**Article:**

**Are the liabilities of newness and smallness the same for male and female informal entrepreneurs? Evidence from Brazil**

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**Abstract**
Though challenges to female entrepreneurship are widely acknowledged in the settings of developed countries or the context of formal firms, the challenges faced by female informal entrepreneurs in developing markets are less explored. Based on the liabilities of newness and smallness framework in organizational ecology, we draw on a sample of 2,562 Brazilian informal firms, to examine the unique differences in the experience of newness and smallness between male and female informal entrepreneurs. With increasing firm age, female informal entrepreneurs realized lower firm revenues (inverted-U), however, the firm age and firm revenue association are linear for males. Informal firm performance did not vary by size between male and female informal entrepreneurs. The distinctive differences in firm revenues for male and female entrepreneurs have implications for informal entrepreneurship.

**Keywords** gender; informal firms; liability of newness, liability of smallness.

## 1. Introduction

Informal firms represent one of the hallmarks of developing economies. Defined as "businesses that are unregistered but derive income from the production of legal goods and services" (Fu, Mohnen, & Zanello, 2018; Nichter & Goldmark, 2009), informal firms often represent a substantial portion of the overall economic activity in developing countries (García, 2017; Günther & Launov, 2012). Indeed, it has been estimated that informal firms can account for over 60 percent of the GDP of emerging economies (Kraemer-Mbula & Wunsch-Vincent, 2016; Schneider, 2005). Recent studies on informal entrepreneurship have focused on factors such as industry effects (Siqueira, Webb, & Bruton, 2016), institutional environments (De Castro, Khavul, & Bruton, 2014), collective identities (Slade Shantz, Kistruck, & Zietsma, 2018; Webb, Tihanyi, Ireland, & Sirmon, 2009), and even innovativeness (Xie, Qi, & Zhu, 2018). However, there remains a considerable need for further research into understanding the forces involved in determining the performance of informal firms and the institutional and social constraints that may influence their outcomes. The prevailing perspective regarding the justification for informality indicates that firms are established and remain informal because the costs, both monetary as well as in time invested, to formally register with the government are simply too

high (Webb, Bruton, Tihanyi, & Ireland, 2013; Williams & Shahid, 2016). In addition, The worldwide cost of corruption and bribery has been estimated to reach as high as US$1.3 trillion per year (Krammer, 2019), and has been shown to contribute between 40 and 60 percent of developing countries' GDP (Vanek, Chen, Carré, Heintz, & Hussmanns, 2014).

As such, whereas factors such as size and age of the firm can often provide advantages for formal ventures (Carr, Haggard, Hmieleski, & Zahra, 2010; Klingbeil & Semrau, 2017; Santoro, Mazzoleni, Quaglia, & Solima, 2019; Short, McKelvie, Ketchen Jr, & Chandler, 2009), these factors can prove potentially detrimental for informal firms. As informal firms grow larger and older, they may be pressured to formalize, and thereby lose the benefits of informality. It is also possible that such firms could become ever more susceptible to harassment by government officials, thereby necessitating increasingly higher payouts in the form of bribes to ensure that inspectors look the other way and allow these informal firms to continue to operate (Djankov, Lieberman, Mukherjee, & Nenova, 2003; Stawasz & Ropega, 2017). Continuing from the traditional liabilities of newness and smallness perspective, informal firms may realize distinctive returns from these forms of liabilities. Indeed, in the literature based on formal firms, researchers have also found support for inverted-U type effects of liabilities of smallness (or, the liability of obsolescence) and liabilities of newness (or, the liabilities of senescence).

Complementing the perspective of the liabilities of newness and smallness is the growing stream of research regarding gender and entrepreneurship. Recent findings point to a significant increase in women's participation in the informal economy, and in developing countries, the percentage of women working in the informal economy is substantially higher than the percentage of men who are informally employed (Bonnet, Vanek, & Chen, 2019; Chant & Pedwell, 2008), with an estimated 92 percent of women workers in the non-agricultural labor

market reporting being involved in the informal economy, compared to only 87 percent of their male counterparts (Bonnet et al., 2019; USAID, 2005). While this continued increase in women's involvement in informal firms has been viewed by some as a positive outlet for women to pursue economic opportunities outside of the often gender-biased contexts of formal economies within developing countries (Daza Ramos, 2017; Kent, 2018; Meagher, 2011), not all scholars share this perspective. In contrast, feminist researchers have argued that informal firms can embody perilous traps that can funnel women into low-income ventures with little to no potential for advancement (Boeri, 2018; Chant & Pedwell, 2008; Chen, Vanek, & Heintz, 2006). If indeed female-owned informal firms are more likely associated with lower performance, then it is possible that the influence that both size and age have on informal firm performance could be unique for female-owned firms.

Indeed, informal firms not only face broader institutional constraints, but females may especially face the grind from these liabilities. If female entrepreneurship is challenging in developed country contexts, such entrepreneurship for females in an informal setting in a developing country context would be especially debilitating. Due to lack of direct institutional support from the government or the formal sector, too small a size or inability to survive for longer periods may result in an inability for female-led informal firms to accumulate the necessary resources required for survival to a lesser extent than male-owned firms. Conversely, larger or longer surviving informal firms could be considered to be more stable and financially healthy. As such, informal entrepreneurs must manage the intertemporal tradeoffs between the odds of failure from the smaller size or failing too early, versus increased direct and indirect costs from generating costly signals of firm viability. These tradeoffs are particularly challenging for female informal entrepreneurs who must manage familial obligations with larger firm size

and longer engagement in the informal firm enterprise. We argue that as female-owned informal firms increase in size and age, they have a higher likelihood of gaining access to the necessary resources required for survival and success. As such, age could benefit firm performance for female-owned informal ventures. However, once female-owned informal ventures achieve certain critical size and age, they are likely to suffer from similar liabilities as all other informal firms, such that these factors will be negatively associated with performance at suitably high levels.

In completing our study, we make several contributions to the literature. First, the findings complement a parallel stream of literature on time to formalization. Williams, Martinez-Perez, and Kedir (2017) using a sample of formally registered firms in the World Bank Enterprise Survey from 127 countries found that registered enterprises that spent longer operating unregistered had higher sales. Conversely, Assenova and Sorenson (2017) in a sample of 18 sub-Saharan countries, found greater returns to registration, conditional on government benefits provided for registration. Our findings perhaps provide a complementary aspect to these findings—if the gains from larger informal firm size were declining, the transition to formalization may not be possible. As such, liabilities of newness may reign strongly for female-owned informal firms who may eventually find it difficult to formalize, reducing the overall occurrence of female-owned formal firms within developing economies. We suggest that increases in firm age for female-owned informal firms could help to combat the inherent difficulties that such firms face, particularly in regards to access to necessary resources. However, these benefits only accrue to a certain point, after which they could become a liability.

Second, complementing the broader literature on liabilities of newness and smallness, our findings indirectly aim to re-contextualize the "honeymoon" period in the lifecycle of firms in

the informal firm context (Fichman & Levinthal, 1991; O'Toole & Ciuchta, 2019). While

Fichman and Levinthal (1991) focused on declining chances of success with increasing firm size

and age, our framework assesses the role of informal context that posits that liabilities of

newness and smallness are also managed by contexts of informality. While the honeymoon

window for firm size did not find support in our framework, for female informal firm owners, the

honeymoon window related to firm age is supported.

Third, we find that firm size is positively related to performance for informal firms, and

this association is not conditional on gender. Potential benefits of firm size could outweigh the

costs associated with ensuring that larger informal organizations incur as they find a way to

manage government interference. For example, government officials seeking informal payments

from larger informal firms may demand payments by optimizing against taxes from

formalization and other costs incurred by formal firms. We also speculate that government

officials may want more stable and larger informal firms, which can assist in ensuring payments

and lowering transaction costs that could be associated with seeking bribes from smaller and less

stable informal firms.

Finally, when not modeling for gender, we demonstrate that the relationship between

informal firm age and performance, although statistically significant, did not represent a

meaningful effect. This suggests that informal firms might not be as susceptible to the liabilities

associated with age that can affect formal ventures (Santoro et al., 2019; Thornhill & Amit,

2003). It is possible that the relatively fluid nature of informal economies (Cross, 2000; Daniels,

2004; Siqueira et al., 2016; Williams, 2017), and by extension, the firms that operate within

them, could render the advantages that older firms can gain, as well as the disadvantages

experienced by newer firms, somewhat moot. From this perspective, the importance of

establishing legitimacy via age is not perhaps as important of a factor for informal firms, therefore older organizations might not be perceived as superior to newer firms within informal contexts

## 2. Informal firms and organizational factors

Informal firms are "businesses that are unregistered but derive income from the production of legal goods and services" (Fu et al., 2018; Nichter & Goldmark, 2009). For our study, it is important to note the distinction between legal and illegal products and services, for although all informal firms are by definition operating illegally (Webb et al., 2009), our theoretical development focuses squarely on informal ventures that offer otherwise legitimate products or services (De Soto, 1989; Ulyssea, 2018), to the exclusion of informal entities engaged in supplying illegal products or services (i.e. drugs, weapons, pirated software, etc.).

Although the existence of informal firms is a widely acknowledged cornerstone of emerging economies (Khavul, 2010; Khavul, Bruton, & Wood, 2009; Omri, 2020), the influence that informality can have on key aspects of firm performance is still debated within the scholarly community (Krasniqi & Williams, 2020; La Porta & Shleifer, 2008; Williams & Kedir, 2017). Previous research has established that key organizational factors such as firm size and age can influence entrepreneurial performance (Arend, 2014; Ling, Zhao, & Baron, 2007). However, although previous efforts at examining these factors have indicated that firm size is negatively associated with the propensity of firms to be informal (Assenova & Sorenson, 2017; Dabla-Norris, Gradstein, & Inchauste, 2008) and that older firms are more likely to formalize (Bigsten, Kimuyu, & Lundvall, 2004; Matsongoni & Mutambara, 2018), there remains a relative paucity

of research as to how factors such as size and age could relate to informal firm performance, especially, given additional challenges for female informal entrepreneurs.

Moving from the traditional construal of liabilities of newness and smallness in the organizational ecology literature where much of the hypotheses are tested among formal firms in the contexts of developed countries, we bring to the fore a critical element of considerations – the role of size and age as a signal that leads to a deeper impact on informal firm performance within developing countries, and a critical contingency set forth by female entrepreneurs. Female informal entrepreneurs may face an additional burden of a wide range of constraints, including lower protections than those afforded to firms in the formal sector while managing institutional and socioeconomic pressures. Female owned informal firms may face particular challenges to managing competing tensions between the economic rationale for increasing firm size and lengthening firm age to survive precarious conditions faced by informal firms, and the institutional and socio-economic constraints. As such, we expect an inverted-U type relationship between firm size and age and performance for female-owned informal firms.

## 2.1. Firm size, gender, and performance of informal firms

One of the most prominent risks that individuals face when starting new ventures is the liability of size. Research has long established that larger firms are more likely to survive as they have proven their legitimacy and crafted routines that can be predictably reproduced (Smith & Cao, 2007; Stinchcombe & March, 1965). Evidence indicates that new venture size is positively associated with sales, growth, and survival (Lippi, Barbieri, Bosoni, & Fellegara, 2019; Short et al., 2009). Furthermore, larger ventures are more likely to have amassed adequate resources necessary to be successful (Desa & Basu, 2013), and as firms grow larger they are more apt to be

able to leverage key network resources that can further enhance firm performance (Partanen, Kauppila, Sepulveda, & Gabrielsson, 2018). However, while the size can have marked advantages for firms operating within a formal context, it is unlikely that the relationship between size and performance will be similar for informal firms.

While increasing size can prove beneficial to informal firms, for reasons similar to those detailed regarding formal ventures, as informal firms grow larger, they face distinctive risks. It has been noted that, by their very nature, informal firms "need to stay small lest they become the target of government inspectors" (Djankov et al., 2003). Research has shown that larger size is associated with a higher likelihood that firms will encounter local officials, and as a result be forced to pay bribes to those officials (Rand & Tarp, 2012), this has been attributed to the fact that larger firm size within informal sectors increases firm visibility without a corresponding increase in the firm's power to bargain with corrupt officials (Lavallée & Roubaud, 2019). If informal firms do garner the attention of government officials, they will likely be susceptible to having to pay ever-increasing levels of bribes to ensure that these officials and inspectors continue to look the other way and allow these informal firms to continue to operate. These mounting costs could in turn translate into reduced overall performance. As a result, as informal firms increase in size, they show a substantial increase in the likelihood that they will take steps to formalize, rather than remain within the informal economic environment (Dabla-Norris et al., 2008). Therefore, we predict that firm size will have an inverted-U relationship with the performance of informal firms.

Given the relative heterogeneity that exists among self-employed individuals, the proposed inverted-U relationship might not remain consistent across different demographic segments. For our study, we specifically extend upon the substantial amount of previous research

exploring gender differences within the context of entrepreneurship (Carter, Shaw, Lam, & Wilson, 2007; Hmieleski & Sheppard, 2019; Uzuegbunam & Uzuegbunam, 2018). In general, the prevailing perspective that has arisen from this literature is that women tend to underperform relative to men (Klapper & Parker, 2011; Tandrayen-Ragoobur & Kasseeah, 2017) and that there is a general bias against women within entrepreneurial contexts (Chamorro-Premuzic, 2104). Indeed, prior work indicates that women face considerably greater difficulties in accessing financial resources (Marlow & Patton, 2005), achieve lower overall earnings (Leung, 2006), and have less access to viable entrepreneurial mentors within their social networks (Greenberg & Mollick, 2016). All of these factors contribute to the general notion that female-owned firms are likely to experience lower performance than their male-owned counterparts (Bosma, van Praag, Thurik, & de Wit, 2004; Fairlie & Robb, 2009; Lee & Huang, 2018). Yet, despite these findings, we continue to see an increase in the overall involvement of women within informal economies. Because female-owned firms tend to be smaller and less profitable, they may lack the necessary resources and access to the funding required for success (Abor & Biekpe, 2006; Ali, 2018). However, as female-owned informal firms grow in both size and age, it is possible that such increases could afford them a higher level of legitimacy and access to valuable resources, which could in turn help them to overcome the distinct liabilities of size and newness experienced by women within entrepreneurial contexts (Powell & Eddleston, 2008).

> *Hypothesis 1:* The gender of an informal firm owner will moderate the relationship between size and informal firm performance, such that larger firms will have an inverted-U shaped relationship with the performance for female-owned informal firms.

**2.2. Firm age, gender, and performance of informal firms**

Similar to the liability of size, new ventures are often confronted with a liability of newness that can negatively impact their performance. This liability of newness "stems from the organizations' general lack of resources and legitimacy that leave them with reduced ability to compete" (Srinivasan & Venkatraman, 2018). For firms operating within formal economies, it is likely that as they grow older they amass considerably greater levels of resources, that when combined in innovative ways can benefit firm performance (Kotha, Zheng, & George, 2011). Moreover, firm age is a key component in determining the level of legitimacy that a firm has achieved, which has been shown to enhance new venture performance (Wang, Thornhill, & De Castro, 2017). Despite these established influences of age on formal new venture performance, the association between age and performance for informal firms may take on a decidedly different nature.

Just as increasing size can have a non-linear (i.e. inverted U-shaped) relationship with informal firm performance, age could also result in similar effects. Up to a certain point, age can afford informal firms the ability to gain access to critical resources, as well as establish a certain level of legitimacy, which could translate into improved performance. However, as informal firms grow older, it could become increasingly difficult for them to conceal their activities from interested authorities (Mathias, Lux, Crook, Autry, & Zaretzki, 2015). As such, the increased efforts necessary to remain hidden would likely require additional costs to the organization, thereby reducing performance. Therefore it is possible that beyond this point age is potentially negatively associated with informal firm performance (Williams et al., 2017), and older firms are more likely to take steps to become formal (Bigsten et al., 2004). Firm age will have an inverted-U relationship with the performance of informal firms.

In such instances, it is possible that age could have positive associations with the performance for female-owned informal firms. However, these benefits are likely to have a limit. Once female-owned informal firms reach a certain size and age, it is likely that they will become as susceptible to risks associated with increased attention from government officials as all other informal firms. Therefore, while increases in size and age could benefit female-owned informal ventures at moderate levels, at high levels both size and age could ultimately prove detrimental to firm performance. Based on this logic, we predict the following:

> *Hypothesis 2: The gender of an informal firm owner will moderate the relationship between age and informal firm performance, such that firm age will have an inverted-U shaped relationship with the performance for female-owned informal firms.*

## 3. Methods

### 3.1. Sample

We used three data sources—the 2003 Urban Informal Economy Survey in Brazil, state-level violence, and state-level corruption data in Brazil. We draw on a large-scale survey of informal firms in Brazil, *Economia Informal Urbana* – 2003, or referred to as the 2003 Urban Informal Economy Survey (IBGE, 2003). The survey was conducted by the Brazilian Institute of Geography and Statistics Informal Urban Economy-2003 (2006). The 2003 Urban Informal Economy Survey data was collected by trained interviewers who visited respondent homes. Informal firms, based on the International Labor Organization (1993) were defined as businesses that were not formally registered with the Brazilian government. The survey collected data on firm characteristics, informal activities, and industry characteristics. We also use regional data from 2001-2003 to operationalize corruption and violence measures at the regional level. To

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gather data about the violence we used the *Sistema de Informações Sobre Mortalidade* (Mortality Information System – SIM) data provided by the Health Surveillance Secretariat of the Ministry of Health (MS/SVS)[1]. We used the data from the Brazilian Government Accountability Office (*Tribunal de contas da Uniao*) to measure the level of corruption. The data provides information on estimated regional corruption in Brazilian Reals ("Brazilian government accountability office," 2018).

Though the data was collected in 2003, it still provides rich details on informal entrepreneurs. The data used in this study was also used recently by Siqueira et al. (2016), Bologna (2016), and Ulyssea (2018). Furthermore, the context of informal employment in Brazil and its prevalence is consistent with that described in more recent studies (Gomes, Iachan, & Santos, 2019), and estimates of the size of the informal economy have stayed steady (de Holanda Barbosa Filho, 2012).

The full sample includes 48,813 firms. However, there is a substantial amount of missing data. We do not apply any filters and based on case-wise deletion our sample includes 2,562 informal firms with the necessary information for analyses. Although the data requires the inclusion of sampling weight, due to a substantial amount of missing data on the key variables necessary to lower confounding for testing the hypotheses, we are unable to use the sample level weighting variable. However, to lower concerns for sample stratification, we control for state-level effects, along with gender, and owner characteristics along with income.

**3.2. Measures**

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[1] The following filter was applied to extract the data: Agressões (X85 - Y09) (MS/SVS/CGIAE - Sistema de Informações sobre Mortalidade – SIM - http://tabnet.datasus.gov.br/cgi/deftohtm.exe?sim/cnv/ext10uf.def)

The dependent variable is the natural log of total firm revenue. While a more reliable measure of our outcome variable is possible, there are two challenges to collecting such outcomes. First, informal firms may be reluctant to divulge information on their revenue and profitability. Trepidation of possible harassment by government officials for bribes or suspicion that reported information may be transferred to the government may reduce the motivation to share more detailed information backed by business records. Second, informal firm owners have limited education and business training to use formal accounting tools to provide information on profitability and cost structures (Bradford, 2007). In line with prior studies, we use the log of revenue reported by the respondent.

Related to the measure of firm size, informal firms seldom employ employees (Chen, 2012). In the sample, only 10% of the firms had an employee. As such, we use the range of value of equipment and materials as a proxy for firm size. The variable ranges (in R$) from 1-10 (1=0.00 to 250.00 to 8=10,001 or more). Firm age is years since ownership in years. The moderator variable is sex (1-male; 3-female).

### 3.3. Controls

We use a variety of controls to lower the effects of confounding factors on firm revenue. We include owner's age and owner education (1=None; 2=Can read and write; 3=Elementary school or incomplete 1st Grade; 4=Primary school or first grade complete; 5=High school degree or second incomplete; 6=High school degree or second complete; 7=incomplete; 8=University Graduation). We include the count of employees and the number of owners. To control for business operations, we include the measures of whether the business operates during all months of the year (2=yes; 4=No, only certain months of the year; 6=No, only from time to time), hours

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per week the business operates, and days per week the business operates. We also include the composition of clients (2=single client; 4=stable clientele; 6=varied clientele) and whether the business has ongoing debt (2=yes; 4=no).

Finally, because violence influences business activities more so of informal firms, we use the mean of state-level violence between 2001 and 2003. The data is provided by the Ministry of Health supported by the Brazilian Disease Classification Centre (CBCD), at the University of São Paulo Public Health School, a national reference center for mortality information and a World Health Organization Collaboration Center. The cause of death is entered according to the International Classification of Diseases, namely its 9th Revision from 1979 to 1995 (CID-9), and its 10th Revision since 1996 (CID-10). To measure violence, for this research we have searched used this data using the CID X85-Y09. Between these codes, they classify deaths caused by firearms, knives, and other forms of violence.

---------------Insert Tables 1-3 and Figure 1 about here------------

### 3.4. Results

Table 1 lists the sample descriptives. Based on the correlation table, as expected, female-led informal firms had lower revenues ($r = -0.1187$, $p < 0.01$). Informal firms with more assets had higher revenues ($r = 0.6225$, $p < 0.01$), however, firm age had no association with total revenue ($r = 0.0262$, $p > 0.05$). The correlation between females and firm size was negative ($r = -0.0599$, $p < 0.10$), and females were likely to own younger informal firms ($r = -0.1272$, $p < 0.01$). Related to common method bias, Harman's factor analysis with all the variables resulted in seven factors with the first three factors explaining 46.03%, 36.52%, and 24.04% of the variance,

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respectively. The factor analysis was based on all the variables included in Table 1 with state of residence as an enumerated variable for the state of residence.

Table 2, presents the Ordinary Least Square (OLS) estimates. The specification is as follows:

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\begin{aligned}
Log\ of\ revenue_i \\
&= \alpha_0 + \beta_1 Firm\ Size_i + \beta_2 Firm\ Size_i^2 + \beta_3 Sex_i + \beta_4 Firm\ Size_i \ \times Sex_i \\
&+ \beta_5 Firm\ Size_i^2 \times Sex_i + \beta_5\ Firm\ Age_i + \beta_6 Firm\ Age_i\ \times Sex_i \\
&+ \beta_7 Firm\ Age_i^2 \times Sex_i + \sum_{c=1}^{C} \beta_c\ Control_c + \varepsilon_i
\end{aligned}
$$

Where represents the firm $i$ of the respondent and $Control_c$ represents the vector of control variables. The average variance inflation factor for the model with only the linear effects was 1.82 (highest VIF = 8.1). To lower model specification bias we present models both with and without controls. Across all models, females had a negative association with revenue. Firm size had inverted-U returns to firm revenue (model 8: $\beta = 0.0098$, $p < 0.01$). The effect size is meaningful with a change in R-square of 12.5%. Firm age had an inverted-U type returns to revenue (model 9: $\beta = -0.00032$, $p < 0.01$). The effect size is not meaningful with a change in R-square of 0.2%.

Hypothesis 1 proposed that for female owners, the firm size and revenue association is more likely to have decreasing returns is not supported. Hypothesis 2 proposed that for female owners, the firm age and revenue association is more likely to have decreasing returns (model 11: $\beta = -0.000330$, $p < 0.05$). Figure 1 supports the hypothesis. The effect size is meaningful with a change in R-square of 1.5%. Liabilities of newness has decreasing returns to firm age for female owners.

**3.5. Robustness checks**

To assess the robustness of inferences under different specifications, we conduct a series of robustness tests.

### 3.5.1. Additional controls of corruption and business license.

In addition to violence, corruption, and propensity to acquire business licenses are some modes of overcoming the requirements of operating formally (through bribes) or engaging formal business practices without fully participating in the formal economy. In Brazil during the period of observations, informal enterprises were allowed a variety of formalization benefits without operating formally. We, therefore, include whether the business as a license (1=yes; 0=no) and the mean corruption at the state level between 2001 and 2003. Model 1 in Table 3, using the OLS model, shows that the effects were consistent with the main effects.

### 3.5.2. Tobit model.

Due to the possibility of reluctance in fully reporting income at lower and upper bounds of income, in a Tobit model with upper and lower censoring, the estimates in Model 2 of Table 3, show effects consistent with the main effects.

### 3.5.3. Mixed model. To control for shared correlation based on state and industry sector memberships, specifying a multilevel model with the state at level-2 (Model 1) and state (level-3) nested within the industry (level-2; Model 2) in Table 4 (using the *mixed* routine in Stata 16), shows inference similar to main inferences.

### 4. Discussion

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The results of the present study suggest that although the relationship between size and informal firm revenues is not moderated by gender, the association between age and the informal firm performance had an inverted U-shape for female-owned informal firms. Thus, consistent with the findings of past research on firms operating within formal contexts (Desa & Basu, 2013), the liability of size is consistent across the gender of owners of informal firms. However, our results did support the hypothesis that firm age would have an inverted-U shaped relationship with the firm performance for female-owned informal ventures. These findings are interesting because they provide valuable insight into the ongoing conversation regarding the complex nuances involved in determining gender difference in the entrepreneurial process.

While there could be several underlying mechanisms that explain these results, perhaps the most plausible is that as female-owned firms get older, they could eliminate some of the difficulties they traditionally experience with regards to access to vital financial resources (Cole & Mehran, 2018) which could in turn increase firm performance. Essentially, whereas younger female-owned new ventures often face considerable discrimination in terms of their ability to access the financial resources necessary to succeed and grow (Hasan, Almubarak, & Ahmed, 2016), after surviving for a certain period they can demonstrate their worthiness to potential investors and lenders. However, there is some evidence that indicates that gender stereotypes could have detrimental effects on succession to subsequent generations (Kubíček & Machek, 2019; Mustafa, Elliott, & Zhou, 2019), which could help to explain why beyond a certain point, the benefits that female-owned firms experience diminish. Furthermore, issues surrounding succession could be further enhanced if the transition is between mother and daughter (Higginson, 2010). Future research will need to examine this phenomenon more extensively to further develop our understanding of the mechanisms that underly these relationships.

**4.1. Theoretical implications**

The present findings have important theoretical implications for existing research. First, they contribute to the ongoing efforts to understand how organizational influences deemed relevant for formal firms (i.e. liability of size) can influence firms within informal contexts. Contrary to previous notions of the potential risks of size for informal firms (Djankov et al., 2003), our results indicate that informal firms can also face a liability of size, and that larger informal firms can achieve higher levels of performance. Because larger firms represent a more stable and consistent source of informal payments (i.e. bribes), it is conceivable that government inspectors could view large informal firms more favorably, afford them some benefits so long as they remain amenable to paying a consistent amount in the form of bribes and kickbacks, and may not pressure such firms to formalize. Future research will be needed to tease out the mechanisms involved in these relationships across males and females, and better understand how the liability of size might play a role in informal firm success and survival.

Second, our results also add to the considerable literature regarding the liability of age experienced by most firms within formal economies. Interestingly, we did not find that age had a meaningful practical relationship with informal firm performance, which implies that perhaps informal firms are not as vulnerable to the liabilities connected with the newness that have been shown to influence formal ventures (Kotha et al., 2011; Srinivasan & Venkatraman, 2018). It is possible that the relatively fluid nature of informal economies (Cross, 2000; Daniels, 2004), and by extension, the firms that operate within them, could render the advantages that older firms can gain, as well as the disadvantages experienced by newer firms, somewhat moot. From this perspective, the importance of establishing legitimacy via age is not perhaps as important as a

factor for informal firms, therefore older organizations might not be perceived as superior to newer firms within informal contexts. Further research focusing on how legitimacy plays a role in the informal economy will be crucial in furthering our understanding of how age relates to performance for informal firms, especially for female owners.

Most importantly, we add to the growing stream of research concerned with the unique influence that gender can have on the entrepreneurial process. While considerable evidence has established that female-owned ventures underperform their male-owned counterparts (Klapper & Parker, 2011) and that women face marked disadvantages across numerous aspects of the entrepreneurial process (Fairlie & Robb, 2009; Greenberg & Mollick, 2016), our results provide some hope for optimism. Our results indicate that age can prove beneficial for female-owned informal ventures, however, these benefits only increase to a certain point, after which the advantages that female-owned informal firms experience begin to dwindle. This raises the fascinating question as to why such benefits disappear as female-owned firms persist beyond a certain point. Perhaps because females are more likely to start ventures in industries with relatively limited growth potential (Chant & Pedwell, 2008), the benefits of age reach a critical mass at moderate levels, beyond which older organizations could face greater levels of mortality. Conversely, it could be that the inherent gender biases present within many developing countries (Jayachandran, 2015; Klasen & Lamanna, 2009) could play a role in the relationship between age and informal firm performance, such that as informal firms reach a certain age, it becomes widely known that they are female-owned, and therefore they become more susceptible to potential gender bias effects.

**4.2. Practical implications**

In addition to the implications that our study has from a theoretical perspective, we also offer practical implications that can be gleaned from our results. From a practical perspective, our findings suggest that indeed *size does matter*, even within the context of informal firms. Whereas conventional theoretical wisdom has suggested that informal firms face explicit risks as a result of becoming too large and that by necessity informal firms must stay small (Djankov et al., 2003), our results suggest that this might not be the case. It is possible that the added access to resources that size allows can similarly benefit informal firms as formal ventures. Furthermore, it is possible that size also offers a unique form of legitimacy advantage for formal firms. Rather than construing legitimacy from a consumer or competitor perspective, it is possible that size can infer legitimacy from the perspective of government officials for informal firms. Essentially, as informal firms grow to a certain size, they become known to key government officials as stable and consistent sources of informal payments (i.e. bribes and financial kickbacks). As such, these firms represent a valuable resource of informal payments for government officials, thereby fortifying the desire for officials to ensure that these large, informal firms continue to be successful.

Additionally, our findings reinforce the relative lack of barriers to entry that exist within informal sectors. While we did find that age was statistically significant in terms of its relationship with informal firm performance, the practical size of this effect was meaningless. This suggests that the liability of newness, one of the key barriers of entry present within many formal economic sectors (Wang et al., 2017), might not play as prominent a role in the development of informal within emerging economies. Because of this relative lack of penalties levied against new ventures, it could be that starting a new venture within an informal context

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could be seen as even more desirable and advantageous than founding a formal new venture (Williams et al., 2017).

Finally, we offer some practical insight into the unique experience of female-owned informal ventures. Although it has been argued that informal firms can embody perilous traps that can funnel women into low-income ventures with little to no potential for advancement (Chant & Pedwell, 2008; Chen et al., 2006), if female-owned ventures can persist to a certain age, they can potentially experience some noticeable benefits with regards to their firm's performance. However, beyond a certain age, there could be potential downsides for female-owned informal firms that must be considered. Because we do not find support for H1, female informal firm owners can focus on growth-oriented aspects, which is increasing firm size, instead of survival-oriented aspects, that is ensuring survival for a longer period.

### 4.3. Limitations

The findings must be interpreted in light of its limitations. First, although consistent with past works on informal firms where reliable financial data is not available, the limitation of the study is that the financial performance data is self-reported. The context of an informal firm operation makes elicitation of such information highly problematic and unreliable. Faced with possible leakage of firm performance of government officials, these entrepreneurial efforts aimed at sustaining livelihood may limit the availability of such information, even if formal government efforts were made to collect such information. Second, due to the nature of the data and context, the data on firm age could be subject to recall bias and revenues could also be subject to underreporting bias. While underreporting of income could bias our estimates downwards, the issue of recall bias may not be ruled out. Third, our inferences, although based on reasonable

effect sizes, are association based and causation is not implied. While endogeneity will be difficult to parse out in these contexts, randomized controlled trials may be more effective.

Fourth, while our study focuses on general differences between genders with regards to the relationships in our theoretical model, we do not examine potential variance within genders in terms of the relationships in our theoretical model. Because individuals can have considerably different motives regarding why they choose to pursue self-employment (i.e. opportunity versus necessity), the expected duration they plan on engaging self-employment, as well as the industries in which they establish their informal firms there is likely substantial variation within genders in terms of the influence of venture age and size on firm performance as a result of such factors. Therefore, it will be imperative for additional future research to examine the variables that might create differences within gender categories for the relationships established in our study. Finally, the context of informatization is a result of complex institutional, economic, and local conditions. Our study is limited to informal firms in Brazil, and as such the findings cannot be generalized beyond the time and context that we focus on.

Though our data is dated, we discussed earlier that the richness of the data is still appealing to more recent studies by Siqueira et al. (2016), Bologna (2016), and Ulyssea (2018). We nevertheless concede that this is a limitation and richer data from the Brazilian census department may help further add more temporal validity to the findings in this study.

The study of informal firms, though phenomenologically important to emerging economies, is scientifically difficult. Challenges to accessing the firms, reticence to share the accurate performance information from the participants, and the fundamentally fluid nature of business execution that does not lend itself to traditional business theories from developed

countries, call for a more grounded theory building approach in this domain. Developing an understanding of business models of informal firms, improvisation strategies in the face of resource constraints, and survival orientation calling for a more tactical focus on business conduct are some aspects that could be further explored by future research.

**5. Conclusion**

Informal firms represent a significant portion of the overall activity of emerging economies. While the strategic aspects of such firms do not lend to traditional theories of firm organization and management from developed countries, the ecological forces of firm age and size proxy for the competitive pressures or resistance to such forces over time. We focused on this less explored, but highly relevant, area of informal firm performance to contribute towards the broader organization ecology literature and female entrepreneurship literature. Our findings indicate that informal firms despite the increasing size, continue to improve their revenues, irrespective of the gender of the owner. Furthermore, we find that female-owned informal firms can benefit from being older, but that these benefits have their limits, and that beyond a certain age performance of female-owned informal firms could begin to deteriorate. In conclusion, the informal firms in emerging economies represent a distinct aspect of organizational demography, and their liabilities of newness and smallness dynamics could be a distinct and fruitful area of future research.

References

Abor, J., & Biekpe, N. (2006). Smes' access to debt finance: A comparison of male-owned and female-owned businesses in ghana. *The International Journal of Entrepreneurship and Innovation, 7*(2), 105-112.

Ali, R. S. (2018). Determinants of female entrepreneurs growth intentions. *Journal of small business and enterprise development*.

Arend, R. J. (2014). Entrepreneurship and dynamic capabilities: How firm age and size affect the 'capability enhancement–sme performance'relationship. *Small Business Economics, 42*(1), 33-57.

Assenova, V. A., & Sorenson, O. (2017). Legitimacy and the benefits of firm formalization. *Organization Science, 28*(5), 804-818.

Bigsten, A., Kimuyu, P., & Lundvall, K. (2004). What to do with the informal sector? *Development Policy Review, 22*(6), 701-715.

Boeri, N. (2018). Challenging the gendered entrepreneurial subject: Gender, development, and the informal economy in india. *Gender & Society, 32*(2), 157-179. doi:10.1177/0891243217750119

Bologna, J. (2016). The effect of informal employment and corruption on income levels in brazil. *Journal of Comparative Economics, 44*(3), 657-695.

Bonnet, F., Vanek, J., & Chen, M. (2019). Women and men in the informal economy: A statistical brief. *International Labour Office, Geneva. http://www. wiego. org/sites/default/files/publications/files/Women% 20and% 20Men% 20in% 20the% 20Informal, 20*.

Bosma, N., van Praag, M., Thurik, R., & de Wit, G. (2004). The value of human and social capital investments for the business performance of startups. *Small Business Economics, 23*(3), 227-236. doi:10.1023/b:sbej.0000032032.21192.72

Bradford, W. D. (2007). Distinguishing economically from legally formal firms: Targeting business support to entrepreneurs in south africa's townships. *Journal of small business management, 45*(1), 94-115.

Brazilian government accountability office. (2018, September 17). *Brazilian Government Accountability Office*. Retrieved from https://contasirregulares.tcu.gov.br/ordsext/f?p=105:1:::NO:1,2,3,4,5,6::

Carr, J. C., Haggard, K. S., Hmieleski, K. M., & Zahra, S. A. (2010). A study of the moderating effects of firm age at internationalization on firm survival and short-term growth. *Strategic Entrepreneurship Journal, 4*(2), 183-192.

Carter, S., Shaw, E., Lam, W., & Wilson, F. (2007). Gender, entrepreneurship, and bank lending: The criteria and processes used by bank loan officers in assessing applications. *Entrepreneurship Theory and Practice, 31*(3), 427-444. doi:10.1111/j.1540-6520.2007.00181.x

Chamorro-Premuzic, T. (2104). The unnatural selection of male entrepreneurs. *Harvard Business Review Digital Articles*, 2-4.

Chant, S., & Pedwell, C. (2008). Women, gender and the informal economy: An assessment of ilo research and suggested ways forward.

Chen, M. A. (2012). *The informal economy: Definitions, theories and policies*. Retrieved from

Chen, M. A., Vanek, J., & Heintz, J. (2006). Informality, gender and poverty: A global picture. *Economic and Political Weekly*, 2131-2139.

Cole, R. A., & Mehran, H. (2018). Gender and the availability of credit to privately held firms: Evidence from the surveys of small business finances. *FRB of New York Staff Report*(383).

Cross, J. (2000). Street vendors, and postmodernity: Conflict and compromise in the global economy. *International journal of sociology and social policy, 20*(1/2), 29-51.

Dabla-Norris, E., Gradstein, M., & Inchauste, G. (2008). What causes firms to hide output? The determinants of informality. *Journal of Development Economics, 85*(1), 1-27. doi:https://doi.org/10.1016/j.jdeveco.2006.05.007

Daniels, P. W. (2004). Urban challenges: The formal and informal economies in mega-cities. *Cities, 21*(6), 501-511.

Daza Ramos, L. V. (2017). *A pathway towards empowerment in post-conflict colombia? The case of female victims of conflict in the department of meta.* Norwegian University of Life Sciences, Ås.

De Castro, J. O., Khavul, S., & Bruton, G. D. (2014). Shades of grey: How do informal firms navigate between macro and meso institutional environments? *Strategic Entrepreneurship Journal, 8*(1), 75-94. doi:doi:10.1002/sej.1172

de Holanda Barbosa Filho, F. (2012). An estimation of the underground economy in brazil: OECD.

De Soto, H. (1989). *The other path*: Harper & Row New York.

Desa, G., & Basu, S. (2013). Optimization or bricolage? Overcoming resource constraints in global social entrepreneurship. *Strategic Entrepreneurship Journal, 7*(1), 26-49. doi:10.1002/sej.1150

Djankov, S., Lieberman, I., Mukherjee, J., & Nenova, T. (2003). Going informal: Benefits and costs. *The Informal Economy in the EU Accession Countries: Size, Scope, Trends and Challenges to the Process of EU Enlargement‖. Sofia: CSD*, 63-80.

Fairlie, R. W., & Robb, A. M. (2009). Gender differences in business performance: Evidence from the characteristics of business owners survey. *Small Business Economics, 33*(4), 375.

Fichman, M., & Levinthal, D. A. (1991). Honeymoons and the liability of adolescence: A new perspective on duration dependence in social and organizational relationships. *Academy of Management Review, 16*(2), 442-468.

Fu, X., Mohnen, P., & Zanello, G. (2018). Innovation and productivity in formal and informal firms in ghana. *Technological Forecasting and Social Change, 131*, 315-325.

García, G. A. (2017). Labor informality: Choice or sign of segmentation? A quantile regression approach at the regional level for colombia. *Review of Development Economics, 21*(4), 985-1017.

Gomes, D., Iachan, F., & Santos, C. (2019). *Labor earnings dynamics with a large informal sector.* Paper presented at the 2019 Meeting Papers.

Greenberg, J., & Mollick, E. (2016). Activist choice homophily and the crowdfunding of female founders. *Administrative Science Quarterly, 62*(2), 341-374. doi:10.1177/0001839216678847

Günther, I., & Launov, A. (2012). Informal employment in developing countries: Opportunity or last resort? *Journal of Development Economics, 97*(1), 88-98.

Hasan, F. S., Almubarak, M. M. S., & Ahmed, A. (2016). Factors influencing women entrepreneurs' performance in smes. *World Journal of Entrepreneurship, Management and Sustainable Development*.

Higginson, N. (2010). Preparing the next generation for the family business: Relational factors and knowledge transfer in mother-to-daughter succession. *Journal of Management and Marketing research, 4*, 1.

Hmieleski, K. M., & Sheppard, L. D. (2019). The yin and yang of entrepreneurship: Gender differences in the importance of communal and agentic characteristics for entrepreneurs' subjective well-being and performance. *Journal of Business Venturing*.

IBGE. (2003). *Research about informal urban economy*.

Informal Urban Economy-2003. (2006). Informal urban economy-2003.

Jayachandran, S. (2015). The roots of gender inequality in developing countries. *Economics, 7*(1), 63-88.

Kent, R. (2018). "Helping" or "appropriating"? Gender relations in shea nut production in northern ghana. *Society & Natural Resources, 31*(3), 367-381.

Khavul, S. (2010). Microfinance: Creating opportunities for the poor? *Academy of Management Perspectives, 24*(3), 58-72.

Khavul, S., Bruton, G. D., & Wood, E. (2009). Informal family business in africa. *Entrepreneurship Theory and Practice, 33*(6), 1219-1238.

Klapper, L. F., & Parker, S. C. (2011). Gender and the business environment for new firm creation. *The World Bank Research Observer, 26*(2), 237-257.

Klasen, S., & Lamanna, F. (2009). The impact of gender inequality in education and employment on economic growth: New evidence for a panel of countries. *Feminist economics, 15*(3), 91-132.

Klingbeil, C., & Semrau, T. (2017). For whom size matters–the interplay between incubator size, tenant characteristics and tenant growth. *Industry and Innovation, 24*(7), 735-752.

Kotha, R., Zheng, Y., & George, G. (2011). Entry into new niches: The effects of firm age and the expansion of technological capabilities on innovative output and impact. *Strategic Management Journal, 32*(9), 1011-1024.

Kraemer-Mbula, E., & Wunsch-Vincent, S. (2016). *The informal economy in developing nations*: Cambridge University Press.

Krammer, S. M. S. (2019). Greasing the wheels of change: Bribery, institutions, and new product introductions in emerging markets. *Journal of Management, 45*(5), 1889-1926. doi:10.1177/0149206317736588

Krasniqi, B. A., & Williams, C. C. (2020). Does informality help entrepreneurs achieve firm growth? Evidence from a post-conflict economy. *Economic Research-Ekonomska Istraživanja, 33*(1), 1581-1599.

Kubíček, A., & Machek, O. (2019). Gender-related factors in family business succession: A systematic literature review. *Review of Managerial Science, 13*(5), 963-1002.

La Porta, R., & Shleifer, A. (2008). *The unofficial economy and economic development*. Retrieved from

Lavallée, E., & Roubaud, F. (2019). Corruption in the informal sector: Evidence from west africa. *The Journal of Development Studies, 55*(6), 1067-1080.

Lee, M., & Huang, L. (2018). Gender bias, social impact framing, and evaluation of entrepreneurial ventures. *Organization Science, 29*(1), 1-16.

Leung, D. (2006). The male/female earnings gap and female self-employment. *The Journal of Socio-Economics, 35*(5), 759-779. doi:http://dx.doi.org/10.1016/j.socec.2005.11.034

Ling, Y., Zhao, H., & Baron, R. A. (2007). Influence of founder—ceos' personal values on firm performance: Moderating effects of firm age and size. *Journal of Management, 33*(5), 673-696.

Lippi, A., Barbieri, L., Bosoni, E., & Fellegara, A. M. (2019). Firm survival: An empirical study concerning insurance agencies. *International Journal of Business and Management, 14*(11).

Marlow, S., & Patton, D. (2005). All credit to men? Entrepreneurship, finance, and gender. *Entrepreneurship Theory and Practice, 29*(6), 717-735. doi:doi:10.1111/j.1540-6520.2005.00105.x

Mathias, B. D., Lux, S., Crook, R. T., Autry, C., & Zaretzki, R. (2015). Competing against the unknown: The impact of enabling and constraining institutions on the informal economy. *Journal of Business Ethics, 127*(2), 251-264. doi:10.1007/s10551-013-2030-6

Matsongoni, H., & Mutambara, E. (2018). An assessment of informal smes' potential in an african economy—theoretical and conceptual framework. *Public and Municipal Finance, 7*(2), 6-17.

Meagher, K. (2011). The empowerment trap: Gender, poverty and the informal economy in sub-saharan africa. In S. Chant (Ed.), *The international handbook of gender and poverty* (pp. 472-477). Northampton, MA: Edward Elgar.

Mustafa, M., Elliott, C., & Zhou, L. (2019). Succession in chinese family-smes: A gendered analysis of successor learning and development. *Human Resource Development International, 22*(5), 504-525. doi:10.1080/13678868.2019.1608123

Nichter, S., & Goldmark, L. (2009). Small firm growth in developing countries. *World Development, 37*(9), 1453-1464.

O'Toole, J., & Ciuchta, M. P. (2019). The liability of newer than newness: Aspiring entrepreneurs and legitimacy. *International Journal of Entrepreneurial Behavior & Research*.

Omri, A. (2020). Formal versus informal entrepreneurship in emerging economies: The roles of governance and the financial sector. *Journal of Business Research, 108*, 277-290. doi:https://doi.org/10.1016/j.jbusres.2019.11.027

Partanen, J., Kauppila, O. P., Sepulveda, F., & Gabrielsson, M. Turning strategic network resources into performance: The mediating role of network identity of small and medium-sized enterprises. *Strategic Entrepreneurship Journal*.

Partanen, J., Kauppila, O. P., Sepulveda, F., & Gabrielsson, M. (2018). Turning strategic network resources into performance: The mediating role of network identity of small-and medium-sized enterprises. *Strategic Entrepreneurship Journal*.

Powell, G. N., & Eddleston, K. A. (2008). The paradox of the contented female business owner. *Journal of Vocational Behavior, 73*(1), 24-36.

Rand, J., & Tarp, F. (2012). Firm-level corruption in vietnam. *Economic Development and Cultural Change, 60*(3), 571-595.

Santoro, G., Mazzoleni, A., Quaglia, R., & Solima, L. (2019). Does age matter? The impact of smes age on the relationship between knowledge sourcing strategy and internationalization. *Journal of Business Research*.

Schneider, F. (2005). The size of shadow economies in 145 countries from 1999 to 2003. *The Brown Journal of World Affairs, 11*(2), 113-129.

Short, J. C., McKelvie, A., Ketchen Jr, D. J., & Chandler, G. N. (2009). Firm and industry effects on firm performance: A generalization and extension for new ventures. *Strategic Entrepreneurship Journal, 3*(1), 47-65.

Siqueira, A. C. O., Webb, J. W., & Bruton, G. D. (2016). Informal entrepreneurship and industry conditions. *Entrepreneurship theory and practice, 40*(1), 177-200.

Slade Shantz, A., Kistruck, G., & Zietsma, C. (2018). The opportunity not taken: The occupational identity of entrepreneurs in contexts of poverty. *Journal of Business Venturing, 33*(4), 416-437. doi:https://doi.org/10.1016/j.jbusvent.2018.02.003

Smith, K. G., & Cao, Q. (2007). An entrepreneurial perspective on the firm-environment relationship. *Strategic Entrepreneurship Journal, 1*(3-4), 329-344.

Srinivasan, A., & Venkatraman, N. (2018). Entrepreneurship in digital platforms: A network-centric view. *Strategic Entrepreneurship Journal, 12*(1), 54-71.

Stawasz, E., & Ropega, J. (2017). *Economic failure in the process of small business growth in the context of the shadow economy*. London, UK: Union Bridge Books.

Stinchcombe, A. L., & March, J. (1965). Social structure and organizations. *Handbook of organizations*, 142-193.

Tandrayen-Ragoobur, V., & Kasseeah, H. (2017). Is gender an impediment to firm performance? Evidence from small firms in mauritius. *International Journal of Entrepreneurial Behavior & Research*.

Thornhill, S., & Amit, R. (Writers). (2003). Learning about failure: Bankruptcy, firm age, and the resource-based view [Article], *Organization Science*: INFORMS: Institute for Operations Research.

Ulyssea, G. (2018). Firms, informality, and development: Theory and evidence from brazil. *American Economic Review, 108*(8), 2015-2047.

USAID. (2005). *Gender and pro-poor growth*. Washington, D. C.: United States Agency for International Development.

Uzuegbunam, A. O., & Uzuegbunam, I. (2018). Arm's-length or give-and-take? Gender differences in the relational orientation of new ventures in sub-saharan africa. *Strategic Entrepreneurship Journal, 12*(4), 522-541.

Vanek, J., Chen, M. A., Carré, F., Heintz, J., & Hussmanns, R. (2014). Statistics on the informal economy: Definitions, regional estimates and challenges. *Women Informal Employ Glob Organ Work Pap, 2*.

Wang, T., Thornhill, S., & De Castro, J. O. (2017). Entrepreneurial orientation, legitimation, and new venture performance. *Strategic Entrepreneurship Journal, 11*(4), 373-392.

Webb, J. W., Bruton, G. D., Tihanyi, L., & Ireland, R. D. (2013). Research on entrepreneurship in the informal economy: Framing a research agenda. *Journal of Business Venturing, 28*(5), 598-614.

Webb, J. W., Tihanyi, L., Ireland, R. D., & Sirmon, D. G. (2009). You say illegal, i say legitimate: Entrepreneurship in the informal economy. *Academy of Management Review, 34*(3), 492-510.

Williams, C. C. (2017). *Entrepreneurship in the informal sector: An institutional perspective*: Routledge.

Williams, C. C., & Kedir, A. M. (2017). Evaluating the impacts of starting up unregistered on firm performance in africa. *Journal of Developmental Entrepreneurship, 22*(03), 1750017.

Williams, C. C., Martinez-Perez, A., & Kedir, A. M. (2017). Informal entrepreneurship in developing economies: The impacts of starting up unregistered on firm performance. *Entrepreneurship Theory and Practice, 41*(5), 773-799.

Williams, C. C., & Shahid, M. S. (2016). Informal entrepreneurship and institutional theory: Explaining the varying degrees of (in) formalization of entrepreneurs in pakistan. *Entrepreneurship & Regional Development, 28*(1-2), 1-25.

Xie, X., Qi, G., & Zhu, K. X. (2018). Corruption and new product innovation: Examining firms' ethical dilemmas in transition economies. *Journal of business ethics*, 1-19.

**Table 1:** Sample Descriptives

| | variable | N | mean | sd | min | max | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | log of total revenue | 2,562 | 6.6152 | 1.1865 | 1.7918 | 10.8198 | 1 | | | | | | | |
| 2 | Sex (1=male; 3=female) | 2,562 | 1.7018 | 0.9547 | 1 | 3 | -0.1187* | 1 | | | | | | |
| 3 | value of total equipment and facilities | 2,562 | 4.3942 | 2.3697 | 1 | 8 | 0.6225* | -0.0599* | 1 | | | | | |
| 4 | Firm age | 2,562 | 9.8329 | 9.5457 | 0 | 60 | 0.0262 | -0.1272* | 0.0144 | 1 | | | | |
| 5 | Owner age | 2,562 | 41.5699 | 11.9928 | 11 | 89 | 0.0377 | -0.0907* | 0.0427* | 0.4780* | 1 | | | |
| 6 | education | 2,562 | 4.4173 | 1.8618 | 1 | 8 | 0.3418* | 0.1797* | 0.3364* | -0.1017* | -0.1840* | 1 | | |
| 7 | Total employees | 2,562 | 0.2326 | 0.6803 | 0 | 5 | 0.3626* | -0.0819* | 0.2781* | 0.0138 | -0.0019 | 0.1450* | 1 | |
| 8 | Total number of owners | 2,562 | 0.0316 | 0.2132 | 0 | 3 | 0.2098* | 0.0252 | 0.1376* | -0.0367 | -0.0358 | 0.0887* | 0.3180* | 1 |
| 9 | Average state level violence between 2001 and 2003 | 2,562 | 2331.7520 | 3311.8510 | 112 | 14707 | 0.0776* | 0.022 | 0.0382 | 0.0432* | 0.0905* | 0.0873* | -0.0275 | 0.0375 |
| 10 | Whether business operates during all months of the year | 2,562 | 2.2053 | 0.7415 | 2 | 6 | -0.1266* | 0.0126 | -0.1114* | -0.0166 | -0.0016 | 0.003 | -0.0529* | -0.0164 |
| 11 | Hours per week the business operates | 2,562 | 46.4180 | 22.0536 | 1 | 139 | 0.3005* | -0.1490* | 0.2325* | -0.03 | 0.0021 | -0.1466* | 0.0834* | 0.0362 |
| 12 | Days per week the business operates | 2,562 | 5.6596 | 1.3109 | 1 | 7 | 0.1726* | -0.1080* | 0.1278* | -0.0523* | 0.0186 | -0.1387* | 0.0328 | 0.0092 |
| 13 | Composition of clients | 2,562 | 5.6651 | 0.8413 | 2 | 6 | -0.008 | -0.0690* | -0.0517* | -0.0212 | 0.0332 | -0.0773* | 0.0025 | 0.0155 |
| 14 | Ongoing debt | 2,562 | 3.6245 | 0.7812 | 2 | 4 | -0.1711* | -0.0444* | -0.1432* | 0.0608* | 0.0268 | -0.0619* | -0.0986* | -0.0975* |

| | | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|
| 9 | Average state-level violence between 2001 and 2003 | 1 | | | | |
| 10 | Whether a business operates during all months of the year | -0.0301 | 1 | | | |
| 11 | Hours per week the business operates | -0.0061 | -0.1822* | 1 | | |
| 12 | Days per week the business operates | -0.02 | -0.1820* | 0.6346* | 1 | |
| 13 | Composition of clients | 0.006 | -0.0224 | 0.0724* | 0.0644* | 1 |
| 14 | Ongoing debt | 0.004 | 0.0037 | -0.0846* | -0.0539* | 0.0415* |

*Notes.*

*p<0.05 (two-tailed)

**Table 2:** Ordinary Least Square (OLS) estimates

| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Log of revenue | | | | | | |
| Firm size (value of equipment) | | 0.184*** | | 0.104 | | 0.0990 | 0.130*** | | | 0.100 | | 0.0966 |
| | | (0.0343) | | (0.0700) | | (0.0700) | (0.0315) | | | (0.0633) | | (0.0633) |
| Firm size - square | | 0.0150*** | | 0.0222*** | | 0.0229*** | 0.00978*** | | | 0.0122* | | 0.0129* |
| | | (0.00393) | | (0.00798) | | (0.00798) | (0.00361) | | | (0.00724) | | (0.00724) |
| Sex | | | | -0.194*** | -0.209*** | -0.242*** | | | | -0.141** | -0.198*** | -0.188*** |
| | | | | (0.0636) | (0.0430) | (0.0703) | | | | (0.0579) | (0.0340) | (0.0638) |
| Firm size × sex | | | | 0.0447 | | 0.0512 | | | | 0.0177 | | 0.0236 |
| | | | | (0.0357) | | (0.0357) | | | | (0.0323) | | (0.0323) |
| Firm-size square × sex **[H1]** | | | | -0.00412 | | -0.00502 | | | | -0.00174 | | -0.00257 |
| | | | | (0.00414) | | (0.00414) | | | | (0.00374) | | (0.00374) |
| Firm age | | | 0.0187*** | | -0.0103 | -0.00128 | | | 0.0146*** | | -0.00790 | -0.00147 |
| | | | (0.00635) | | (0.0128) | (0.0100) | | | (0.00510) | | (0.0101) | (0.00903) |
| Firm-age square | | | -0.000454*** | | 0.000348 | 5.14e-05 | | | -0.000322** | | 0.000240 | 5.40e-05 |
| | | | (0.000172) | | (0.000344) | (0.000269) | | | (0.000136) | | (0.000271) | (0.000242) |
| Firm age × sex | | | | | 0.0161** | 0.0107** | | | | | 0.0121** | 0.00972** |
| | | | | | (0.00682) | (0.00534) | | | | | (0.00535) | (0.00479) |
| Firm-age square × sex **[H2]** | | | | | -0.000485** | -0.000319** | | | | | -0.000330** | -0.000261* |
| | | | | | (0.000190) | (0.000149) | | | | | (0.000149) | (0.000134) |
| Owner age | | | | | | | 0.00952*** | 0.00508*** | 0.00832*** | 0.00465*** | 0.00813*** | 0.00396** |
| | | | | | | | (0.00159) | (0.00142) | (0.00179) | (0.00142) | (0.00177) | (0.00160) |
| Owner education | | | | | | | 0.213*** | 0.121*** | 0.214*** | 0.132*** | 0.225*** | 0.132*** |
| | | | | | | | (0.0106) | (0.0101) | (0.0105) | (0.0102) | (0.0106) | (0.0101) |
| Number of employees | | | | | | | 0.431*** | 0.282*** | 0.429*** | 0.268*** | 0.407*** | 0.267*** |
| | | | | | | | (0.0291) | (0.0267) | (0.0290) | (0.0267) | (0.0289) | (0.0266) |
| Number of owners | | | | | | | 0.449*** | 0.378*** | 0.456*** | 0.399*** | 0.474*** | 0.401*** |
| | | | | | | | (0.0922) | (0.0823) | (0.0922) | (0.0820) | (0.0914) | (0.0819) |
| violence20012003 | | | | | | | 6.17e-05 | 0.00438 | 0.0119 | 0.00561 | 0.0128 | 0.00606 |
| | | | | | | | (4.55e-05) | (0.0110) | (0.0123) | (0.0109) | (0.0122) | (0.0109) |
| Operates for all months during the year | | | | | | | -0.0776*** | -0.0462** | -0.0764*** | -0.0499** | -0.0793*** | -0.0482** |
| | | | | | | | (0.0255) | (0.0228) | (0.0255) | (0.0227) | (0.0253) | (0.0227) |
| Hours per week the business operates | | | | | | | 0.0165*** | 0.0109*** | 0.0164*** | 0.0104*** | 0.0157*** | 0.0103*** |
| | | | | | | | (0.00110) | (0.00101) | (0.00110) | (0.00101) | (0.00110) | (0.00101) |
| Days per week the business operates | | | | | | | 0.00983 | 0.00908 | 0.0115 | 0.00774 | 0.0105 | 0.00902 |
| | | | | | | | (0.0184) | (0.0164) | (0.0184) | (0.0163) | (0.0182) | (0.0163) |
| Composition of clients | | | | | | | 0.00104 | 0.0190 | 0.00152 | 0.0132 | -0.00561 | 0.0137 |
| | | | | | | | (0.0222) | (0.0198) | (0.0222) | (0.0198) | (0.0220) | (0.0198) |
| Ongoing debt | | | | | | | -0.142*** | -0.0865*** | -0.145*** | -0.0942*** | -0.152*** | -0.0948*** |
| | | | | | | | (0.0241) | (0.0216) | (0.0241) | (0.0215) | (0.0239) | (0.0215) |
| State = Alagoas | | | | | | | 0.454 | -3.310 | -9.172 | -4.224 | -9.795 | -4.589 |
| | | | | | | | (0.626) | (8.357) | (9.362) | (8.309) | (9.266) | (8.294) |
| State = Amapa | | | | | | | 0.757 | 0.377* | 0.271 | 0.375* | 0.258 | 0.365* |
| | | | | | | | (0.675) | (0.217) | (0.243) | (0.216) | (0.241) | (0.216) |

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State = Amazonas | | | | | | | 0.481 | -1.386 | -3.990 | -1.784 | -4.263 | -1.948 |
| | | | | | | | (0.650) | (3.590) | (4.022) | (3.569) | (3.980) | (3.563) |
| State = Bahia | | | | | | | 0.596 | -7.083 | -19.63 | -9.090 | -21.03 | -9.861 |
| | | | | | | | (0.588) | (18.18) | (20.36) | (18.07) | (20.15) | (18.04) |
| State = Ceara | | | | | | | 0.0815 | -5.718 | -15.17 | -7.216 | -16.21 | -7.779 |
| | | | | | | | (0.608) | (13.59) | (15.22) | (13.51) | (15.06) | (13.48) |
| State = Distrito Federal | | | | | | | 0.698 | -2.054 | -5.824 | -2.661 | -6.247 | -2.900 |
| | | | | | | | (0.637) | (5.490) | (6.150) | (5.458) | (6.087) | (5.448) |
| State = Espmrito Santo | | | | | | | 0.798 | -5.851 | -16.18 | -7.530 | -17.35 | -8.159 |
| | | | | | | | (0.602) | (15.18) | (17.00) | (15.09) | (16.83) | (15.06) |
| State = Goias | | | | | | | 0.775 | -4.672 | -12.87 | -6.005 | -13.80 | -6.523 |
| | | | | | | | (0.611) | (12.09) | (13.54) | (12.02) | (13.40) | (12.00) |
| State = Maranhco | | | | | | | 0.275 | -2.075 | -5.780 | -2.630 | -6.163 | -2.843 |
| | | | | | | | (0.637) | (5.066) | (5.675) | (5.037) | (5.617) | (5.028) |
| State = Mato Grosso | | | | | | | 0.482 | -3.691 | -9.009 | -4.605 | -9.636 | -4.944 |
| | | | | | | | (0.821) | (8.257) | (9.249) | (8.209) | (9.155) | (8.194) |
| State = Mato Grosso do Sul | | | | | | | 0.859 | -1.931 | -5.412 | -2.497 | -5.800 | -2.734 |
| | | | | | | | (0.642) | (5.249) | (5.880) | (5.218) | (5.820) | (5.209) |
| State = Minas Gerais | | | | | | | 0.271 | -12.82 | -34.47 | -16.34 | -36.96 | -17.66 |
| | | | | | | | (0.529) | (31.63) | (35.44) | (31.45) | (35.07) | (31.39) |
| State = Parana | | | | | | | 0.672 | -9.018 | -24.51 | -11.56 | -26.31 | -12.51 |
| | | | | | | | (0.567) | (22.78) | (25.52) | (22.65) | (25.25) | (22.61) |
| State = Paramba | | | | | | | 0.399 | -1.843 | -4.654 | -2.312 | -4.988 | -2.487 |
| | | | | | | | (0.651) | (4.139) | (4.636) | (4.114) | (4.589) | (4.107) |
| State = Para | | | | | | | 0.696 | -4.030 | -11.69 | -5.266 | -12.57 | -5.729 |
| | | | | | | | (0.620) | (10.92) | (12.23) | (10.86) | (12.11) | (10.84) |
| State = Pernambuco | | | | | | | 0.170 | -19.20 | -51.95 | -24.51 | -55.68 | -26.50 |
| | | | | | | | (0.467) | (47.72) | (53.46) | (47.44) | (52.91) | (47.36) |
| State = Piaum | | | | | | | 0.364 | -0.627 | -1.387 | -0.735 | -1.457 | -0.793 |
| | | | | | | | (0.667) | (1.085) | (1.216) | (1.079) | (1.203) | (1.077) |
| State = Rio Grande do Norte | | | | | | | 0.675 | -0.616 | -1.706 | -0.774 | -1.799 | -0.861 |
| | | | | | | | (0.658) | (1.656) | (1.855) | (1.646) | (1.836) | (1.643) |
| State = Rio Grande do Sul | | | | | | | 0.788 | -7.272 | -19.93 | -9.334 | -21.38 | -10.12 |
| | | | | | | | (0.586) | (18.64) | (20.88) | (18.53) | (20.66) | (18.50) |
| State = Rio de Janeiro | | | | | | | 0.256 | -33.25 | -90.73 | -42.61 | -97.34 | -46.08 |
| | | | | | | | (0.323) | (83.73) | (93.79) | (83.24) | (92.83) | (83.09) |
| State = Rondtnia | | | | | | | 1.026 | -1.361 | -4.223 | -1.830 | -4.542 | -2.017 |
| | | | | | | | (0.642) | (4.313) | (4.831) | (4.288) | (4.782) | (4.280) |
| State = Roraima | | | | | | | 0.326 | 0.0994 | 0.692 | 0.205 | 0.767 | 0.241 |
| | | | | | | | (0.666) | (0.889) | (0.996) | (0.884) | (0.986) | (0.883) |
| State = Santa Catarina | | | | | | | 0.988 | -1.481 | -4.066 | -1.929 | -4.371 | -2.113 |
| | | | | | | | (0.644) | (4.123) | (4.619) | (4.099) | (4.571) | (4.091) |
| State = Sergipe | | | | | | | 0.186 | -1.720 | -4.232 | -2.088 | -4.470 | -2.253 |
| | | | | | | | (0.646) | (3.535) | (3.960) | (3.514) | (3.919) | (3.508) |
| State = Tocantins | | | | | | | 0.612 | | | | | |
| | | | | | | | (0.670) | | | | | |
| State = Sco Paulo | | | | | | | | -63.32 | -172.5 | -81.12 | -185.1 | -87.68 |
| | | | | | | | | (159.3) | (178.4) | (158.3) | (176.6) | (158.1) |
| Constant | 6.615*** | 5.432*** | 6.516*** | 5.779*** | 6.896*** | 5.778*** | 4.375*** | 3.836* | 2.665 | 3.913* | 2.912 | 3.860* |
| | (0.0234) | (0.0621) | (0.0421) | (0.128) | (0.0870) | (0.143) | (0.694) | (2.113) | (2.369) | (2.100) | (2.345) | (2.097) |

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Observations | 2,562 | 2,562 | 2,562 | 2,562 | 2,562 | 2,562 | 2,562 | 2,562 | 2,562 | 2,562 | 2,562 | 2,562 |
| R-squared | 0.000 | 0.391 | 0.003 | 0.398 | 0.019 | 0.402 | 0.396 | 0.521 | 0.398 | 0.528 | 0.411 | 0.530 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table 3:** Alternate Specifications

| VARIABLES | (1) Additional controls for corruption and business license OLS | (2) Tobit |
|---|---|---|
| Has license to perform the business activity | -0.156*** | |
| | (0.0210) | |
| Mean corruption (2001-2003) | -0.000733 | |
| | (0.00133) | |
| Sex | -0.188*** | -0.189*** |
| | (0.0631) | (0.0633) |
| Firm size (value of equipment) | 0.0989 | 0.0958 |
| | (0.0626) | (0.0628) |
| Firm size × sex | 0.0281 | 0.0240 |
| | (0.0319) | (0.0320) |
| Firm size - square | 0.0112 | 0.0130* |
| | (0.00717) | (0.00718) |
| Firm-size square × sex | -0.00344 | -0.00261 |
| | (0.00371) | (0.00371) |
| Firm age | -0.00141 | -0.00144 |
| | (0.00892) | (0.00895) |
| Firm age × sex | 0.00838* | 0.00968** |
| | (0.00474) | (0.00476) |
| Firm-age square | 5.15e-05 | 5.26e-05 |
| | (0.000240) | (0.000240) |
| Firm-age square × sex | -0.000224* | -0.000260* |
| | (0.000132) | (0.000133) |
| Controls | Included | Included |
| Constant | 5.678*** | 3.859* |
| | (0.374) | (2.080) |
| Observations | 2,557 | 2,562 |
| R-squared | 0.540 | |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table 4:** Mixed model (Multilevel model)

| VARIABLES | (1)<br>State nesting<br>[Individuals nested within states] | (2)<br>State and Industry nesting<br>[Individuals nested within states, and states nested within the industry] |
|---|---|---|
| Sex | -0.188*** | -0.184*** |
| | (0.0632) | (0.0631) |
| Firm size (value of equipment) | 0.0966 | 0.0817 |
| | (0.0627) | (0.0623) |
| Firm size × sex | 0.0236 | 0.0247 |
| | (0.0320) | (0.0314) |
| Firm size - square | 0.0129* | 0.0138** |
| | (0.00717) | (0.00706) |
| Firm-size square × sex | -0.00257 | -0.00301 |
| | (0.00371) | (0.00363) |
| Firm age | -0.00147 | -0.000610 |
| | (0.00895) | (0.00883) |
| Firm age × sex | 0.00972** | 0.0113** |
| | (0.00475) | (0.00461) |
| Firm-age square | 5.40e-05 | 2.30e-05 |
| | (0.000240) | (0.000237) |
| Firm-age square × sex | -0.000261** | -0.000270** |
| | (0.000133) | (0.000129) |
| | | |
| Controls | Included | Included |
| | | |
| Constant | 3.860* | 3.915* |
| | (2.079) | (2.101) |
| | | |
| Observations | 2,562 | 2,548 |
| Number of groups | 27 | 27 |

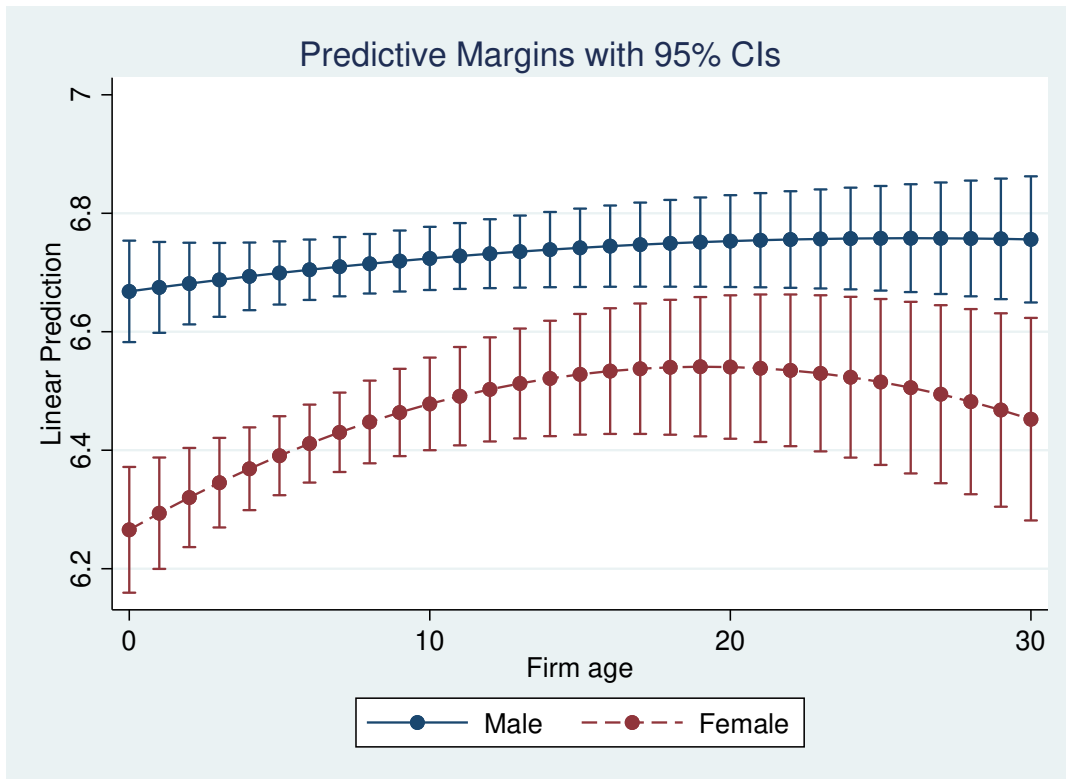Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Figure 1:** Moderation effect of firm age  and gender