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## Social networks and loss of capital<sup>☆</sup>

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### Abstract

Economic sociologists and white-collar criminologists offer competing predictions about the outcomes of socially embedded transactions. Economic sociologists stress the protective and beneficial role of social networks. Their evidence shows that social ties improve transaction outcomes. White-collar criminologists focus on the harmful and exploitative role of social networks. Their evidence shows that social ties facilitate successful economic crimes. Our case permits a critical test of the protective versus harmful effects of social ties: a business that operated as a legitimate enterprise and also engaged in ongoing financial fraud. This case is strategic because the role of social networks ex post is theoretically ambiguous for a legitimate-fraudulent business. Do social networks lower, raise, or have no effect on the probability of loss of capital, given that an investment has been made? The probability of loss of capital depends on due diligence and type of social tie. Investors who fail to conduct due diligence and do not use social ties have a 79% probability of loss of capital, controlling for other factors. Investors who conduct due diligence (and do not use social ties) have a 49% probability. Investors with preexisting social ties to the principals, sales representatives, or employees of the company (and do not conduct due diligence) have a 39% probability of loss, while those with this type of social tie who also conduct due diligence have a 14% probability. Investors with preexisting social ties to prior investors are not significantly more or less likely to lose their capital. Even in a business that was partly fraudulent, preexisting social ties to the company played a protective and beneficial role. Ironically, fraudulent behavior lowered the probability of loss for investors with this type of social tie: Illegal practices allowed the company to favor friends and acquaintances in the ex post allocation of proceeds.

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## 1. Introduction

Economic actors often rely on preexisting social ties to reduce risk and uncertainty, transacting with someone they know or with someone referred by someone they know. Social ties offer *ex ante* and *ex post* advantages. Prior to a transaction, social ties reduce information asymmetry between buyer and seller; after a transaction, social ties reduce opportunism by imposing social obligations and effective sanctions on the seller. The irony of social ties is that they also increase opportunities for deceit, deviance, and misconduct. As Granovetter (1985, p. 491) observes, “The trust engendered by personal relations presents, by its very existence, enhanced opportunity for malfeasance.” The “bright side” of social organization coexists with a “dark side” (Vaughan, 1999, p. 276). Portes and Sensenbrenner (1993) argue that social capital may have negative as well as positive consequences. For example, a fraud attempt is more likely to be successful if the victim knows or knows of the offender, according to the national Fraud Victimization Survey (Titus et al., 1995a,b).

Following Granovetter’s (1985) seminal statement on the embeddedness of economic decisions in social relations, theoretical and empirical work in economic sociology has focused on the protective and beneficial role of social ties. Granovetter noted the “dark side” (p. 491), but economic sociologists have neglected the study of the harmful and exploitative role of social ties (but see Portes and Sensenbrenner, 1993). In contrast, white-collar criminologists focus on the negative role of networks, while neglecting their positive side. We bring together the fields of economic sociology and criminology, exploring both the “bright” and “dark” sides of socially embedded transactions. Specifically, we investigate a “strategic case” (Merton, 1968, pp. 162–165) that permits a critical test of the protective versus harmful effects of social ties. This case is an oil and gas venture that operated as a legitimate enterprise but also engaged in ongoing financial fraud. The venture was not a “pre-planned fraud” (Clinard, 1984, p. 142)—a business created and operated for the sole purpose of defrauding investors, such as a “boiler room” (Stevenson, 1998)—but an example of what Clinard (1984, p. 142) calls “intermediate fraud.” As described below, it was both a legitimate and fraudulent business. For example, some investors made money but others were defrauded of their financial capital. Intermediate frauds are common. Indeed, as Merton (1968, pp. 198–199) observes, most legitimate business people commit economic crimes; white-collar criminality is the norm, not the exception (see, also, Clinard, 1984).

This case is strategic because the role of social networks *ex post* is theoretically ambiguous for a legitimate-fraudulent business. In this mixed situation, do social networks lower, raise, or have no effect on the probability of loss of capital, given that an investment has been made?<sup>1</sup> As we elaborate below, economic sociologists and white-collar criminologists make opposite predictions, which our strategic case allows us to test.

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<sup>1</sup> To date, research has not considered the effect of networks on loss of capital. Loss is an important outcome because preservation of capital is a goal of prudent investment strategies. Preservation of capital is also a psychological motivation. The desire to protect against loss is so strong that investors often make irrational decisions, such as failing to take advantage of buying opportunities in a volatile market, or holding onto a losing stock in the hope that it will eventually recover. Behavioral decision theorists call this “loss aversion” (Kahneman and Tversky, 1982). Loss aversion is a central tenant of behavioral finance theory.

## 2. Protection versus opportunism: the role of social networks

Social scientists tend to focus on the protective and beneficial role of social networks. The literature on social capital, for example, stresses the positive effects of social networks on economic development and democracy (Putnam, 2000), economic exchange (Burt, 1992; Coleman, 1990), education (Coleman, 1988), and career success (Baker, 2000). Social networks should be used when economic transactions involve high risk and uncertainty. This proposition is central to transaction cost economics (Williamson, 1985). Risk is related to transaction frequency. A one-shot transaction without expectations of a continuing relationship is riskier than multiple transactions over time. Product uncertainty exists when buyers are unsure about the quality of a product or service; performance uncertainty exists when buyers are unsure about a seller's future performance (Kollock, 1994). Generally, when economic exchange involves risk and uncertainty, buyers prefer to (1) transact with sellers they know, or (2) use their social networks to locate dependable and honest businesses. DiMaggio and Louch (1998) call the first strategy "within-network exchange" and the second strategy "search embeddedness."

"Within-network exchange" occurs when economic actors "choose persons with whom they have preexisting noncommercial ties as transaction partners" (DiMaggio and Louch, 1998, p. 620). For example, an investor may decide to invest in a business owned by a friend or kin, based on trust in the preexisting social tie. In fact, "family and friends" are common sources of financial capital for start-ups, early stage financing, and businesses that are not big enough to raise funds in the formal capital market (e.g., Gaston and Bell, 1988). Within-network exchange is also a major source of capital for businesses owned by ethnic or religious minorities because they prefer within-group economic exchanges, or because mainstream financial institutions ostracize them (Light and Karageorgis, 1994).

"Search embeddedness" occurs when buyers use their "social relationships to identify and assess the reliability of potential transaction partners to whom they have no direct or close indirect social ties" (DiMaggio and Louch, 1998, p. 620). Search embeddedness is equivalent to the diffusion mechanism of "contagion" or interpersonal influence among buyers (e.g., Rogers, 1995; Valente, 1995). Investors often tap their social networks to discover new investment opportunities. For example, Gaston and Bell (1988) report that two-thirds of investors in the "informal capital market"<sup>2</sup> find suitable investments through their networks: "Investors' most common and reliable sources of information about investment opportunities are their friends and business associates" (p. 6). Professional go-betweens, such as investment and business brokers, are the least common and least trusted channels of information. Shiller and Pound (1989) report similar findings from their survey of purchasers of publicly traded common stock: The majority of investors are influenced to buy based on

<sup>2</sup> The capital market institution includes the primary, secondary, and informal capital markets. Public corporations and governments raise funds in the primary market by issuing *new* debt and equity, using investment banks as intermediaries. The secondary market is a "resale" market for securities already issued in the primary market. It is centered on formal marketplaces, such as the New York Stock Exchange. The informal capital market is diverse, dispersed, and decentralized, operating without "professional middlemen" (Gaston and Bell, 1988, p. 10), such as banks or brokers. "Informal equity capital is supplied *directly* to the firm by private investors" (Gaston and Bell, 1988, p. 10; emphasis added).

information from friends or business associates or because they know someone who bought the stock.

Both within-network exchange and search embeddedness offer ex ante advantages to an investor. Before an investment is made, either type of social tie reduces information asymmetry “by increasing the amount of information that the buyer [investor] takes into the purchase about the product or service, the identity of potential transaction partners, and the prior performance of each” (DiMaggio and Louch, 1998, p. 624). In short, investors with social ties are better informed and make better investment decisions. Within-network exchange also confers ex post advantages (DiMaggio and Louch, 1998, p. 625). After an investment is made, a preexisting social tie with a principal, employee, or representative of the company reduces opportunism by “introducing obligations and sanctions external to the transaction” (DiMaggio and Louch, 1998, p. 625). Network closure creates effective deterrents to ex post opportunism (Burt, 2000; Coleman, 1990). For example, opportunism is less likely when an investor in a friend’s business and the friend have friends and acquaintances in common. As Granovetter (1992, p. 44) puts it, “My mortification at cheating a friend of long standing may be substantial even when undiscovered. It may increase when a friend becomes aware of it. But it may become even more unbearable when our mutual friends uncover the deceit and tell one another.” Similarly, Portes (1994, p. 430) argues, “Trust in informal exchanges is generated by both shared identities and feelings and by the expectation that fraudulent actions will be penalized by the exclusion of the violator from key social networks.”

Coleman (1990, pp. 306–307) cites ethnic rotating savings and credit associations (roscas) as exemplars of trust in informal financial exchange: “Without a high degree of trustworthiness among the members of the group,” Coleman (2000, p. 306) argues, “such a credit association could not exist—for a person who received a payout early in the sequence of meetings could abscond, leaving the others with the loss.” Biggart (2001) argues that the “situational logic” of roscas, such as their communally-based social order and collective obligations, makes default not only unlikely but in some cases “unthinkable” (p. 143). In general, investing in businesses owned by kin, friends, or acquaintances reduces opportunism because it embeds “transactions in sets of continuous, multipurpose relations. From the buyer’s [investor’s] perspective, the seller’s willingness to transact with a friend, relative or compound tie [e.g., a friend of a friend] represents a ‘credible commitment’ in which the seller’s reputation and relations to other network members become hostages to the transaction” (DiMaggio and Louch, 1998, p. 623; Biggart, 2001, p. 147).

Many outcomes of socially embedded transactions imply that social ties reduce ex ante information asymmetry and ex post opportunism. These outcomes include greater satisfaction with consumer purchases (DiMaggio and Louch, 1998), better jobs (Granovetter, 1974), earlier access to innovations (Rogers, 1995), better chances of survival for firms (Uzzi, 1996), higher probability of loan approval (Siles et al., 1994), lower rates on commercial loans (Uzzi, 1999), very low default rates for roscas (Biggart, 2001), and better access to suitable investment opportunities (Gaston and Bell, 1988). However, other outcomes indicate that the trust placed in social ties creates “enhanced opportunity for malfeasance” (Granovetter, 1985, p. 491). Many investors who rely on within-network exchange or search embeddedness are defrauded, as these examples show: (1) “The first person Hugh Francis Rollins stole from, he says, was his mother, Thelma” (Lowry, 1998, p. 1B). The investment banker’s

mother, friends, neighbors, and 550 others had invested in a Ponzi scheme Rollins devised around financing government contractors. (2) In the early 1990s thousands of doctors in the Western US lost millions when they invested in a fraudulent real estate venture. Many said they decided to invest “because they heard about the ‘opportunity’ from other doctors in their clinics and hospitals” (Iowa Securities Bureau, 2001). (3) In the late 1990s lay minister Frank Luca defrauded parishioners in the Eagle’s Nest Christian Embassy when they invested in what turned out to be his Ponzi scheme, according to the Arizona Securities Division. (4) Word-of-mouth referrals among members of suburban Chicago’s Greek community contributed to the success of a commodities fraud (Kirby and Hanna, 1994). (5) Home-Stake Production Company relied on diffusion from prior investors to new investors as it defrauded hundreds of individuals and corporations who put money into its oil and gas exploration ventures (McClintick, 1983). (6) Ethnic affinity accelerated the spread of the original Ponzi scheme among Italian investors living in Boston’s close-knit south end (Knutson, 1996).

Evidence from the national Fraud Victimization Survey ( $n = 1246$ ) demonstrates that the “dark side” of socially embedded transactions is common (Titus et al., 1995a,b). Fifty-eight percent of Americans have been targets of “personal fraud” (a nonviolent type of property crime aimed at individuals) during their lifetimes. About one-third of respondents were targets during the 12 months before the survey. Forty-two percent of these recent fraud attempts were successful, and 85% of the successful frauds involved loss of money or property. Fraud attempts were significantly more likely to be successful if the victim knew or knew of the offender, and if no attempt was made to investigate further before responding to the offer. Social ties increase vulnerability to fraud when investors place trust in social relationships and fail to reduce ex ante information asymmetry by investigating the investment and provider. Affinity fraud, for example, is successful because investors use ethnic, religious, or professional similarity as a “short-hand way of knowing who to trust” and fail to conduct due diligence (North American Securities Administrators Association [NASAA] 2001). The threat of “obligations and sanctions external to the transaction” (DiMaggio and Louch, 1998, p. 625) does not reduce vulnerability to ex post opportunism when the investment provider has criminal intentions.<sup>3</sup> Providers of fraudulent investments do not appear to suffer “mortification at cheating a friend” (Granovetter, 1992, p. 44) or fear being “penalized by . . . exclusion . . . from key social networks” (Portes, 1994, p. 430). Instead of protecting against ex post opportunism, network closure widens the circle of victimization by exposing more friends and acquaintances to a fraud. For example, an affinity fraud perpetrator may “lull members (of a group) into misplaced trust by selling first to a few prominent members, then pitching the scam to the rest of the group by using the names of those previously sold” (NASAA, 2001). In addition, network closure improves affinity fraud success because members usually “try to solve problems within the group” rather than notify the authorities (NASAA, 2001).

In sum, economic sociologists and white-collar criminologists offer competing predictions about the outcomes of socially embedded transactions. Economic sociologists stress

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<sup>3</sup> Our focus is not why crimes are committed. Others offer explanations, such as greed (Galbraith, 1993), “innovative” adaptations to anomie (Merton, 1968), individual differences in self control (Gottfredson and Hirschi, 1990), pleasure (Katz, 1988), turning points in the life course (Sampson and Laub, 1995), and intense profit pressures (Baker and Faulkner, 1993).

the protective and beneficial role of social networks, arguing that social ties reduce ex ante information asymmetry and ex post opportunism. Their evidence shows that social ties improve transaction outcomes. Consistent with theory and evidence, economic sociologists predict that investors who use social ties are less likely to lose their capital, compared with investors who do not use social ties. White-collar criminologists focus on the harmful and exploitative role of social networks, implying that social ties do *not* reduce ex ante information asymmetry or ex post opportunism when investment providers have criminal intentions. Their evidence shows that social ties facilitate successful economic crimes. Consistent with theory and evidence, white-collar criminologists predict that investors who use social ties are *more likely* to lose their capital, compared with investors who do not use social ties.

We study a “strategic case” (Merton, 1968, pp. 162–165) that permits a critical test of the protective versus harmful effects of social ties: a business that operated as a legitimate enterprise and also engaged in ongoing financial fraud. By focusing on a single firm and its investors, we add depth to research on social networks, economic decisions, and transaction outcomes. Breadth is a strength of previous research, such as DiMaggio and Louch’s (1998) study of the kinds of consumer purchases for which people most often use social networks. As described below, we obtained detailed archival information about the business, its operations, and every investor and every investment. A telephone survey of a large sample of investors provided data on the use of social networks, due diligence, and loss of capital. This combination of archival records, interviews, and survey data provides an unprecedented view of the inner workings of the informal capital market.

### 3. Strategic case: Fountain Oil & Gas Company

Our strategic case is an oil and gas venture that operated as a legitimate business and also committed ongoing financial fraud: Fountain Oil & Gas Company (Fountain) and its entire population of 230 investors. Fountain raised capital via oil and gas partnerships, the main type of investment vehicle used in the natural resource exploration industry. Investors perceive the risk of loss of capital to be higher for oil and gas partnerships than for equipment leasing programs, real estate syndicates, real estate rental property, gold certificates, individual retirement accounts, or money market mutual funds (Srivastava et al., 1985). Only one in seven exploratory wells produces enough oil or gas to be profitable, according to educational brochures published by the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (Hodgson, 1989, p. 13). High risk and uncertainty should impel investors to use their social networks—investing with someone they know (i.e., a social tie with the owners, representatives, or employees of an oil and gas firm), or relying on social ties with prior investors to inform the decision to invest.

Fountain operated in California during the late 1980s. The eldest of three brothers, Charles Fuentes, who was chairman of the board and president, owned the company. His brothers, James and Kenneth, were also involved in the management of the firm. Fountain’s main office was located Westlake Village. The firm also had a field office in Sacramento Valley, the location of Fountain’s oil and gas wells. The management of the company included a petroleum geologist, operations manager, engineering manager, and a manager of lands. The

firm employed a staff of sales representatives, telemarketers, accountants, clerks, secretaries, receptionists, and others.

Fountain sought capital in the informal capital market, attracting its first investor in January 1986 and its last new investor in the middle of 1988. In total, 230 individuals invested US\$ 11.5 million of equity capital. Fountain explored oil and gas in Sacramento Valley, drilling wells at most of the 33 well properties acquired by the company. Fountain's first successful well began producing gas in November 1986; Fountain continued to drill successful wells throughout its 3-year history. In total, Fountain's wells produced about 4244 MCF of natural gas from November 1986 to December 1995, according to records from the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, with a market value of about US\$ 7,214,000.

A series of dry holes caused growing financial problems for the company. It was later discovered that these problems were exacerbated by the ongoing embezzlement of funds. Eventually, Fountain was unable to pay office rent or its field contractors, who filed liens against the company. The firm went into receivership in March 1989, and the bankruptcy court appointed a receiver to operate the business. A small number of investors filed a complaint against Fountain in the US District Court, which launched an investigation by the District Attorney of Ventura County. The District Attorney's forensic accounting firm uncovered enough evidence of business irregularities to indict the Fuentes brothers. Charles was convicted of the most serious offenses, including grand theft by embezzlement, sale of securities without permission, excessive taking of funds, and filing false tax returns. Both James and Kenneth were convicted of making false statements in the sale of a security. (For additional details about the company and its operations, see [Baker and Faulkner, 2003](#).)

## 4. Data and measures

### 4.1. Data

The legal actions brought against Fountain produced an abundance of publicly available data that would not have been available otherwise. We obtained these data from the District Attorney's Office of Ventura County, California, and from the receiver appointed by the bankruptcy court. Data include detailed records of Fountain's financial transactions, bank accounts, and complete lists of all investments (including investor, amount, well, and date) and of all investors (including name and contact information). We reconstructed the company's financial books, using QuickBooks accounting software. Other archival data include geological maps and monthly production records for all wells operated by Fountain (from the Division of Oil, Gas, and Geothermal Resources), copies of the search warrant and affidavit, transcripts of the preliminary hearing, records of liens filed against Fountain by drilling contractors and oil-field service firms, and newspaper articles about the case. We informally interviewed investigators from the District Attorney's Office, the court-appointed receiver, the forensic accountant for the District Attorney's case, several of Fountain's oil-field service contractors, and a sample of investors. Some investors mailed us copies of Fountain's prospectuses and partnership agreements, correspondence from Fountain to investors, correspondence from investors to investors, and investor representation letters.

The final phase of data collection was a telephone survey of investors. A census of all investors would be desirable for measuring the investor network, but this option was not feasible.<sup>4</sup> Nonetheless, it is possible to obtain structural data from a sample, using survey research methods (Coleman, 1958; Marsden, 1987; Burt, 1992). To ensure that we obtained the largest high-quality sample possible, we employed survey research professionals with substantial experience tracking and interviewing respondents. We contracted with Survey Operations at the University of Michigan Institute for Social Research (ISR) to find and interview investors.

We designed our telephone survey instrument to elicit information on the role of networks in decisions to invest, including social ties to Fountain's principals, sales representatives, and other employees, and referrals of Fountain from investor to investor. We asked for reasons why social networks were or were not used, and whether an investor made or lost money. ISR interviewers administered the survey in fall 1998, soon after we mailed pre-notification letters to investors at addresses confirmed or updated by ISR staff. In total, ISR interviewed 72 investors, yielding a 31% convenience sample. The results in Table 1 show that respondents and nonrespondents do not differ significantly along a number of critical dimensions: total dollars invested, number of investments made, or month of first investment.

One potential concern is the ability of investors to recall accurately the details of their involvement with Fountain, given the passage of time between the date of our telephone survey and the period when they invested. First, we note that investing a large sum of money is a memorable event, especially compared with purchases of routine or inexpensive products. Second, recall errors are potential problems for all survey studies, though most are not able to measure recall errors. Third, the frequency and magnitude of recall errors are important, but we are more concerned with the possibility of *systematic* variation in recall errors. If recall errors are not systematic, then we can assume errors are random and do not bias our findings. Our analysis suggests that recall errors do not systematically bias the findings (see Appendix A).

## 4.2. Measures

### 4.2.1. Dependent variable

Our measure of "loss of capital," *lost entire investment*, is a dichotomous indicator, which = 1 if an investor reported losing all of his or her investment (total dollars invested) in Fountain.

### 4.2.2. Independent variables

Following DiMaggio and Louch (1998), we consider two types of social ties. *Within-network exchange* occurs when a person invests in an oil and gas limited partnership offered by Fountain as a result of a preexisting social tie with one of the principals, sales

<sup>4</sup> There are ethical and legal issues involved in the use of a typical network survey instrument that lists all investors by name. Many investors lost large sums of money, and those we interviewed were embarrassed by their loss and worried about their reputations. They agreed to talk with us on the condition that we did not reveal their names. A list-style network survey would have revealed the identities of investors to hundreds of others.



Table 1  
 Analysis of possible nonresponse bias: sample of 72 investors interviewed compared with 158 investors not interviewed

Variables	(1) Total population of investors ( $n = 230$ )	(2) Sample of investors interviewed ( $n = 72$ )	(3) Investors not interviewed ( $n = 158$ )
Average total dollars invested	US\$ 45896.61 (3249.36)	US\$ 47048.22 (5202.17)	US\$ 45258.17 (4091.75)
Average number of investments	2.86 (0.165)	2.93 (0.300)	2.82 (0.197)
Average month of first investment	17.13 (0.55)	18.87 (0.96)	16.69 (0.67)

Notes: Months are numbered consecutively from 1 (January 1986) to 31 (July 1988). Numbers in parentheses are standard errors. No differences are statistically significant at  $P < 0.05$ .

representatives, or employees of the firm. It is a dichotomous variable, where 1 = preexisting social tie with the company. *Search embeddedness* occurs when a person invests in one of Fountain's limited partnerships as a result of a preexisting social tie to a prior investor in Fountain. This category includes compound social ties to a prior investor. Search embeddedness is a dichotomous variable, where 1 = preexisting social tie with a prior investor. The omitted category includes all "impersonal" sources of influence: telemarketing cold call, direct mail, television advertisement, or an in-person cold call by a sales representative with whom the investor does not have a preexisting social tie (i.e., the sales representative and potential investor are strangers).

Given the importance of the network variables, we designed a strategy to determine accurately the source of influence responsible for an investor's decision to invest. Instead of relying on a single survey item, our coding of the network variables is based on responses to a series of questions. Each investor was asked how he or she came into contact with Fountain, focusing on the specific method or vehicle of contact, such as a person associated with Fountain, a person unrelated to Fountain, or any of a list of impersonal sources of influence (cold calls, direct mail, advertisement, etc.) If a person was involved, the investor was asked (1) about the specific role of the person (e.g., a sales representative), (2) whether the investor previously knew this person, and (3) the investor's prior social relationship to the person, if any (e.g., family member, friend, acquaintance, co-worker, or co-member of a social, business, or religious group). Independent of the answers to these questions, we also asked every investor whether he or she had personal contact with one or more of the principals of Fountain, and if so, where contact took place. Also independent of the answers to previous questions, we asked each investor an open-ended question about why he or she decided to invest in Fountain. We instructed the ISR interviewers to write on the survey form any relevant comments made by investors. Answers to the open-ended question and the written comments confirmed our coding of network variables, and helped us to resolve the ambiguity in the few cases where method of influence was unclear.

*Due diligence* is a dichotomous indicator of whether an investor conducted his or her own research and/or consulted with the institutions of "impersonal trust" (Shapiro, 1987). Due diligence = 1 if an investor reported doing one or more of the following: checking references, getting credit reports, analyzing the geological evidence, visiting well sites, or consulting with the Better Business Bureau, California Department of Conservation's Division of Oil, Gas, and Geothermal Resources, local area banks, Pacific Gas & Electric, etc.

#### 4.2.3. Controls

*Age at time of first investment* is a positive integer that represents an investor's age, in years, at the time of first investment. *Level of experience* is an investor's self-assessment of his or her experience with investments in natural resources, prior to making an investment in Fountain. Level of experience = 1 if an investor reported "a great deal of" or "some" experience (0 = "none" or "not much"). *Occupational prestige* is the General Social Survey 1989 Occupational Prestige Score (Nakao and Treas, 1992) associated with the occupation an investor held at the time of first investment. Though 85% of investors were involved in professional, technical, or managerial occupations, there is considerable

variation in occupational prestige scores. We also asked about household income, but 25% of our sample refused to answer this question. Refusing to answer questions about income is a common problem in survey research. As expected, occupational prestige scores and income are significantly correlated ( $r = 0.37$ ,  $P < 0.01$ ) for the subset of investors who answered both questions. We omit income in the multivariate analyses due to (1) the sizable reduction of number of observations caused by listwise deletion of cases with missing data, and (2) the possible sample biases that would be introduced into the models by including it (e.g., those who answered the income question are likely to be significantly different—in some unknown way—from those who did not answer the question). We therefore assume that occupational prestige controls (at least partly) for education and income (Duncan, 1961).

## 5. Findings and discussion

### 5.1. *Social ties versus impersonal sources of information*

Fifty percent of our sample reported relying on social ties to make their decisions to invest in Fountain. Fifty percent said they relied on impersonal sources of information. Those who used social ties are split almost evenly between within-network exchange and search embeddedness. About 21% used within-network exchange, relying on a preexisting social tie with the principals, sales representatives, or other employees of Fountain. For example, the owner of a local jewelry store, who was dating one of Fountain's principals, invested over US\$ 75,000. She said, "He showed me the paper reports and demographics. It was a great comeback on your money in 3–4 months. I took a trip to one of the sites, and, while I was visiting, they hit oil. Very exciting! It made me want to invest more." About 29% of investors used search embeddedness, relying on a preexisting social tie with a prior investor (19%) or on a compound social tie with a prior investor, such as a friend of a prior investor (10%). For example, an engineer in a defense company invested about US\$ 15,000 after his friend invested: "A friend of mine invested and [invested again] after he made money. It looked good, a reasonable business thing because at that time the IRS code allowed for depreciation allowance."

The most frequent source of information for investors who did not use social networks was telemarketing cold calls (38% of all investors). Fountain purchased commercially available lists of affluent individuals, investors in other speculative ventures, and consumers of "big ticket" items. For example, as one investor told us, "The telemarketer got my name from a list of yacht and airplane owners." Investors also responded to direct mail and advertisements, but these were relatively infrequent sources of information that led to the decision to invest (about 6 and 7%, respectively).

The 50–50 distribution of social ties versus impersonal sources is consistent with the findings of studies of networks in product, labor, and consumer markets. (1) Forty-five percent of the physicians in Coleman et al. (1957) study decided to prescribe tetracycline based on direct interpersonal contact with other physicians (i.e., search embeddedness). Fifty-five percent were "isolates"—unconnected with peers in the medical discussion network—and instead "had to depend upon advertising and the drug salesman to be persuaded to use the

Table 2

Binary logit coefficients from regression of loss of capital on social ties and due diligence: sample of 72 investors in Fountain Oil & Gas Company

Variables	Lost entire investment
Social ties	
Within-network exchange	−1.772*
Search embeddedness	0.980
Conducted due diligence	−1.341*
Controls	
Age at first investment	0.003
Occupational prestige	−0.008
Level of experience	0.525
Constant	1.622
Nagelkerke pseudo $R^2$	0.288
No. of observations	64

Notes: Omitted category is impersonal sources of information: telemarketing cold calls, direct mail, advertisements, and direct sales “cold contact.” No. of observations is less than 72 for due to listwise deletion of cases with missing data on one or more variables. \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ .

\*  $P < 0.05$ .

drug” (Coleman, 1964, p. 44).<sup>5</sup> (2) Fifty-six percent of the 275 job seekers in Granovetter’s (1974) study got their jobs via “personal contacts” while 44% used “formal means” (such as advertisements and employment agencies), direct application, or other impersonal means. Bridges and Villemez (1986) report a similar distribution: 58% of their 2761 respondents used a “personal tie” to find jobs while 42% used impersonal means. Generally, surveys of labor markets report that 20–61% of job seekers use personal contacts to find jobs (Granovetter, 1995, pp. 139–141; Lin, 2001, p. 85). (3) DiMaggio and Louch (1998) analyze the use of social ties in four categories of consumer purchases, using data from the economic sociology module of the 1996 General Social Survey. The distribution of social ties versus impersonal means is 38% versus 62% (cars), 40% versus 60% (homes), 39% versus 61% (legal services), and 39% versus 61% (home maintenance services).

## 5.2. Loss of capital

Most investors should expect to lose their money because the odds of a profitable oil and gas well are low (Hodgson, 1989). In fact, about 67% of the investors in Fountain lost their entire investment. The probability of loss of capital, however, depends on whether investors conduct due diligence and which type of social tie, if any, they use (Table 2). For comparison,

<sup>5</sup> Burt (1987) argues that contagion occurred through structural equivalence (imitation of competitors) rather than through direct interpersonal contact (cohesion). Based on their reanalysis of Burt’s analysis, Marsden and Podolny (1990) argue that neither structural equivalence nor cohesion significantly increased the hazard rate of adoption. Strang and Tuma’s (1993) reanalysis of Burt (1987) and Marsden and Podolny (1990) reports significant network effects based on both structural equivalence and cohesion. Van den Bulte and Lilien (2001) argue that the effect of social ties disappears when they control for “marketing effort”—the volume of advertising in medical journals.

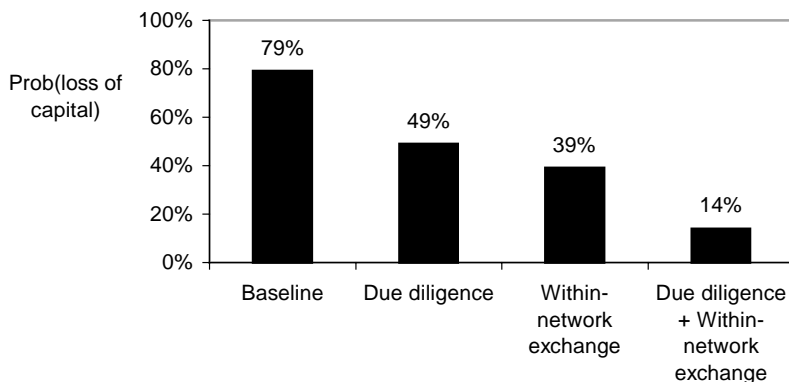


Fig. 1. Estimated probabilities of loss of capital. *Note:* Baseline: investors who do not use social networks, do not conduct due diligence, have no experience investing in oil and gas, and are of average age and average occupational prestige.

consider the estimated probability of loss of capital for “baseline” investors—those who do not use social networks, do not conduct due diligence, have no experience investing in oil and gas, and are of average age and average occupational prestige. These investors have a 79% probability of total loss of capital.<sup>6</sup> Conducting due diligence significantly decreases the odds of losing money. Investors who conduct due diligence (and do not use social ties) have only a 49% probability of losing their entire investment (see Fig. 1). Using within-network exchange significantly decreases the odds of loss. Investors who have preexisting social ties to the principals, sales representatives, or other employees of Fountain (and do not conduct due diligence) have a 39% probability of total loss of capital. Investors who use search embeddedness, however, were not significantly more or less likely to lose their money. Investors who use within-network exchange *and* conduct due diligence (about 15% of all investors) enjoyed double protection against loss: They had only a 14% probability of losing their capital.

These findings support the economic sociology argument that within-network exchange protects against loss after an investment has been made. This type of tie has a beneficial and protective effect even when a business venture is partly fraudulent. The lack of a significant effect for search embeddedness is consistent with the argument economic sociologists make that the benefit of this type of tie comes *before* an investment is made. After an investment is made, search embeddedness does not increase or decrease the probability of loss of capital. The findings do not support the white-collar criminology argument that social ties increase the probability of loss. Perhaps social ties increase risk only when a business is an

<sup>6</sup> Probabilities were obtained as follows: Our baseline is investors who do not use social ties, do not conduct due diligence, have no experience investing in oil and gas, and are of average age and average occupational prestige. We set the values in the regression equation accordingly and used the coefficients from Table 2 to calculate the predicted log odds of loss of capital (“predicted value”). The predicted probability equals the antilog of this predicted value, divided by 1 plus the antilog of the predicted value. To calculate the predicted probability for an investor who used due diligence, for example, we substituted the value of 1 for this variable in the regression equation, and then recalculated the predicted probability.

Table 3  
Binary logit coefficients from regression of due diligence on social ties: sample of 72 investors in Fountain Oil & Gas Company

Variables	Conduct due diligence
Social ties	
Within-network exchange	−1.635*
Search embeddedness	−0.958
Controls	
Age at first investment	−1.017
Occupational prestige	−0.025
Level of experience	−0.105
Constant	2.702
Nagelkerke pseudo $R^2$	0.144
No. of observations	64

Notes: Omitted category is impersonal sources of information: telemarketing cold calls, direct mail, advertisements, and direct sales “cold contact.” No. of observations is less than 72 due to listwise deletion of cases with missing data. \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ .

\*  $P < 0.05$ .

outright “pre-planned” fraud (Clinard, 1984)—an enterprise formed solely for the purpose of economic crime, such as a boiler room or bucket shop (Stevenson, 1998).

White-collar criminologists argue that using social ties to make economic decisions raises the risk of losing money because investors use social ties as “short cuts,” substituting trust in social relationships for due diligence. The logic of substitutability is clear in the answer an investor gave when asked why she did not make any attempt to independently verify the information given to her by Fountain: “because I was personally involved with—dating—[principal’s name]!” We find that the odds of conducting due diligence decrease significantly if an investor used within-network exchange (Table 3). There is only a 23% probability that an investor who used within-network exchange also conducted due diligence, compared with a 60% probability for an investor who did not use social ties. (Search embeddedness is not significantly related to the odds of due diligence.) Substituting trust in social ties for due diligence does raise the risk of loss, as white-collar criminologists argue. As shown in Fig. 1, investors who use only within-network exchange have a higher probability of loss of capital (39%) than investors who use within-network exchange and still conduct due diligence (14% probability of loss).

Investors do not have to use within-network exchange or search embeddedness to reduce risk and uncertainty. Due diligence alone reduces the probability of loss of capital almost as much within-network exchange (Fig. 1). The protective effects of within-network exchange and due diligence are separate and additive, as the regression equation implies (Table 2). Our interview data support the quantitative finding that those who decided to invest based on impersonal sources of information are more likely to conduct due diligence (Table 3).

Why does within-network exchange reduce the risk of loss of capital? Economic sociologists argue that within-network exchange reduces ex post opportunism due to network closure and effective sanctions. Simply put, Fountain would be less likely to defraud family, friends, and acquaintances than strangers. Timing is an alternative explanation. Diffusion

theory suggests that within-network exchange occurs in the first stage of diffusion and search embeddedness occurs in the second.<sup>7</sup> If the diffusion of Fountain's investments followed a two-stage process, then there could be two rival explanations of a significant effect of within-network exchange on the probability of loss: Fountain's wells were more successful in the first stage than in the second, or Fountain's criminal acts tended to occur in the second stage rather than the first. Archival data do not support either explanation. Well production and financial records show that Fountain drilled successful wells throughout its history. Fraudulent acts occurred early as well as late in the company's life. Finally, timing of investment is not significantly related to within-network exchange or search embeddedness (Appendix B). The diffusion of Fountain's investments does not appear to follow a two-stage process.

Within-network exchange offered protection because investors with preexisting social ties to Fountain were favored in the ex post allocation of proceeds. Our data show that winners and losers often invested in the *same* wells, indicating the illegal practice of preferential treatment of investors. Each well was a separate limited partnership. Investors in the same partnership should make or lose money together based solely on the results of the specific well in which they invested. This rule is an example of the economic ethic of universal fair treatment that arose in Western capitalism, merging an "internal ethic" that proscribed making a profit from transactions with members of one's community with an "external ethic" that allowed exploitation of foreigners and strangers (Swedberg, 1998, p. 20). However, investors in the same well were not treated equally and fairly: It appears that the decision of whom to pay was influenced by preexisting social ties to Fountain. For example, some investors used these social ties to gain access to the principals and demand payment. They were more likely to be paid than investors who did not know anyone at the company. Other investors with social ties to Fountain were simply paid without making any such demands. The illegal diversion of funds from one well to another (which was one of the bases of the District Attorney's case) facilitated the preferential ex post allocation of proceeds by enlarging the pool of funds Fountain could tap to pay certain investors. Ironically, it was fraudulent behavior—preferential treatment of investors and co-mingling of funds—that enabled the protective and beneficial role of social ties.

## 6. Conclusion

Economic sociologists and white-collar criminologists make opposite predictions about the outcomes of socially embedded transactions. Economic sociologists stress the protective and beneficial role of social networks, arguing that social ties reduce the probability of loss of capital. White-collar criminologists emphasize the harmful and exploitative role of networks, arguing that social ties increase the probability of loss of capital. Our case provides

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<sup>7</sup> Diffusion theory assumes a two-stage process (Bass, 1969; Mahajan et al., 1990). Marsden and Podolny (1990, p. 199) call the first stage "discovery" and the second stage "diffusion." "Discovery" occurs as a result of "personal selling" (within-network exchange). New businesses often get started by selling to friends, kin, and acquaintances (Frenzen and Davis, 1990; Gaston and Bell, 1988). Word-of-mouth (search embeddedness) takes place in the "diffusion" stage, as early investors who "discovered" the opportunity influence the decisions of later investors.

a critical test of these competing hypotheses: the effect of social ties on the probability of loss of capital for investors in a business that operated as a legitimate enterprise and engaged in ongoing financial fraud. This case is strategic because the role of social networks *ex post* is theoretically ambiguous for a legitimate-fraudulent business. Do social networks lower, raise, or have no effect on the probability of loss of capital, given that an investment has been made? We find that investors who did not use social ties or conduct due diligence had the highest risk—a 79% probability of total loss of capital. The probability of loss for investors with preexisting social ties to prior investors (search embeddedness) is not significantly different. Investors who relied on preexisting social ties to the principals, sales representatives, or employees of the company (within-network exchange) but did not conduct due diligence had a 49% probability of loss. Investors who used within-network exchange and conducted due diligence had the lowest probability of loss, only 14%.

Our results suggest that the harmful and exploitative role of social networks may be limited to pre-planned frauds—businesses created for the sole purpose of economic crime. If sellers have only criminal intentions, then social ties facilitate economic crimes. When businesses are legitimate *and* fraudulent, however, preexisting social ties to the seller (within-network exchange) improve transaction outcomes by reducing *ex post* opportunism. Ironically, illegal practices—preferential treatment of investors and co-mingling of funds—enabled the company to favor friends and acquaintances in the *ex post* allocation of proceeds. Our case shows that sellers commit economic crimes to protect their social ties, suggesting that “obligations and sanctions external to the transaction” (DiMaggio and Louch, 1998, p. 625), “mortification at cheating a friend” (Granovetter, 1992, p. 44), and fear of “exclusion of the violator from key social networks” (Portes, 1994, p. 430) are effective sanctions even when a seller’s intentions are partly criminal. Consistent with the prevailing argument in economic sociology, preexisting social ties play a protective and beneficial role even in a business that was partly fraudulent.

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## Appendix A. Analysis of possible systematic recall errors

The ability to perceive and recall events accurately can be influenced by such factors as age, salience, and stress (e.g., Loftus, 1979; Cohen and Faulkner, 1989; Hartman and Hasher, 1991). The combination of archival and interview data permits us to evaluate (at least partly) the possible influence of these factors on recall accuracy. Fountain’s books report the total dollar amount invested by each investor. These are objective data, recorded by a professional accountant at the time each investment was made. In our survey, we asked each investor to tell us how much he or she had invested in total, using categories graduated by multiples of US\$ 15,000. Each category was assigned a number, starting with 1 (under



US\$ 15,000) to 12 (US\$ 155,00 or more). To facilitate comparison, we recoded the dollar amounts reported in Fountain's books into the same categories. An "error" is a positive or negative difference between the "recall" category and the "actual" category (error = recall – actual). For example, +1 means an investor *overestimated* by one category, and –1 means an investor *underestimated* by one category. The absolute value of the error represents the magnitude of *misestimation*, regardless of direction (absolute error = |recall – actual|). Seven of ten investors (69%) correctly estimated within one category (+1 to –1), and 8 of 10 (81%) correctly estimated within two (+2 to –2).

We correlated error and absolute error with age of investor at time of first investment, salience (a dichotomous variable to indicate if an investor lost all of his or her investment), and stress (four dichotomous variables—whether or not the incident had caused family credit problems, family conflict, emotional or medical problems, or harm to long-range plans). (1) Age: Age is not significantly associated with recall errors ( $r = -0.121$ ,  $P = 0.325$ ) or the absolute value of recall errors ( $r = 0.134$ ;  $P = 0.276$ ). (2) Salience: Salience is not associated with recall errors ( $r = 0.137$ ,  $P = 0.258$ ) or the absolute value of recall errors ( $r = -0.196$ ;  $P = 0.104$ ). (3) Stress: Family credit problems is not significantly associated with recall errors ( $r = 0.047$ ,  $P = 0.697$ ) or the absolute value of recall errors ( $r = -0.195$ ;  $P = 0.106$ ). Emotional or medical problems is not significantly associated with recall errors ( $r = 0.144$ ,  $P = 0.235$ ) or the absolute value of recall errors ( $r = -0.139$ ;  $P = 0.252$ ). Harmed long-range plans is not significantly associated with recall errors ( $r = 0.177$ ,  $P = 0.142$ ) or the absolute value of recall errors ( $r = -0.209$ ;  $P = 0.083$ ). Family conflict is significantly associated at the 0.05 level with recall errors ( $r = 0.315$ ,  $P = 0.008$ ) but not with the absolute value of recall errors ( $r = 0.092$ ;  $P = 0.451$ ). However, family conflict explains only 9% (adjusted  $R^2$ ) of the variation in recall errors, and the association is not significant ( $P = 0.063$ ) when only four outliers are deleted.

Overall, age, salience, and stress do not appear to influence accuracy of recall. Investors who experienced family conflict (one of four measures of stress) may have had a slight tendency to overestimate the amounts invested. Thus, while we find some recall errors, these do not seem to be *systematic*, suggesting that our findings are not biased systematically by recall errors. This conclusion is supported by the qualitative experiences of the ISR interviewers. We questioned them about this issue during a post-survey debrief. The interviewers said that investors seemed to be able to recall the details of their involvement with Fountain without hesitation or equivocation. (Note that none of the independent or control variables used in our analyses is significantly associated with recall errors or the absolute value of recall errors.)

## Appendix B. Analysis of social networks and timing of investments

Diffusion theory suggests a two-stage process: Investors who use within-network exchange ("sales to family and friends") are expected to invest earlier than investors who use do not use social ties; investors who use search embeddedness ("word-of-mouth") are expected to invest later than investors who do not use social ties (e.g., Bass, 1969; Mahajan et al., 1990; Marsden and Podolny, 1990; Rogers, 1983, 1995).

### B.1. Variables

The dependent variable is *month of first investment*. This refers to the first time an investor “subscribed” to (invested in) one of Fountain’s joint-venture limited partnerships. It is a positive integer from 1 to 31, where 1 = the month in which Fountain’s first investor made his first investment (January, 1986) and 31 = the month in which Fountain’s last new investor made his first investment (July 1988). The independent and control variables are the same as described in Section 4.

### B.2. Methods

The dependent variable for timing, month of first investment, is analogous to failure time (alternatively, survival time). Often, proportional hazards models are used for the analysis of time to failure. However, as Cox and Oakes (1984, p. 6) note, “In the absence of censoring, the dependence of failure time on the explanatory variables can be explored through multiple regression” (for the same advice, see Allison, 1995, p. 63). Our data are neither left nor right censored. We have a complete census of investors in Fountain from the day the company opened its doors for business until the day the US District Court placed the company in receivership and closed its doors. All investors invested; in the language of failure analysis, all units “failed” (invested) during the observation period. Accordingly, we use linear regression (OLS) to estimate the coefficients for the impact of the independent variables on month of first investment. Nonetheless, we also report results from the Cox regression proportional hazards model.

### B.3. Results

Social networks do not influence the timing of first investments. As shown in Table B.1, the results from linear regression (Model 1) and Cox regression (Model 2) demonstrate that investors who used within-network exchange did not invest earlier or later than investors who did not use social ties. Similarly, the results from linear regression (Model 1) and Cox regression (Model 2) show that investors who used search embeddedness did not invest earlier or later than investors who did not use social ties.

The lack of a significant impact of search embeddedness on timing of first investment (Table B.1) suggests that “word-of-mouth” (search embeddedness) did not create a network “diffusion effect” (Rogers, 1983, p. 234; Valente, 1995, pp. 12–14). An additional clue to the lack of a “diffusion effect” is the shape of the graph of the cumulative distribution of the entire population of Fountain investors over time, based on the timing of first investments. The shape of such a graph is one indication of the underlying diffusion process: the extent to which earlier adopters (investors) influenced later adopters (investors). The characteristic pattern associated with network diffusion (search embeddedness) is the familiar S-shaped or logistic curve. A linear pattern, in contrast, suggests that personal selling (within-network exchange) and advertising drive the spread of a product or service. The graph of the cumulative distribution of the 230 investors in Fountain does not conform to the logistic curve (Fig. 2). In fact, the best linear fit of the data yields an  $R^2$  of 0.99. Consistent with the results in

Table B.1

OLS and Cox proportional hazards coefficients from regression of timing of investment on social ties and due diligence: sample of 72 investors in Fountain Oil & Gas Company

Variables	(1) Month of first investment (OLS)	(2) Month of first investment (proportional hazards)
<b>Social ties</b>		
Within-network exchange	−3.318	0.661
Search embeddedness	1.860	−0.206
<b>Conducted due diligence</b>		
	−2.083	0.173
<b>Controls</b>		
Age at first investment	−0.003	0.007
Occupational prestige	0.002	0.001
Level of experience	1.959	−0.627
Constant	20.006**	
Adjusted $R^2$ or $\chi^2$	0.000	9.440
No. of observations	64	64

Notes: Omitted category is impersonal sources of information: telemarketing cold calls, direct mail, advertisements, and direct sales “cold contact.” Adjusted  $R^2$  is reported for OLS.  $\chi^2$  is reported for Cox regression. No. of observations is less than 72 due to listwise deletion of cases with missing data on one or more variables. \*  $P < 0.05$ , \*\*\*  $P < 0.001$ .

\*\*  $P < 0.01$ .

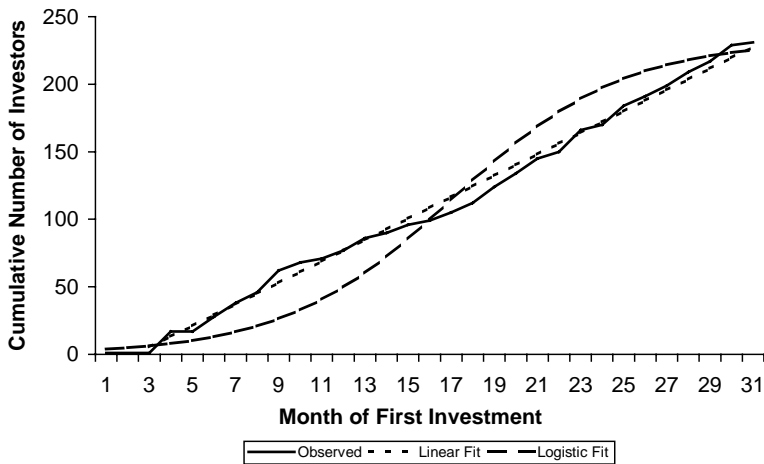


Fig. 2. Cumulative number of investors, observed and fitted values.

Table B.1, the shape of this curve indicates the absence of a network diffusion effect in the spread of Fountain’s investments.

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