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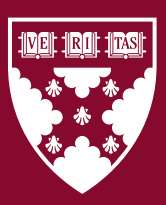
The Need for Speed: The Impact of Capital Constraints on Strategic Misconduct

F. Christopher Eaglin



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Abstract

Under what conditions do firms engage in strategic misconduct? Why do they undertake actions that increase profitability yet break laws or violate strong norms often with costly consequences for public welfare? The strategic management literature offers two external constraints that might explain these actions. First, firms in highly competitive environments with few options for differentiation turn to strategic misconduct for survival. Second, firms that operate in weak regulatory environments adopt strategic misconduct to overcome market frictions that lack of regulation creates. This paper offers a third explanation – access to affordable financing. Existing research on capital constraints has demonstrated firms benefit greatly from additional capital but has yet to investigate its impact on strategic misconduct. I examine the impact of capital constraints on strategic misconduct in the minibus taxi industry in South Africa. Exploiting a natural experiment in which a financing company changed its interest rates due to nationwide protests, I assess the impact of declining interest rates on over 5000 firms from 2015 to 2020. Using an instrumental variable analysis, I find that firms given lower interest rates decrease strategic misconduct and are more likely to survive. Exploring potential mechanisms through survey and qualitative analysis,
I find suggestive evidence that firms often turn to misconduct to avoid default which can carry high economic, social, and even physical consequences. My findings suggest that the reduction of capital constraints for firms under duress might increase both firm survival and public safety presenting implications for how we might approach building sustainable and resilient firms in challenging contexts.

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Section 1: Introduction

Under what conditions do firms engage in strategic misconduct? Why do they undertake actions that increase profitability yet break laws or violate strong norms often with costly consequences for public welfare? The strategic management literature offers two explanations. First, limited scope for differentiation leads firms to engage in strategic misconduct to gain competitive advantage (Bennett et al 2013). They might falsify test results (Bennett et al 2013), engage in deceptive marketing practices (Luca and Zervas 2016; Belavina et al 2020), or recklessly deliver services (Pierce et al 2015). Second, firms that operate in weak regulatory environments adopt strategies such as bribery, cheating and misdirection in order to overcome market frictions that the lack of adequate regulation creates (Khanna and Palepu 2010; Cheung et al 2020). Firms that face both intense competition and institutional voids can find themselves in an environment in which misconduct becomes rampant (Madsen 2009; Greve, Palmer and Pozner 2010; Dimmock, Gerken, and Graham 2018; Law and Zuo 2021).

This paper explores a third explanation – access to affordable financing. Access to affordable financing is one of the most important predictors of economic growth and development globally (Rajan and Zingales 1998; Levine and Zervos 1998). Lack of affordable capital leads to lower incomes, poverty traps, underinvestment in public infrastructure and poorer social outcomes overall (Bruhn et al 2010; Doering 2016; Popov 2018). At the firm level, such capital constraints are associated with lower levels of growth, productivity, profitability, innovation, and survival (Andrade and Kaplan 1998; De Mel et al 2008; Fafchamps et al 2014). In Africa for example, access to capital is cited as the largest challenge for firms second only to reliable electricity (Pierce and Snyder 2018).

Research suggests that relaxing capital constraints can significantly improve firm performance – in particular for firms that operate in challenging environments (McKenzie 2017; Woodruff and Quinn 2019). However, research has yet to focus on the impact of relaxing capital

constraints on strategic misconduct. Based on the existing literature, there is uncertainty as to how firms might respond to relaxed capital constraints. Firms might decrease their level of misconduct as fewer capital constraints can encourage socially productive practices by firms such as new market entry and innovation (Andersen and Nielsen 2012; Cole et al 2017). Perhaps lower capital constraints might encourage better practices overall. However, several studies on misconduct suggest otherwise demonstrating that more access to capital can lead to profligate, risky, and destructive practices by firms (Bianchi and Mohliver 2016; Schnatterly et al 2018).[1]

I explore the impact of capital constraints on strategic misconduct in the minibus taxi industry in South Africa. This industry, comprised predominantly of small and medium sized enterprises (SMEs), transports 15 million people per day, accounting for 75% of daily transport and catering almost exclusively to the historically disadvantaged South African population. These firms are privately owned, receive no public subsidy from the state, are not subject to significant regulatory oversight, and operate oversubscribed pre-determined routes with fixed prices (Kerr 2018). On average interest rates on loans to these SMEs range between 18% and 30% which can lead to loan payments accounting for 50% to 90% of the firms' monthly revenue. Misconduct is rampant in the industry. These firms have a reputation for aggressive and often deadly driving behavior. Some estimates suggest that there are as many as 70,000 minibus crashes per year which account for over 5,000 deaths (Arrive Alive 2020). [2]

I provide causal evidence of the impact of declining capital constraints on strategic misconduct by exploiting an industry wide strike in 2017 as a source of quasi exogenous variation. I

[1] Appendix A explores the intuition for this trade-off. I build a simple firm decision model that explores the trade-off between fair play and misconduct subject to strict minimum profitability requirements. Even if there is a penalty for misconduct, firms will engage in misconduct to meet the minimum profitability requirements in each period. More risk averse firms (those with greater capital) will be more likely to decrease misconduct as opposed to risk taking firms (those with less capital) that are more likely to fall short of the minimum profitability requirement in any given period.

[2] Estimates vary on the number of minibus taxis operating in South Africa. Most estimates suggest between 200,000 to 300,000 minibus taxis are in operation. See Fobosi (2021).

use a rich proprietary dataset of over 5,000 vehicles financed between 2015 and 2020 from one of the largest minibus taxi financiers in South Africa that provides both loans and insurance to firms in the industry. I measure strategic misconduct by examining excessive speeding, evidence of law breaking and windshield claims, a proxy for aggressiveness with other firms in the industry as evidence of norm breaking as well as other major insurance outlays.[3] Firms that financed vehicles after the strike received lower interest rates than those who financed vehicles beforehand – the maximum interest rate decreased by two percentage points, the minimum rate decreased by six percentage points, and the average rate decreased by one and a half percentage points the equivalent of a 5% decrease in monthly fuel costs or four additional meals for a family of four in a month. I use this exogenous variation in interest rates before and after the strike to estimate the causal impact of declining interest rates on strategic misconduct using an instrumental variable (IV) estimator similar to the method used by Ferraz and Finan (2009) and Luca and Smith (2013).

Using this methodology, I find strong evidence that lower interest rates decrease misconduct by firms. A 1 percentage point decrease in interest rates leads to a 11% decrease in speeding alerts, 6% decrease in glass claims, 12% decrease in major insurance claims, and 12% decrease in collision claims. I also find that firm are more likely to increase performance and most importantly *survive*. A 1 percentage point decrease in interest rates leads to a 5% increase in average daily distance travelled, 9% increase in average daily hours operated, and 4% lower defaults over the operating period. However, average daily trips decrease by 15% in response to a 1 percentage point decrease in interest rates suggesting that firms respond to financial pressure by increasing the number routes they operate.

[3] It is a common occurrence for minibus taxi operators to smash the windows of a competitor if they believe that competitor is trying to overtake their routes unjustly. In the most extreme cases, smashing of windows can lead to gun violence. See Fobosi (2021).

I also find that the firms that change their behavior the most are those with the most financial resources in this constrained environment. These firms still face a great deal of pressure to meet their minimum monthly requirements yet their exposure to uncertainty is proportionally lower. Firms that have higher credit scores, more vehicles, and better quality vehicles represent the highest percentage of speeding, collisions, and glass claims in the dataset. In addition, these firms decrease speeding by 24% and glass claims, my proxy for aggressiveness, by 20% in response to a 1 percentage point change in interest rates. By comparison, their less resourced counterparts decrease speeding by 9% and glass claims by 4%. These results suggest that those firms most able to decrease their misconduct do so. Meanwhile those less resourced firms most likely find themselves less able to meet minimum profitability requirements and therefore continue to rely on misconduct.

I also explore which firms engage in the most misconduct and how those behaviors are correlated with each other. First, I find that the distribution of speeding alerts suggests that those who engage in misconduct do so to a high degree which follows similar findings on which types of individuals exert the most effort in tasks (Lazear 2000; Shaw and Lazear 2008). In addition, I find that those firms that speed are more likely to be aggressive - they are 30% more likely to have glass claims than non-speeders. While these speeders take more trips and drive longer distances, surprisingly I find that they default more often. The speeding firms represent 68% of the defaulters in the dataset. These results imply that whilst speeding might generate more income in the short run it is not necessarily a robust long term survival strategy.

To further understand why firms might engage in strategic misconduct even if it carries high risks, I turn to qualitative data. I conducted a survey of 100 firm owners and over 60 hours of interviews with firm owners, drivers, financiers, regulators, and industry observers. Over 55% of owners surveyed indicate that high monthly capital payments represent the greatest challenge in their business. Stuck between fixed prices, high operating costs, set routes, and limited number of

working hours, they turn to misconduct, driving aggressively, to earn sufficient revenue to repay loan, labor, vehicle, and fuel costs.

Avoiding default is critical. According to the interviews, the penalty of default extends far beyond the loss of assets for these firms. Many firm owners are the only consistent income earners within their extended family due alarmingly high unemployment rates in South Africa in which approximately 60% of the population under 30 is unemployed (Maduku and Kaseeram 2018). Therefore, default represents both the loss of the firm and the livelihood of the owner and her dependents. Moreover, default can lead to loss of status in the industry which can increase the likelihood that other firms will try to overtake the defaulting owner's taxi routes. In the most extreme cases, the aggressive behavior is accompanied by violent and sometimes deadly force. Firms therefore may engage in strategic misconduct to prevent default and its dire consequences.

These findings advance our understanding of why and how firms engage in strategic misconduct, behavior that the public would like for them to avoid. My work suggests that the benefits of access to affordable financing go beyond firm performance and include public welfare. I find in this setting that capital constraints might lead firms to engage in misconduct even if it might imperil their long-term profitability and survival. This insight places misconduct at the heart of firm strategy in uncertain environments and suggests that further research on the relationship between capital constraints and strategic misconduct might help uncover a wider set of financing and policy options to address negative externalities created by the private sector.

In addition, my findings suggest that research conducted in understudied populations and geographical areas can yield important insights for ongoing debates within the strategic management literature. There are vanishingly few studies of firm behavior in sub-Saharan Africa that addresses core strategy questions (Yenkey 2015; Yenkey 2018). Furthermore, there are few studies that investigate how SMEs operate under intense competition, weak regulatory oversight, and in severe

institutional voids (Hiatt and Sine 2014). The myriad constraints these firms face create enormous inefficiencies and engender many forms of strategic misconduct (Klimczak et al 2021). This misconduct not only decreases economic output but imperils public welfare (Vasudev 2015). Understanding what encourages and limits this behavior is critical towards building sustainable and inclusive economic growth.

This paper proceeds as follows. Section 2 describes the setting, the minibus taxi industry in South Africa. Section 3 discusses the data collected and empirical strategy while Section 4 presents the results and robustness checks. Section 5 discusses potential mechanisms. Section 6 concludes.

Section 2: South African Minibus Taxi Industry

The South African mass transport system is a mixture of public and private services comprising trains, buses, and minibus taxis. Within this system, the minibus taxi industry is the primary mode of transport. Over 25 million South Africans use the system daily and approximately 80% of 60 million population over the course of a year (Fobosi 2021). Most minibus taxi commuters are low-income earners individuals most of whom earn less than US$7/day (Antrobus and Kerr 2019). Given the high rates of poverty amongst the South African population, it is hard to overstate the economic, political, and social importance of the minibus taxi industry. The industry is the primary mode of transport between a township and the nearby city center, other townships, other cities, provinces, and even neighboring countries. [4]

INSERT FIGURE 1

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[4] I provide a description of the history of the minibus taxi industry in Appendix B.

As Figure 1 demonstrates, minibus taxis represent local, provincial, and international transport replacing local taxicabs, buses, trains, and planes for most South Africans. In fact, many routes that the industry travel are serviced by them alone as the South African government has failed to increase transport services at the rate at which the population has demanded them. The reach of the minibus taxis is pervasive providing a critical service to commuters, communities, businesses, and the government. [5] Their consistent service is notable given the increasing failures in public service by the South African government.

One of the reasons the minibus taxi industry has been able to maintain its independence from the government stems from the way in which it is organized, through very strong institutional bodies called associations.[6] These associations are groups of owners that control any number of routes between two geographies with significant overlap within urban settings. Due to the apartheid legacy, most associations are based in a particular township and control the routes between that township and another transportation hub. Figure 2 illustrates the structure of the minibus taxi industry.

INSERT FIGURE 2

Competition. Most observers characterize the minibus taxi industry as highly competitive. This intense competition in the industry stems from inefficient demand estimation and corruption by both the government and the taxi associations. Given the South African government has failed to adequately estimate demand and provide transport services, it implicitly relies on the minibus taxi

[5] The routes associations "own" are formally set and licensed by a provincial licensing authority but in reality, these routes are exclusively controlled by the associations themselves as the South African government has abdicated enforcement to them (citation). In turn, associations govern the routes through various means including preventing entry of new taxi owners, limiting the number of vehicles a particular owner might have, and using the credible threat of violence to intimidate rival associations or non-compliant owners and operators within its own association.
[6] Associations of this sort are typical of main market settings in developing countries. See Kirstruck and Beamish (2010).

industry to fill this gap. Most transport agencies in the country grant operating licenses for taxi routes without thorough consideration for how many operators should service a particular route. Therefore, it is relatively common for the government to grant licenses for the same route to competing taxi associations. When asked why this might occur, one government official responded, "we want to make sure routes are adequately served." When asked the same question, multiple taxi associations officials and minibus taxi owners responded, "because they receive cash suitcases from us." A similar process occurs at the association level. Associations will assign multiple owners to the same route in excess of the demand for that route. This strategy is lucrative for the associations as it can collect multiple entrance fees per route. There is little scope to curb this behavior as legal challenges often take years to resolve so very often the supply of services outstrips the demand from passengers.

Fare Setting and Enforcement. Minibus taxis operate an unscheduled service on fixed routes managed by taxi associations. Taxis will typically depart from fixed terminals but stop anywhere along their route to pick up and drop off passengers. Passengers hail taxis using hand signals along these established routes. The associations set the price to be charged for all passengers along the route and prevent entry by other taxi operators who have not been approved by association. Taxi fares take into consideration length, time and projected number of passengers, commuter affordability, operator profitability, and timing and extent of prior increases. The SA government provides no fare subsidies to either the passengers or operators (Kerr 2018).

The associations enforce taxi fares through a variety of means. Fares are regularly communicated to customers via flyers, radio ads, and association employees at the taxi rank. Operators that try to independently increase fares along a route will find themselves without passengers as they will either take a competing taxi or report the fare increase to association officials. Alternatively, if an operator independently lowers fares along a route, they will find themselves in

conflict with other drivers, owners, and the governing association. When asked how they might penalize an operator that deviates from pricing, the chairman of an association indicated "we will kill him if he does."

Misconduct. As the above discussion suggests, misconduct is rampant in the industry. Given that routes and prices are largely fixed, the only option to become profitable in this environment is to run as many routes filled with passengers as possible, i.e., increasing volume similar to other industries (Blader et al 2015). As a result, these operators drive aggressively and *very fast*. Given many routes are contested and there are a finite number of passengers, operators frequently fight with each other. They try to run competing vehicles off the road, smash windows, burn vehicles, and in the most extreme cases carry out hits on competitors. Despite these challenges, profits from operating taxis can be extremely high. Successful operators lift themselves from poverty into the middle and upper classes.

The minibus taxi industry is an excellent setting to explore the impact of capital constraints on strategic misconduct. There is a high degree of uncertainty given the unscheduled routes, changing demand from customers, lack of state subsidy, and competition from other drivers within and between associations. Amongst these challenges, operators regularly cite high monthly installments required by loan companies as a primary source of distress. Firms often engage in misconduct, in this case speeding and aggressive behavior, as way to make more money to overcome the challenges they face in the environment.

In addition, these firms represent the modal firm size in South Africa and therefore are an excellent proxy for understanding how a multitude of firms responds to credit constraints. As will become clear in my explanation of the dataset below, these firms represent what Woodruff (2018) calls dynamic enterprises. Unlike subsistence firms which are informal and necessity driven, the minibus taxi firms deploy existing products (taxis) in a traditional industry (transport) that seek to

grow through market expansion (acquiring new taxis), have the capacity for moderate growth and scale potential (some operators have over 50 taxis in their portfolio and then diversify into other industries), and are subject to high barriers to entry (government licenses and large association fees to join). These characteristics allow for comparison to firms both in developed and emerging markets.

Section 3: Data and Empirical Strategy

I use a proprietary dataset from a large taxi financier in South Africa. The company has built a business model providing capital to taxi owners since 2006. Financing over 35,000 minibus taxis, the company "provides asset-backed financing for the taxi vehicle" as well as allied services such as insurance, spare parts, and maintenance. The core of the business is to extend loans to prospective or current mini-bus taxi business owners to purchase a new or used vehicle. Given the lack of reliable credit ratings on these owners, the company conducts an extensive financial disclosure on each applicant. In addition to credit scores, the company collects demographic information, driving records, the proposed route, and affiliated taxi association. Once the company approves a client for a loan and said client purchases a vehicle, the company installs a GPS telemetric device in the vehicle which provides the precise location of the vehicle every eight seconds. From this device, one can construct a number of operational variables such as distance travelled, routes taken, and time driven. From the company, I have approximately ten million unique daily vehicle observations for 7,573 vehicles based in Gauteng Province of South Africa financed between January 2015 until March 2020.

Data. The dataset is a panel recording daily observations of operations for every vehicle from the time it is financed until March 2020. This dataset represents that the entirety of vehicles financed by the company in Gauteng during this period. While there are no official estimates of the

number of vehicles operating in Gauteng, previous studies have suggested anywhere from 50,000 to 100,000 vehicles operate in the province. This sample represents probably between 7% to 15% of the total marketplace. For the sake of clarity, each vehicle is its own cost and revenue center, so it is best to consider each as an establishment (Andersen and Nielsen 2012). In the dataset, some 25% of firms are single owner-operators (1,831 vehicles) and the other 75% are part of a larger firm (5,742 vehicles). Of those vehicles that are part of larger firms, close to 70% are part of firms that have financed multiple vehicles with the financing company (3,977 vehicles). For the sake of analysis, I analyze only those vehicles which have complete credit and operational data (5209 vehicles). There are 417 associations represented in the dataset.

I have two categories of dependent variable measures that I use for analysis: misconduct and performance.[7] The summary statistics of these variables are presented in Table 1. I rely on speeding alerts and insurance claims as the proxies for strategic misconduct. The company insures approximately 95% of its loan book and 100% of the observations in the dataset. There are a variety of claims that owners can place through the company including vehicle collision, windscreen breakage, theft, hijacking, and death. I also construct a measure of significant insurance outlays called *Major Claims*, which represent over US$2,500 in repairs. These repairs consist mostly of accidents, large collisions, and violence against the owner or driver. I also have a separate variable for collisions (*Collision)*. A smashed window claim (*Glass Claim*) most likely relates to discord with other owners and operators. Smashing a window often serves as an early warning of displeasure with business practices which we might infer means that the owner with the smashed window has been

[7] A careful reader will note that there is a principal agent problem here. I collect information for each individual asset that is financed although they are often run by a different individual. For some firms, this is the entirety of their asset base and therefore likely that they are the owner and operator. For others, this asset is one of many. For more research on incentive challenges with minibus operators see Kelley, Erin M., Gregory Lane, and David Schönholzer. "Monitoring in Target Contracts: Theory and Experiment in Kenyan Public Transit." (2021).

behaving aggressively in route selection and capture.[8] These outcome variables are measured as binaries, 1 if they have ever had such claim, 0 if not. Another measure of misconduct is captured in *Average Daily Speed Alerts.* A speeding alert is triggered if a vehicle exceeds 120km/hr, the top highway speed limit in the country, which provides a conservative estimate of speeding as many routes are in the urban areas.[9] Speeding alerts are calculated as an average per vehicle over the entire operation period.

INSERT TABLE 1

For firm performance, I primarily rely on operational variables constructed from the GPS data which I have summarized as an average per vehicle over the entire operation period similar to speeding alerts. The most reliable metric of performance is how many kilometers a vehicle travels which is captured by *Average Daily Distance.* Beyond distance, I also have the average number of routes a vehicle completes (*Average Daily Trips*) and the average number of hours a vehicle is in operation (*Average Daily Hours*). In addition, I measure firm failure by *High Default* which corresponds to when the company initiates legal proceedings to re-possess the financed vehicle. I limit *High Default* to within 30 months of deal initiation to create equivalent measures of firm failure between time periods.[10] This is a particularly robust measure of firm failure as it is a clear demarcation that the business line is no longer functional.[11]

[8] As I note in the qualitative section below, operators often try to encroach upon the routes of other drivers. One form of retaliation is to smash the aggressor's window. It is unlikely that the window smashing occurred from petty theft as valuables tend not to be left in these vehicles and the minibus operators *themselves* tend to be the aggressors.
[9] There is a concern that speeding alerts as constituted might represent long distance operators only. I address this concern in the robustness checks.
[10] This measure is of course not perfect however 95% of delinquencies and 80% of defaults occur prior to this period.
[11] All the measures for firm performance are used by the financing company itself assesses firm performance. *Distance, Trips, Hours and Default* are regularly used as key performance indicators for internal and external company reporting. Therefore, their usage here would appear particularly robust.

In Table 1, I also include summary statistics on the characteristics of the financing of each vehicle and of each owner. I report *Interest Rate,* the size of the loan *(Loan)*[12], the term of the loan (*Loan Term*), and the cost of the vehicle (*Vehicle Cost*). *Loan Score* is a combination of internal company and external credit assessments of default risk scored between 0 to 1000.[13] *No. of Deals* reflects the number of deals that particular owner has ever had with the company. *Existing Operator* measures whether a firm has other minibus taxi vehicles in operation according to a national registry of taxi owners. *Assoc Quality* is calculated from the entire loan book starting in 2012. A taxi association is considered of high quality (*Assoc Quality = 1*) if less than 50% of other members of that association have defaulted on loans with the company.[14] I also collect information on *Gender* and *Age*.

INSERT FIGURE 3

Figure 3 plots the cumulative density functions of the variables taken from the GPS data. What is immediately clear is that each variable displays a concave shape as it increases. These shapes suggest that those who work the most work *much* harder than their counterparts as previous research has shown (Shaw and Lazear 2008). This behavior is particularly acute for those individuals who speed. Speeding is selected most intensively by a small set of operators who speed a great deal. 85% of the operators in the dataset have fewer than one speeding alert per day. Of the 15% of the dataset that has over one speeding alert, those operators on average log over three speeding alerts per day.

[12] For reference, the average vehicle cost in the dataset is ~US$33,000 and loan size is ~US$30,000 based on 2018 exchange rates.
[13] In the estimation models below, I use a standardized version of the score for ease of interpretation.
[14] This measure is another that I take from the financing company itself. Although not part of its loan decision making process, it has begun to explore how best to determine whether an association with better performing members on the whole produces better new loans. They adopt this simple binary metric to estimate association quality.

This finding suggests that the more one engages in misconduct the more likely one is to continue to do so. I explore this finding further in the complementary analysis.

Natural Experiment: Change in Interest Rate Determination. Prior to January 2017, the financing company did not have a sophisticated internal credit system, by its own admission. It relied on external credit scores and existing deals with the company. Given the breadth of data at its disposal, the company devised a new credit rating system in late 2016 which considers a more nuanced risk profile which includes performance of previous loans, previous business experience, and an estimation of profitability based on the prospective route.[15] The company deployed this new methodology in January 2017.

At the same time, there was growing unrest within the minibus taxi industry that the monthly payments required to service vehicle loans were too high (AP 2017). In June 2017, the minibus taxi industry launched a nationwide strike protesting affordability targeting the major loan companies, national and provincial government, and equipment manufacturers organized by the major taxi unions.[16] Due to a combination of industry pressure and early positive signs from its new scoring system, the company lowered interest rates across the board in July 2017. Figure 4 demonstrates the change in interest rate regimes. In the pre-period, the highest interest rate assigned to owners was 28.75% whereas in the post period it was 26.75%. In addition, the cumulative density functions (CDFs) of the pre & post regime demonstrate a marked shift in the assignment of rates. A Welch t-test and Kolmogorov-Smirnov test of independence of two CDFs both yield p values less than 0.0001 providing an empirical foundation for the statistically significant difference between the regimes. I can compare the Loan Score variable between regimes because the financing company

[15] It should be noted that the internal company estimation of projected revenue is still under refinement. Early estimates accurately predict revenue with under 50% accuracy. Since 2021, these measures have improved but still do not top 60% and incorporate major mismatches in which firms can pay and which firms do pay.
[16] Appendix C provides a full description of the minibus taxi strike in 2017.

retroactively refitted the new loan scoring mechanism to owners in the pre-period. All of the scores I collect are calculated in a similar fashion in the pre and post periods. Because of the simultaneous shift in interest rates and lending criteria, observed interest rate changes may reflect endogenous changes in borrower characteristics. To identify the causal effect of interest rate changes, I therefore require an empirical design that identifies the effect of a purely exogenous shift in interest rates, which I describe in more detail in the next section.

INSERT FIGURE 4

Two important assumptions for identifying a causal treatment effect in an experimental setting are independence and stable unit variation in treatment assignment (SUTVA). Although this setting is not a true experiment, if it is consistent with these two factors, it can be considered a natural experiment, allowing for a more causal interpretation. Independence in this case appears strong for several reasons. First, the nationwide strike was organized by the industry bodies, focused on affordability, and targeted multiple large entities including the South African government and equipment manufacturers. Those industry bodies are composed of owners and drivers however individual actors are likely to have had little impact on the outcome and are unlikely to have anticipated how they themselves would benefit. Second, the company elected to choose its new interest rate regime without consultation with any operator or minibus taxi industry body. Furthermore, the change in interest rates was not retroactive, i.e., there were no rate changes for owners already in the loan book.

Considering the second condition, one can decompose the requirements for SUTVA into two main categories, no interference between units and no hidden variation in treatment. Given the independent nature of each owner in the industry, no interest rate for one owner would directly

impact the operations of another owner. Owners and drivers determine when and how frequently they operate independently.

One indirect effect might be that lower credit prices will increase competition and therefore depress whatever positive impact drivers might receive from lower payments. Given the previous discussion about competition, price setting, and enforcement in the industry, this scenario is unlikely given the various factors outside credit availability that determine competition. Fare pricing changes typically happen on an annual basis and are responsive to fuel price and equipment increases rather than interest rates for individual operators according to qualitative interviews. New entrants are subject to availability of new routes and changes in demand for existing routes subject to the rent-seeking behavior of the local government or taxi association. Concerning the second condition, no hidden variation in treatment, there is little cause for concern. The financing company does not alter interest rates after assignment without documentation. The few documented cases have been excluded from the analysis herein. Figure 5 provides graphical evidence of the variation between interest rates, loan scores, loan sizes, and firm size providing further support for the SUTVA conditions. There is sufficient "thickness" in the assignment of interest rates based on loan scores between the two regimes that we might expect estimation relying on this natural experiment might be robust.

INSERT FIGURE 5

Estimation Strategy. My analysis examines the impact of capital constraints on firm survival and risk taking. To identify these effects, I exploit the quasi-exogenous variation in interest rates induced by the change in assignment methodology by the financing company. I begin this section by discussing the identification concerns associated with using OLS estimation. I then

present the econometric model I use to estimate the changes in interest rates and the assumptions necessary for a causal interpretation of the outcome variables.

Consider the cross-sectional relationship between firm performance and interest rates:

$$Rate_i = f_i^{Regime}(X_i, regime, \mu_i)$$

$$Outcome_i = \alpha_0 + \alpha_1 Rate_i + \boldsymbol{\theta}_i \boldsymbol{X}_i + \gamma_i$$

where $Outcome_i$ is the performance of owner *i* (e.g., *Major Claim*), $Rate_i$ is the interest rate the owner receives, $\boldsymbol{X}$ is a vector of observed owner characteristics, and μ_i and γ_i are unobserved determinants of firm performance and interest rates respectively.

To overcome identification concerns from omitted variable bias, I exploit the exogenous variation in interest rate assignment in the pre and post period following the model of Ferraz and Finan (2011) and Luca and Smith (2013). As I do not directly observe the interest rate algorithms of either period, I form a simulated instrument using the methodology of interest rate determination from the pre-period applied to the post-period. Thus, the predicted value shows what interest rate an owner in the post-period would have received had they applied for the loan in the pre-period if all else was equal. For the post period, I use the previous period's methodology to predict the interest rates via OLS prediction algorithm. Then I calculate the difference between the predicted interest rate and the actual interest rate. This difference captures the size of the "shock" the new interest rate was to any given driver.

To construct the instrument of interest, let *f* be a prediction function for interest rates such that:

$$f_i^{Regime} = \varphi_0 + \varphi_1 X_i^{Regime} + \xi_i$$

Then using this prediction formula, I construct the difference between rates (*Diff*R*ate*) as:

$$f_i^{Pre}(Rate) - f_i^{Post}(Rate) = DiffRate_i$$

More formally, the instrument must satisfy the relevance condition and the exclusion restriction. The difference between predicted interest rates and actual interest rates satisfies the relevance condition, as larger differences are associated with larger values of the potentially endogenous rate. The exclusion restriction is also likely to be satisfied as the difference between the predicted and actual interest rate should have no impact on the outcome variables other than via the endogenous variable. For this concern to be true, the change in interest rates would have to be systematically biased towards or against characteristics that are more likely in firms associated with different outcomes. For example, if the new regime gives more weight to some driving risk indicator than the previous one then the new rate would be lower for safer drivers relative to more risky ones. If that driving risk indicator correlates with some other outcomes, then there still might be omitted variable bias. However, this is unlikely here for several reasons. The company does not take misconduct into account when making interest rate determinations. Furthermore, interest rates changes are based on the likelihood of default, not performance as estimated here in terms of distance travelled, trips taken, or hours spent in operation.[17] Moreover, there would have to be a systematic change in the driving risk indicator to confound the analysis. In addition, the level of all characteristics is controlled as part of the rate estimation. Another possible violation of the exclusion restriction would occur if owners anticipated changes made by the financing company. However, given no taxi owner, association or industry body held equity in the company at the time and the financing company did not publicize its methodology change until after its implementation, this argument seems unlikely. Following the construction of the instrument, I estimate the following two stage least squared (2SLS) model:

[17] The financing company bases its business model on collections from loans and repossessing vehicles which are then repaired and sold onto the second vehicle market. The primary loan scoring system therefore only focuses on defaults as the primary metric. To date, it does not include insurance payouts or potential driver behavior.

$$Stage\ 1: Rate_i = \beta_0 + \beta_1 DiffRate_i + \boldsymbol{X}_{it}\boldsymbol{\delta}_{it} + \mu_i$$

$$Stage\ 2: Outcome_i = \alpha_0 + \alpha_1 Rate_i + \boldsymbol{X}_{it}\boldsymbol{\theta}_{it} + \gamma_i$$

In the equation, the consistent estimation of $\boldsymbol{\alpha}_1$ using the 2SLS approach relies on the strength of the interest rate prediction methodology with X_{it} a vector of observed owner characteristics in addition to association and time fixed effects. If this function is specified correctly, it will isolate out the portion of the interest rate change caused by the exogenous change in rate methodology as opposed to the actions of the operators. Conditional on the validity of the instrument, $\boldsymbol{\alpha}_1$ will then capture the average treatment effect of interest rates on firm performance. For the main specification, I specify the prediction function using OLS methodology This functional form assumption fits the data quite well and it does not appear to be overly restrictive as the results are robust to a series of alternative functional form assumptions. [18]

Section 5: Empirical Results

In this section, I use the identification strategy based on the difference between the two interest rate regimes to estimate the causal effects of interest rates on firm performance. I show that lower interest rates lead to a decrease in strategic misconduct and improved performance. I demonstrate that these results are robust to different specifications. I then investigate whether interest rates heterogeneously impact operators along the characteristics of gender, firm age, firm size, firm resources and loan scores. I follow with an exploration of how different misconduct "strategies" relate to each other. My results suggest that misconduct is sensitive to capital constraints and larger and more resourced firms undertake less aggressive behaviors as the model suggests. I then undertake several robustness checks including re-estimating the impact on the primary

[18] As a robustness check, I run a coarse exact matching model comparing the outcomes of firms with similar characteristics in the pre and post periods.

outcome variables via coarsened exact matching and various constructions of the instrument. Overall, the results are robust to various specifications. [19]

INSERT TABLE 2

Two-Stage Least Squares Estimates of Firm Performance. In Table 2, I investigate whether interest rates impact strategic misconduct using the difference between interest rate regimes as quasi-exogenous variation as described in Section 3. Column 1 reports the estimated coefficient of the *DiffRate* from the methodology specified in Section 3 regressed on interest rates including the set of controls I will use throughout the analysis[20]. As expected, I find a statistically significant negative relationship as interest rates are lower in the post period. To test for instrument relevance, I compute the heteroskedasticity robust F-statistic which yields a value of 71.729 and a p value of less than .001 suggesting that the instrument is strong and appropriate for statistical inference.

I then examine the relationship between a primary outcome variable, *Major Claims*, and interest rates. In Column 2, I report a statistically significant positive association between interest rates and major claims. I now turn to the instrumental variable regressions using quasi-exogenous variation between credit regimes to address these identification concerns. In Column 3, I report the full specification with controls using *Major Claims* as the outcome variable. I find that the point estimate 0.110 (standard error = 0.007) suggesting that a 1 percentage point decrease in interest rates leads a 11% decrease in major insurance claims for the average operator. To account for variation in time and between taxi associations, I add time and association fixed effects. Capturing this variation

[19] I also conduct a complementary analysis of the various outcome variables in Appendix D. These results suggest that firms select misconduct actions as a bundle. Firms that speed tend also to get into more crashes and have more glass claims. A MANOVA analysis indicates that it is the firms with the greatest resources that are most likely to engage in misconduct. These results support the heterogenous findings above.
[20] Throughout the analysis I use Credit Category, Age, Gender, Exist Operator, Number of Deals, and Association Quality.

is important as different associations might select for different types of owners and firms are financed over a multi-year period which might include seasonal and yearly variations. The sample size decreases for the specifications with association fixed effects due to incomplete data in the sample. I find that adding fixed effects to the specification does not significantly change the outcome variable. I therefore will rely on the IV plus controls and fixed effects throughout the remaining analysis as specified in Column 6 noting that a 1 percentage point decrease in interest rates leads to a 12% decrease in major insurance claims.

The IV estimates presented in Columns 3- 6 are larger than the OLS estimates presented in Column 2. This comparison suggests that our OLS estimates under-estimate the true impact of interest rates on firm performance. This under-estimation could be the case if the company tends to select for owners more motivated to succeed, in which case the OLS estimates would underestimate the true effects of decreasing interest rates. An alternative, and perhaps more likely, explanation might be that my IV estimates are estimated locally and the response can be quite heterogenous. My estimates suggest that the marginal owner that is affected by the interest rate is more responsive than the effects for the average owner.

INSERT TABLE 3

Table 3 applies the IV regression to the remaining dependent variables. In Column 2, I find that owners assigned lower interests have a lower probability of filing a glass claim (a 1 percentage point decrease in interest rates decreases the likelihood of a glass claim by 6%). Lower interest rates are also associated with a decrease in major collisions (12%) and speeding alerts (11%). These findings confirm the primary prediction from the model, namely that relaxing capital constraints amongst distressed firms leads to lower levels of strategic misconduct.

Table 3 also reports the impact of capital constraints on firm performance. I find that a 1 percentage point decrease in interest rates leads to a 5% increase in daily distance travelled, an 8% increase in hours driven, and a 4% decrease in defaults, the proxy for firm failure. These point estimates suggest that firm performance increases with lower capital constraints. Interestingly, total trips decrease by 15% in response to a 1 percentage point decrease in interest rates. This result suggests that higher interest rates push firms into operating more trips than might be optimal. These results together suggest that firms increase their efficiency and decrease failure when capital constraints are relaxed echoing findings from other studies that examine capital constraints on firm performance (McKenzie 2017; Quinn and Woodruff 2019).

In sum, the estimates presented in Table 3 suggest that interest rates have an important impact on strategic misconduct and performance. Operators that receive lower interest rates are less likely to get into accidents, be aggressive with other firms, speed, and default on their loans. In addition, they drive further and longer yet take fewer trips suggesting that capital constraints increase the "economic vice" which produces suboptimal performance. Notably, the decrease in total trips in response to the relaxation of capital constraints suggests that the only strategic option available to increase profitability for these firms is to increase volume. However, given the limitations of time, increasing volume most likely means increasing speed and aggressiveness. It is therefore encouraging that my results present a coherent whole, improved performance, fewer trips, less misconduct, as one might anticipate in response to the relaxation of capital constraints.

The next logical question is how these effects might vary heterogeneously for different types of operators especially given the importance of different characteristics in capital allocation decisions. In the next section, I explore the heterogenous effects of interest rate increases on different sub-populations.

Heterogenous effects. Table 4 presents the relationship between interest rates, misconduct and firm performance by different operator categories. For each category, I re-run the IV regression including interaction effects for firms run by women, existing owners, firms with newer assets, larger firms, and firms with more resources, and those who record speeding alerts on average more than once a day. The regression coefficients for each sub-category are estimated in separate regressions. They include the controls and fixed effects from the main regression specification in Table 2.

INSERT TABLE 4

The first set of rows consider the impact of interest rates on outcomes for female run firms. Across all outcome variables, there is no statistical difference between male and female run firms.[21] The second set of rows report the impact of interest rates on existing owners. I report a mixed set of findings when including the interaction of existing owners, those who have at least one other vehicle. I find that existing owners and new owners decrease glass claims (5%) and speeding alerts (10%), and trips (16%) and increase distance travelled (4%) and hours operated (9%) at the same level in response to a 1 percentage point decrease in interest rates as the interaction terms are not statistically significant. However, I do find that newer firms default less and lodge fewer major insurance and collision claims than existing ones. These results indicate that newer firms disproportionately benefit from the relaxation of capital constraints on some dimensions. As the qualitative evidence below suggest, these newer firms might drive more aggressively to make their

[21] This finding with female run firms is consistent across all specifications of the instrument and within matching analysis which is reported within the robustness checks. While female tend to default more than their male counterparts, the relaxation of capital constraints seems to be associated with no statistically significant decrease in default for example. These results might also suggest that my sample is underpowered. This might be true however 20% of the sample is female owners. In addition, when I conduct split sample analysis, I find similar results.

minimum profitability requirements and therefore struggle to turn away from more misconduct. In addition, the capital constraints they face might be particularly binding in terms of survival.

I next examine firms that have a higher quality asset (a new vehicle). The purchase of a new vehicle is an important determination for firm performance according to the qualitative interviews. Newer vehicles require less maintenance and as a result can drive further and longer. In response to a 1 percentage point decrease in interest rates, I find that owners with newer assets drive more hours on average (9%), experience a smaller decrease in collisions (10%) and major claims (10%) in comparison to those owners with used vehicles. In comparison, they decrease both major insurance claims and collisions by 15% while only increasing hours by 4%. These results are in line with previous findings. Notably, new vehicles decrease speeding by 16% while used vehicles *increase* speeding by 11% in response to a 1 percentage point change in interest rates.

How might we make sense of these results? Lower assets values might lead to additional strategic misconduct. If one believes that the asset might have a shorter-term shelf life, an owner might choose to operate the vehicle as aggressively as possible to maximize the amount of revenue that she might receive from the asset. Lower capital constraints would increase the revenue available and therefore increase the incidence of misconduct. This result provides a potential boundary condition on the extent to which strategic misconduct might decrease as a result of capital constraints.

I now turn to firms that have more resources which I proxy by higher quality assets, more assets owned by the firm, and a composite which includes assets and higher credit scores. [22] The fourth section of Table 4 reports the results for large firms which I designate as having financed at least four or more vehicles with the financing company. Like with existing firms, larger firms benefit less than their smaller counterparts in terms of defaults, collisions, and major insurance claims.

[22] I explore alternative cut-offs for large and top credit scored firms in the robustness checks in Appendix E

Columns 1 and 8 suggests that in fact larger firms benefit not at all from the relaxation of capital constraints in terms of default and major insurance claims. On the contrary, lower interest rates might be associated with modestly higher levels of default and major insurance claims. I investigate these findings further in the robustness checks.

Regarding strategic misconduct, I report mixed results. According to Table 4, large firms seem to report fewer glass claims (20%) than smaller firms (5%) as interest rates fall yet smaller firms report fewer collisions (12%) than larger firms (2.5%) at statistically significant levels. As I detailed previously, glass claims might indicate more aggressiveness with other operators so a significant decrease as a result of failing interest rates might be associated with substantially less predatory behavior. This rationale is particularly compelling in the case of larger firms. As larger firms experience less financial pressure, they might become less aggressive in securing routes from other operators. Smaller firms most likely are unable to exercise this strategy as they have less assets and clout in associations and therefore rely on strategic misconduct as part of their core operating strategy.

The next category of firms I investigate are those owners with the most overall resources which comprises firms with the highest loan scores, owners above 750 on a 1000-point scale, at least four vehicles, and new assets. In response to a decrease interest rate, these firms experience a steep decline in misconduct. A 1 percentage point change in interest rates is associated with a 20% reduction in glass claims and 15% reduction in speeding alerts in comparison to 4% and 9% respectively for less resourced firms. At the same time, the performance of better resourced firms increases substantially as measured by distance travelled (11%) and hours in operation (13%) in comparison to 6% and 7% respectively for their less resourced counterparts. These results mirror the findings for the large firm category as one would expect. However, it is notable that aggressive behavior decreases substantially for these firms. It seems likely that these firms with more resources

are better able to take advantage of the reduction of capital constraints due to their more flexible financial position and perhaps status in the industry. These results suggest that those firms most able to decrease their misconduct do so. Meanwhile those less resourced firms most likely find themselves less able to meet minimum profitability requirements and therefore continue to rely on misconduct.

The last notable heterogenous effect is for those firms that log more than one speeding alert per day. The IV analysis suggests that a 1 percentage point change in interest rates leads non speeders to decrease defaults by 6% but speeders only do so marginally by less than half a percent. These results imply that whilst speeding might generate more income in the short run it is not necessarily a robust long term survival strategy.

Complementary Analysis. I next consider how firms engage in misconduct and how those behaviors correlate with each other. As I demonstrate in the exploration of the data, the distribution of speeding alerts is strikingly convex. Firms that log over 1 speeding alert per day represent 15% of the sample whereas those who speed less comprise 85% of the sample. I now investigate how different categories of firms, those that speed, get in collisions, and have glass claims (aggressors), relate to one other.

INSERT TABLE 5

Table 5 provides differences for different variables of performance and misconduct by category of firms. I find that those firms that speed, log at least 1 speeding alert on average per day, are 33% more likely to have a glass claim and 8% more likely to experience a collision. Notably these firms drive 15% more kms and spend 5% less time on the road. Despite the increased risk of a crash, they are more efficient in their operations suggesting that speeding is an effective strategy for increasing revenue at least in the short term. Considering aggressors, they are 37% more likely to

speed and 22% more likely to get into a crash. These findings support the prediction from the model, namely that those who engage in misconduct will do so in a variety of ways. This behavior also coincides with the qualitative findings. Aggressive owners and drivers often spoke of speeding, running competitors of the road, *and* getting into crashes with some regularity. In addition, firms that speed more than average are more likely to default but they drive longer distances, take more trips, yet drive fewer hours. The speeding firms represent 68% of the defaulters in the dataset. These results also suggest that the inference above – strategic misconduct is a profitable albeit risky strategy for firms to undertake.

INSERT TABLE 6

I next consider which firms engage in the most misconduct. I conduct a MANOVA analysis relying on a Pillai test statistic following (citation) to test joint significance across covariates in a model. I rely on the basic OLS regression for the misconduct outcome variables. Table 6 reports the findings from this analysis. I find that firms that are larger, have higher credit scores, and newer assets are more likely to speed, collide, and be aggressive all reporting F statistics over 3, the threshold for statistical significance. We can infer from these findings that those well-resourced firms are more likely to engage in misconduct. The qualitative supports these findings. These firms have the highest status in the industry and therefore can be more aggressive with other operators who might face social sanction or even death if they anger a senior member.

Robustness Check – Coarsened Exact Matching. Having explored my primary specification and its heterogenous effects, I explore several robustness checks. First, I re-estimate the core results from Table 3 via a coarsened exact matching strategy following King et al (2011). CEM selects strata for similar types of pre and post treatment units via a monotonic imbalance bounding method. It clusters similar observations based on ex-ante user choice bounding the degree

of model dependence and the average treatment effect estimation error eliminating the need for a common empirical support procedure. I use the binary variable of credit regime as the treatment assignment. Table 7 reports the results of this estimation method and the balance table. The $\mathcal{L}_1$ score for the pre-treated variables is 0.452. Of the total sample, 1901 observations are in the pre-period and 2297 are in the post period. The matching process creates 1580 pre-period and 2115 post-period matched observations dropping 494 observations. Given that lower interest rates were assigned in the post-period, I find similar relationships between the treatment assignment and the dependent variables. These sign directions are consistent with the primary IV estimation strategy, as lower interest rates are associated with lower incidences of misconduct and improved performance.

INSERT TABLE 7

Robustness Check – Alternative Instrument Construction. In the original instrument construction, I use an OLS prediction model for interest rate which includes the co-variates of age, gender, existing operator, association quality, asset quality, firm size, loan size, and loan score. This core specification is based on qualitative interviews with the credit team of the financing company. Although the team did not reveal the exact algorithm for interest rate allocation, they did indicate that these variables are the ones that they use in their` credit decision making process.

INSERT TABLE 8

As a robustness check, I apply different methodologies to the outcome variables of interest in Table 8. The *core specification* refers to the original OLS estimation. *OLS Alternate 1* re-estimates the OLS model with just the variables *Loan Score, Asset Quality,* and *SATaxiDeals* as a proxy for previous history with the company. *OLS Alternate 2* re-estimates the OLS model with co-variates from the original specification but includes polynomials for *Age* and *Loan Size* as well as two-way interactions

for all the co-variates. To address the concern of overfitness, I apply ridge and lasso regression approaches to increase the prediction accuracy of the statistical model that includes polynomials and interactions. As a final robustness check to the specification, I use a dummy variable for the regime change as an instrument in the first stage. Overall, the results from alternative specifications are remarkably robust. All coefficients are similarly statistically significant across the specifications. I conduct and report several other robustness checks in Appendix E.

Section 6: Qualitative Evidence & Mechanisms

To understand why the modest relaxation of capital constraints might reduce strategic misconduct and why that effect is strongest for the largest firms, I turn to survey and qualitative evidence. I collected survey data on 108 minibus owners. In addition, I conducted over 60 hours of semi-structured interviews with 46 stakeholders throughout the minibus taxi industry including taxi owners, drivers, union representatives, financiers, regulators and journalists. I adopted this holistic approach as there is little existing systematic research on the minibus taxi industry in South Africa. The survey and qualitative interviews uncover two primary mechanisms that might explain the quantitative results: capital constraints are a primary challenge for firms and the penalty of default is extremely high.[23]

Capital Constraints. Owners and drivers that operate in the minibus taxi industry often complain about extremely high monthly payments to service their loans. In the survey, I ask the question "what is the greatest challenge to your business." Over 55% of operators selected high monthly capital payments in response. These high capital costs immediately put owners and drivers in an economic bind. Joining an association is costly, prices are fixed, routes are largely set, and those routes are oversubscribed. The only strategic choice available to make enough money to

[23] My survey and qualitative methodology are explained in Appendix F along with additional findings.

remain profitable in the industry is to drive fast and aggressively according to many who operate in the industry. One owner describes the predicament:

> "I must make what I can to make the monthly payment. Every trip I take is valuable. I will be aggressive with other vehicles to get as many passengers as I can on a route. I then drive as fast as I can to make it back to the taxi rank to get more passengers. I know an accident is bad for the vehicle, but I cannot afford to miss trips."

As this owner notes, many operators know that fast and aggressive driving can lead to costly accidents but choose to do so anyway. Capital constraints in this setting therefore exacerbates already tough daily operating conditions.

Penalty of Default. The reduction in strategic misconduct in the empirical analysis may be driven by the fact that while firms that are "close to the edge" are often driven to engage in risk behaviors. According to interviews, for these firms the penalty for default extends far beyond the loss of assets. One operator quotes: "I have to keep the business going or else we will not eat. I have no formal education and job prospects are very bad. I am the only one who works and I support five different family members. Without me there is nothing."

Penalty of default can extend beyond economic loss increasing the likelihood of violence. Within minibus taxi associations, stronger owners within a taxi association prey on their weaker counterparts forcing them off routes with aggressive tactics such as damaging vehicles, beatings or in the most extreme case assassinations. Defaulting on loans and inability to operate is considered a weakness in the eyes of other operators and signals an invitation to respond with violence. One operator recalls: "My father defaulted on a loan and couldn't run his route. While he was arranging payment, some operators in his association bombed our house to intimidate us."

Together the various components of the penalty of default amount to the prospect of severe loss of economic and physical security. This dynamic makes the penalty of default extremely high. Coupled with the high penalty of default and uncertainty from high impact events, the evidence

suggests that lower fixed monthly costs might decrease the likelihood of strategic misconduct. The survey and qualitative data collected here provides supporting evidence to the results of the 2SLS regressions in the previous section. It appears that reduction in capital constraints, even modest ones, might play a critical role in strategic misconduct and firm performance.

Section 7: Discussion and Conclusion

Despite the consensus that higher capital constraints lead to worse firm performance, there has been little work to date on how capital constraints impact strategic misconduct. In this paper, I estimate the effects of changing interest rates on strategic misconduct and firm performance. My empirical analysis suggests that rising interest rates lead to worse firm performance as previous studies have found. However, I find that strategic misconduct decreases as capital constraints relax and the most well-resourced firms decrease the most. Relying on a series of in-depth qualitative interviews, I argue that the degree of uncertainty that these firms face and the penalty of default might underlie these results.

Academic Contribution. My findings contribute to several literatures. First, my results suggest that an important lever for alleviating misconduct might be relaxing capital constraints. They further suggest that settings which are characterized by competition and institutional voids might yield insight as to how and why firms adopt misconduct as a dominant strategy even if they understand the extent of the consequences. I also contribute evidence to an active ongoing debate on how more vulnerable firms respond to the relaxation of capital constraints in emerging markets. To date, empirical studies have focused mostly on firm performance and survival. My results suggest that impact of relaxing capital constraints is understated. Relaxing capital constraints can decrease strategic misconduct, behavior the public would like for firms to avoid, which might have broad public welfare benefits. In addition, my findings create a direct link between strategic misconduct

and weak regulatory environments. Many firms that operate in these spaces have a large impact on public welfare due to the lack of effective regulation. My findings suggest that relaxing capital constraints might lead to improved public welfare for communities that face weak regulation.

In addition, I contribute to the growing field in management and economics that is concerned with how to incentivize firms to undertake pro-social behavior. Research on corporate social irresponsibility, broadly defined as unethical behavior that shows disregard for the welfare of others, primarily focuses on why large well-resourced firms in developed markets might pursue socially sub-optimal strategies. To this author's knowledge, no research exists on why smaller entrepreneurial firms might pursue these strategies. By examining the impact of capital constraints on strategic misconduct, I add to our understanding of how capital constraints might incentivize socially non-optimal behavior for small entrepreneurial firms which might have larger public welfare impacts.

I also contribute to the institutions and entrepreneurship literature. My results join a growing body of research that suggest that management strategy theories might have limited applicability for firms with limited resources that operate in highly competitive environments and with weak regulation (Hiatt and Sine 2014; Hiatt, Carlos, and Sine 2018. The optimal entrepreneurship strategy in these environments might not rely on experimentation or developing a superior competitive position per se. My research suggests that the pathway to survival and long-term profitability might instead turn on alternative factors and traditional strategies might lead to misconduct.

My research also extends the work on payday lending in the US and other markets. This literature has demonstrated that excessively high interest rates might lead to increase personal bankruptcies (Skiba and Tobacman 2019), difficulty in making mortgage payments (Melzer 2011), increased delinquency in child support (2017), and most alarmingly increased incidence of suicide

(Lee 2017). This paper suggests that capital constraints can also lead firms to adopt strategic misconduct such as speeding or aggressiveness with other firms that can have deadly consequences.

Managerial Implications. The findings of this paper suggest several implications for managers. For financiers who specialize in delivering capital to firms in competitive environments with weak regulation, this paper suggests charging too high interest rates cause harm for both the financing firm and the entrepreneur. Ample research suggests that capital constraints undermine firm performance. My findings extend the scope of harm outside of the firm to the wider public. Strategic misconduct can potentially hinder the firm itself, dampen the performance of other firms in the industry, and have deadly consequences for customers and other community members. Therefore, relaxing capital constraints, e.g. offering lower interest rates, presents a threefold opportunity. First, such relaxation will increase the performance of the loan as the financed company will be less likely to engage in activities that undermine the long-term sustainability of its operations. Second, other firms who have loans with the company will be less likely to be negatively impacted by strategic misconduct, e.g. getting into an accident with a vehicle that is speeding. Third, employees who might use the services of the firms constrained by capital are less likely to face dire consequences.[24] However, financing firms often charge higher rates due to informational asymmetries and funder priorities. Given these limitations, future research should consider how best to offer more affordable capital to these firms such as offering working capital facilities, lowering interest rates, or providing equity contracts.

The findings of this paper also present implications for managers who operate firms in competitive environments with weak regulation. First, while tempting, turning to strategic

[24] The Head of Credit for the financing company here died in an accident with a speeding minibus taxi in the fall of 2021. Without irony, that taxi was financed by the company. Indeed, the consequences of strategic misconduct are deadly.

misconduct increases the likelihood of an event that could permanently damage the operating asset limiting the potential for long term profitability. Second, strategic misconduct endangers the well-being of the community a firm serves. Often these firms are closely linked - geographically, socially, and economically - to their customers. Those customers are the ones most likely to suffer the consequences from strategic misconduct such as vehicle crashes. Notwithstanding these drawbacks, firms still choose to engage in strategic misconduct. Therefore, future research should consider how what practices might substitute for strategic misconduct such as improved bookkeeping, better asset maintenance, or optimal employee contracts.

These lessons apply to firms beyond South Africa. Multiple emerging markets have industries with characteristics that mirror those in the minibus taxi industry. Furthermore, firms that operate in developed markets yet face institutional voids such as poor regulatory oversight, lack of access to affordable financing, or experience severe information asymmetry. In the US, many firms that operate in underserved neighborhoods in urban and rural areas face many of the same challenges as firms that operate in the minibus taxi industry.

References

Alive, Arrive. "Minibus taxis and road safety." (2015).

Andersen, Steffen, and Kasper Meisner Nielsen. "Ability or finances as constraints on entrepreneurship? Evidence from survival rates in a natural experiment." *The Review of Financial Studies* 25.12 (2012): 3684-3710.

Andrade, Gregor, and Steven N. Kaplan. "How costly is financial (not economic) distress? Evidence from highly leveraged transactions that became distressed." *The journal of finance* 53.5 (1998): 1443-1493.

Associated Press. "Johannesburg taxi strike turns violent, snarls traffic." 15 June 2017. Web. 13 Dec 2021 https://apnews.com/article/b3a678afa24445898026cbf694fa2361

Belavina, Elena, Simone Marinesi, and Gerry Tsoukalas. "Rethinking crowdfunding platform design: mechanisms to deter misconduct and improve efficiency." *Management Science* 66.11 (2020): 4980-4997.

Bennett, Victor Manuel, et al. "Customer-driven misconduct: How competition corrupts business practices." *Management Science* 59.8 (2013): 1725-1742.

Bianchi, Emily C., and Aharon Mohliver. "Do good times breed cheats? Prosperous times have immediate and lasting implications for CEO misconduct." *Organization Science* 27.6 (2016): 1488-1503.

Bruhn, Miriam, Dean Karlan, and Antoinette Schoar. "What capital is missing in developing countries?" *American Economic Review* 100.2 (2010): 629-33.

Chan, Tat Y., et al. "The influence of peers in worker misconduct: Evidence from restaurant theft." *Manufacturing & Service Operations Management* 23.4 (2021): 952-973.

Cheung, Yan-Leung, P. Raghavendra Rau, and Aris Stouraitis. "What determines the return to bribery? Evidence from corruption cases worldwide." *Management Science* 67.10 (2021): 6235-6265.

Cole, Shawn, Xavier Giné, and James Vickery. "How does risk management influence production decisions? Evidence from a field experiment." *The Review of Financial Studies* 30.6 (2017): 1935-1970.

De Mel, Suresh, David McKenzie, and Christopher Woodruff. "Returns to capital in microenterprises: evidence from a field experiment." *The quarterly journal of Economics* 123.4 (2008): 1329-1372.

Dimmock, Stephen G., William C. Gerken, and Nathaniel P. Graham. "Is fraud contagious? Coworker influence on misconduct by financial advisors." *The Journal of Finance* 73.3 (2018): 1417-1450.

Doering, Laura. "Necessity is the mother of isomorphism: Poverty and market creativity in Panama." *Sociology of Development* 2.3 (2016): 235-264.

Fafchamps, Marcel, et al. "Microenterprise growth and the flypaper effect: Evidence from a randomized experiment in Ghana." *Journal of development Economics* 106 (2014): 211-226.

Ferraz, Claudio, and Frederico Finan. *Motivating politicians: The impacts of monetary incentives on quality and performance*. No. w14906. National Bureau of Economic Research, 2009.

Fobosi, Siyabulela. *Uncovering Precarious Working Conditions in the Global South: A Case of the Minibus Taxi Industry in South Africa.* (2021)

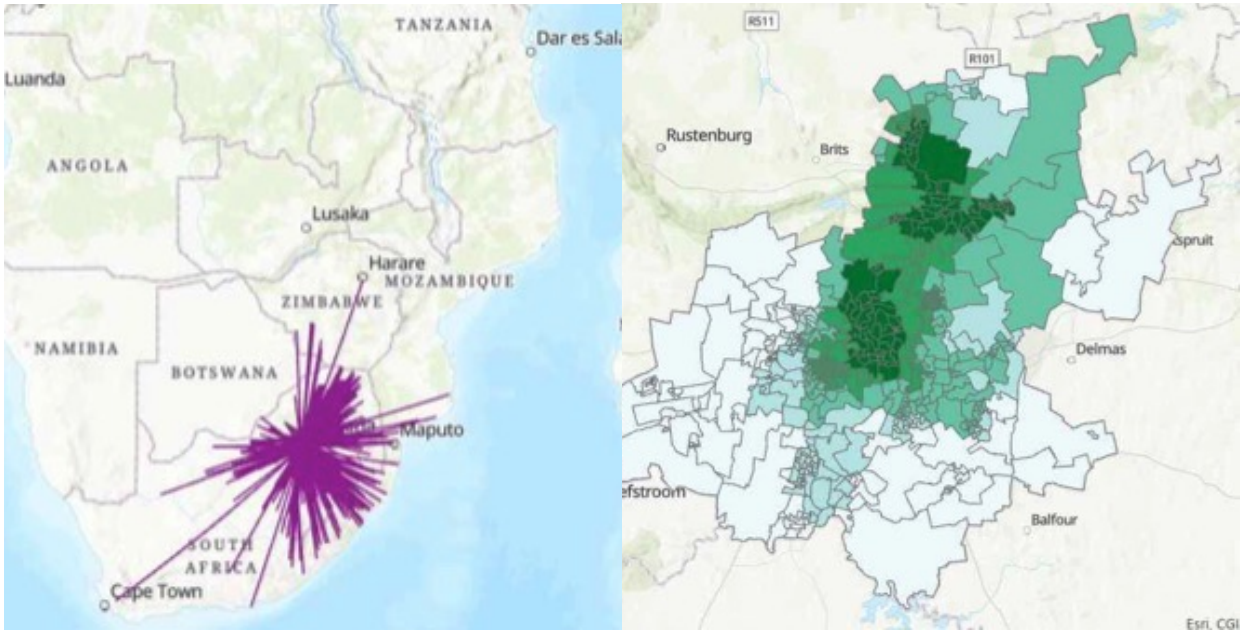
Greve, Henrich R., Donald Palmer, and Jo-Ellen Pozner. "Organizations gone wild: The causes, processes, and consequences of organizational misconduct." *Academy of Management Annals* 4.1 (2010): 53-107.

Hiatt, Shon R., and Wesley D. Sine. "Clear and present danger: Planning and new venture

survival amid political and civil violence." *Strategic Management Journal* 35.5 (2014): 773-785.
Hiatt, Shon R., W. Chad Carlos, and Wesley D. Sine. "Manu Militari: The institutional contingencies of stakeholder relationships on entrepreneurial performance." *Organization Science* 29.4 (2018): 633-652.
Hope, Ole-Kristian, et al. "Newspaper censorship in China: Evidence from tunneling scandals." *Management Science* (2021).
Kerr, Andrew. *Minibus Taxis, Public Transport, and the Poor*. World Bank, 2018.
Khanna, Tarun, and Krishna G. Palepu. *Winning in emerging markets: A road map for strategy and execution*. Harvard Business Press, 2010.
Klimczak, Karol Marek, et al. "How to Deter Financial Misconduct if Crime Pays?" *Journal of Business Ethics* (2021): 1-18.
Law, Kelvin KF, and Luo Zuo. "How does the economy shape the financial advisory profession?" *Management Science* 67.4 (2021): 2466-2482.
Lee, Jaeyoon. "Credit access and household well-being: Evidence from payday lending." *Available at SSRN 2915197* (2019).
Levine, Ross, and Sara Zervos. "Stock markets, banks, and economic growth." *American economic review* (1998): 537-558.
Luca, Michael, and Georgios Zervas. "Fake it till you make it: Reputation, competition, and Yelp review fraud." *Management Science* 62.12 (2016): 3412-3427.
Luca, Michael, and Jonathan Smith. "Salience in quality disclosure: Evidence from the US News college rankings." *Journal of Economics & Management Strategy* 22.1 (2013): 58-77.
Madsen, Peter M. "Does corporate investment drive a "race to the bottom" in environmental protection? A reexamination of the effect of environmental regulation on investment." *Academy of Management Journal* 52.6 (2009): 1297-1318.
Maduku, Harris, and Irrshad Kaseeram. "Inflation Targeting Monetary Policy and Unemployment in South Africa." *Journal of Economics and Behavioral Studies* 10.4 (J) (2018): 88-96.
Melzer, Brian T. "The real costs of credit access: Evidence from the payday lending market." *The Quarterly Journal of Economics* 126.1 (2011): 517-555.
Melzer, Brian T. "Spillovers from costly credit." *The Review of Financial Studies* 31.9 (2018): 3568-3594.
McKenzie, David. "Identifying and spurring high-growth entrepreneurship: Experimental evidence from a business plan competition." *American Economic Review* 107.8 (2017): 2278-2307.
Palmer, Donald, and Christopher B. Yenkey. "Drugs, sweat, and gears: An organizational analysis of performance-enhancing drug use in the 2010 Tour de France." *Social Forces* 94.2 (2015): 891-922.
Pierce, Lamar, Daniel C. Snow, and Andrew McAfee. "Cleaning house: The impact of information technology monitoring on employee theft and productivity." *Management Science* 61.10 (2015): 2299-2319.
Pierce, Lamar, and Jason A. Snyder. "The historical slave trade and firm access to finance in Africa." *The Review of Financial Studies* 31.1 (2018): 142-174.
Popov, Alexander. "Credit constraints, equity market liberalization, and growth rate asymmetry." *Journal of Development Economics* 107 (2014): 202-214.
Quinn, Simon, and Christopher Woodruff. "Experiments and entrepreneurship in developing countries." *Annual Review of Economics* 11 (2019): 225-248.
Rajan, Raghuram, and Luigi Zingales. "Financial development and growth." *American Economic Review* 88.3 (1998): 559-586.

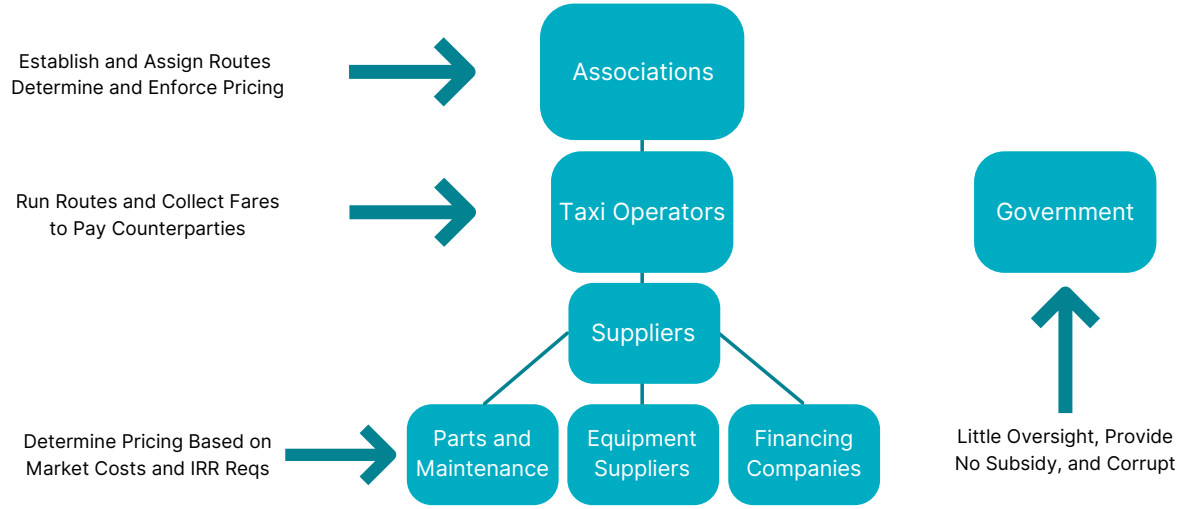
Schnatterly, Karen, K. Ashley Gangloff, and Anja Tuschke. "CEO wrongdoing: A review of pressure, opportunity, and rationalization." *Journal of Management* 44.6 (2018): 2405-2432.
Skiba, Paige Marta, and Jeremy Tobacman. "Do payday loans cause bankruptcy?" *The Journal of Law and Economics* 62.3 (2019): 485-519.
Vasudev, P. M. "Financial Misconduct, Ethical Theory, and Regulatory Ethics-Promoting Accountability." J. Bus. Entrepreneurship & L. 9 (2015): 93.
Webb, Justin W., et al. "You say illegal, I say legitimate: Entrepreneurship in the informal economy." *Academy of management review* 34.3 (2009): 492-510.
Yenkey, Christopher B. "Mobilizing a market: Ethnic segmentation and investor recruitment into the Nairobi Securities Exchange." *Administrative Science Quarterly* 60.4 (2015): 561-595.
Yenkey, Christopher B. "Fraud and market participation: Social relations as a moderator of organizational misconduct." *Administrative Science Quarterly* 63.1 (2018): 43-84.

Figure 1: Minibus Taxi Spatial Coverage



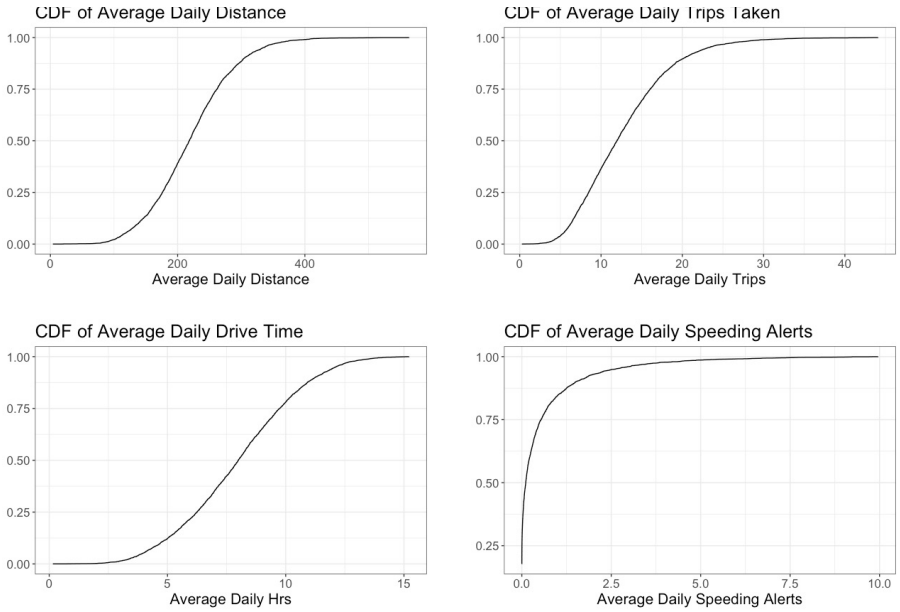
The maps above are generated from the GPS data from the financing company. The panel on the left represents routes that begin in Johannesburg and then end in various parts of Southern Africa. The panel on the right focuses on the Johannesburg area. These panels demonstrate the breadth and density of minibus taxi routes in South Africa.

Figure 2: Overview of Minibus Taxi Industry



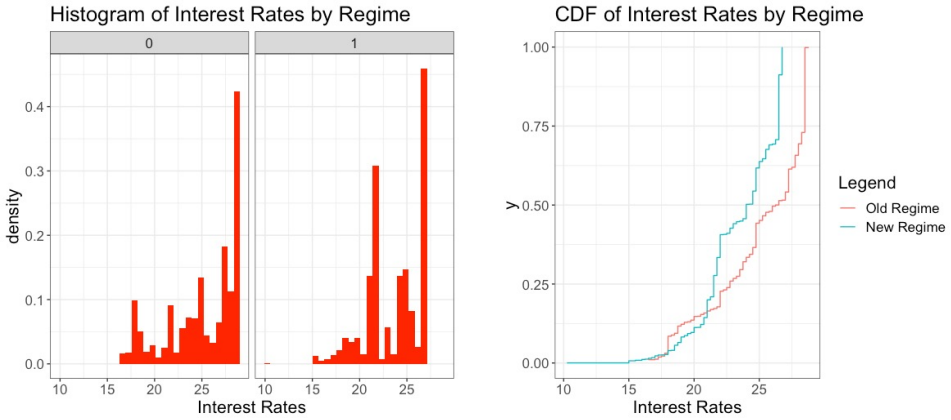
The hierarchy above represents the primary interactions in the minibus taxi industry. Associations are the most powerful bodies. They establish and assign routes, determine and enforce pricing, and add new taxi owners and operators into the industry. They enforce these functions by both social sanction and violence. The government technically issues licensing but in reality provides little oversight, no subsidies to the industry and is plagued by corruption. The suppliers to the industry provide finance, vehicles, and parts and maintenance but receive no subsidy from the government to do so. In turn, taxi operators are left to run routes and collect fares to pay various counter-parties. To remain profitable while fulfilling these obligations often requires reliance on misconduct.

Figure 3: CDFs of Performance Variables



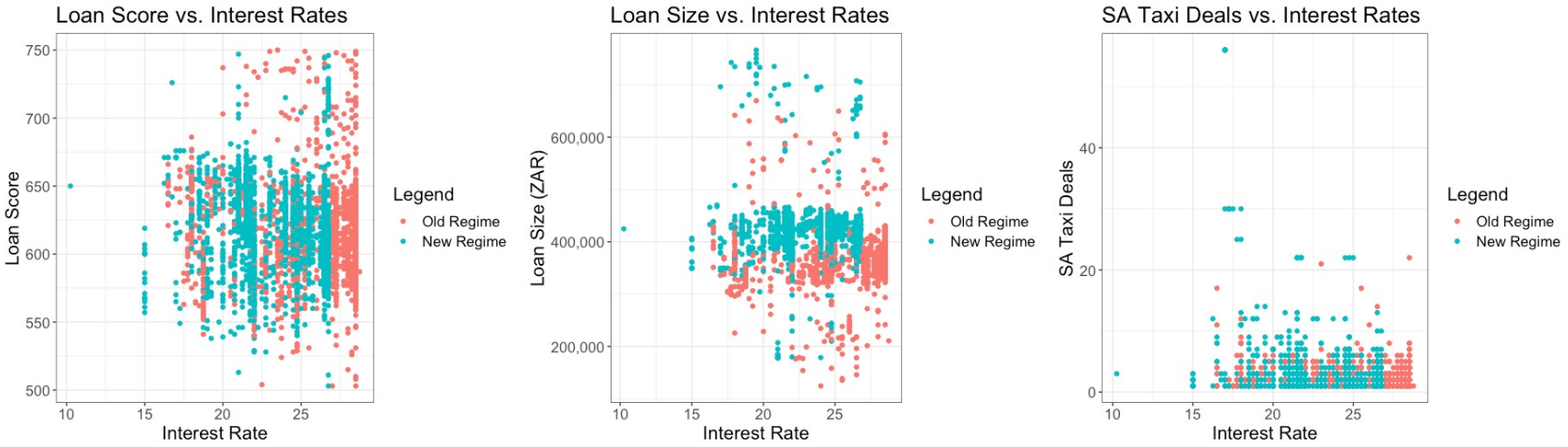
The cumulative density functions above represent the "effort" different operators put into the business. Strikingly, the CDF for average daily speeding alerts is very convex indicating that there are a few operators (15%) who speed a disproportionate amount. The shape of the curve remains true whether a firm is considered a short or long haul.

Figure 4: Key Policy Change: Shift in Interest Rates



The figures here display the distribution of interest rates between the old (pre Jan 2017) and new (post July 2017). The histograms show that the highest interest rate in the old regime is 28.5% and in the regime is 26.5%. The cumulative density functions provide a representation of the difference between regimes. A Welch t-test between the two histograms yields *p-value* = *0.00* and the Kolmogorov-Smirnov Test between the two CDFs yields *p-value* = *0.00* providing motivation to estimate the impact of the difference between the two regimes on firm outcome variables.

Figure 5: Variation of Interest Rates across Loan Score, Loan Size, and Firm Size



The figure above graphs the variation in interest rates across loan scores, loan sizes, and firm size. The first panel restricts the loan score from 500 to 750. The second and third panel represents the entire dataset. The three panels display significant variation amongst interest rates.

Table 1: Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Strategic Misconduct								
Average Daily Speed Alerts	5,209	0.63	1.93	0.00	0.004	0.11	0.52	67.83
Major Claim	5,209	0.26	0.44	0	0	0	1	1
Glass Claim	5,209	0.23	0.42	0	0	0	0	1
Collision Claim	5,209	0.31	0.46	0	0	0	1	1
Firm Performance								
Average Daily Distance	5,209	218.81	65.47	3.83	173.82	216.71	258.95	606.81
Average Daily Hrs Driven	5,209	7.99	2.44	0.15	6.24	8.00	9.70	16.20
Average Daily Trips	5,209	7.34	3.55	1.17	4.89	6.61	8.87	34.66
Default	5,209	0.16	0.37	0	0	0	0	1
Financing								
Interest Rate	5,209	24.22	3.41	10	21.8	24.8	26.8	29
Loan Score	5,209	637.05	101.70	35	594	618	646	972
Credit Category	5,209	3.17	0.60	1	3	3	3	5
Loan (ZAR)	5,209	394,103.80	68,645.44	100,003.70	365,555.70	398,643.70	425,633.50	801,205.70
Vehicle Cost (ZAR)	5,209	425,967.80	74,747.18	98,115	402,440	432,440	450,000.0	894,865
Loan Term (months)	5,209	67.61	6.50	15	65	72	72	72
Owner Characteristics								
Gender (F=1)	5,209	0.19	0.39	0	0	0	0	1
Age	5,209	48.34	10.83	23	40	48	57	76
Asset Quality	5,209	0.76	0.43	0	1	1	1	1
No of Deals	5,209	2.51	3.51	1	1	2	3	56
Exist Operator	5,209	0.73	0.44	0	0	1	1	1
Assoc Quality	5,209	0.09	0.29	0	0	0	0	1
Credit Regime	5,209	0.44	0.50	0	0	0	1	1

Table 2: First and Second Stage IV Regression Results

	Dependent variable:					
	Interest Rate	Major Insurance Claim				
	First Stage - OLS	*OLS*	*Second Staage - IV*			
	(1)	(2)	(3)	(4)	(5)	(6)
DiffRate	-1.080^{***}					
	(0.050)					
Interest Rate		0.015^{***}	0.110^{***}	0.111^{***}	0.116^{***}	0.117^{***}
		(0.002)	(0.007)	(0.007)	(0.009)	(0.009)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	No	No	No	Yes	No	Yes
Association Effects	No	No	No	No	Yes	Yes
Observations	4,197	4,197	4,197	4,197	3,381	3,381
R^2	0.284	0.022	0.070	0.073	0.188	0.188
Adjusted R^2	0.282	0.020	0.068	0.069	0.100	0.100
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 3: IV Estimates on Firm Misconduct and Performance

	Dependent variable:							
	Speeding	Glass	Collision	Major Claim	Distance	Hrs	Trips	Default
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Interest Rate	0.108***	0.057***	0.118***	0.117***	−10.908***	−0.636***	1.136***	0.035***
	(0.008)	(0.008)	(0.009)	(0.009)	(1.190)	(0.043)	(0.067)	(0.008)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Association Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,381	3,381	3,381	3,381	3,381	3,381	3,381	3,381
R^2	0.192	0.159	0.186	0.056	0.306	0.355	0.260	0.172
Adjusted R^2	0.101	0.064	0.095	0.054	0.227	0.282	0.176	0.078

Note: *p<0.1; **p<0.05; ***p<0.01

Table 4: IV Estimates on Impact of Interest Rates: Heterogenous Effects

	Dependent variable:							
	Major Claim	Glass	Collision	Speeding	Distance	Hrs	Trips	Default
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gender								
Interest Rate	0.109***	0.059***	0.105***	0.113***	−12.506***	−0.719***	1.129***	0.033***
	(0.008)	(0.008)	(0.009)	(0.009)	(1.254)	(0.046)	(0.067)	(0.007)
Interest Rate x Gender	0.007	0.014	0.026	−0.027	1.947	0.153	0.051	0.029
	(0.023)	(0.023)	(0.025)	(0.026)	(3.502)	(0.129)	(0.188)	(0.019)
Existing Operators								
Interest Rate	0.139***	0.047***	0.140***	0.077***	−9.120***	−0.711***	1.160***	0.065***
	(0.018)	(0.018)	(0.019)	(0.021)	(2.759)	(0.101)	(0.148)	(0.015)
Interest Rate x Exist Operator	−0.038*	0.019	−0.039*	0.039	−3.913	0.028	−0.027	−0.033*
	(0.022)	(0.022)	(0.023)	(0.025)	(3.306)	(0.121)	(0.177)	(0.018)
Asset Quality								
Interest Rate	0.154***	0.076***	0.145***	−0.107***	−12.245***	−0.488***	0.964***	0.023
	(0.020)	(0.019)	(0.021)	(0.022)	(2.970)	(0.109)	(0.159)	(0.016)
Interest Rate x New Asset	−0.053**	−0.017	−0.041*	0.255***	0.145	−0.239*	0.208	0.019
	(0.022)	(0.022)	(0.023)	(0.025)	(3.341)	(0.123)	(0.179)	(0.019)
Large Firms								
Interest Rate	0.118***	0.048***	0.119***	0.102***	−10.684***	−0.635***	1.127***	0.044***
	(0.008)	(0.008)	(0.008)	(0.009)	(1.192)	(0.044)	(0.064)	(0.007)
Interest Rate x Large Firm	−0.083**	0.147***	−0.092**	0.059	−14.016**	−0.534**	0.090	−0.056*
	(0.037)	(0.037)	(0.039)	(0.042)	(5.661)	(0.208)	(0.302)	(0.031)
Better Resourced Firms								
Interest Rate	0.113***	0.038***	0.113***	0.090***	−11.020***	−0.645***	1.136***	0.039***
	(0.008)	(0.008)	(0.009)	(0.009)	(1.224)	(0.045)	(0.065)	(0.007)
Interest Rate x Resourced	−0.019	0.162***	−0.022	0.126***	−12.265**	−0.405**	0.029	0.002
	(0.034)	(0.034)	(0.036)	(0.038)	(5.098)	(0.187)	(0.272)	(0.028)
Speeding Firms								
Interest Rate	0.119***	0.045***	0.126***	0.037***	−14.809***	−0.691***	1.305***	0.059***
	(0.011)	(0.010)	(0.011)	(0.007)	(1.573)	(0.058)	(0.085)	(0.009)
Interest Rate x Speeder	−0.030	0.031	−0.043*	−0.018	3.599	0.165	−0.396**	−0.055***
	(0.023)	(0.023)	(0.024)	(0.016)	(3.468)	(0.127)	(0.187)	(0.019)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 5: Complementary Analysis - Speeders, Colliders, Aggressors

Panel A: Speeders				
	Speeder	Non-Speeder	Difference	p-value
Avg Trips	7.37	7.24	2%	0.32
Avg Hours	7.70	8.05	−5%	0.00
Avg Distance	251.51	214.91	15%	0.00
Collision	0.32	0.30	8%	0.05
Glass	0.31	0.21	33%	0.00
Panel B: Colliders				
	Collider	Non-Collider	Difference	p-value
Avg Trips	8.11	6.91	15%	0.00
Avg Hours	7.68	8.13	−6%	0.00
Avg Distance	215.35	223.17	−4%	0.00
Collision	0.28	0.28	1%	0.90
Glass	0.27	0.21	24%	0.00
Panel C: Aggressors				
	Aggressors	Non-Aggressors	Difference	p-value
Avg Trips	7.27	7.26	0%	0.99
Avg Hours	7.57	8.12	−7%	0.00
Avg Distance	225.08	219.56	2%	0.04
Collision	0.36	0.28	22%	0.05
Glass	0.39	0.25	37%	0.00

Table 6: Joint Significance - Speeding, Collisions, and Windscreen Breakage

Type II Manova Tests	Test Stat	Approx F	num Df	den Df	Pr(>F)
Panel A					
Credit Category	0.007	9.760	3	4189	0.000
Gender	0.0002	0.328	3	4189	0.805
Existing Operator	0.007	10.060	3	4189	0.000
Asset Quality	0.004	5.573	3	4189	0.001
No of Deals	0.005	7.353	3	4189	0.000
Panel B					
Large Firms	0.003	5.250	3	4189	0.001
Resourced	0.009	12.706	3	4189	0.000
Experience	0.001	0.776	3	4189	0.507
Long Haul Operator	0.017	24.6233	3	4189	0.000

The table above presents the test for joint significance between various outcome variables. The first panel jointly tests the significance of credit category, gender, existing operator, asset quality and number of deals with the financing company amongst speeding, collisions and glass claims. The results demonstrate that all categories are significant across the outcome variables save gender which our other results suggest. The second panel follows a similar process for large firms, well resourced firms, experienced firms, and long haul operators. Interestingly, firms with more experience, a combination of age and existing operator, does not seem to be statistically significant for these outcome variables.

Table 7: Robustness Check: CEM Estimates on Firm Misconduct and Performance

	Dependent variable:							
	Major Claim	Glass	Collision	Speeding	Distance	Hrs	Trips	Default
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Interest Rate	-0.108^{***}	-0.093^{***}	-0.234^{***}	-0.211^{***}	21.335^{***}	1.372^{***}	-2.350^{***}	-0.073^{***}
	(0.013)	(0.013)	(0.015)	(0.015)	(2.108)	(0.079)	(0.111)	(0.012)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,198	4,198	4,198	4,198	4,198	4,198	4,198	4,198

Note: *p<0.1; **p<0.05; ***p<0.01

Table 8: Robustness Check: Alternate Instrument Specifications

	Dependent variable:							
	Major Claim	Glass	Collision	Speeding	Distance	Hrs	Trips	Default
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Core Specification	0.117^{***}	0.057^{***}	0.118^{***}	0.108^{***}	-10.908^{***}	-0.636^{***}	1.136^{***}	0.035^{***}
	(0.009)	(0.008)	(0.009)	(0.009)	(1.190)	(0.043)	(0.067)	(0.008)
OLS Alternate 1	0.127^{***}	0.062^{***}	0.127^{***}	0.113^{**}	-11.884^{***}	-0.688^{***}	1.250^{***}	0.040^{***}
	(0.009)	(0.009)	(0.009)	(0.009)	(1.231)	(0.044)	(0.069)	(0.008)
OLS Alternate 2	0.110^{***}	0.048^{***}	0.113^{***}	0.096^{***}	-11.690^{***}	-0.790^{***}	1.179^{***}	0.045^{***}
	(0.011)	(0.011)	(0.012)	(0.011)	(1.560)	(0.059)	(0.091)	(0.010)
Ridge Estimation	0.137^{***}	0.054^{***}	0.136^{***}	0.125^{***}	-11.228^{***}	-0.718^{***}	1.336^{***}	0.037^{***}
	(0.010)	(0.009)	(0.010)	(0.010)	(1.330)	(0.047)	(0.074)	(0.009)
Lasso Estimation	0.152^{***}	0.060^{***}	0.151^{***}	0.139^{***}	-12.456^{***}	-0.796^{***}	1.482^{***}	0.041^{***}
	(0.011)	(0.010)	(0.011)	(0.011)	(1.474)	(0.053)	(0.082)	(0.009)
Regime Change	0.119^{***}	0.057^{***}	0.118^{***}	0.097^{***}	-9.841^{***}	-0.599^{***}	1.114^{***}	0.029^{***}
	(0.010)	(0.008)	(0.010)	(0.009)	(1.227)	(0.050)	(0.086)	(0.007)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Association Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,381	3,381	3,381	3,381	3,381	3,381	3,381	3,381

Note: *p<0.1; **p<0.05; ***p<0.01

Appendix A: Theoretical Framework

In this section, I present a simple model of misconduct to help interpret some of the main empirical findings. The model highlights the principal tradeoffs firms face in allocating time (effort) between fair play and misconduct in their operations. I then provide some comparative statics for how capital constraints affect the level of misconduct firms choose.

Basic Model. Consider a one-period decision model in which a single firm chooses between two market activities: F, a fair play market activity (e.g. safe driving), and M, a misconduct activity (e.g. speeding). The firm must choose its optimal participation in each activity at the beginning of the period.

Let us assume that there is no enforcement of misconduct, fair play and misconduct are perfect substitutes, returns to each activity are monotonically related to time spent in that activity, and fair play returns occur with certainty and misconduct returns are conditional. Misconduct *M* is risky insofar as the net returns are conditional on whether it faces penalty *S* for misconduct (e.g. damage to the asset) with probability p or not with probability $1 - p$ at the end of the period. The firm must allocate all available time between t_m (time in misconduct) and t_f (time in fair play). The firm faces this decision problem:

$$(1) \qquad ((1-p)M - pS)\, t_M \;\geq F t_F$$

Equation (1) implies that in any given period that misconduct is more profitable than fair play. If $p = 0$, then $Mt_M \geq Ft_f$. As p increases the gap between misconduct and fair play must increase to maintain the advantage of misconduct. The greater the chance of a penalty, the less likely a firm will engage in misconduct.

Based on equation (1), there are only two states of the world that the firm will face, W_G in which the firm "gets away" with misconduct without penalties and W_S in which they are penalized. This yields the following profitability conditions:

(2) $$W_G = R_F(t_F) + R_M(t_M)$$

$$W_S = R_F(t_F) + R_M(t_M) - S_M(t_M)$$

in which R_F and R_M are profit functions with respect to times spent operating fairly or engaging in misconduct respectively. In addition, the firm faces a minimum profitability constraint $min\pi$ that they must achieve to avoid bankruptcy.

(3) $$W_G, W_S \geq min\pi$$

The expected utility function for the firm then is given by the following equations

(4) $$EU(W_i, t_i) = (1-p)U(W_G, t_i) + pU(W_S, t_i)$$

Firms allocate time based on this reduced form maximization problem insofar as $t_F, t_M \geq 0$ and represent the total time allocation available to the firm. Assuming the Kuhn-Tucker first order optimality conditions, the optimal time allocation must satisfy the first order condition below.

(5) $$-\frac{\frac{\partial R_M}{\partial t_M} - \frac{\partial R_F}{\partial t_F}}{\frac{\partial R_M}{\partial t_M} - \frac{\partial S_M}{\partial t_M} - \frac{\partial R_F}{\partial t_F}} = \frac{pU'(W_S)}{(1-p)U'(W_G)}$$

The term on the left-hand side of the equation represents the production frontier of composite profitability between the two states of world. The term on the right side of the equation is the slope of the indifference curve for the firm. In an equilibrium position in which a firm participate in both fair play and misconduct the right- and left-hand side of the equation (5) must be the equal. Equation (5) also implies that the potential marginal penalty $\frac{\partial S_M}{\partial t_M}$ must be greater than the differential marginal return from misconduct otherwise marginal opportunities for misconduct would always dominate fair play.

INSERT FIGURE A.1

Figure A.1 graphically illustrates the challenges and opportunities a firm faces. A sufficient condition for firm participation in misconduct, independent of risk preferences, is that the absolute slope of the opportunity boundary must exceed the absolute slope of the indifference curve at the position in which total operating time is spent in fair play (point A on the certainty line). This condition in turn implies that the marginal expected profitability of misconduct exceeds that of fair play. If we assume that misconduct and fair play are available to firms equally independent of their risk preferences, a risk neutral firm will dedicate more operating time to misconduct relative to a risk avoidant firm whereas a risk seeking firm will specialize in misconduct. In addition, given the marginal profitability of misconduct, a risk avoidant firm will still engage in misconduct, albeit less so than a risk seeking firm. The risk avoidant firm will most likely combine misconduct and fair play to hedge against the risk involved in full specialization in misconduct.

In addition, the minimum profitability line will force risk avoidant firms to engage in levels of misconduct they would prefer to avoid but will do so to participate in the market. A reduction in the minimum profitability line then would allow those risk avoidant firms to select perhaps a lower level of misconduct that is more in line its risk preferences.

Implications. The simple model here can be used to explain why many firms will choose misconduct even if they have experienced a significant penalty in the past. Given a firm's preferences and opportunity set, it might be optimal to engage in multiple instances of misconduct in any given period. Even if preferences did not vary between periods (which might be unlikely if the firm has fallen short of the minimum income requirement in a previous period), a firm might choose to repeatedly engage in misconduct if the opportunity set remains unchanged. Therefore, misconduct here is not a matter of erratic behavior or myopia. Rather it is the optimal strategic choice dictated by opportunities and constraints the firm faces.

In addition, the model sheds light on firms with different risk preferences. Risk averse firms will respond more to changes in the likelihood of experiencing a penalty rather than the extent of that penalty holding constant the expected net income from misconduct. Conversely, more risk-taking firms will be more likely to engage in higher levels of misconduct as they will heavily weight the potential gains from misconduct as opposed to the certainty of fair conduct.

This model has several empirical implications. First, it is clear how firms with low probabilities of penalties will engage in increasing levels of misconduct creating widespread misconduct in a particular industry. The pervasiveness of misconduct is exacerbated by stringent minimum profitability requirements which excessive capital constraints impose. Second, firms engage in different levels of misconduct depending on their risk preferences and their proximity to the minimum profitability requirement. If it is possible to remain profitable without engaging in misconduct, some risk averse firms will do so. However, risk seeking firms will disproportionately engage in misconduct. Together this will create a skewed convex curve of misconduct as risk avoidant firms will select little to no misconduct while risk seeking firms might specialize in it. Third, lower minimum income levels will lead to less misconduct overall as firms with risk neutral and averse preferences will switch away to more certain profits from fair play. Fourth, firms with less capital will have a lower cost of misconduct and therefore will be less sensitive to changing constraints. The gains from misconduct will be disproportionately lager for firms that have lower initial levels of financial resources. Therefore, they will be less likely to switch away from misconduct even in the face of higher penalties or lower capital constraints. Last, firms that engage in misconduct will do so over a variety of options.

Appendix B: History of Minibus Taxi Industry

The industry emerged in the 1950s and 1960s as a result of the pass laws under the Apartheid Regime (Barrett 2003). These laws required that non-white populations relocate from city centers to "homeland areas" or "townships" that were co-located with cities anywhere from walking distance to 20 kms away (include maps of South African apartheid spatial planning). However, as the economic centers still required low-skill and low-wage work, these now disenfranchised and forcibly removed African and Asian populations, constituting the majority of South Africans, had to return to these commercial hubs for domestic, service, and hard labor work (Vegter 2020). The apartheid government provided transport links to individual townships but given the geographic dispersion traveling to these points could take hours on foot. The minibus taxi industry emerged as small family businesses providing "feeder" services between black townships and pre-dominantly white commercial and residential centers.

Although critical for the economic functioning of South African society, these minibuses were classified as illegal by the apartheid government in order to maintain high degrees of economic and social control over the majority nonwhite populations (citation). As the Apartheid regime lost legitimacy and began to negotiate with opposing political factions like the African National Congress (ANC), the government elected to legitimize the mini-bus taxi industry to gain political currency in the mind 1980s. Following this legitimation, the industry experienced a period of explosive growth and consolidation filling pent up demand for additional routes between townships, city centers, and rural areas. In a short period, the industry became the primary mode of transport in South Africa and a source of economic opportunity for drivers and owners. If successful, many owners can purchase homes, send their children to university, and provide financial assistance to their extended family making the industry one of the few routes to middle- and upper-class income status in South Africa. The industry has taken on increased importance as an engine of wealth generation as income

inequality has accelerated in post-apartheid South Africa which has disproportionately affected the previously disadvantaged African population. [25]

However, as a result of the long history of informalization and antipathy with the government, minibus taxis have a history of poor service, intermittent violence, gang activity, and other illegal operations (Antrobus and Kerr 2019). These persistent informal activities present challenges to fully integrating the minibus taxi industry into the formal public transportation system in South Africa, a problem several other emerging markets have faced (Holland 2017). Despite multiple attempts of formalization and incorporation in the state infrastructure by the SA government, the minibus taxi industry remains mostly autonomous and self-regulating with cursory intervention by the state. Notably there are subsidies for neither passengers nor owners for minibus taxi routes while all other forms of public transport including trains, planes and buses receive significant subsidies from the state.

[25] Citation on the importance of entrepreneurship in generating employment in South Africa

Appendix C: Description of Minibus Taxi Strike in 2017

In June 2017, the minibus taxi industry led a strike against the taxi financing company, Toyota motor company, and the South African government. The South African National Taxi Council (SANTACO) and the National Taxi Alliance (NTA), the two primary associations representing the minibus taxi industry nationally, organized the strike in response to the increasing cost of owning a minibus taxi, interest rates, and the difficulty of getting transport licenses.

South Africa has a long history of unions organizing strikes against corporate and political bodies with great success. The African National Congress (ANC) effectively protested the existing Apartheid government in the 1980s leading to the fall of the regime. In addition, many of its ancillary bodies such as the Congress of South African Trade Unions (COSATU), have protested against low wages, on the job safety, lack of pensions and other labor causes to varying degrees of success. As such strong unions and collective action more generally remain important fixtures of the South African landscape.

The minibus taxi industry is one of the most highly organized sectors in the economy. Each owner is part of a local association which oversees a township or municipality. Local associations join together to form provincial associations which map closely to South Africa's provinces. Provincial associations in turn form national associations (SANTACO and NTA). The national and provincial associations provide guidance on how local association should set routes, fares, select new owners, and engage with passengers. They also advocate for the minibus taxi owners and drivers in provincial and national matters. These national associations are well respected as they tend to be effective in advocating for the industry.

According to news reports and qualitative interviews, there were several precipitating events that lead to the nation-wide strike in 2017. A number of operators, industry observers, and company representatives indicated that the rising cost of the Toyota Quantum was a leading factor. From

2010 until 2017, the cost of the Quantum rose close to 50% mostly due to mismatch of high inflation in South Africa and overseas production and revenue requirements. Given the industry receives no government subsidy and lacks state negotiating power, it had to internalize these cost increases. As I mention in the main text, fares are set locally by associations often at yearly meetings after consultation with owners and passengers. Economic prospects for many South Africans, most notably for those who rely on minibus taxis for transport, have not improved significantly so fare increases meet significant resistance.

Second, SANTACO and NTA seem to be in a constant set of ongoing negotiations with the provincial and national government about the level of support the industry should receive with the most recent negotiation falling apart in early 2017. These negotiations tend to yield few results as the industry provides an essential service transporting close to 50% of South Africans daily and over 80% of the population reporting relying on minibuses as a primary source of transport yet is also known extremely high profits and gang activity. The industry was also critical in the anti-Apartheid struggle in the 1970s and 1980s often transporting ANC leaders and supplies to different locations within South Africa and to neighboring countries.

At the same time, the South African government has increasingly failed to provide reliable public services. Public transport such as the national airline, bus services, and trains have degraded significantly over the last decade with multiple reports of corruption, service failure, and general financial mismanagement. In addition, other public utilities such as water and power now provide inconsistent service for similar reasons. Given the industry profitability and links with gang activity yet high degree of trust with its customers and history of anti-Apartheid action, the SA government has been unable to muster the political or economic power to nationalize the minibus taxi industry providing only infrastructure at minibus taxi bus terminals and regulating licensing.

In addition to the increasing cost of the Toyota Quantum and the consistent failure of negotiations with the South African government, the financing company also increased its market share significantly over the past several years. The company changed its strategy from just providing loans to providing insurance, maintenance, and other auxiliary services to the industry. Yet it charged some of the highest interest rates amongst lenders. The financing company charged between 22% - 28% annual interest rates on average vs. other banks who charged between 12% - 18%.

These factors boiled over in early June 2017 leading to a nationwide strike by the minibus taxi industry. Starting on June 15 at 6 am, minibus taxis blocked major transport arteries in Johannesburg and Pretoria bringing traffic to a standstill. SANTACO cited high interest rates as a primary cause.

> "This is to hand over a memorandum of grievances to the directors of the company. Some members of the taxi industry have been hard hit by the high interest rate of 28% and blacklisting due to payment of R15,000 per month over 72 months. We can't take it any more" says Ralph Jones, chairman of SANTACO

The strike lasted approximately six hours bringing commercial life in Gauteng to a standstill. It was reported that as many as 12 people died and several dozen were injured during the strike. After negotiations with the financing company and the South African government representative, SANTACO called an end to the strike.

Whilst I have not been privy to the results of those negotiations, I do observe in the data that after the strike the financing company lowered their top interest rate by 2 percentage points from 28.5% to 26.5% and lowered interest rates on average by 2 percentage points. Figure C.1 provides graphical evidence of the change in key variables of interest over time. The panels plot the monthly average of interest rates, loan scores, speeding alerts and distance travelled over a four-year period. There is a clear downward trend in interest rates and speeding alerts while there is a clear

upward trend in loan scores and average distance travelled. The decreasing speeding alerts and increasing distance travelled indicates lower levels of misconduct and improved performance respectively. One might initially attribute this change to lower interest rates over time. However, the corresponding increase in loan scores indicates that the company both changed the composition of its loan book providing loans to a higher caliber of owners while at the same time offering lower interest rates.

INSERT FIGURE C.1

Appendix D: Robustness Checks

This Appendix explores several robustness checks to support the primary analysis in the paper.

A potential concern with my identification strategy is the possibility that the differences between different firms are too great to generalize given the uniqueness of their circumstances. Whilst there is a downward trend in defaults and insurance claims as interest rates decrease, this effect might be confounded by firm quality. To address this concern, I re-estimate the primary specification splitting the sample to include only those firms who have financed vehicles in the pre and post period. I add firm fixed effects to this specification to capture the variation within each firm.

Table D.1 presents the results from this analysis. Notably, there isn't a statistically significant relationship between interest rates and defaults as reported by Columns 8. Given the financing company does not extend loans to firms who defaulted on previous loans with them, this result is expected. However, the other misconduct measures mirror the main specification effects and the results from the larger firms which we would expect. For those firms that have vehicles financed in both regimes, decreases in interest rates are associated with a decrease in strategic misconduct and increase in performance. [26]

INSERT TABLE D.1

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[26] Another potential concern here might relate to the principal agent difficulty explained in the footnote above. Firms that have multiple vehicles undoubtedly have multiple drivers which creates an incentive problem. Perhaps it is simply poor management that results in the insurance claims and speeding alerts. This story is unlikely as if that were the case, declining interest rates would only impact firm level variables (delinquency and default) rather than operational variables (collisions, claims, and speeding). Yet we find the opposite to be the case which suggests that these firms exercise some degree of control over the ways in which their assets are operated. However, one can also consider the case of owner-operator, i.e., those firms that only have one vehicle, as an analysis of how falling interest rates directly impact operational behavior.

Another potential concern is the opposite of the above. Perhaps firms that have multiple deals have learned how to better operate and navigate the financing company system. Table D.2 addresses this concern. Here I examine only those firms that have one deal in either period, the mirror opposite of the analysis in the previous table. Table D.2 recreates the results of the primary specification with slightly higher statistically significant coefficients for defaults, major insurance claims and collisions. These results again support the central claim that the reduction of capital constraints decreases strategic misconduct and increases firm performance.

INSERT TABLE D.2

As mentioned earlier, further investigation of speeding alerts is warranted. One concern might be that the speeding alerts might be bias towards operators that take longer trips. An operator that travels long distances will have a higher likelihood to cross the speeding threshold, 120 km/hr, and therefore bias the results. To address this concern, I constructed a variable, *Long Distance Operator*, based on qualitative interviews with the credit team at the financing company. This variable captures vehicles that travel on average over 300 kms per day when in operation. It is impossible to capture vehicles that only run long distance routes as both the quantitative and qualitative evidence suggests that majority of vehicles are used for both depending on the time of week, month or year. Nonetheless, this measure captures the likelihood that these firms predominantly run long distance routes.

INSERT TABLE D.3

Table E.3 reports the results of speeding alerts interacted with the *Long-Distance Operator* variable. I find that long distance operators are much more likely to decrease their speeding alerts as interest rates fall yet shorter distance operators still decrease speeding alerts at statistically significant

levels. In addition, I measure speeding alerts by daily distance travelled in *Alerts by kms*. Columns (3) and (4) report these results finding that falling interest rates decrease alerts for all operators but do so more for long distance operators as one might expect. This result helps alleviate another concern, namely that firms are utilizing their assets less as interest rates fall which might be explain the result. To further explore this concern, I examine long distance vs. trips. I find that the number of routes taken decrease overall for firms but less so for long haul firms. This result suggests that firms that specialize in long haul trips have less opportunity to switch away from trips in response to a reduction in capital constraints. However, this finding further supports the inference that the decline in speeding alerts might be linked to fewer routes taken.

Two additional concerns merit investigation. First, as is typical with most before and after studies, it is worthwhile considering if the cut-off selected is salient or if it is simply part of a time trend. To test this concern, I move the cut-off point to June 2016 which corresponds to the when a quarter of the sample had received loans. I construct the instrument based on this cut-off and then re-estimate the primary models. Table E.4 reports the results from these regressions. I find that there is no statistically significant impact of interest rates on firm stress, failure and risk taking.

INSERT TABLE D.4

Second, the construction of large firms and top credit firms might be arbitrary although these metrics were provided by the financing company. I re-estimate the primary models including interactions for the median firm size (two vehicles financed), the top quartile firm size (three vehicles financed), the median loan score (637), and the top quartile loan score (646). Table E.5 reports the results from these regressions. I find that the median and top quartile firm size follow closely the results from existing operators and large firms respectively from the heterogenous

analysis in the main text. I similarly find that firms with median and top quartile loan scores follow closely the results of the top credit firms from the heterogenous analysis.

INSERT TABLE D.5

Appendix E: Qualitative Evidence & Mechanisms

This Appendix further explores and deepens the qualitative analysis presented in the main text. To understand why the modest relaxation of capital constraints might reduce strategic misconduct and why that effect is strongest for the largest firms, I turn to survey and qualitative evidence.

I collected survey data on 108 minibus owners. The survey sample is described in Table 1. I conducted the survey in conjunction with the minibus taxi financier in October and November 2021. The surveys took place in person in the welcome center of the financing company. All the respondents either have loans or are seeking additional loans with the taxi financier. To address sample bias, no taxi owners who had loans currently in default with the company are included in the sample. Whilst those owners who have loans in default provide an interesting perspective on capital constraints, it will understandably bias the results of the primary concern in their operations. A sub sample of those owners who are in default are included in the qualitative interviews in order to capture their perspective.

INSERT TABLE E.1

The primary finding from the survey is that capital constraints truly bind. Over 55% of the respondents indicate that capital constraints are the primary challenge to their business. Operators indicated that they "speed to make payments", "have side businesses to make up income", and "try to get more from routes" in order to meet these requirements. Notably two of these responses involve misconduct – speeding and aggressiveness with other operators.

In addition, I conducted over 60 hours of semi-structured interviews with 46 stakeholders throughout the minibus taxi industry including taxi owners, drivers, union representatives, financiers, regulators and journalists. I adopted this holistic approach as there is little existing

systematic research on the minibus taxi industry in South Africa. The qualitative sample is outlined in Table 2. The interviews were conducted via zoom and in person between June 2020 and November 2021. As a result of the COVID pandemic, many interviews were initially completed via zoom and then repeated in person when I travelled to South Africa.

INSERT TABLE E.2

The survey and qualitative interviews uncover three primary mechanisms that might explain the quantitative results: (1) capital constraints are a primary challenge for firms, (2) operating in the industry is extremely challenging due to fixed prices, competition, and idiosyncratic shocks to demand and costs, and (3) the penalty of default is extremely high.

Capital Constraints. Owners and drivers that operate in the minibus taxi industry often complain about extremely high monthly payments to service their loans. In the survey, I ask the question "what is the greatest challenge to your business." Over 60% of operators selected high monthly capital payments in response. Of those who responded that high monthly payments are their primary concern, 55% indicate that they have other businesses that they use to subsidize their earnings from the taxi. These findings indicate that for many of these firms, operating the taxi provides inconsistent revenue which they must work to accommodate. Following up in interviews with owners, they indicate that few banks will lend to them and those that do charge extremely high rates. This finding accords with the interest distribution in the sample in which most loans are priced at 24.5% or higher.

According to the multiple financing companies I interviewed, the price of loans is extremely high as the industry is extremely high risk. Most prospective owners who seek financing do not have a verifiable bank account or a credit score. In addition, the industry is known for intimidation and violence so collecting on bad loans can be difficult. Given the inherent risks in recouping the value

of the loan, most financing companies choose either to offer a loan to the credit worthy individuals or not at all. The company from which I have data have structured their business such that they can recoup the average loan but only with very high interest rates. As one executive comments "these guys are the wild west. The only way we can keep the company afloat is to charge high rates."

These high capital costs immediately put owners and drivers in an economic bind. Joining an association is costly, prices are fixed, routes are largely set, and those routes are oversubscribed. The only strategic choice available to make enough money to remain profitable in the industry is to drive fast and aggressively according to many who operate in the industry. One owner describes the predicament:

> "I must make what I can to make the monthly payment. Every trip I take is valuable. I will be aggressive with other vehicles to get as many passengers as I can on a route. I then drive as fast as I can to make it back to the taxi rank to get more passengers. I know an accident is bad for the vehicle, but I cannot afford to miss trips."

As this owner notes, many operators know that fast and aggressive driving can lead to costly accidents but choose to do so. Capital constraints in this setting therefore exacerbates already tough daily operating conditions. These constraints become even more salient when an accident happens.

Idiosyncratic Shocks. First, many firm owners reported that looser capital constraints make withstanding catastrophic business events such as crashes, unexpected major maintenance, and vehicle theft much easier. Consider the story of an owner who has one minibus that she uses to run routes between a major city center and a peri-urban area. The route she runs is highly trafficked by low-income individuals who work mostly the informal economy such as domestic services and small businesses in the city center.

One day, at a stop close to the end of the peri-urban area, her minibus breaks down. There are no nearby service shops that can tow and service her car. The only one to which she has reliable access is 30 km away in another part of town that her cousin owns. She cannot trust another

minibus service center as they are generally known for inconsistent repairs. In addition, there is no directory service to provide reliable quality information on business history, service quality, and customer reviews. As she is not officially part of the public transport sector, she cannot rely on government services to provide assistance either in repairing the vehicle or providing interim payments to ensure she can service her fixed costs including the loan payment.

Given she has no recourse from a central authority for the public service she provides or from a reliable local intermediary, she must wait until a service center through her kinship network can come and collect her vehicle which takes two days. Given that the service center has incomplete inventory, it takes two weeks to source the correct parts to repair her vehicle. In addition, as there is limited knowledge of this particular transmission challenge, repairs take an additional two weeks. A full month has passed from the initial breakdown until she might operate the vehicle again. The cost of repairs and loss of income presented a long-term challenge for this owner. Over time, she reports that she "was crushed obligations and was unable to recover." More relaxed capital constraints, even modest ones, might have decreased the financial burden that she faced and ultimately contributed to her preventing delinquency and ultimately default.

Other operators and industry observers echo this sentiment indicating that "repairs are difficult" and "once you lose your route it is difficult to come back." One owner said he encourages his drivers to "be aggressive so I make payments and save for bad events as they will come." An industry observer noted that "owners are working hard to try to prevent against inevitable catastrophes as no one can help them really." The interviews suggest that more stringent capital requirements might lead to more strategic misconduct such as speeding as owners try to guard against the prospect of idiosyncratic and costly shocks.

Penalty of Default. The reduction in strategic misconduct in the empirical analysis may be driven by the fact that while firms that are "close to the edge" are often driven to engage in risk

behaviors. According to interviews, for these firms the penalty for default extends far beyond the loss of assets.

The prospect of irretrievable loss of income looms large as outside options for sustainable income generation are slim. Capital availability is generally low in South Africa for previously disadvantaged and poor populations - the very people who become mini-bus taxi owners. In addition, the rate of failure of entrepreneurship is very high often with disastrous consequences (citation). There is only a marginal safety net from which these individuals might draw upon should they default There are illiquid labor and capital markets servicing low income previously disadvantaged communities (citation) and few other income pathways that would generate income to the level of the minibus taxi industry provides. In addition, many minibus taxi operators support multiple people in their households.

The fear of default is echoed by minibus taxi operators. One operator quotes "I have to keep the business going or else we will not eat. I have no formal education and job prospects are very bad. I am the only one who works and I support five different family members. Without me there is nothing." Another owner states "I support my family. I must be aggressive to stay alive [in the business] so we can survive." This qualitative finding is supported by the literature on entrepreneurship in emerging markets. Entrepreneurs in these markets are unable to open multiple businesses as the cost of failure is so high that it taxes their economic and social resources (citation).

The second component of penalty of default is the loss of status in the association. If other operators in the minibus taxi association observe that you cannot run profitably, the chances they will grant an additional license to you is low. In addition, they might consign you to less profitable routes. Given there is some degree of flexibility in the routes that an association might assign to a particular owner, this loss of status would translate into further loss of income which might create the first scenario - permanent loss of economic prospects. This dynamic is also voiced by minibus

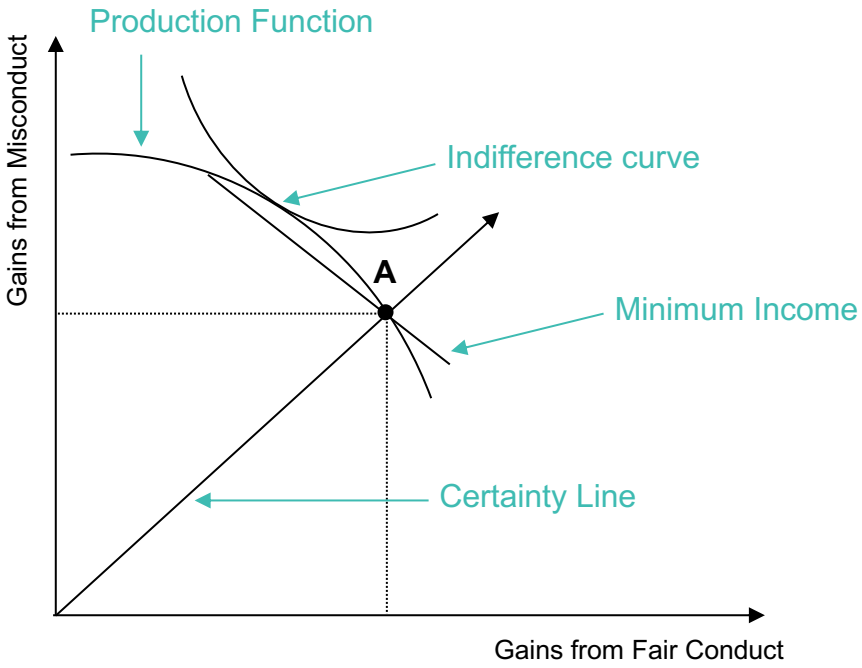
taxi operators "The association leadership and taxi rank managers are ruthless. If they see you failing, they don't help. You always have to stay ahead in the game to keep your routes."

Within minibus taxi associations, there is not just a threat of loss of status from the association leadership but the prospect of violence over routes. Stronger owners within a taxi association prey on their weaker counterparts forcing them off routes with aggressive tactics such as damaging vehicles, beatings or in the most extreme case assassinations. Defaulting on loans and inability to operate is considered a weakness in the eyes of other operators and signals an invitation to respond with violence. The process proceeds as follows. "An ambitious owner decides he will increase his business by getting more routes. He joins with other owners to target the weaker owner in the association. First these owners overtake the weaker one's routes. If he resists, they threaten him. Or if he is difficult, they shoot him" (quotation). To recap, owners form a coalition, target weaker owners, encroach upon their income generation stream, and deploy violence should that owner resist.

Together the various components of the penalty of default amount to the prospect of severe loss of economic and physical security. This dynamic makes the penalty of default extremely high. Coupled with the high penalty of default and uncertainty from high impact events, the evidence suggests that lower fixed monthly costs might decrease the likelihood of strategic misconduct.

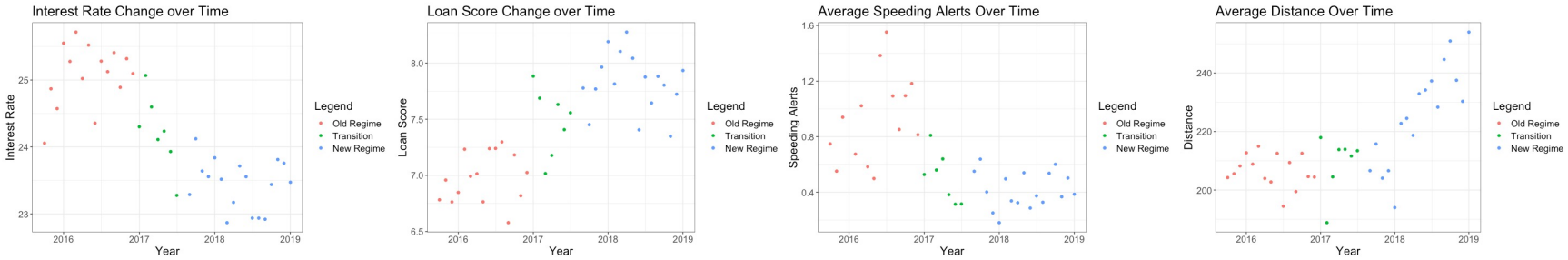
The survey and qualitative data collected here provides supporting evidence to the results of the 2SLS regressions in the previous section. It appears that reduction in capital constraints, even modest ones, might play a critical role in strategic misconduct and firm performance.

Figure A.1: Model of Misconduct



The graph above represents the findings of the simple model. Firms face a strict minimum income requirement which incentivizes them to engage in misconduct at various levels depending on their preference sets.

Figure C.1 : Change in Interest Rates, Loan Score, Misconduct and Performance over Time



The graphs above show the change in interest rates, loan scores, speeding alerts and average distance travelled per operator between 2016 and 2019.. The graphs show a clear decrease in interest rates and misconduct as well as an increase in performance. However there is a marked increase in loan score during that time period. The increasing loan score requires thoughtful empirical estimation to control for increasing quality of owners. The primary IV specification and the matching procedures in the robustness checks seek to address these concerns. The transition period depicted in green is the intermediary period as SA Taxi settled on a new credit assessment and interest rate regime.

Table D.1: IV Estimates for Impact on Interest Rates: Firms with Vehicles Financed in Both Regimes

	Dependent variable:							
	Major Claim	Glass	Collision	Speeding	Distance	Hrs	Trips	Default
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Interest Rate	0.042^{**}	0.075^{***}	0.045^{**}	0.168^{***}	-8.074^{***}	-0.556^{***}	0.938^{***}	-0.012
	(0.020)	(0.019)	(0.022)	(0.025)	(2.812)	(0.090)	(0.175)	(0.010)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Owner Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	673	673	673	673	673	673	673	673
R^2	0.520	0.716	0.582	0.654	0.703	0.779	0.565	0.692
Adjusted R^2	0.044	0.435	0.166	0.310	0.408	0.560	0.133	0.386

Note: *p<0.1; **p<0.05; ***p<0.01

Table D.2: IV Estimates for Impact of Interest Rates for Unique Firms Only

	Dependent variable:							
	Major Claim	Glass	Collision	Speeding	Distance	Hrs	Trips	Default
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Interest Rate	0.128^{***}	0.052^{***}	0.130^{***}	0.098^{***}	-10.937^{***}	-0.636^{***}	1.168^{***}	0.039^{***}
	(0.010)	(0.009)	(0.010)	(0.009)	(1.331)	(0.048)	(0.075)	(0.009)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Association Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,524	3,524	3,524	3,524	3,524	3,524	3,524	3,524
R^2	0.208	0.169	0.208	0.269	0.307	0.343	0.272	0.176
Adjusted R^2	0.104	0.061	0.105	0.173	0.217	0.257	0.177	0.068

Note: *p<0.1; **p<0.05; ***p<0.01

Table D.3: IV Estimates: Investigation of Speeding

	Dependent variable:					
	Speeding Alerts		Speeding Alerts by km		Trips	
	(1)	(2)	(3)	(4)	(5)	(6)
Interest Rate	0.110^{***}	0.090^{***}	0.001^{***}	0.001^{***}	1.136^{***}	1.175^{***}
	(0.009)	(0.010)	(0.0001)	(0.0001)	(0.067)	(0.078)
Interest Rate x Long Haul		0.237^{***}		0.002^{**}		-0.660^{*}
		(0.051)		(0.001)		(0.385)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Association Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,381	3,381	3,381	3,381	3,381	3,381
R^2	0.244	0.214	0.037	0.038	0.132	0.148
Adjusted R^2	0.161	0.128	0.035	0.035	0.130	0.146

Note: *p<0.1; **p<0.05; ***p<0.01

Table D.4: IV Estimations based on June 2016 Cut-Off

	Dependent variable:							
	Major Claim	Glass	Collision	Speeding	Distance	Hrs	Trips	Default
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Interest Rate	−0.039	−0.146	0.025	−0.102	−12.498	0.444	0.549	−0.120
	(0.137)	(0.123)	(0.138)	(0.134)	(17.186)	(0.601)	(1.138)	(0.115)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Association Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,601	1,601	1,601	1,601	1,601	1,601	1,601	1,601
R^2	0.181	0.226	0.193	0.315	0.318	0.305	0.185	0.216
Adjusted R^2	0.022	0.075	0.036	0.183	0.186	0.171	0.026	0.064

Note: *p<0.1; **p<0.05; ***p<0.01

Table D.5: Robustness Check: Firm Size and Loan Scores

	Dependent variable:							
	Major Claim	Glass	Collision	Speeding	Distance	Hrs	Trips	Default
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Median Firm Size								
Interest Rate	0.122***	0.064***	0.126***	0.112***	−9.948***	−0.609***	1.164***	0.038***
	(0.011)	(0.010)	(0.011)	(0.011)	(1.462)	(0.052)	(0.082)	(0.009)
Interest Rate x Median Firm Size	−0.022	−0.033	−0.035	−0.008	−4.551	−0.144	−0.104	−0.014
	(0.027)	(0.026)	(0.028)	(0.027)	(3.683)	(0.132)	(0.207)	(0.024)
Top Quartile Firm Size								
Interest Rate	0.120***	0.060***	0.120***	0.099***	−11.796***	−0.663***	1.180***	0.036***
	(0.010)	(0.009)	(0.010)	(0.010)	(1.334)	(0.048)	(0.075)	(0.009)
Interest Rate x Top Q Size	−0.028	−0.023	−0.023	0.097***	8.485*	0.276	−0.410	−0.015
	(0.036)	(0.035)	(0.038)	(0.037)	(4.988)	(0.178)	(0.280)	(0.032)
Median Loan Score								
Interest Rate	0.118***	0.057***	0.118***	0.109***	−11.120***	−0.643***	1.128***	0.036***
	(0.009)	(0.008)	(0.009)	(0.009)	(1.200)	(0.043)	(0.067)	(0.008)
Interest Rate x Median Score	−0.077	0.045	−0.092	0.038	19.966	0.761	0.596	−0.095
	(0.099)	(0.094)	(0.103)	(0.099)	(13.549)	(0.485)	(0.760)	(0.087)
Top Quartile Loan Score								
Interest Rate	0.119***	0.058***	0.119***	0.110***	−10.655***	−0.634***	1.136***	0.035***
	(0.009)	(0.008)	(0.009)	(0.009)	(1.195)	(0.043)	(0.067)	(0.008)
Interest Rate x Top Q Credit	−0.182	−0.018	−0.217	−0.049	−36.875**	−0.383	−0.077	−0.062
	(0.135)	(0.129)	(0.141)	(0.137)	(18.587)	(0.666)	(1.045)	(0.120)

Note: *p<0.1; **p<0.05; ***p<0.01

Table E.1: Survey Statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Gender	108	0.19	0.40	0	0	0	0	1
Age	108	54.17	11.42	27	45	56	62.2	73
Number of Vehicles	108	1.68	1.65	1	1	1	2	11
Owner Operator	108	0.73	0.45	0	0	1	1	1
Primary Challenge - Cap Constraint	108	0.56	0.50	0	0	1	1	1

Table E.2: Qualitative Interviews

			Years of Experience		
Respondent Type	N	Gender	Avg	Max	Min
Minibus Taxi Drivers	8	Male = 7 Female = 1	7.62	20	2
Minibus Taxi Owners	11	Male = 8 Female = 3	15.2	30	2
Minibus Taxi Financiers	9	Male = 6 Female = 3	15.3	22	8
Minibus Taxi Regulators	2	Male = 1 Female = 1	16.5	20	13
Taxi Rank Marshals	2	Male = 1 Female = 1	6.5	10	3
Taxi Rank Ombudsman	1	Male = 1 Female = 0	10	10	10
Taxi Association Representatives	4	Male = 3 Female = 1	8.75	15	3
Industry Observers	3	Male = 1 Female = 2	16.7	25	5
Minibus Taxi Passengers	6	Male = 3 Female = 3	27.5	50	20
Total	**46**				