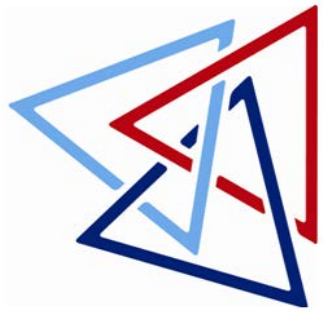

Exploring the relationship between crime-related business insurance and informal firms' performance: a South African case study

Haroon Bhorat and Karmen Naidoo

Abstract

This paper aims to better understand the obstacles and risks faced by informal sector firms in South Africa and the insurance by firms against this risk. We study informal firms in Diepsloot, an urban township north of the city of Johannesburg. Based on a unique enterprise survey dataset for the township, this paper firstly assesses factors driving the incidence and cost of crime against these enterprises. Second, we examine existing methods of risk-mitigation against crime-related events, with a focus on the access to formal risk-mitigation instruments. Finally, the paper evaluates the relationship between purchasing formal business insurance and firm performance. Our findings show that crime is the most important perceived business environment obstacle for these informal firms, more important than other often emphasized obstacles such as access to credit. We find that wealthier, better performing firms and those that rent non-residential business premises are more likely to experience losses due to crime. Importantly, we also show that there is a significantly positive relationship between being covered by business insurance and firm performance. This result has important implications for South Africa's policies to improve financial access and enhance the efficacy of the informal sector, which we outline briefly.

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Exploring the relationship between crime-related business insurance and informal firms' performance: A South African case study

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1. Introduction

The informal sector[2] is for many least developed and developing countries, the predominant form of employment (ILO, 2012) and therefore remains crucial to understanding the economic growth challenges and constraints of these economies. The existing developing-country literature around this topic highlights several constraints to the informal sector, most commonly: access to finance[3] (Levy, 1993; Rajan and Zingales, 1998; Beck and Demirguc-Kunt, 2006), skills and financial literacy (Chandra et al, 2001, pp. 23-27; Berg, Bjorvatn, Juniwaty and Tungodden, 2012), and weak property rights (Johnson, McMillan and Woodruff, 2002). In addition, much of the literature is focused on trying to understand how to 'formalise' the informal sector (Levinson and Maloney, 1998; Loayza, 1997; Chen, 2007; Gelb, Mengistae, Ramachandran and Shah, 2009). Our paper takes a different perspective in that we recognize that one of the key informal sector business risks, and perhaps one that disproportionately impacts on the informal sector, is that of crime such as theft, robbery and vandalism. As a constraint of doing business, it has been under-researched, yet remains a key line of enquiry.

For South Africa, there is a growing body of evidence to suggest that crime is the most binding business environment hindrance, particularly for informal enterprises (Cichello et al., 2011; Gough, Tipple and Napier, 2003; McDonald, 2008). Crime impacts the business environment through acting as a direct violation of firms' property rights, and therefore lowers the incentive for firms to reinvest. Such a risk may cause firms to forgo potentially new technologies and more profitable production choices. It also creates barriers to the access of inputs as suppliers prefer not to operate in high-crime areas. In addition, for informal firms in informal areas, crime may erode their competitive advantages – the convenience associated with their location – since hours of operation are conditioned by the probability of a crime occurring. Importantly, the ability of informal

[1] The financial assistance of the Research Project on Employment, Income Distribution and Inclusive Growth is acknowledged. Findings, opinions and conclusions are those of the author and are not to be attributed to said Research Project, its affiliated institutions or its sponsors.

[2] There is on-going debate about defining the informal sector. Our definition is outlined in Appendix B and is guided by the available information on the enterprises in our dataset.

[3] See Beck and Demirguc-Kunt (2008) for a review of this literature.

enterprises to cope with any negative external shock is arguably limited and may make these firms more likely to temporarily or permanently exit the market.

Firms can deal with the effects of crime related negative shocks in two ways. First, ex-ante measures include hiring security personnel, reinforcing businesses premises with additional security features, and diversifying the location of stock storage. Second, ex-post measures include self-insurance through the sale of assets, accessing formal or informal credit to compensate for the loss, receiving cash transfers from family or friends, and claiming from a pre-purchased insurance policy.

One of the main constraints with private hiring of security personnel is the possibility of free-riding in the absence of group hiring, which would necessarily lower the individual incentive for incurring this cost. Furthermore, the effectiveness of this type of security monitoring is limited when considering mobile assets such as cell phones and vehicles. The other ex-ante measure of security reinforcement of existing structures could be ineffective in preventing crime in informal settings where business premises are not located within a formal permanent structure but are mobile or temporary.

Following from this, informal firms then are highly affected by crime in the South African environment and are less able to benefit fully from ex-ante mitigation measures. Therefore, this paper focuses on the ex-post measure of formal insurance, in the form of purchasing an insurance policy from a financial institution, to better understand its relationship with firm performance in the informal business sector. The paper has three main aims. First, to assess the relative importance of perceived business environment obstacles to firm performance and growth, and in particular, to understand the burden of crime faced by these enterprises. Second, to estimate the impact of crime on firm performance. Finally, to understand the relationship between the purchase of short-term business insurance (which insures against crime) and firm performance.

This study is important in a number of ways. First, despite the high levels of crime in South Africa, there is little research on the effectiveness of risk-mitigation instruments against crime-related risks for enterprises. Second, within the enterprise access to finance literature, finance is primarily defined as access to credit, rather than access to other financial products such as short-term insurance. Where risk-mitigation has been considered, these studies focus primarily on weather-related short-term insurance for agriculture-based communities (Gine, Townsend, Vickery, 2008; Cole, Tobacum and Topalova, 2007; Townsend, 1994). Firms face risks on a daily basis, which in the formal market are readily insured for (such as vehicle accidents, theft or damage of stock, or property vandalism). Such short-term insurance markets do not necessarily seem to extend to the informal sector in South Africa (Ardington and Leibbrandt, 2004; FinScope 2010). More relevant though, is that such short-term insurance markets are seldom examined in the literature for informal sector firms. We propose to

examine one such short-term risk, namely crime, and the prevalence as well as impact of the available risk-mitigation instrument – crime insurance – on firm performance.

The rest of the paper is structured as follows. Section 2 reviews the evidence of the impact of crime on firms in South Africa as well as the literature on the impact of risk-mitigating methods on firm performance. Section 3 describes the dataset and outlines the methodology. Section 4 presents the descriptive statistics and Section 5 presents the econometric results and discussion. Section 6 considers the policy implications of the results and concludes.

2. Evidence of the Impact of Crime and the Use of Risk-Mitigating Methods on Firm Performance

Impact of Crime on Informal Firms in South Africa

The South African Police Service' (SAPS) crime statistics for South Africa suggest a decline in most categories of reported crimes over the 2004-2013 period (SAPS, 2013). However, when isolating the business-related crimes, they show an increase in the number of business crimes reported over this period (Edwards and Sundaram, 2013).

Cichello et al. (2011) investigate the perceived barriers to entry into self-employment in the township of Khayelitsha in Cape Town. They find that crime is the "single most dominant perceived hindrance to entering self-employment", where self-employment is understood as starting a micro-enterprise related to retail trade activities. This is consistent with Gough et al. (2003), a study that compares types of household-based enterprises[4] (HBEs), the contribution to household livelihoods and the limits to growth of HBEs in low-income settlements in Accra and Pretoria. While the nature of the HBEs in the two locations are similar, a clear distinction is the overwhelming role that crime plays in terms of being a major perceived obstacle to operations in Mamelodi (Pretoria) compared to Madina (Accra), where it is negligible.

Chandra, Nganou, and Marie-Noel (2002) also finds that crime was perceived to be a major constraint on entrepreneurs in the informal sector in Johannesburg, but shows that the perception of crime is more pervasive than the reality. The data show that over 50 percent of firms perceive their business to be constrained by crime, however, in reality only 30 percent of firms were victimised by crime in 1998. Conversely, Devey, Valodia, and Velia (2005) show that whilst 41 percent of larger manufacturing firms[5] in the Greater Durban Metropolitan Area perceive crime to be a major constraint to growth, 72 percent of firms were actually victims of criminal activity in either 2000 of 2001, and

[4] The study surveyed 157 HBEs in Mamelodi and 173 in Madina, where the most common types of activities are retailing and selling and/or producing food and drink in both areas, and with an average monthly turnover of £66 and £27 respectively.

[5] Importantly, while this study only surveyed firms with more than 50 employees, the proportion of smaller firms (50-99 employees) that ranked crime as a major business environment obstacle is significantly larger than the larger firms, supporting the significance of the relationship between the burden of crime and firm size.

66 percent of them having been victims in both years. Perceptions of crime though are critical as they impact on an entrepreneur's decision to either start-up a business or to invest in improving or expanding an existing business.

A comprehensive study on the impact of crime on small business in South Africa by McDonald (2008) makes use of a firm survey of small business in both formal and informal areas of South Africa's three major cities[6]. The study found that seventy percent of small business owners felt that they or their staff were at serious risk of crime at the work place. Over half (54 percent) of the businesses in the survey had experienced at least one incident of crime in the previous year; with robbery and burglary the most common crimes in informal settlements – 28 percent and 57 percent of incidents in these areas respectively – and over 30 percent of crimes having accompanying property damage. Importantly, McDonald's analysis concludes that the direct costs of crime were disproportionately higher for small firms. For firms with a turnover of less than R750,000 per annum, the study finds that the average cost of crime was just over 5 percent of sales. For enterprises with a turnover of less than R10,000 this cost goes up to at least 20 percent of turnover, rising to as much as 36 percent of turnover for enterprises with a turnover of below R5,000.

The author also emphasises the indirect costs of crime – particularly, the unwillingness of firms to invest in and expand their businesses, and the deleterious impact on firms performance given the reduced passing trade due to fear of crime among clients and suppliers. The forgone performance of firms, whilst very difficult to quantify, remain a crucial concern for firms operating in townships and informal settlements. These same firms are also considerably less likely than the sample average to have insurance coverage and considerable more likely than the average to be rejected upon applying for insurance. These are also the firms most in need of risk-mitigation given that the probability of closure following one or more incidents of serious crimes appears to be significant (McDonald, 2008).

Evidence of the impact of crime on firm closures in South Africa is provided by Edwards and Sundaram (2013), who investigate the impact of localised crime on firm births, exit and growth in the stock of firms in South Africa, using a unique new panel dataset. The authors construct the database from various sources: firm level data from the Companies and Intellectual Property Commision; regional crime statistics from Quantec that is based on South African Police service data; and other regional level characteristics from the Population Census and Quantec's Standardised Regional Database. The authors find that rises in business crime significantly reduces growth in the stock of active firms within municipal units, which is attributed primarily to firm exit. This is also supported by the finding that a ten percent rise in the total number of severe crimes is associated with a 1.5 percent reduction in the number of firm births. In contrast to the previous studies that highlight

[6] The survey covered 446 small and emerging businesses, excluding any subsistence-level activities.

the disproportionate burden of crime on smaller firms, however, they do not find evidence that crime is negatively and significantly associated with firm turnover or size. The exclusion of informal firms from their dataset may potentially be affecting this outcome.

Stone (2006) proposes that the costs of crime to firms operating in the formal sector of the South African economy appear to be in line with costs in other middle-income countries. However, he argues that the composition of these costs is substantially different: South African firms bear more of the costs in direct losses to crime, whereas in other countries, the costs are more heavily weighted toward crime prevention. In addition, prevention costs in South Africa are almost all for security as opposed to unofficial payments to organised crime or local officials that are common in other similar economies (Stone, 2006).

Impact of the Risk-Mitigation Methods and Instruments on Enterprise Performance

Neoclassical theory predicts that without asymmetric information, insurance participation is increasing in risk aversion and the variance of risk, the expected payout and the size of the insured risk; and it is decreasing in basis risk between insurance payouts and the risk to be insured (Gine et al., 2008).

Gine et al. (2008) investigate the determinants of small-holder farmers purchasing an innovative rainfall insurance product in southern India. The authors' results are somewhat consistent with the benchmark neoclassical model but have three main points of departure. First, credit constraints are a significant impediment to purchasing insurance. Take-up rates are higher among wealthy households and lower among households that are credit constrained. Second, among the most significant determinants of insurance take-up are variables measuring the household's degree of familiarity with the insurance provider and more generally insurance products. The authors' qualitative findings show that a lack of understanding about the product was one of the most commonly cited reasons for not purchasing insurance. Third, risk-averse households are *less* likely to purchase rainfall insurance. The authors provide the explanation that these households are also possibly averse to uncertainty about insurance itself, which arises due to their imperfect understanding about the product.

In a closely related paper, Cole et al. (2008) examine the take-up decisions of an innovative rainfall insurance product in rural Gujarat, India using data from a large-scale randomised field experiment. They find that education, wealth, risk aversion and facility with probabilities are strong predictors of the decision to purchase weather insurance. In addition, they find that marketing manipulations of insurance products have relatively few effects but that demand for insurance is very price sensitive.

There is very little literature on informal enterprise insurance within urban communities but rather, as highlighted above, the literature focuses on rural agricultural villages in developing countries that face a variety of risks, ranging from weather-related to illness and political instability. The literature has documented different ways that households in low-income and developing countries cope with

risks. These include drawing down savings, selling of assets, money transfers or gift exchanges, diversifying crops in rural agricultural settings, and expanding income-generating activities (Murdoch, 1995). However, most of these informal mechanisms have been found to be weak and provide only inadequate protection to poor households (Townsend, 1994; Deaton, 1997; Lund and Fafchamps, 1997).

Murdoch (1999) reviews the evidence and proposes several constraints in these informal insurance systems that hinder the realisation of perfect risk-sharing. Some of these are applicable to this context of an urban township setting: First, when an individual is close to the subsistence constraint, renegading on an informal agreement may be more tempting, leading to reciprocal exchanges falling apart when perhaps insurance is most needed. This is supported by studies showing that systems of reciprocal transfers will be more effective when participants have a cushion against poverty (Coate and Ravallion, 1993). Second, just as moral hazard causes market failures in standard insurance markets, it too plays a role in informal insurance where others in the informal sharing network may not be able to observe and enforce that receivers of insurance are taking all required precautions to prevent the risky event from occurring. Third, when incomes grow at different rates or when there are opportunities for households to accumulate savings, richer households tend to opt out rather than be subject to the possibility of systematically redistributing to others. This confounds the first problem then, and relates to the problem of adverse selection, where it is poorer households or enterprises that seek to enter informal risk sharing agreements. It is these types of households whose incentives to default are heightened as their incomes reach the subsistence level. Lastly, from theoretical model of Banerjee and Newman (1998) on structural change, it can be inferred that increased mobility and urbanisation have hindered the functioning of informal insurance as households can move away and default on their village obligations. Furthermore, while cities offer better earning opportunities, insurance mechanisms are weaker as communities are not as well acquainted and the presence of extended family – critical to informal risk sharing networks – is typically more limited.

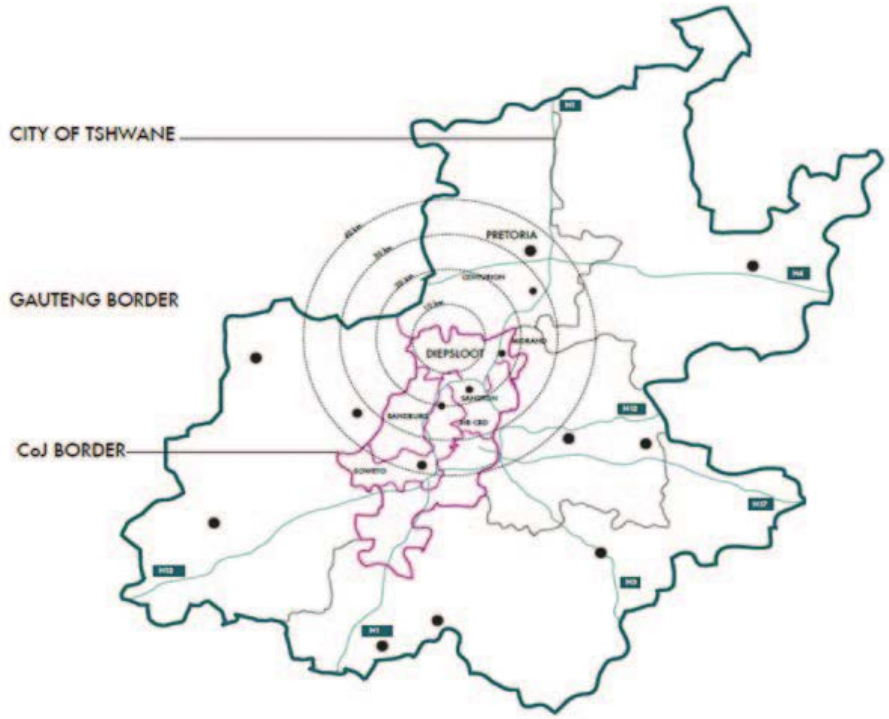
There is much evidence to suggest that the take-up of insurance is constrained by information asymmetries around the understanding of the mechanisms of insurance and its potential benefits. Furthermore, evidence shows that informal insurance mechanisms often do not work effectively to smooth consumption. In this sense, income generated from business activities in a high-crime environment are a source of vulnerability and repeated exposure to crime-related risks reinforces the inability of these firms to formalise or to move to a more conducive business environment.

3. Data and Methodology

The World Bank Diepsloot Survey

The 2012 World Bank Diepsloot Enterprise Survey data[7] is useful in providing a nuanced view of an urban township setting in South Africa. Diepsloot is an area in the north of the city of Johannesburg, with an estimated population of 200,000 and is a mixture of informal and formal settlements (see Figure 1). According to the fieldwork report (Outsourced Insight, 2012), the initial Diepsloot business census produced a listing of 2,500 enterprises of whom about half retail different types of food and beverages[8]. About half are owner-run businesses, and a third employ 1 other person. Approximately half of the enterprise owners are foreign owned, with the largest groups originating from Zimbabwe and Mozambique. The median monthly sales of all enterprises in Diepsloot in 2012 were R 2,200 (USD 268)[9] and about half of the enterprises commenced operations since 2008.

Figure 1: Location of Diepsloot



Source: World Bank (2014), figure originally sourced from the Johannesburg Development Agency (JDA).
Note: CoJ stands for City of Johannesburg.

[7] Data can be accessed upon contacting the World Bank.
[8] Both the census and the survey were conducted by the World Bank.
[9] All currency values converted into US Dollars using the average 2012 exchange rate of R/USD: 8.21, according to the International Monetary Fund (IMF) International financial Statistics (IFS) data.

From this census, the World Bank Diepsloot Enterprises Survey team selected a representative sample of 500 firms using two strata: i) the number of individuals employed by the enterprise; and ii) the nationality of the enterprise owner. The survey was conducted with all owners of enterprises on the sample list who agreed to participate. A significant threat to the quality of the sample arose because of a substantial refusal rate and the disappearance of roadside businesses between the census and the survey. To address this, a replacement protocol was adopted where there was an additional random sample of 500 firms (without replacement of previously selected enterprises) selected from the census, and then interviews were conducted with the owners of enterprises that matched the strata of the enterprise that refused to participate. The ultimate total realised sample was 450 enterprises that represents a random representative sample of the Diepsloot enterprise sector[10]. We have classified the entire sample of firms as informal, based not only on national definitions but also on contextual information (see Appendix B for more discussion).

Estimation approach

As stated previously, the main aims of this paper are to estimate the determinants of the incidence and cost of crime, estimate the probability of a business owner purchasing insurance for business assets, and finally, evaluate the relationship between the purchase of business insurance and firm performance. The data we use differentiate among 5 different types of business insurance: insurance for a business cell phone, car, machinery or tools, stock, and business premises. This is discussed in more detail in the next section.

The Incidence and Cost of Crime

This paper uses the following empirical model to study the relationship between the incidence and cost of crime and firm characteristics:

$$Y_i = c + \beta F_i + \gamma O_i + \varepsilon_i$$

In the first specification, $Incidence_i$ is used as the dependent variable and is estimated as probit model. $Incidence_i$ is a dummy variable indicating whether or not firm i experienced a crime-related loss in 2012. The second specification replaces Y_i with $Cost_i$, which is defined as the loss due to crime as a percentage of annual turnover for the annual period of 2012.

F_i is a vector of firm characteristics (including size, turnover, wealth, and whether the business is trade or sales oriented); $O_i$is a vector of owner characteristics (including age, nationality, education and gender); and ε_i is the error term where $\varepsilon_i \sim N(0, \sigma^2)$. A detailed description of each variable can be found in Appendix A.

[10] The underrepresentation of roadside business in the survey should be noted. It is likely that the results discussed later on apply more intensely to these most vulnerable businesses.

Determinants of purchasing insurance for business assets

To evaluate the probability of a business owner purchasing insurance for business assets to insure against theft or damage, we make use of the following probit model:

$$\text{INSUR}_i = \beta_0 + \beta_1 F_i + \beta_2 O_i + \varepsilon_i$$

INSUR_i will equal 1 if the business owner has purchased at least 1 type out of the 5 possible business insurance products and will equal 0 otherwise. As above, F_i is a vector of firm characteristics, $O_i$is a vector of owner characteristics, and ε_i is the error term.

Due to a lack of supply side information such as insurance pricing and product specification, this estimation fails to distinguish demand effects from supply effects. Instead, we use the qualitative evidence from this survey data to explore this point later on.

Relationship between Business Insurance and Firm Performance

We estimate a simple OLS model to determine the nature of the relationship between firm performance and business insurance:

$$\text{Performance}_i = \beta_0 + \beta_1 \widehat{INSUR}_i + \beta_1 F_i + \beta_2 O_i + \varepsilon_i$$

Performance of the firm is measured in two ways: i) by turnover per employee, and ii) by turnover. In the second case, we control for firm size by including it as an explanatory variable. INSUR_i captures whether or not the business owner has purchased at least 1 type of business insurance and ε_i is the error term. Due to data constraints, we cannot use other methods such as instrumental variables to ascertain causality in this relationship, and so we emphasize that this is a simple first step into better understanding this relationship.

4. Descriptive Statistics

Table 1 presents an overview of the enterprises and the owner characteristics as at the time of the survey in 2012. Approximately half of the enterprises in Diepsloot are owned by South Africans, with the remaining half being primarily Africans from neighbouring countries of Mozambique and Zimbabwe. The average age of enterprise owners is 35, with the majority of owners falling within the 20-49 age band, and more than two-thirds are male. The median educational level of owners is an incomplete secondary education, with only 28 percent of owners obtaining a complete secondary school education.

Table 1: Summary statistics

Owner Characteristics	Frequency	% of owners	Median	Mean	SD[2]
Nationality					
South Africa	208	47.06			
Other African	192	43.44			
Pakistani	37	8.37			
Other	5	1.13			
Owner age (years)	444	100	34	35.43	9.42
20-29	92	20.72			
30-49	303	68.24			
50-80	49	11.08			
Gender					
Male	306	68			
Female	144	32			
Education	450	100	Incomplete secondary	Incomplete secondary	1.28
No formal education	21	5			
Incomplete or complete primary	104	24			
Incomplete or complete secondary	294	67			
Vocational training	15	3			
Some university	8	2			
Firm Characteristics	**Frequency**	**% of firms**	**Median**	**Mean**	**SD**
Firm age	449		3	4.5	4.12
Location					
Building other than owner's residence	160	35.56			
Owner's residence	187	41.56			
Fixed non-residential temporary structure	97	21.56			
No fixed location	6	1.33			
Activity					
Service	65	14			
Retail trade	385	86			
Firm size (# of paid employees)[1]	450	100	1	2	1.22
Micro (< 5 employees)	434	96			
Very small (5-10 employees)	16	4			
Turnover (Rand)	260		2 500	7 504	17 114.15

Source: Own calculations using World Bank Diepsloot Enterprise Survey (2012)

Notes: 1) Includes owner

2) SD stands for Standard Deviation

Regarding the firm characteristics, the majority is engaged in retail trade activities, such as selling alcohol, food and other beverages, fruit and basic grocery items. Half of the firms engaged in services are in the hairdressing sector. Exactly half of the firms are owner managed and operated without employing other paid workers. About 27 percent of enterprises employ one other person to work in the business, and 14 percent employ 2 workers. The remaining 9 percent hire 3 or more people. The average monthly turnover is R 7,504 (USD 914) in nominal current values and with the majority of firms beginning in 2008, the average firm age is about 4.5 years. Finally, over 50 percent of enterprises in Diepsloot operate at premises outside of the owner's residence in a building or other fixed structure.

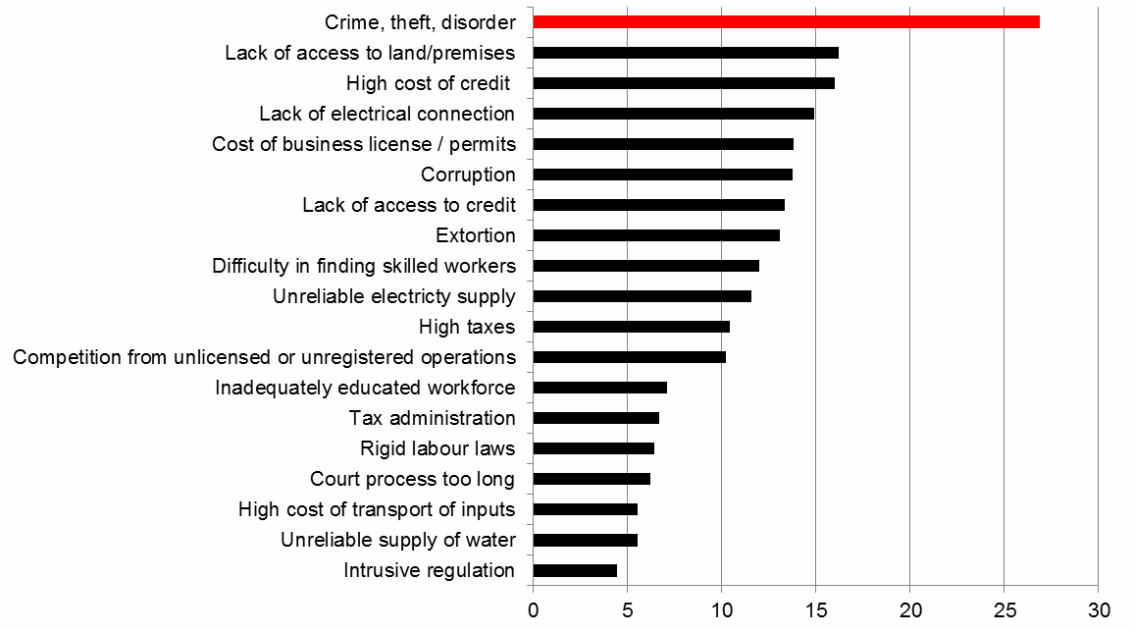
A challenge of this dataset is that just under 60 percent of firms report the monetary value of their turnover. We have tested the differences of the firms that report turnover and those that don't, along both the owner characteristics and the firm characteristics. There is no significant difference between firms that provide turnover data and those that don't regarding the owner characteristics (nationality, gender, educational attainment, age, of size of network). Regarding differences in the firm characteristics, there is no statistically significant difference between these two groups of firms in terms of firm age, wealth (value of assets), number of paid employees or the firm activity, proportion that rent premises. Two differences arise: the firms that do not report turnover are more likely to be credit constrained than those that do report it, and the firms that do not report turnover perceive crime to be less of a problem (both tests are significant at the 10% level). We do not think then that there is large statistical bias in the sample for firms for which we have the turnover data.

Perception, incidence and cost of crime

Figure 1 shows that almost 27 percent of firms surveyed in Diepsloot rank crime as the most serious business obstacle[11]. Compared to the other potential obstacles, we see that crime is – by a large margin – the most serious perceived obstacle to the operations and growth of enterprises in this urban township setting. This is followed by the lack of access to land or business space, with just over 16 percent of firms ranking this as their most serious obstacles, and then closely followed by the high cost of credit and the lack of electrical connection as other major obstacles to business operations in Diepsloot.[12]

[11] In addition, 9 percent rank it as the second most serious obstacle and 16 percent as the third most serious.
[12] Firms can rate more than one obstacle as the 'most serious obstacle'.

Figure 1: Most Serious Business Environment Obstacles, % of firms, 2012



Source: Own calculations using World Bank Diepsloot Enterprise Survey (2012)

The survey collects information on crime related losses in two ways. The first is a question on the incidence of theft at the business over the last three years and the second is on the incidence of a wider range of crime – theft, robbery, vandalism and arson – during 2012 alone. To compare the perception of crime as an obstacle against the firms' actual experiences, Table 2 contains some summary statistics of these two measures of the incidence and cost of crime. The data on theft alone shows that over the three-year period of 2010-2012, 23 percent of firms experienced at least one theft-related loss. A large majority of the affected firms – 82 percent – experienced up to three incidents of theft over the period, and the median frequency of repeat theft is 2. In 2012 alone, 90 firms (20 percent of total firms) experienced negative shocks related to crime[13] and the loss for the average firm was equivalent to 8 percent of annual turnover, and 5 percent for the median firm.

[13] Losses related to theft, robbery, vandalism or arson.

Table 2: Incidence of Crime and Firm Characteristics (Individual Two-sample T Tests with Equal Variance)

Theft incidence (2010-2012)	Share (% of firms)	Firm age		Firm size		Turnover**		Turnover per employee**		Fixed Assets	
		Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean
No	77%	347	4.43	348	1.03	189	6181.65	189	4626.48	346	17775.18
Yes	23%	102	5	102	1.04	71	11024.44	71	8090.24	100	11960.71
Crime incidence (2012)	Share (% of firms)	Firm age		Firm size		Turnover**		Turnover per employee**		Fixed Assets*	
		Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean
No	80%	357	4.44	358	1.9	192	6098.24	192	4567.96	356	14696.26
Yes	20%	90	5	90	2	68	11473.6	68	8404.28	88	23652.42

Source: Own calculations

**** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level*

It could be likely that better performing, larger or wealthier firms may attract criminal activity as there would be greater gains for the perpetrator. Before we estimate econometrically in the next section the relationship between crime-related losses and firm performance, we assess here the difference between those firms that were victims of crime and firms that were not. We see, using individual two-sample t tests with equal variances for each of the age, size, wealth and performance indicators, that firms that were affected by crime during 2012 were not significantly older or larger in terms of the number of paid employees, but were wealthier in terms of fixed assets, compared to those that were not victims of crime. Better performing firms, measured by turnover and turnover per employee, were also significantly more likely to experience an incident of crime.

Ex-ante and ex-post risk-mitigation against crime-related events

Although a large proportion of firms consider crime to be a major business climate obstacle, few invest in crime prevention methods. Only 3 percent of firms pay for security measures at their business at an average monthly cost of R1,508[14] (USD 184). Comparing those that paid for security measures to those that didn't, there was little difference in their experience of direct crime against the business and if anything, the results are counterintuitive (Table 3). Of these firms that paid for security, 29 percent experienced crime-related shocks to their business and of the remaining firms that did not pay for security, the corresponding figure is 20 percent. This result is not statistically significant, which then suggests either a small sample size problem or that the purchase of security is an ineffective crime-prevention strategy.

[14] While all firms answer whether or not they pay for security at their premises, only 6 firms report their monthly security costs. Therefore, this cost figure may not be representative of the average cost of the 14 firms that do pay for security.

Table 3: Crime Prevention Measures

Crime against the business in 2012	No paid security		Paid security	
	Number	%	Number	%
No	347	80%	10	71%
Yes	86	20%	4	29%
Total	433	100%	14	100%

Source: Own calculations using World Bank Diepsloot Enterprise Survey (2012)

Table 4 summarises the means with which firms are able to cope after a negative crime- related shock, which will often involve a balancing act that is aimed at maintaining income and/or assets above critical levels. Of those firms that were victims of theft over the three-year period, the overwhelming majority utilised existing savings or borrowed from informal sources (with interest) in order to smooth income. Drawing down on savings necessarily lowers the ability of enterprise owners to invest in improvements or expansion of their enterprises. Furthermore, while the majority of the informal sources are listed as friends, family or religious organisations – rather than a moneylender – the interest rates charged may in some cases be higher than market-determined interest rates, depending on the relative monitoring (of the borrower by the lender) and transaction costs.

Table 4: Coping Mechanisms for an Adverse Theft Shock, 2010-2012

	Firms	
	Number	%
Used savings	84	82.35
Borrowed from informal sources	33	32.35
Other	6	5.88
Cut down on household or business expenses	2	1.96
Borrowed from a bank	2	1.96
Sold assets	1	0.98
Claimed from insurance	1	0.98
Closed down business temporarily	0	0.00
Dismissed employees	0	0.00
Took another job	0	0.00

Source: Own calculations using World Bank Diepsloot Enterprise Survey (2012)
Note: 'Other includes' borrowing from a stokvel, receiving stock credit from a supplier, and self-repair of damaged goods/premises.

Business insurance would then offer these enterprises an effective ex-post solution of dealing with the exogenous shock of a theft or other criminal acts against the enterprise. Common business insurance policies typically available to these types of enterprises are to insure against the theft or damage of the following business assets: cell phone, vehicle, machinery or tools, stock, or business premises. These are the 5 types of business insurance that are asked about in the survey dataset used here. Business owners may insure any number of the assets and at present, the policies mimic the features of those offered to formal businesses[15].

[15] Of course, insurance policies for informal enterprises would insure at a lower value of assets in order for it to be affordable to this sector and would typically require monthly payments. In the event of a loss or the damage of any of these assets through theft or otherwise, the business owner can claim from the insurance policy up to a pre-determined value.

In terms of individual personal insurance, enterprise owners have a personal insurance take-up rate of 67 percent. Almost a third of all insured owners have a funeral insurance policy, and most of the remainder have another type of insurance policy that we are unable to define precisely. However, Table 5 shows that only 20 percent of owners purchase at least one type of business insurance. Notably, the take-up of those that have been offered formal business insurance by an insurance provider is 47 percent.

Table 5: Insurance Take-up

	Total Owners		**Insured owners**
Owner Insurance Type	**Number**	**%**	**%**
At least one type of insurance	300	66.67	
Funeral	96	21.33	32.00
Health	18	4	6.00
Household contents	24	5.33	8.00
Other	196	43.56	65.33
Intensity of coverage			
1 product	272	60.44	90.67
2 products	22	4.89	7.33
3 products	6	1.33	2.00
	Total Firms		**Insured firms**
Business Insurance Type	**Number**	**%**	**%**
At least one type of insurance	90	20.00	
Cell phone	59	13.11	65.56
Car	12	2.67	13.33
Machinery or tools	8	1.78	8.89
Stock	26	5.78	28.89
Premises	20	4.44	22.22
Intensity of coverage			
1 product	69	15.33	76.67
2 products	8	1.78	8.89
3 products	12	2.67	13.33
4 products	1	0.22	1.11

Source: Own calculations using World Bank Diepsloot Enterprise Survey (2012)
Note: All business owners/managers answered the questions on whether or not they purchased each type of personal and business insurance, therefore, there is no missing data regarding these variables.

The most purchased type of business insurance is insurance for a cell-phone (mobile) used for business purposes, purchased by 13 percent of firms. This is followed by insurance for business stock at almost 6 percent of firms and third, insurance for the business premises held by almost 4.5 percent of firms. Of the 90 firms that have purchased any of the business insurance products listed, the large majority has only purchased one type.

Table 6: Purchased Business Insurance and Firm Characteristics, Individual Two-sample T Tests with Equal Variance

Business insurance	Share (% of firms)	Firm age***		Firm size**		Turnover***		Turnover per employee**		Fixed Assets*	
		Obs	Mean	Obs	Mean	Obs	Mean	Obs	Mean	Obs	Mean
0	80%	359	4.33	360	1.83	215	6,242.21	215	4,790.49	356	14,812.08
1	20%	90	5.5	90	2.12	45	13,533.16	45	9,307.9	90	23,035.36

Source: Own calculations

**** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level*

Table 6 shows that each of the age, size, wealth and performance of businesses is significantly related to the purchase of business insurance. In terms of the relationship between purchasing insurance and firm performance, on average, enterprises which have purchased at least one type of business insurance are associated with an average monthly turnover per employee of R9,308 (USD 1,134), which is statistically significantly larger by almost two times the monthly turnover per employee of enterprises with no form of business insurance, at R4,790 (USD 583).

Lastly, it may be that there are regulatory restrictions on the resident status of the business owner or registration status of the firm. We find no clear barrier to access for foreign enterprise owners or for firms that have not been registered. Looking at the three largest nationality groups – which make up 85 percent of the business owners in the sample – we find that the proportion of business owners within each group that have purchased business insurance is similar. The take-up rate among South African firm owners is 23 percent, among Zimbabweans it is 17 percent and finally, 15 percent of Mozambican business owners have purchased the relevant insurance. As discussed earlier, we define all the firms in the sample as informal, not solely based on their registration status but on the nature of the business and the environment in which it operates. The results show that 20 percent of both registered and unregistered businesses have at least one business asset insured.

Table 7: Reasons for Not Purchasing Insurance

	Number of firms	% of Uninsured Firms
Family provides financial support	98	27.22
No knowledge of the applicability and/or where to get it	158	43.89
Too expensive	71	19.72
No suitable product	34	9.44
No trust that claims will be repaid	141	39.17
Other	51	14.17

Source: Own calculations using World Bank Diepsloot Enterprise Survey (2012)

The perceptions based data on the reasons for not being insured are quite revealing (Table 7). The primary reasons – reported by almost 44 percent of all uninsured firms – relate to the lack of knowledge of how insurance products can be useful for the business or of where to purchase insurance

products. Furthermore, if one considers the second most important reason for not purchasing insurance – the lack of trust that insurance providers will pay out firms – as also a knowledge related problem, it can be deduced that low levels of business and financial literacy are the key reasons for not purchasing business insurance. Furthermore, less than a third of all firms state that the informal risk-mitigation technique of borrowing (or receiving money as a gift) from family or friends is the main reason for not purchasing formal insurance. Importantly, issues with price or product design are not the most important deterrents to purchasing insurance, already indicating that there are demand-side, rather than supply-side, failures in the market.

5. Econometric Results and Discussion

Table 8 presents the first set of results looking at the relationships between both the incidence and cost of crime, and owner and firm characteristics. The results for the probit model of the incidence of crime suggest that older firms are more likely to be a target of crime than newer firms. Furthermore, firms that rent their business premises and firms that are wealthier in terms of fixed assets are also more likely to be targets for criminals. While we are not able to draw this out of our model alone, this result may be suggesting that criminal theft is targeted at physical assets and stock as opposed to cash.

In the assessment of the determinants of the cost of crime, we exclude owner characteristics and conclude that, consistent with the first regression, older firms, those that rent their business premises and wealthier firms bear a significantly higher cost of crime.

Incidents of xenophobia have, since 2008, highlighted another element of the complexities of South Africa's socio-economic problems, which invariably affects the domestic business environment. Xenophobic attacks reached a peak in 2008, and often involved the targeting of foreign-nationals who own or operate informal or very small shops (commonly known as spaza shops) in townships (Jost, Popp, Schuster, and Ziebarth 2012). Interestingly, we find that the nationality of the enterprise owner is not a significant predictor of the incidence of crime against the firm.

The results of the full probit model (Table 9) suggest that there are two important characteristics of the owner that increase the likelihood of the firm holding any business insurance – the educational level of the owner and whether or not the owner has purchased funeral insurance. Owners with a higher level of education and those who have purchased personal funeral insurance are more likely to have purchased short-term asset insurance for the business.

Table 8: The Relationship between Incidence and Cost of Crime and Firm/Owner Characteristics

	Probit model - marginal effects	OLS	OLS
	(1)	(2)	(3)
		Cost (% of turnover)	Cost (% of turnover)
Incidence			
Security	0.23	-1.28	-1.72
	(0.24)	*(1.78)*	*(1.58)*
South African owner	-0.08	-0.17	-
	(0.6)	*(0.84)*	
Female	-0.07	0.18	-
	(0.6)	*(0.91)*	
Owner's education	0.03	0.15	-
	(0.02)	*(0.32)*	
Owner's age	-0.08	0.29	-
	(0.14)	*(1.81)*	
Diepsloot network	0.00	-0.07	-
	(0.00)	*(0.06)*	
Firm age	0.10**	1.30*	1.25*
	(0.05)	*(0.72)*	*(0.66)*
Service sector	-0.04	-1.77	-1.67
	(0.07)	*(1.11)*	*(1.04)*
Rent	0.15**	2.32**	2.22***
	(0.07)	*(0.99)*	*(0.82)*
Employee size	0.03	0.31	0.30
	(0.02)	*(0.09)*	*(0.29)*
Fixed assets	0.01*	0.18**	0.15**
	(0.01)	*(0.09)*	*(0.07)*
Turnover	0.00	-	-
	(0.02)		
Constant	-	-4.07	-2.59
		(6.50)	(1.73)
Number of observations	249	61	63
Prob > F		0.2908	0.0725
R-squared		0.217	0.1809
Prob >chi2	0.0127		
Pseudo R-squared	0.0897		

Standard Errors are in parenthesis

**** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level*

There are four significant firm characteristics in determining the probability of purchasing insurance. First, we find that firms that have been approached by an insurance provider and offered insurance products are significantly more likely to purchase it. This result, combined with the findings on the owner characteristics suggest that those business owners who have had prior exposure to insurance products and have a better understanding and familiarity with the products are significantly more likely to purchase it. This is in line with the literature reviewed above on the uptake of rainfall insurance in a developing country context (Gine et al, 2008; Cole et al. 2008).

Second, we find that firms that are credit constrained are significantly less likely to purchase any kind of business insurance and this is consistent with Gine et al. (2008). This is an important result given that credit-constrained business owners may value the reduction in income volatility provided by

insurance because they have a limited ability to cope after a negative shock such as the theft of business stock or other assets. At the same time however, these business owners have limited funds to purchase the type of insurance that can help them to insure against outcomes that are disastrous for them.

Third, wealthier firms (those with a higher level of assets) are more likely to purchase insurance as their loss potential is greater and they can afford to purchase insurance which would mitigate any losses occurring form theft or damage of business assets or premises. Lastly, firms that rent the business premises are less likely to purchase business insurance.

Table 9: The Probability of Insurance Take-Up (Probit Regression Reporting Marginal Effects)

	1		2		3	
	Coefficient	Std Error	Coefficient	Std Error	Coefficient	Std Error
Nationality	-0.048	0.044			-0.018	0.051
Gender	0.011	0.041			0.032	0.051
Education	0.0491***	0.016			0.058***	0.020
Age	0.059	0.082			0.081	0.103
Funeral insurance	0.245***	0.058			0.107*	0.072
Informal credit	-0.075*	0.040			-0.035	0.054
Diepsloot network size	-0.029	0.022			-0.020	0.026
Firm characteristics						
Age			0.001	0.0062	0.002	0.006
Size			0.073	0.1108	-0.070	0.137
Activity			-0.069	0.0520	-0.052	0.051
Offered insurance			0.348***	0.1042	0.254***	0.108
Credit constrained			-0.124***	0.0433	-0.139***	0.042
Wealth			0.018***	0.0050	0.019***	0.005
Rent			-0.125**	0.0465	-0.121**	0.047
Turnover per employee			-0.002	0.0165	-0.019	0.016
Number of observations	435		253		247	
LR Chi2	35.88		34.80		51.08	
Prob>chi2	0.0000		0.0000		0.0000	
Pseudo R2	0.08		0.15		0.22	

*** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level

Table 10 presents the results of the final model – estimating the relationship between the purchase of business insurance and firm performance. The key result is that businesses that have at least one type of asset insured are associated with better firm performance. On average, firms that have at least one business asset covered by an insurance product have a turnover that is about R6,840 more than firms without any business insurance. This result holds while also controlling for the business owner having access to informal credit, which can serve as a form of ex-post insurance. Data constraints means that we cannot estimate a more sophisticated model to ascertain causality and this represents an important area of further research in South Africa.

Overall, the qualitative evidence suggests that the purchase of short-term business insurance positively impacts firm performance. The reasons for not purchasing insurance are revealing here because we find that the price point or product specifications are not as important in the decision to not purchase insurance as is knowledge about insurance and how it can benefit the business owner. Furthermore, national identity or registration status of the firm has not been seen to be a barrier to access. There is no evidence here that applications to purchase insurance have been declined, although without further supply side information it is difficult to make stronger conclusions on this point.

Table 10: Estimating the Relationship Between Anti-Theft Business Insurance and Firm Performance

	1	2
	Turnover per employee	Turnover
Business Insurance	3,713.404*	6,840.252**
	(2135.842)	(2731.628)
Owner's Nationality	699.73	1,275.252
	(1799.987)	(2301.317)
Owner's Gender	-2,955.398*	-3,790.059*
	(1734.862)	(2212.549)
Owner's Education	2,708.034***	3,096.063***
	(645.9778)	(824.4198)
Owner's Age	8,269.08**	9,028.956**
	(3799.4)	(4857.558)
Access to Informal credit	2,637.95	3,230.144
	(2078.848)	(2654.087)
Owner's Network size	1,756.851*	3,838.912***
	(900.0142)	(1151.861)
Firm age	914.96	1,970.148
	(1183.769)	(1510.373)
Firm Activity	-2,701.22	-3,439.341
	(2280.915)	(2909.694)
Credit constrained	-2,065.38	-1,131.699
	(1643.195)	(2101.786)
Rent	4,522.15**	6,836.842***
	(1986.423)	(2547.903)
Crime perception	-1,538.38	-2,826.920
	(1627.796)	(2080.04)
Firm size	-	-1,001.246
	-	(878.1909)
Constant	-34,628.91**	-39,253.13**
	(13420.94)	(17329.1)
Number of observations	252	252
F stat (12, 239); F stat (11, 238)	4.63	5.110
Prob > F	0.0000	0.0000
R-squared	0.1885	0.2183

**** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level*

Note: Standard Errors shown in parenthesis

6. Conclusion and policy considerations

Our analysis of the existing literature and evidence of the impact of crime on informal firms' performance as well as the efficacy of informal risk sharing mechanisms point to the notion that many South African informal business owners may be in a type of poverty trap that is difficult to exit from without redistributive interventions. A public-backed insurance scheme may be the type of intervention that can move these individuals out of the poverty trap.

A major obstacle to doing business for these informal enterprises is crime, as well as the lack of access to land or own business premises. Importantly, crime seems to affect more established, wealthier and better performing firms. It is these types of entrepreneurs that are possibly at the periphery of, or moving toward the formalised economy, however, cannot get out of the 'trap'. In addition, given the strong relationship between wealthier firms and the incidence and cost of crime, asset protection potentially represents an important intervention to promote the informal business sector as a source of employment in South Africa.

Formal business insurance is precisely the type of instrument that can be used to mitigate the risk of crime and, importantly, has been shown to have a positive relationship with better firm performance, even when controlling for the informal risk sharing mechanisms that exist within the community (which is predominantly informal loans at the time of a negative shock). A critical element of the take-up of business insurance, that necessarily insures against theft, is the level of education of the business owner. In addition, we found a significantly higher take-up of business insurance by firms that were offered the products by an insurance provider relative to those that were not approached. The existing evidence reviewed highlighted the importance of education, financial literacy and familiarity with insurance products for the take-up of the products with which our results are consistent.

Finally, the importance of being credit constrained in determining the probability of insurance take-up highlights the interconnectedness of the credit and insurance markets and necessarily broadens the access to finance agenda to insurance, whereas it has typically focused on savings and credit. Furthermore, for the risk of crime, formal business insurance can be seen as a more effective risk-mitigation method than credit since the perception of crime alone can impact on business decisions, negatively impacting firm performance. Therefore, the notion of security that anti-theft business insurance offers may allow business owners to purse more productive strategies.

To fully uncover the nature of this market failure, a study of the supply side of the micro-insurance market in South Africa is critical and represents an important area of further research. Without supply side data it is difficult to uncover the associated constraints. Clearly, the pricing of risk within the informal enterprise sector is a difficult task since little is known about informal enterprises and the environment in which they operate. This paper is one step in this direction. Large insurers with a diverse enough client base should be able to price this risk at a price point that still overs value to the client. To operate in this market, profit-driven insurers will need more than a

development incentive. This market not only provides a new customer base but allows insurers the opportunity to cross-sell other products such as life insurance. In this sense, product innovation may provide some solutions, such as bundling life or funeral insurance and short-term insurance within the micro-insurance market, so that it offers the right incentives to both sides of the market in order to overcome the current failures.

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1. Appendix A:

Table 11: Definition of Key Variables

Crime and insurance	**Definition**
Perception	1 if crime is ranked as the most serious obstacle to business operations; 0 otherwise
Loss	Loss as a proportion of turnover as a result of a negative crime shock
Incidence of Crime	1 if the firm experienced a negative crime shock in 2012; 0 otherwise
Business insurance	1 if the firm has purchased insurance for a cell-phone used in the business, vehicle used in the business, machinery or tools of the business, stock of the business, and for the business premises.
Funeral Insurance	1 if the owner has purchased funeral insurance; 0 otherwise
Owner characteristics	**Definition**
Nationality	1 = South African; 0 = Other
Gender	1 = female; 0 = male
Education	0 = no formal; 1 = incomplete primary; 2 = complete primary; 3 = incomplete secondary; 4 = secondary; 5 = vocational training; 6 = some university
Age	Log of age of owner as at 2012.5
Informal credit	1 if the owner has access credit from friends, family, or a moneylender in response to a crime-related negative shock; 0 otherwise
Network size	Log of the number of close relatives or friends that the owner has in Diepsloot in any line of business
Firm characteristics	**Definition**
Age	Log of firm age as at 2012.5
Size	Number of paid employees including the owner
Activity	1 if the business is service oriented; 0 if the business is trade oriented
Security	1 if the firm pays for additional security; 0 otherwise
Offered insurance	1 if the business has been offered insurance by an insurance provider; 0 otherwise
Credit constrained	1 if the business would like to maintain higher inventories but cannot do so due to lack of credit to finance the purchase; 0 otherwise
Wealth	Log of the current value of fixed assets of the business
Rent	1 if the business rents its premises; 0 otherwise
Turnover	Log of the monthly turnover of the business

2. Appendix B:

Defining informality

In trying to determine the nature of formality or informality in Diepsloot, it is important to adjust national definitions by contextual information. The data shows that 87 percent of enterprises surveyed in Diepsloot have not been or are currently not registered and hence would be defined as informal according to national policy. Of the remaining 13 percent, almost 90 percent are micro enterprises – those that employ less than 5 employees.

	Micro	Very small	Total
Not registered	372	10	382
Registered	51	6	57
Total	423	16	439

A closer look at monthly turnover of the enterprises shows that all firms, on average, have a monthly turnover of less than R 10,000 (USD 1,218). This is far below the standard definition of formal micro enterprises of having a turnover of less than R 150,000 (USD 18,270) per year or R12,500 (USD 1,523) per month, which is why we propose that all the enterprises within this survey can be considered informal enterprises.

		Not registered	Registered	Total
Micro	Mean	7 465.90	10 009.26	7 746.19
	Standard deviation	17 842.28	15 246.65	17 564.95
	Frequency	218	27	245
Very small	Mean	5 683.33	2 833.33	4 733.33
	Standard deviation	7 242.21	1 154.70	5 928.32
	Frequency	6	3	9
Total	Mean	7 418.16	9 291.67	7 639.44
	Standard deviation	17 636.35	14 604.76	17 290.89
	Frequency	224	30	254