and Minten (1999a) for details).[36]

Results, presented in Table 6, show that entrepreneurial traits affect firm performance: traders who described themselves as self-reliant ('I solve my problems by myself') and thrifty ('I save when I make a lot of money') are shown to be more productive. In contrast, fear of predation by relatives seems to be a disincentive to effort: respondents who claim that, if they are successful, their family and friends will live at their expense, tend to be less productive. Individual control over assets does not matter. Of course it would be foolish to claim that responses to a few qualitative questions fully capture the respondent's personality. It is also conceivable that answers capture factors other than personal traits -- wealthier respondents, for instance, are more likely to save than poor ones. Results should thus be taken with a grain of salt.

In spite of their shortcomings, attitudinal variables nevertheless purge social capital coefficients of (some of) the effects of entrepreneurship. How does their inclusion affect the measured effect of social capital on productivity? Family members in agricultural trade remain a negative influence on firm performance, but the significance of the variable drops below conventional levels of significance in the value added regression. Non-family network variables remain jointly significant, but the emphasis shifts to the number of potential lenders.[37] The coefficient on numbers of traders known drops in both regressions and is no longer significant in the value added regression. These results suggest that part of the measured effect of social capital on performance is attributable to entrepreneurial talent. Non-family social networks nevertheless maintain a distinct positive influence on firm performance. Of course, there may exist yet other omitted unobservables that bias our results. In the absence of panel data, these effects can unfor-

[36] To minimize bias, the assertions were translated in Malagasy and enumerators were instructed to read the assertions aloud.

[37] If the number of traders known is the only social capital variable included in the regression with entrepreneurial variables, it is significant.

tunately not be controled for.

We also experimented with two measures of shocks: whether the firm has been victim of a theft in the preceding year; and a measure of aggregate sales shock computed as the growth in total annual sales enjoyed by traders in the same location and the same type of business (e.g., wholesale, retail, etc).[38] The idea is that if social capital is but a by-product of past sales, firms that grew rapidly over the last two years should have less social capital. If, in addition, sales shocks are correlated, social capital may proxy for autocorrelated shocks. Including growth in sales should minimize the possibility of such a bias.[39] Regression results (not reported here for the sake of brevity) indicate that past growth in sales is strongly associated with current sales, suggesting that idiosyncratic sales shocks are positively correlated over time. If confirmed by more detailed time-series analysis on panel data, this finding has deep implications regarding arbitrage and market efficiency: presumably, if competition is fierce, any efficiency advantage should be competed out over time. The presence of long-lasting idiosyncratic shocks suggests otherwise and is consistent with Barrett's (1997b) observation that, in spite of massive entry, Madagascar grain markets remain uncompetitive. This issue deserves more investigation. Including past shocks in the regression does not, however, reduce the magnitude or significance of social capital variables. We also find that the occurrence of theft has no noticeable effect on performance, although indirect costs might be large (see Fafchamps and Minten (1999b)).

Section 4. Testing for Collusion

Having established that social capital affects firm performance, we now investigate the channels through which the effect operates. We begin by testing collusion. The approach outlined in Section 2 requires that we split value added into unit margin and quantity sold. This decomposition can only be done for an homogeneous product. Consequently, for the purpose of testing,

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[38] The firm's own sales are omitted from the shock variable to avoid spurious correlation.

[39] It should also reduce simultaneity bias.

[39] We also tried to test whether knowing potential lenders helps deal with sales shock. To that effect, we crossed number of lenders known with past sales shock: firms that know more lenders should have withered past shocks better and might be in a better position now. Results have the expected negative sign but are not significant.

we focus on rice, which is the most widely traded agricultural commodity.[40] To increase the robustness of our results, unit margins that are unbelievably large or low are dropped from the analysis.

Instrumental variable results are summarized in Table 7.[41] Instruments used are as before. Social capital is shown to have a very strong and significant effect on quantities sold, but a negative and non-significant effect on unit margin. In fact, we appear unable to explain much of the variation in unit margin, which is dominated by regional differences. Controlling for rice type and category of trader (collector, wholesaler, or retailer) improves the fit but does not affect the conclusions regarding social capital (results not shown).

We therefore find no evidence that social capital raises value added by raising the unit margin while limiting sales. These results suggest that, contrary to commonly held beliefs, the primary effect of social network capital on firm performance does *not* take place through collusion.

Section 5. Social Capital and Modes of Transaction

Having ruled out collusion as the most likely explanation for returns to network capital, we turn to transactions costs. Although we do not have direct measures of the cost of transacting, we have detailed information on the way traders deal with each other (Table 8). The data show that traders collect price information primarily by talking with other traders. The information so collected need not be accurate, however, given that traders have conflicting interest in taking advantage of arbitrage opportunities. A small proportion of respondents prefer to rely on information provided by suppliers and clients. Since the interests of traders and their suppliers and clients are contradictory, this approach is unlikely to yield accurate information unless respondents have a long term relationship that ensures truthfulness. Some traders obtain information from 'messengers' instead, a more costly but probably more accurate method.[42]

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[40] Paddy is not included in the analysis.

[41] Qualitatively similar results are obtained using quantile regressions.

[42] Messenger is the name used by respondents to describe the practice of sending firm employees to investigate prices and market conditions in another locality.

On average, surveyed traders buy and sell mostly in cash. Invoicing and the use of checks are virtually unheard of. A small but non-negligible proportion of traders nevertheless manage to receive and grant trade credit, typically for a very short duration. Since respondents rotate their working capital several times per month, even short term credit can significantly add to their buying capacity. Traders nearly always inspect the quality of the food products they buy; this task is so important that it is virtually always assumed by the owner/manager in person (see Fafchamps and Minten (1999a) for details). Surveyed traders do part of their business with regular suppliers and clients, with whom they are more likely to place orders and receive or grant credit and less likely to inspect quality. This conforms with theoretical expectations according to which relationships facilitate search (e.g., Granovetter (1995), Kranton (1996)) and contract enforcement (e.g., Ghosh and Ray (1996), Kranton (1996), Fafchamps (1998)).

The data reported in Table 8 is suggestive of ways in which social network capital might reduce transactions costs. The inspection of quality at each purchase, for instance, is a time consuming activity that is likely to divert the trader's attention from other tasks. Consequently, traders who have established a sufficiently strong relationship with their suppliers may skip quality inspection and reallocate their time to other business. Similar reasoning suggest that traders who can trade with regular suppliers and clients should economize on search costs. By the same token, traders should economize on information collection costs if they can rely on their clients and suppliers for price information or if they can afford to send messengers to collect information. Those who receive credit have more working capital to play with and should, other things being equal, also be more productive and expand their business. Those who give credit to their clients should similarly be better able to attract customers and compete successfully. Finally, those who place orders can better plan and coordinate their activities.

We begin by regressing modes of transaction on variables suspected to influence the choice between alternative ways of dealing with clients and suppliers, as well as a series of instruments. Results of the first step, presented in Table 9, indicate that knowing more traders helps collecting price information from clients and suppliers directly; it also helps selling more on credit, buying from regular suppliers, selling to regular clients, and simplifying quality inspection by clients.

The ability to screen clients appears a major determinant of a firm's willingness to grant credit (e.g., Fafchamps (2000)). These results confirm that social capital affects modes of transaction through its effect on relationships (e.g., Fafchamps and Minten (1999a)).

Schooling and experience are associated with more trustworthy modes of transaction as well: the coefficient of years of schooling is positive and significant in the regular client and supplier and quality inspection regressions. These results suggest that better educated traders are more likely to realize the usefulness of more sophisticated ways of transacting, but that they cannot capitalize on this understanding unless they have the necessary social capital.

Next, we investigate whether modes of transaction explain differences in efficiency across traders. If an effect is found, it can be interpreted as evidence that social capital boosts performance in part because it helps economize on transaction costs. A first set of uninstrumented regressions are presented in Table 10. Most coefficients are significant and have the right sign: more trusting business practices are associated with higher firm productivity. Traders able to rely on their clients and suppliers to gather reliable information about prices perform significantly better than those who must rely on the information provided by other traders like them. Traders who use messengers to collect price information also do significantly better. In both cases the estimated effect is large and robust: reporting clients and suppliers as the main source of price information is associated with a 60% increase in gross margin. Taken together, these results indicate that access to accurate price information is a key factor in a trader's success. This is hardly surprising, given the importance of spatial and temporal arbitraging in Third World staple food markets (e.g., Jones (1959, 1965), Dercon (1995), Baulch (1997), Ravallion (1986)). They also suggest that better information can be obtained by establishing a good relationship with clients and suppliers (e.g., Fafchamps and Minten (1999a)).

Except for the placing of orders, all the variables associated with more trusting ways of doing business have the expected sign and many are significant. Traders' ability to sell on credit is shown to be an important determinant of performance; since granting credit to clients is a

highly risky proposition (e.g., Fafchamps and Minten (1999b)), firms better able to identify reliable clients appear to be at an advantage, even after controling for working capital, labor, education, and the like. Having regular clients also appears associated with higher sales and gross margins. Not having to inspect the quality of supplies at each purchase is similarly associated with higher sales and margins: given that quality inspection is virtually exclusively undertaken by the owner/manager of the firm (e.g., Fafchamps and Minten (1999a)), not having to inspect allows the trader to devote more time to other activities and thus to do more business. Contrary to expectations, we find that firms that place orders with suppliers get significantly lower gross margins. One possible interpretation is that Malagasy traders place orders only when they cannot find ready supplies; this interpretation is consistent with the fact that orders are often fulfilled late (e.g., Fafchamps and Minten (1999b)). In this context, placing orders is a sign of weakness and is associated with smaller margins.

The results provide important insights as to the particular role of different dimensions of social capital: once we control for modes of transaction, only those dimension of social capital that raise efficiency in ways other than by facilitating transactions should remain significant. Although the inclusion of modes of transaction variables leads the coefficient of the number of traders known to drop in size and significance,[43] the difference in minor: our measures of modes of transactions do not fully account for the effect of social capital on trader efficiency. The number of close relatives in agricultural trade continues to have a negative and significant coefficient, thereby suggesting that the negative effect on productivity resulting from having relatives in trade has little to do with transactions costs. This is consistent with our earlier interpretation, namely, that traders who have close relatives in agricultural trade overstate their own resources because they do not adequately distinguish them from those of their relatives.

Although the results reported in Table 10 demonstrate a strong association between productivity and modes of transaction, they are potentially subject to endogeneity bias since modes of

[43] Regression not shown for the sake of brevity.

transactions are choice variables. We begin by conducting a series endogeneity test. Standard Hausman and Davidson and MacKinnon tests are reported at the bottom of Table 10. They suggest that modes of transactions can be regarded as exogenous. These tests, however, ignore the fact that modes of transactions are limited dependent variables. We also report Davidson and MacKinnon test results using predicted probabilities (logit) and censored predictions (tobit) instead of linear predictions.[44] Results appear at the bottom of Table 10. They suggest the presence of endogeneity in the value added regression. Consequently, we also report regression results in which modes of transaction variables are replaced by predicted probabilities (logit) and censored predictions (tobit).[45]

Results, reported in Table 11, are disappointing: except for sales to regular clients, which remains significant with the correct sign, other modes of transaction regressors either become non-significant or have the wrong sign. These results could be due to multicollinearity between predicted modes of transactions, given that we do not have good instruments for the propensity to rely on each particular mode of transaction separately from the others. To investigate this possibility, we conduct a joint significance test. Modes of transactions are jointly significant in the value added regression but not in the sales regression. Our results thus constitute preliminary evidence that part of the efficiency enhancing effect of social capital operates through the reduction of transactions costs.

Conclusion

There is a growing recognition that relationships play an important role in market exchange, but what this role is and what function relationships play largely remain a mystery. This paper provides a tentative answer to these questions using original data on agricultural traders in Madagascar. We control for simultaneity with a rich set of instruments and minimize omitted variable bias by adding variables that capture the personal characteristics and family

[44] We also computed Hausman tests, but results proved very sensitive to the method used to invert the variance-covariance term. For this reason, they are not reported here.

[45] Given that it is unclear how a correction should be conducted, standard errors are not corrected for the use of predicted variables.

background of entrepreneurs. We complement our analysis with an investigation of the channels through which social capital affects firm efficiency.

Results document the strong positive effect that social capital has on the performance of agricultural traders in Madagascar. The strength and robustness of social capital variables stands in sharp contrast with the less robust and partly counterintuitive results obtained with human capital variables such as years of schooling, years of experience as a trader, and the ability to speak more than one language. Although this does not imply that human capital is unimportant, it suggests that social capital might be as important if not more for efficiency in economies characterized by high transaction costs and poor market institutions (Fafchamps and Minten (1999b)).

Contrary to Knack and Keefer (1997), we find that interpersonal relationships are significantly related to trust and information flows -- or at least, to their manifestation. Not all relationships matter, though. The evidence indeed suggests that at least three distinct dimensions of social networks can distinguished: relationships with other traders and with potential lenders, which both raise productivity; and family relationships which, in contrast, appear to reduce it, possibly because of the blurring of firm boundaries. Having family members in trade does not constitute a productive component of social capital, as is often assumed -- although it may help at start-up (e.g., Fafchamps and Minten (1999a)).

Results indicate that social networks enable traders to deal with each other in a more trustworthy manner by granting and receiving credit, exchanging price information, and economizing on quality inspection. Preliminary evidence indicates that part of the productivity enhancing effect of social capital operates through the reduction of transactions costs. In contrast, we uncover no evidence that social capital facilitates collusion. These findings suggest that market efficiency could be improved by setting up supportive institutions to reduce transactions and search costs and favor more trusting business practices. In the absence of data on the effect of specific interventions, what form these supportive institutions should take remains unclear, however. More research is needed.

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Table 1. Dependent Variables and Regressors

Dependent variables	**Unit**	**Mean**	**Std. dev.**
Total annual sales of agricultural food products	000 FMg.	196686	510437
Total annual value added	000 FMg.	29311	108653
Capital and labor			
Working capital	000 FMg.	10307	38176
Value of equipment	000 FMg.	1993	10440
Storage capacity	Metric tons	26	134
Number of vehicles	Number	0.14	0.50
Manpower (in months/year)	Month/year	39.5	131.8
% family labor in total labor force	share	76.6%	30.0%
Internal Organization			
Multiple buying/selling points	Yes=1	4.7%	
Full time trader	Yes=1	87.3%	
Trader all year round	Yes=1	83.4%	
Owner/spouse has another business	Yes=1	16.1%	
Human capital			
Gender of owner/manager	Fem=1	45.7%	
Years of schooling of owner/manager	Years	9.1	3.5
Years of experience in agricultural trade	Years	6.0	4.5
Commonly speaks a language other than national language	Yes=1	42.8%	
Social capital			
Number of relatives in agricultural trade	Number	0.7	1.2
Number of traders known	Number	8.8	9.1
Number of potential informal lenders	Number	2.3	1.7
Communication			
Access to telephone	Yes=1	56.5%	
Access to fax machine	Yes=1	21.8%	
Competition			
Main buyer from any supplier	No=1	43.8%	
Main supplier for any client	No=1	21.9%	
Startup history			
Owner learned business alone	Yes=1	52.2%	
Startup capital	000 FMg.	2011	4283
Location			
In capital city	Yes=1	15.7%	
In another city	Yes=1	31.3%	
In Vakinankaratra region	Yes=1	19.9%	
In Fianar/hauts plateaux region	Yes=1	24.9%	
In Fianar/cotes et falaise region	Yes=1	11.5%	
In Majunga/plaines region	Yes=1	12.2%	
In Majunga/plateaux region	Yes=1	13.4%	

Table 2. Effect of Social Capital on Value Added and Total Sales
(dependent variable is in log; estimator is ordinary least squares)

		Value added		Total sales	
Number of observations		627		681	
R-squared		0.465		0.540	
A. Factors of production		Coef.	t-stat	Coef.	t-stat
1. capital and labor					
Working capital	log	0.287	**8.094**	0.253	**8.598**
Manpower (in months/year)	log	0.792	**7.454**	0.785	**9.037**
% family labor in total labor force	share	-0.537	**-2.424**	-0.522	**-2.896**
2. human capital					
Gender of owner/manager	fem=1	-0.261	**-2.331**	-0.135	-1.446
Years of schooling of owner/manager	level	0.033	**1.683**	0.031	**1.938**
Years of experience in agricultural trade	log	0.119	1.318	0.076	1.032
Owner/manager speaks another language	Yes=1	-0.268	**-1.942**	-0.211	**-1.850**
3. social capital					
Number of traders known	log	0.414	**6.146**	0.371	**6.812**
B. Location					
In capital city	Yes=1	-0.903	-1.473	-0.178	-0.533
In another city	Yes=1	0.281	**1.925**	0.288	**2.398**
In Vakinankaratra region	Yes=1	-0.857	-1.391	-0.296	-0.897
In Fianar/hauts plateaux region	Yes=1	-0.880	-1.440	-0.834	**-2.535**
In Fianar/cotes et falaise region	Yes=1	-0.596	-0.967	-0.817	**-2.409**
In Majunga/plaines region	Yes=1	-0.151	-0.239	-0.479	-1.359
In Majunga/plateaux region	Yes=1	-0.071	-0.114	-0.775	**-2.293**
Intercept		3.682	**4.853**	6.287	**12.684**

				Hausman (Wald) exclusion test:	
Intruments tested (1):	df	chi-sq.	p-value	chi-sq.	p-value
Personal background	6	2.00	0.920	3.27	0.774
Family size	4	3.31	0.507	4.03	0.401
Parents' education and experience	10	8.11	0.618	18.19	0.052
History of assistance	2	1.01	0.602	1.02	0.601
				Hausman endogeneity test:	
Regressors tested:	df	chi-sq.	p-value	chi-sq.	p-value
Capital and labor	3	0.76	0.860	3.37	0.339
Social capital	1	0.01	0.903	0.43	0.511

(1) For the precise list of instruments used, see Table 3.

Table 3. Instrumenting Regressions

		Working capital		Manpower		Family share in manpower		Number of traders known	
Number of observations		678		704		695		704	
R-squared		0.376		0.411		0.221		0.249	
A. human capital		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
Gender of owner/manager	fem=1	-0.479	**-4.251**	-0.135	**-2.914**	0.042	**1.941**	-0.100	-1.555
Years of schooling of owner/manager	level	0.107	**5.283**	0.027	**3.193**	-0.012	**-3.174**	0.022	**1.863**
Years of experience in agricultural trade	log	0.093	1.016	0.107	**2.868**	-0.039	**-2.233**	0.329	**6.361**
Owner/manager speaks another language	Yes=1	-0.102	-0.726	0.051	0.885	-0.027	-0.988	-0.349	**-4.330**
B. Location									
In capital city	Yes=1	-1.750	**-4.012**	0.068	0.393	0.113	1.404	0.637	**2.635**
In another city	Yes=1	0.161	1.075	-0.074	-1.188	0.090	**3.066**	-0.198	**-2.288**
In Vakinankaratra region	Yes=1	-1.165	**-2.759**	-0.047	-0.276	-0.025	-0.315	0.652	**2.755**
In Fianar/hauts plateaux region	Yes=1	-1.426	**-3.293**	0.081	0.461	0.058	0.710	0.231	0.952
In Fianar/cotes et falaise region	Yes=1	-1.591	**-3.586**	-0.032	-0.176	0.115	1.391	0.127	0.510
In Majunga/plaines region	Yes=1	-2.314	**-5.088**	-0.509	**-2.781**	0.152	**1.790**	0.085	0.332
In Majunga/plateaux region	Yes=1	-2.318	**-5.228**	-0.557	**-3.124**	0.260	**3.140**	-0.151	-0.609
C. Personal background									
Age	Years	0.100	**3.124**	0.022	1.640	0.001	0.115	0.024	1.302
Age squared	Years^2	-0.001	**-2.255**	-0.000	-0.722	-0.000	-0.909	-0.000	-1.287
Born in capital city	Yes=1	-0.209	-0.806	-0.241	**-2.231**	0.029	0.568	-0.013	-0.088
Born in another city	Yes=1	-0.113	-0.712	-0.146	**-2.241**	0.001	0.019	0.008	0.085
Born at or near location of business	Yes=1	0.127	1.051	-0.055	-1.108	0.038	**1.654**	-0.107	-1.555
Religion other than christian	Yes=1	0.177	0.765	-0.041	-0.433	-0.076	**-1.735**	0.200	1.526
D. Family size									
Number of brothers over 15 years of age	log	0.053	0.459	0.010	0.214	-0.021	-0.938	-0.134	**-2.061**
Number of sisters over 15 years of age	log	0.063	0.540	0.053	1.130	-0.020	-0.886	-0.166	**-2.533**
Number of sons over 15 years of age	log	0.120	0.917	0.130	**2.413**	-0.020	-0.817	0.225	**3.011**
Number of daughters over 15 years of age	log	0.081	0.602	0.016	0.285	0.027	1.051	-0.069	-0.893
E. Family background									
Father was a farmer	Yes=1	-0.662	**-3.421**	-0.306	**-3.854**	0.054	1.462	-0.273	**-2.476**
Mother was a farmer	Yes=1	0.271	1.409	0.018	0.224	-0.013	-0.363	0.176	1.609
Father attended primary school	Yes=1	-0.091	-0.573	0.144	**2.206**	-0.023	-0.762	0.151	**1.673**
Father attended high school	Yes=1	0.222	1.172	0.121	1.547	-0.018	-0.498	0.095	0.873
Mother attended primary school	Yes=1	0.039	0.241	-0.160	**-2.423**	0.028	0.907	-0.189	**-2.068**
Mother attended high school	Yes=1	0.313	1.312	-0.095	-0.960	-0.030	-0.665	0.152	1.106
Father's years of experience in business	log	0.131	1.089	0.045	0.942	0.013	0.575	0.013	0.192
Mother's years of experience in business	log	-0.108	-0.894	-0.040	-0.819	-0.028	-1.241	-0.050	-0.728
Father's years of experience in agricultural trade	log	-0.180	-1.200	-0.111	**-1.829**	-0.005	-0.195	-0.025	-0.302
Mother's years of experience in agricultural trade	log	0.253	**1.738**	0.122	**2.060**	0.029	1.060	-0.020	-0.239
F. History of informal borrowing									
Has lent to trader in difficulty in the past	Yes=1	0.628	**3.342**	0.181	**2.345**	-0.046	-1.260	-0.061	-0.572
Has borrowed for problem in business in the past	Yes=1	-0.450	**-2.478**	-0.228	**-3.089**	0.020	0.583	-0.087	-0.847
Intercept		5.644	**7.474**	2.476	**8.045**	0.923	**6.446**	1.071	**2.506**

Table 4. Instrumental Variable Estimates
(dependent variable is in log; instruments as in previous Table)

		Value added		Total sales	
Number of observations		626		680	
R-squared		0.448		0.489	
A. Factors of production		Coef.	t-stat	Coef.	t-stat
1. capital and labor (*)					
Working capital	log	0.433	**2.415**	0.363	**2.495**
Manpower (in months/year)	log	0.540	1.292	0.487	1.361
% family labor in total labor force	share	-0.163	-0.130	-1.747	**-1.701**
2. human capital					
Gender of owner/manager	fem=1	-0.223	-1.620	-0.036	-0.311
Years of schooling of owner/manager	level	0.024	0.970	0.010	0.481
Years of experience in agricultural trade	log	0.147	1.251	0.011	0.117
Owner/manager speaks another language	Yes=1	-0.223	-1.293	-0.212	-1.415
3. social capital (*)					
Number of traders known	log	0.473	**1.816**	0.462	**2.274**
B. Location					
In capital city	Yes=1	-0.965	-1.380	0.189	0.416
In another city	Yes=1	0.203	1.115	0.345	**2.269**
In Vakinankaratra region	Yes=1	-1.086	-1.489	-0.277	-0.739
In Fianar/hauts plateaux region	Yes=1	-1.050	-1.537	-0.649	**-1.727**
In Fianar/cotes et falaise region	Yes=1	-0.801	-1.139	-0.581	-1.483
In Majunga/plaines region	Yes=1	-0.377	-0.516	-0.221	-0.531
In Majunga/plateaux region	Yes=1	-0.337	-0.449	-0.444	-1.087
Intercept		3.205	**1.670**	7.226	**4.363**

(*) Denotes instrumented variables. Instruments include all instruments used in Table 3

Table 5. Controlling for Omitted Variable Bias

(dependent variable is in log)		**Value added**		**Total sales**	
Number of observations		619		673	
R-squared		0.534		0.626	
A. Factors of production					
1. capital and labor		Coef.	t-stat	Coef.	t-stat
Working capital	log	0.229	**6.096**	0.190	**6.230**
Value of equipment	log	-0.011	-0.357	0.031	1.271
Storage capacity	log	0.219	**3.990**	0.232	**5.541**
Number of vehicles	log	-0.217	-0.850	-0.294	-1.506
Manpower (in months/year)	log	0.523	**4.361**	0.476	**5.214**
% family labor in total labor force	share	-0.393	**-1.761**	-0.269	-1.529
2. internal organization					
Multiple selling/buying points	Yes=1	0.926	**3.665**	0.951	**4.651**
Full-time trader	Yes=1	-0.127	-0.594	-0.018	-0.120
Trader all year round	Yes=1	0.268	1.498	0.414	**3.084**
Owner/spouse has another business	Yes=1	0.399	**2.593**	0.088	0.727
3. human capital					
Gender of owner/manager	fem=1	-0.238	**-2.179**	-0.101	-1.146
Years of schooling of owner/manager	level	0.030	1.612	0.020	1.318
Years of experience in agricultural trade	log	0.088	0.959	0.035	0.486
Owner/manager speaks another language	Yes=1	-0.237	**-1.744**	-0.146	-1.344
4. social capital					
Number of relatives in agric. trade	log	-0.139	-1.179	-0.158	**-1.710**
Number of traders known	log	0.244	**3.289**	0.219	**3.855**
Number of potential lenders	log	0.257	**2.408**	0.319	**3.828**
5. Communication					
Access to telephone	Yes=1	0.369	**2.873**	0.415	**4.083**
Access to a fax machine	Yes=1	0.461	**2.805**	0.547	**4.075**
B. Competition					
Main buyer from any supplier	No=1	0.303	**2.222**	0.117	1.059
Main supplier for any client	No=1	-0.506	**-3.380**	-0.327	**-2.751**
C. Startup history					
Owner/manager learned busines alone	Yes=1	0.204	**1.837**	0.268	**3.033**
Startup capital	log	0.028	0.871	0.050	**2.020**
D. Location					
In capital city	Yes=1	-0.709	-1.184	-0.350	-1.073
In another city	Yes=1	0.123	0.841	0.126	1.073
In Vakinankaratra region	Yes=1	-0.560	-0.940	-0.291	-0.934
In Fianar/hauts plateaux region	Yes=1	-0.952	-1.578	-1.210	**-3.637**
In Fianar/cotes et falaise region	Yes=1	-0.756	-1.236	-1.206	**-3.454**
In Majunga/plaines region	Yes=1	-0.147	-0.238	-0.672	**-1.926**
In Majunga/plateaux region	Yes=1	-0.246	-0.400	-1.027	**-3.005**
Intercept		3.908	**4.953**	6.301	**12.179**

Table 6. Controling for Entrepreneurship

(dependent variable is in log)		**Value added**		**Total sales**	
Number of observations		619		673	
R-squared		0.558		0.647	
A. Factors of production					
1. capital and labor		Coef.	t-stat.	Coef.	t-stat.
Working capital	log	0.221	**6.021**	0.180	**6.042**
Value of equipment	log	-0.018	-0.562	0.027	1.109
Storage capacity	log	0.234	**4.370**	0.245	**5.999**
Number of vehicles	log	-0.166	-0.663	-0.260	-1.362
Manpower (in months/year)	log	0.505	**4.299**	0.456	**5.091**
% family labor in total labor force	share	-0.269	-1.229	-0.158	-0.914
2. internal organization					
Multiple selling/buying points	Yes=1	1.000	**4.041**	0.990	**4.958**
Full-time trader	Yes=1	-0.115	-0.550	-0.005	-0.033
Trader all year round	Yes=1	0.280	1.598	0.389	**2.962**
Owner/spouse has another business	Yes=1	0.324	**2.099**	0.037	0.303
3. human capital					
Gender of owner/manager	fem=1	-0.223	**-2.087**	-0.105	-1.231
Years of schooling of owner/manager	level	0.045	**2.385**	0.033	**2.192**
Years of experience in agricultural trade	log	0.082	0.919	0.034	0.479
Owner/manager speaks another language	Yes=1	-0.256	**-1.918**	-0.164	-1.544
4. social capital					
Number of relatives in agric. trade	log	-0.182	-1.577	-0.174	**-1.921**
Number of traders known	log	0.108	1.408	0.107	**1.814**
Number of potential lenders	log	0.260	**2.461**	0.315	**3.848**
5. Communication					
Access to telephone	Yes=1	0.385	**3.049**	0.449	**4.509**
Access to a fax machine	Yes=1	0.405	**2.503**	0.489	**3.718**
B. Competition					
Main buyer from any supplier	No=1	0.274	**2.005**	0.108	0.989
Main supplier for any client	No=1	-0.421	**-2.850**	-0.289	**-2.474**
C. Startup history					
Owner/manager learned busines by him/herself	Yes=1	0.152	1.389	0.250	**2.888**
Startup capital	log	0.007	0.227	0.037	1.492
C. Location					
In capital city	Yes=1	-1.075	**-1.807**	-0.792	**-2.396**
In another city	Yes=1	0.191	1.324	0.171	1.483
In Vakinankaratra region	Yes=1	-0.534	-0.911	-0.341	-1.120
In Fianar/hauts plateaux region	Yes=1	-1.348	**-2.252**	-1.571	**-4.683**
In Fianar/cotes et falaise region	Yes=1	-1.152	**-1.899**	-1.620	**-4.612**
In Majunga/plaines region	Yes=1	-0.659	-1.063	-1.181	**-3.323**
In Majunga/plateaux region	Yes=1	-0.703	-1.145	-1.487	**-4.281**
D. Entrepreneurship					
Full control over assets	Rank 1-5	-0.117	-1.089	-0.040	-0.465
Self-reliance	Rank 1-5	0.243	**3.374**	0.150	**2.690**
Fear of predation by relatives	Rank 1-5	-0.177	**-4.122**	-0.198	**-5.739**
Thrift/propensity to save	Rank 1-5	0.149	**3.398**	0.081	**2.290**
Intercept		4.146	**4.382**	6.823	**10.510**

Table 7. Testing Collusion (dependent variable is rice; estimator is instrumental variables)		**Rice quantities sold** (in log)		**Selling price - buying price** (in level)	
Number of observations		415		356	
R-squared		0.550		0.066	
A. Factors of production		Coef.	t-stat.	Coef.	t-stat.
1. capital and labor (*)					
Working capital	log	0.438	**2.738**	0.026	0.798
Manpower (in months/year)	log	-0.137	-0.330	0.077	0.940
% family labor in total labor force	share	-0.976	-1.054	0.341	**1.816**
2. human capital					
Gender of owner/manager	fem=1	-0.367	**-2.711**	-0.006	-0.273
Years of schooling of owner/manager	level	0.058	**2.441**	-0.005	-1.044
Years of experience in agricultural trade	log	0.156	1.173	0.011	0.462
Owner/manager speaks another language	Yes=1	-0.251	-1.487	-0.005	-0.166
3. social capital (*)					
Number of traders known	log	0.542	**2.100**	-0.052	-1.168
B. Location					
In capital city	Yes=1	0.570	1.238	-0.008	-0.059
In another city	Yes=1	0.242	1.295	-0.023	-0.655
In Vakinankaratra region	Yes=1	0.053	0.126	0.069	0.487
In Fianar/hauts plateaux region	Yes=1	-0.531	-1.296	0.173	1.324
In Fianar/cotes et falaise region	Yes=1	-0.985	**-2.393**	0.261	**2.045**
In Majunga/plaines region	Yes=1	0.009	0.020	0.258	**1.820**
In Majunga/plateaux region	Yes=1	0.044	0.112	0.169	1.238
Intercept		6.272	**3.727**	-0.493	-1.546

(*) Denotes instrumented variables. Instruments identical to instruments used in Table 3.

Table 8. Modes of Transaction

	Unit	Mean	Std. dev.
Price information obtained from other traders	Yes=1	60.2%	
Price information obtained from clients and suppliers	Yes=1	28.3%	
Price information obtained from messengers	Yes=1	11.5%	
Share of purchases on credit	Share	15.8%	31.9%
Share of sales on credit	Share	13.6%	19.6%
Share of purchases from regular suppliers	Share	38.6%	39.9%
Share of sales from regular clients	Share	26.8%	27.7%
Firm always inspect supplies	Yes=1	84.5%	
Firm's clients always inspect supplies	Yes=1	85.3%	
Firm places orders from suppliers	Yes=1	14.6%	

Table 9. Determinants of Modes of Transaction

	Info on prices from suppliers		**Info on prices from messengers**		**Credit from suppliers**		**Credit to clients**		**Regular suppliers**		**Regular clients**		**Firm inspects quality**		**Clients inspect quality**		**Firm places orders**	
Dependent variable	Yes=1		Yes=1		Share purchases		Share sales		Share purchases		Share sales		No=1		No=1		Yes=1	
Estimator	Logit		Logit		Two-limit tobit		Two-limit tobit		Two-limit tobit		Two-limit tobit		Logit		Logit		Logit	
Number of observations	682		682		680		682		682		682		678		678		681	
R-squared	0.246		0.269		0.354		0.421		0.113		0.315		0.296		0.239		0.142	
A. Factors of productio	Coef.	z-stat.	Coef.	z-stat.	Coef.	z-stat.	Coef.	z-stat.	Coef.	z-stat.	Coef.	z-stat.	Coef.	z-stat.	Coef.	z-stat.	Coef.	z-stat.
1. capital and labor																		
Working capital	0.094	1.366	-0.027	-0.226	-0.001	-0.035	0.019	**2.415**	-0.006	-0.282	0.031	**3.520**	-0.071	-0.823	-0.013	-0.136	-0.036	-0.486
Manpower	0.152	0.732	0.452	**1.644**	0.074	0.903	0.061	**2.473**	0.096	1.509	0.051	**2.001**	0.063	0.218	0.126	0.451	0.480	**2.061**
% family labor	0.220	0.534	0.002	0.004	0.189	1.206	-0.085	-1.820	-0.141	-1.143	-0.154	**-3.023**	-0.156	-0.327	-0.230	-0.473	-0.310	-0.680
2. human capital																		
Gender	0.179	0.811	-0.182	-0.587	-0.015	-0.182	-0.024	-0.975	0.002	0.031	-0.031	-1.162	0.121	0.449	-0.039	-0.144	-0.022	-0.086
Schooling	0.011	0.279	0.079	1.354	-0.014	-0.928	0.007	1.437	0.021	**1.682**	0.009	**1.909**	0.171	**2.990**	0.131	**2.349**	0.056	1.222
Experience	0.122	0.641	0.074	0.294	0.053	0.768	0.069	**3.146**	0.087	1.582	0.098	**4.335**	0.117	0.456	0.243	0.958	-0.034	-0.167
Other languages	1.134	**3.991**	-0.564	-1.538	-0.079	-0.779	-0.080	**-2.537**	0.001	0.010	-0.068	**-2.042**	-1.618	**-4.525**	-0.729	**-2.159**	-0.047	-0.155
3. social capital																		
Relatives in ag.trade	0.291	1.177	-0.064	-0.203	-0.019	-0.219	-0.056	**-2.044**	0.207	**2.855**	0.044	1.480	-1.541	**-4.572**	-0.845	**-2.589**	0.638	**2.409**
Traders known	0.682	**4.250**	0.287	1.396	0.054	0.956	0.072	**4.209**	0.082	**1.853**	0.072	**3.934**	0.172	0.877	0.444	**2.187**	-0.250	-1.584
Potential lenders	0.339	1.502	-0.086	-0.299	0.038	0.442	0.040	1.549	0.078	1.174	-0.010	-0.356	0.086	0.288	0.004	0.012	0.184	0.729
B. Location																		
In capital city	1.388	**1.862**	15.669	**5.762**	1.300	**4.487**	-0.230	**-2.690**	0.170	0.721	-0.460	**-4.690**	0.061	0.052	-1.267	-1.298	-0.089	-0.118
In another city	-0.189	-0.631	0.304	0.906	0.150	1.262	-0.014	-0.427	-0.025	-0.291	-0.087	**-2.439**	-0.753	**-2.060**	-0.558	-1.612	-0.241	-0.727
Vakinankaratra	-1.130	-1.589	18.438	**6.968**	-0.095	-0.347	-0.303	**-3.696**	0.260	1.146	-0.169	**-1.807**	0.756	0.661	0.331	0.367	0.224	0.311
Fianar/plateaux	-1.182	-1.580	16.342	**5.888**	-0.562	-1.897	-0.248	**-2.881**	0.121	0.511	-0.327	**-3.364**	0.607	0.515	0.690	0.737	-0.985	-1.271
Fianar/cotes	-0.360	-0.480	15.030	**5.319**	-0.373	-1.248	-0.256	**-2.935**	0.396	1.644	-0.333	**-3.359**	0.667	0.563	0.558	0.592	-1.210	-1.491
Majunga/plaines	-0.456	-0.563	14.721	**5.245**	-0.487	-1.508	-0.487	**-5.057**	0.036	0.144	-0.246	**-2.397**	-2.967	**-1.857**	-1.148	-1.076	-0.724	-0.840
Majunga/plateaux	-0.431	-0.554	15.449	**5.575**	-0.621	**-1.928**	-0.473	**-5.103**	-0.226	-0.913	-0.240	**-2.407**	-3.259	**-2.048**	-2.236	**-1.894**	-1.649	**-1.813**
C. Instruments																		
Age	-0.052	-0.833	0.147	1.338	0.057	**2.257**	-0.001	-0.162	0.012	0.625	-0.007	-0.938	-0.044	-0.497	-0.127	-1.584	-0.058	-0.844
Age squared	0.001	0.972	-0.001	-0.991	-0.001	**-1.869**	-0.000	-0.244	-0.000	-0.464	0.000	0.874	0.001	0.575	0.001	1.394	0.001	1.253
Born in tana	-0.093	-0.187	0.328	0.473	-0.271	-1.442	-0.110	**-1.728**	0.115	0.773	0.026	0.420	-1.025	-1.163	-0.090	-0.111	-0.105	-0.183
Born in other town	0.342	1.121	-0.583	-1.469	-0.081	-0.705	-0.032	-0.920	-0.197	**-2.160**	-0.004	-0.112	0.616	**1.828**	0.316	0.903	-0.300	-0.821
Born locally	0.444	**1.919**	-0.192	-0.566	0.041	0.469	0.005	0.191	0.033	0.470	0.028	0.989	0.068	0.235	0.072	0.250	0.478	**1.818**
Non christian	0.248	0.528	-0.307	-0.252	-0.182	-0.861	-0.009	-0.145	-0.335	**-2.241**	-0.053	-0.961	-0.005	-0.004	-0.251	-0.280	0.291	0.437
N. brothers >15	-0.096	-0.421	0.239	0.710	-0.085	-1.025	0.070	**2.707**	-0.073	-1.086	0.054	**1.977**	0.924	**2.928**	0.274	0.909	-0.076	-0.287
N. sisters >15	-0.407	**-1.766**	0.619	**1.765**	0.068	0.807	0.088	**3.257**	-0.029	-0.417	0.057	**2.011**	0.062	0.213	0.449	1.461	-0.521	**-1.995**
N. sons >15	0.127	0.496	0.045	0.133	0.025	0.262	0.065	**2.211**	0.062	0.810	-0.007	-0.218	0.036	0.108	-0.047	-0.144	0.340	1.190
N. daughters >15	0.196	0.742	0.097	0.278	-0.024	-0.244	-0.051	**-1.713**	-0.186	**-2.360**	-0.014	-0.427	-0.993	**-2.780**	-0.557	-1.630	-0.153	-0.511
Father farmer	-0.004	-0.011	-0.130	-0.264	0.063	0.431	0.029	0.689	-0.009	-0.080	0.014	0.305	-0.351	-0.789	0.299	0.623	0.441	0.997
Mother farmer	0.032	0.089	-0.217	-0.441	0.117	0.821	-0.052	-1.259	0.001	0.009	-0.028	-0.608	0.066	0.150	-0.482	-1.026	-0.537	-1.266
Father primary	0.210	0.672	0.011	0.024	0.101	0.870	0.033	0.915	-0.001	-0.010	-0.033	-0.868	0.655	1.521	0.426	1.069	0.430	1.236
Father secondary	0.570	1.547	-0.003	-0.006	0.172	1.193	0.020	0.458	0.145	1.321	0.014	0.319	0.358	0.715	-0.289	-0.604	1.034	**2.510**
Mother primary	-0.273	-0.870	0.179	0.409	-0.104	-0.893	-0.021	-0.587	-0.019	-0.202	0.004	0.117	0.045	0.110	-0.279	-0.715	-0.507	-1.476
Father secondary	-0.132	-0.293	0.129	0.208	-0.000	-0.002	-0.031	-0.600	-0.243	**-1.754**	0.005	0.095	-0.026	-0.045	-0.217	-0.382	-0.812	-1.555
Father business exp.	-0.173	-0.737	-0.098	-0.328	0.102	1.435	0.007	0.280	-0.039	-0.602	-0.016	-0.613	-0.560	**-1.950**	0.184	0.704	-0.091	-0.382
Mother business exp.	-0.564	**-2.225**	0.222	0.809	-0.060	-0.828	0.001	0.042	0.101	1.569	-0.000	-0.015	0.802	**3.044**	0.089	0.329	0.366	1.623
Father ag.trade exp.	0.248	0.875	0.055	0.145	-0.020	-0.213	0.027	0.899	0.001	0.017	0.048	1.436	0.521	1.462	-0.397	-1.016	0.135	0.455
Mother ag.trade exp	0.545	**1.872**	-0.263	-0.757	-0.043	-0.466	-0.029	-0.973	-0.218	**-2.713**	-0.032	-0.976	-0.936	**-2.831**	-0.492	-1.253	-0.515	**-1.810**
Informal lender	0.756	**1.974**	-0.761	-1.487	0.129	0.907	-0.036	-0.833	-0.228	**-2.097**	-0.088	**-1.970**	0.465	0.868	0.021	0.042	-0.328	-0.766
Informal borrower	-0.451	-1.260	0.393	0.743	0.034	0.252	-0.113	**-2.780**	0.121	1.150	0.002	0.056	-0.323	-0.616	0.033	0.066	0.522	1.267
Intercept	-3.848	**-2.310**	-25.446		-2.444	**-3.635**	-0.244	-1.287	-0.735	-1.494	-0.014	-0.073	-2.874	-1.294	-1.326	-0.658	-1.864	-1.032

Table 10. Testing Modes of Transaction

(dependent variable is in log)		Value added		Total sales	
Number of observations		625		676	
R-squared		0.538		0.590	
A. Mode of Transaction		Coef.	t-stat.	Coef.	t-stat.
Info. on prices from clients and suppliers	Yes=1	0.643	**4.833**	0.468	**4.271**
Info. on prices from messengers	Yes=1	1.074	**6.091**	0.671	**4.508**
Share of purchases with supplier credit	Share	0.352	1.396	0.353	**1.665**
Share of sales with credit to client	Share	0.606	**1.873**	0.260	0.967
Share of purchases from regular suppliers	Share	0.176	1.236	0.232	**1.953**
Share of sales to regular clients	Share	0.815	**3.543**	0.646	**3.363**
Firm always inspect quality of supplies	No=1	0.460	**2.698**	0.356	**2.500**
Clients always inspect quality of supplies	No=1	-0.307	**-1.717**	-0.243	**-1.672**
Firm places orders from suppliers	Yes=1	-0.452	**-2.971**	-0.125	-0.989
B. Factors of production					
1. capital and labor					
Working capital	log	0.265	**7.797**	0.238	**8.325**
Manpower (in months/year)	log	0.633	**6.174**	0.669	**7.905**
% family labor in total labor force	share	-0.393	**-1.858**	-0.374	**-2.150**
2. human capital					
Gender of owner/manager	fem=1	-0.260	**-2.464**	-0.153	**-1.720**
Years of schooling of owner/manager	level	0.019	1.000	0.019	1.214
Years of experience in agricultural trade	log	0.033	0.384	0.020	0.273
Owner/manager speaks another language	Yes=1	-0.180	-1.338	-0.158	-1.398
3. social capital					
Number of relatives in agric. trade	log	-0.162	-1.396	-0.228	**-2.378**
Number of traders known	log	0.194	**2.597**	0.170	**2.791**
Number of potential lenders	log	0.206	**1.967**	0.291	**3.405**
C. Location					
In capital city	Yes=1	-1.336	**-2.182**	-0.354	-1.000
In another city	Yes=1	0.339	**2.418**	0.339	**2.895**
In Vakinankaratra region	Yes=1	-1.228	**-2.082**	-0.287	-0.886
In Fianar/hauts plateaux region	Yes=1	-0.994	**-1.714**	-0.635	**-1.970**
In Fianar/cotes et falaise region	Yes=1	-0.722	-1.233	-0.686	**-2.060**
In Majunga/plaines region	Yes=1	-0.154	-0.256	-0.240	-0.691
In Majunga/plateaux region	Yes=1	-0.080	-0.135	-0.536	-1.600
Intercept		4.225	**5.786**	6.328	**13.038**
			Joint significance test		
	df	F-stat.	p-value	F-stat.	p-value
Joint test of mode of transaction variables	9	9.70	0.0000	7.24	0.0000
			Endogeneity test:		
Testing mode of transactions variables	df	test	p-value	test	p-value
a. using linear predictors					
Hausman test (chi-square)	9	6.77	0.6612	5.40	0.7982
Davidson and MacKinnon (F)	9	0.98	0.4540	0.59	0.8058
b. using probability (logit) and censored (tobit) predictors					
Davidson and MacKinnon (F)	9	2.41	0.0110	1.27	0.2485

Table 11. Instrumented Modes of Transaction

(dependent variable is in log)		Value added		Total sales	
Number of observations		626		680	
R-squared		0.486		0.558	
A. Mode of Transaction, instrumented (*)		Coef.	t-stat.	Coef.	t-stat.
Info. on prices from clients and suppliers	Yes=1	-0.938	**-1.713**	-0.336	-0.755
Info. on prices from messengers	Yes=1	-1.772	**-2.286**	-0.386	-0.628
Share of purchases with supplier credit	Share	-0.142	-0.217	0.413	0.745
Share of sales with credit to client	Share	-0.778	-0.920	-1.333	**-1.923**
Share of purchases from regular suppliers	Share	0.396	1.038	0.266	0.861
Share of sales to regular clients	Share	3.085	**3.206**	2.040	**2.613**
Firm always inspect quality of supplies	No=1	0.496	0.854	0.568	1.183
Clients always inspect quality of supplies	No=1	-0.606	-0.913	-0.458	-0.827
Firm places orders from suppliers	Yes=1	-0.564	-0.778	0.329	0.568
B. Factors of production					
1. capital and labor					
Working capital	log	0.249	**6.182**	0.236	**7.019**
Manpower (in months/year)	log	0.852	**6.742**	0.742	**7.280**
% family labor in total labor force	share	-0.046	-0.178	-0.142	-0.666
2. human capital					
Gender of owner/manager	fem=1	-0.211	**-1.831**	-0.097	-1.012
Years of schooling of owner/manager	level	0.011	0.508	0.013	0.712
Years of experience in agricultural trade	log	-0.008	-0.073	-0.002	-0.023
Owner/manager speaks another language	Yes=1	0.003	0.016	-0.041	-0.269
3. social capital					
Number of relatives in agric. trade	log	-0.312	**-2.039**	-0.317	**-2.521**
Number of traders known	log	0.303	**2.789**	0.274	**3.104**
Number of potential lenders	log	0.297	**2.535**	0.325	**3.458**
C. Location					
In capital city	Yes=1	0.605	0.659	0.082	0.126
In another city	Yes=1	0.479	**2.940**	0.430	**3.240**
In Vakinankaratra region	Yes=1	-0.085	-0.119	-0.195	-0.434
In Fianar/hauts plateaux region	Yes=1	-0.058	-0.083	-0.405	-0.931
In Fianar/cotes et falaise region	Yes=1	-0.018	-0.025	-0.543	-1.189
In Majunga/plaines region	Yes=1	0.512	0.748	-0.199	-0.471
In Majunga/plateaux region	Yes=1	0.585	0.853	-0.487	-1.154
Intercept		2.663	**3.180**	5.737	**10.190**
			Joint significance test		
	df	F-stat.	p-value	F-stat.	p-value
Joint test of mode of transaction variables	9	1.98	0.0390	1.35	0.2060

(*) Predictors are Prob(X'bhat) for logit and by 0<=X'bhat<=1 for tobit.
Standard errors are uncorrected for the fact that certain regressors are instrumented.