Improving the resilience of SMEs in times of crisis: The impact of mobile money amid Covid-19 in Zambia

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Abstract
This study investigates the impact of mobile money (MM) on SMEs’ resilience and the associated business outcome in developing countries amid Covid-19. Despite the potential of MM to improve SMEs’ resilience, little evidence has been documented. Using Enterprise Survey data in Zambia, we show that SMEs are more likely than large firms to experience catastrophic sales decline, reflecting their inherent vulnerability. Further analysis reveals that this unfavourable effect can be effectively counteracted when SMEs incorporate MM into daily business. An important policy implication is that the use of digital technologies should be a key element of policy responses to Covid-19.

KEYWORDS
Covid-19, Mobile money (MM), resilience, sales decrease, SMEs, Zambia

1 | INTRODUCTION

The frequency and severity of shocks—natural disasters, economic crises, political upheavals and societal disturbances—have been projected to increase in the 21st century (WEF, 2013). Two previous outbreaks of serious disease, SARS and MERS, have now been surpassed by the novel coronavirus, Covid-19, which has turned into a global pandemic. Business communities across the globe have been dramatically impacted by the prolonged containment measures implemented to prevent the spread of coronavirus. In particular, small and medium enterprises (SMEs) are at higher risk of failure than large firms because of their limited resources and capabilities to handle external shocks (Asgary et al., 2020; OECD, 2020). The widespread failures of SMEs could generate unemployment, disrupt large firms relying on them and have a ripple effect on the economies of countries on every continent. Given their important roles and prevalence, the resilience of SMEs in times of crisis is critical for the private sector and national and global economies (Asgary et al., 2020).
The resilience of SMEs broadly refers to the capabilities of SMEs to withstand and adapt to external shocks (Heeks & Ospina, 2019). Among the factors contributing to SMEs’ resilience, this paper focuses specifically on the use of digital technologies in developing countries, which has been of increasing interest to scholars in the fields of development studies (Mbuyisa & Leonard, 2017), information systems (Papadopoulos et al., 2020) and SMEs (Akpan et al., 2020). A typical example is the use of mobile money (MM) in sub-Saharan Africa (SSA). Using telecommunication infrastructure and non-bank retail channels, MM extends the delivery of basic financial services over mobile phones to individuals and small businesses, especially those who are marginalized from the traditional banking system (GSMA, 2016). Following the phenomenal success of M-Pesa in Kenya, MM initiatives have been widely implemented throughout SSA, and these mobile financial services have been increasingly adopted by SMEs since the early 2010s (Islam et al., 2018).

The history of MM uptake has its roots in a crisis. The launch of M-Pesa in 2007 coincided with the Kenya election crisis, which erupted in a series of boycotts and outbreaks of violence. Kenyans turned to M-Pesa to digitally send money to friends and family members because the banks were closed due to the widespread violence (Suárez, 2016). The superiority and fundamental novelty of MM is concerned with the digitalization of cash and the associated financial transactions (Markus & Nan, 2020). Due to its digitality, MM has been perceived more convenient, affordable and secure than traditional banking services (Aron, 2018; Mbiti & Weil, 2016). It appears that the potential of MM to improve SMEs’ resilience is likely to be actualized amid Covid-19, where physical contacts and movements have been severely restricted. However, little evidence has been documented in this regard. Thus, this paper aims to investigate the impact of mobile money on SMEs’ resilience and the associated business outcome amid Covid-19 in developing countries.

Drawing on the literature on SMEs’ resilience and MM, we theorize that MM use contributes to three enabling attributes—rapidity, scale and flexibility—of SMEs’ resilience such that MM users are afforded the digital opportunities and capabilities to combat their inherent vulnerability and withstand external shocks. We explore this issue in the context of Zambia, where the standard Enterprise Survey (World Bank, 2020a) and the follow-up Survey on Covid-19 (World Bank, 2020b) were conducted before and after the outbreak of Covid-19, respectively. Using the merged survey data, we show that SMEs, ceteris paribus, are more likely than large firms to have experienced catastrophic sales decline during the pandemic, which is consistent with the literature (e.g., Asgary et al., 2020). Our analysis further documents that this unfavourable effect, reflecting SMEs’ vulnerability, can be effectively mitigated when SMEs incorporate MM into daily business.

These findings contribute to our understanding of three interrelated fields: development studies, information systems and SMEs. Despite the potential significance of digital technologies for SMEs in times of crisis, this crucial area has been weakly examined (Papadopoulos et al., 2020), particularly in developing countries. This study addresses this research gap and meanwhile the findings provide important policy implications. While traditional anti-crisis policy responses geared towards SMEs have tended to focus primarily on the ‘financial relief’ frame (OECD, 2009), our findings demonstrate the necessity of extending the frame by showing that digital technologies matter as well. Policymakers in developing countries should thus consider incorporating the use of digital technologies like MM as an essential constituent of policy responses to Covid-19.

The remainder of this paper is structured as follows. Section 2 reviews the related literature. Section 3 describes data and research method. Section 4 reports estimation results. Section 5 discusses research and policy implications. Section 6 concludes this paper.

2 | LITERATURE REVIEW

In this section, we discuss how the use of MM can contribute to the resilience of SMEs in developing countries amid Covid-19, drawing on the literature on SMEs’ resilience and MM.
2.1 | Resilience of SMEs in times of crisis

SMEs in this paper refer to firms that employ between 5 and 99 workers, based on the legal framework in Zambia (World Bank, 2020c). SMEs make significant contributions to socioeconomic development in developing countries (e.g., Mbuyisa & Leonard, 2017). Yet SMEs are found more vulnerable and susceptible to external shocks than large firms (e.g., Asgary et al., 2020). This vulnerability in times of crisis is manifested in terms of four interrelated aspects: capital, labour, logistics and market (Asgary et al., 2020; Ballesteros & Domingo, 2015; OECD, 2009). First and foremost, financial obstacles, such as weak cash flow, few financing options and limited capital generation, constitute a critical factor that puts SMEs at risk of insolvency and failures (Beck & Demirguc-Kunt, 2006). Second, having small labour force can be a problem for SMEs as it is difficult to downsize since they are already small (OECD, 2009). Moreover, labour availability could be a challenge if workers are affected by external shocks (Ballesteros & Domingo, 2015); for example, workers are required to quarantine amid Covid-19. Third, SMEs, generally, have limited alternative or emergency logistic support when a breakdown (or lockdown) of public facilities and infrastructure disrupts their supply chain networks, which eventually undermines the SMEs' inventories, production and, hence, their revenues (Asgary et al., 2020; Ballesteros & Domingo, 2015). Finally, unpredicted disturbances often come with a shift in customer preference, consumption modes and/or market demand (Ballesteros & Domingo, 2015). This poses fresh challenges for SMEs, who are less diversified in their economic activities as they tend to focus on niche markets (OECD, 2009).

The vulnerability, attributable to resource constraints, can be referred to as size matters. Size still matters when it comes to Covid-19. As an increasing number of countries have imposed extensive containment measures, smaller firms have been found more vulnerable to prolonged lockdowns (OECD, 2020). Recent research has shown that SMEs have taken multiple hits including cash flow interruptions (Lu et al., 2020), logistics issues (Juergensen et al., 2020) and the resulting sales loss (Fairlie & Fossen, 2021). Despite the vulnerability of SMEs, there is a positive side of being small, namely, small is beautiful (Schumacher, 1973). Due to their constant exposure to a high level of environmental uncertainties, SMEs develop strong survival instincts and engage in behavioural patterns that enable them to thrive even in difficult business climates (Sullivan-Taylor & Branicki, 2011). It has traditionally been argued that SMEs enjoy several advantages over large firms, the most significant of which, for the present purpose, concerns SMEs’ nimbleness and responsiveness in making decisions to adapt to changing environment (Gunasekaran et al., 2011; Schumacher, 1973). Being resilient, even in the absence of adequate resources, has become a prerequisite for SMEs to survive external shocks.

Resilience is a multifaceted and multidisciplinary concept. Yet the core component of different conceptualizations across various fields remains consistent: Resilience is perceived as the ability of a system (Bhamra et al., 2011). Specifically, a set of interrelated attributes (e.g., adaptability, flexibility and agility) are portrayed as the inherent constituents of resilience, although the presence (or absence) of these attributes is context-specific (Bhamra et al., 2011; Heeks & Ospina, 2019; Norris et al., 2008). Following prior research, we define the resilience of SMEs as their overall capabilities to withstand and adapt to external shocks. In the following paragraphs, we will shed light on three vital attributes, namely, rapidity, scale and flexibility, as they are relevant to the focal context. A variety of internal and external factors have been shown to influence SMEs' resilience including business characteristics (e.g., sector and managerial practices), shock type (e.g., environmental vs. societal) and policy responses (e.g., credit relief) (Asgary et al., 2020; Gunasekaran et al., 2011). Among others, this paper focuses on the use of digital technologies, which has been suggested as a key enabler of SMEs' resilience (Duncombe & Heeks, 2002; Gunasekaran et al., 2011; Mbuyisa & Leonard, 2017).

2.2 | Mobile money: Improving the resilience of SMEs amid Covid-19

Mobile money (MM) is a convergent digital innovation that orchestrates telecommunications infrastructure (mobile) and microfinance (money) (Nan et al., 2021). From the outset, MM was designed to cater to the financial needs of...
the unbanked in developing countries (Hughes & Lonie, 2007). MM enables financially marginalized individuals and small businesses, especially those without bank accounts, to access basic financial services via their mobile phones. Unlike the traditional banking system that relies on the limited distribution channel of bank branches and ATMs, MM uses networks of transactional agents (e.g., convenience stores in local neighbourhoods) that provide ubiquitous touch points for registration, cash-in and cash-out services (Nan, 2019). Once cash is loaded as e-money into virtual MM accounts, users can initiate a range of financial transactions vis-à-vis individuals and businesses including money transfers, bill/merchant payments, savings and microloans. Due to the digitality of MM, users are empowered to circumvent the temporal, spatial and physical constraints associated with the physicality of cash (Markus & Nan, 2020), making mobile financial services more convenient, affordable and secure than traditional banking services (Aron, 2018; Mbiti & Weil, 2016).

Ever since the remarkable success of M-Pesa in Kenya, business communities across SSA have started to incorporate MM into their daily transactions including receiving payments, paying suppliers, bill payments, savings and microloans (Nan et al., 2021). The predominant business users of MM are SMEs, and the adoption by large firms remains low (Nan et al., 2021). This business gap is attributable to several factors linked to the inherent differences between SMEs and large firms. First, whereas large firms are able to utilize established banking services (e.g., checks and bank transfers) for daily business, SMEs find it difficult or not cost-effective to adopt a full-featured package of banking services and as a consequence are willing to make use of whatever works (Higgins et al., 2012). Relatedly, due to its transaction limits, MM is seldom a viable option for large firms seeking to execute transactions. But these limits are much less likely to be an issue for SMEs. In addition, large firms face a series of challenges in implementing MM, such as the integration of MM into corporate IT systems, the settlements between MM and corporate bank accounts (Mas & Ng’weno, 2012). Taken together, MM turns out an appealing option to close the financial gaps for SMEs, whereas there are limited ‘institutional voids’ in large firms for MM to address. In this regard, Higgins et al. (2012) argued that ‘Safaricom (the provider of M-Pesa in Kenya) does not target its sales, marketing, and services to this (large firms) segment’ (p. 69).

Given the ‘biased’ use case of MM, a growing body of research has focused on the impact of MM on SMEs. The literature shows that MM helps reduce transaction costs and improve operational efficiency, resulting in a range of positive outcomes for SMEs, such as firm investment (Islam et al., 2018), labour productivity (Gosavi, 2018) and innovation performance (Lorenz & Pommet, 2021). Although the literature has advanced our understanding of the favourable implications of MM for SMEs in normal times, it owes us an examination of the role and impact of MM in times of crisis. We therefore attempt to close this gap by investigating the impact of MM on SMEs’ resilience in the challenging economic environment of the Covid-19 pandemic. To this end, we first discuss how the incorporation of MM in daily business helps SMEs improve three enabling attributes of resilience: rapidity, scale and flexibility.

Rapidity means how quickly a system accesses and mobilizes resources in response to external shocks (Norris et al., 2008). MM affords SMEs the digital capabilities to improve the responsiveness of their logistics. On the demand side, MM users can receive customer payments much more quickly and keep daily earnings safely in their virtual accounts (Nan et al., 2021). The digitality of MM minimizes SMEs’ susceptibility to physical and temporal restrictions (e.g., local lockdowns and limited operating hours/capacity) during the pandemic, because, for example, they do not need to visit and wait in line in a banking branch. On the supply side, instant and secure money transfer to suppliers promotes the agility of the procurement process. The literature shows that using MM shortens the time for the purchase of raw materials and enhances the overall supply chain efficiency (Bångens & Söderberg, 2011; Horne et al., 2015). In short, digital payments vis-à-vis customers and suppliers facilitate the flow of materials and financial resources, speeding up the turnover from capital to inventory to receivables (Nan et al., 2021). In a time of unrest, where physical contacts are restricted, MM-enabled digital financial transactions arguably reinforce the resilience of SMEs by improving the rapidity and efficiency of their logistics.

Scale is defined as the range of assets and resources that a system can access to combat unexpected disturbances effectively (Heeks & Ospina, 2019). Using MM can enhance the scale of SMEs at least in two ways. First, MM allows SMEs to access extensive financial resources to smooth negative shocks. A growing body of research
suggests that small businesses (especially family businesses) using MM are more resilient as they are able to obtain emergency funds from family and friends in the case of unpredicted events including climate shocks (e.g., irregular rainfall) and non-climate agricultural shocks (e.g., price change of agricultural inputs) (Afawubo et al., 2019; Riley, 2018). The use of MM in daily business has also been found to increase the likelihood of SMEs being able to access microloans (Bastian et al., 2018) and trade credit (Beck et al., 2018). Second, as opposed to cash, contactless payments via MM appear to be more appealing to customers, ceteris paribus. Digital payments have become a popular and widely accepted payment method during the pandemic, since customers feel reluctant to pay in cash due to the increased exposure to the coronavirus (Agur et al., 2020; Mugema & Njoro, 2020). Therefore, SMEs accepting payments via MM are more likely to survive the demand shock and maintain some level of sales revenue. Arguably, the use of MM mitigates the shortage, or depletion, of working capital by empowering SMEs to exploit resources from wider social and institutional networks that would otherwise have been impossible.

Flexibility refers to the ability of a system to undertake different sets of actions to take advantage of opportunities arising from external change and weather the crisis (Folke, 2006). Due to the lockdown measures following the Covid-19 outbreak, the public has had to limit physical movements, but the demand for basic necessities (e.g., food and hygiene products) has increased sharply. This emergent tension has accelerated the shift towards e-commerce and online shopping across the world (UNCTAD, 2020), with digital payments at the centre of the pandemic-induced digital transformation. Contactless MM payments enact entrepreneurial opportunities for SMEs, enabling them to engage in new digital business models such as contact-free door-to-door delivery and carry-out services. These alternative business models allow SMEs to maintain sales and generate revenue even if their physical premises are forced to close (or operate with limited capacity), while reducing the spread of coronavirus and satisfying customer basic needs (Benni, 2021). To sum up, MM supports the flexibility SMEs need to adapt to the unforeseen (and unforeseeable) disruptions of the Covid-19 pandemic.

2.3 | Summary

Size matters, yet small is beautiful. When faced with a crisis, SMEs possess the survival instincts needed to withstand demand shock and sales loss. The use of MM can facilitate the actualization of this potential by enhancing the rapidity, scale and flexibility attributes of SMEs' resilience in the midst of the Covid-19 pandemic. Each enabling attribute may not be significant individually, but acting in concert the use of MM can counteract the inherent vulnerability of SMEs. Specifically, the MM-enabled digital business model innovation (flexibility), along with the enhanced responsiveness and efficiency of logistics (rapidity) and the expanded reservoir of financing options (scale), constitute a resilient and effective response to SMEs' vulnerability by strengthening revenue streams (capital), reducing the exposure of workers to coronavirus (labour), securing supply chain efficiency (logistics) and adapting to changes in customer purchase behaviours (market). As such, using MM can help preserve the resources and assets that cushion SMEs against external shocks and MM users are more likely to maintain cash flow, sustain business continuity and obtain some level of sales revenue. Based on the preceding arguments, we posit that SMEs using MM tend to be more resilient, more likely to sustain business continuity and therefore less likely to experience catastrophic sales drop even when faced with the Covid-19 pandemic. We test this conjecture using survey data collected in Zambia, which we turn to next.

3 | RESEARCH METHOD

3.1 | Data

Data were extracted from two surveys: Zambia 2019 Enterprise Survey (hereafter, ES-19) and Zambia 2020 Enterprise Follow-up Survey on Covid-19 (hereafter, ESCovid-20). ES-19 is the standard Enterprise Survey conducted by
the World Bank in Zambia between September 2019 and March 2020. Based on stratified random sampling, 481 SMEs (5 to 99 employees) and 120 large firms (100 or more employees) were sampled across four regions: Kitwe, Livingstone, Lusaka and Ndola. This survey provides interview data on the demographics, operation and business environment of firms in the private sector in Zambia. Using ES-19 as the baseline survey, ESCovid-20 was conducted as follow-up interviews with the previously sampled 601 firms between June 16 and July 17, 2020. ESCovid-20 therefore contains contemporary data on the impacts and adjustments that Covid-19 has engendered. These two surveys offer a unique research opportunity for two reasons. First, as the coronavirus reportedly reached Zambia in March 2020 (Chipimo et al., 2020), ES-19 (September 2019 to March 2020) and ESCovid-20 (June–July, 2020) provide important data on business operation and performance immediately before and after the Covid-19 outbreak. Second, these two surveys can be merged using the universal firm identity number, making it possible to examine the resilience implications of MM on SMEs during the pandemic.

3.2 | Variables

3.2.1 | Dependent variables

The ESCovid-20 survey provides data on sales change that is due to the pandemic. Sales change, reflecting the change in sales revenue in the last completed month in 2020 compared with that in the same month in 2019, is reported as a percentage value, with a minimum value of $-100$. Based on these data, a continuous variable, sales change, is developed. Since the reported sales change includes positive and negative values, we address the sign problem by using the following equation; sales change thus contains only positive values, with the higher (lower) value indicating less (more) severe sales change.

$$\text{Sales change} = \log(\text{reported sales change} + 101)$$

3.2.2 | Independent variables

There are two key independent variables. First, an indicator variable (SMEs) shows whether or not a firm is an SME. This variable serves as a proxy for the overall vulnerability of SMEs. Second, a binary variable (MM use) indicates whether or not a firm uses MM. Since the ESCovid-20 survey (after the outbreak) does not cover demographic and MM use data, these two variables have to be developed based on the interview data collected for the ES-19 survey (before the outbreak). As such, our bold assumption is that firms using MM before the Covid-19 outbreak would keep using it and that no new adoption would have been made after the ES-19 survey interview. As will be shown later, we take this one step further by exploring a scenario where this assumption is relaxed.

3.2.3 | Control variables

We include a range of control variables based on the ES-19 survey data. First, an ordinal variable (financial obstacle) is introduced to capture the extent to which access to finance is an obstacle. As financial constraints are generally considered a crucial factor affecting SMEs’ performance during external shocks (Amin & Viganola, 2021; Asgary et al., 2020), we use this variable to disentangle the impact of financial constraints from the impact of other dimensions of SMEs’ vulnerability. Second, following prior research (Gosavi, 2018; Islam et al., 2018), we control for a set of demographic factors: whether a firm is operating in a main business city (main business city); the age of a firm
(firm age); years of top manager’s experience (top manager experience); whether a firm is a part of a larger firm (part of a larger firm) and whether a firm operates in the service sector (service sector). Finally, region dummies are used to control for the potential differences across the sampled regions. The summary statistics are reported in Table 1 and the correlation matrix in Table 2.

### 3.3 Model specification and estimation

For the present purpose, we estimate the following full model:

\[
\text{Sales change} = \beta_0 + \beta_1 \text{SMEs} + \beta_2 \text{MM use} + \beta_3 \text{SMEs} \times \text{MM use} + \Gamma X + \epsilon, \tag{2}
\]

### Table 1 Summary Statistics

| Variable                  | Obs | Mean | Std Dev | Min | Max |
|---------------------------|-----|------|---------|-----|-----|
| **Dependent variables**   |     |      |         |     |     |
| Sales change (log)        | 513 | 3.71 | 1.05    | 0   | 5.14|
| **Independent variables**|     |      |         |     |     |
| SMEs (1 = yes; 0 = no)    | 601 | 0.80 | 0.40    | 0   | 1   |
| MM use (1 = yes; 0 = no)  | 601 | 0.19 | 0.39    | 0   | 1   |
| **Control variables**     |     |      |         |     |     |
| Financial obstacle        | 600 | 1.88 | 1.33    | 0   | 4   |
| Main business city (1 = yes; 0 = no) | 601 | 0.56 | 0.50    | 0   | 1   |
| Firm age (log)            | 591 | 2.69 | 0.75    | 0   | 4.77|
| Top manager’s experience (log) | 594 | 2.65 | 0.70    | 0   | 4.25|
| Part of a larger firm (1 = yes; 0 = no) | 601 | 0.17 | 0.37    | 0   | 1   |
| Service sector (1 = yes; 0 = no) | 601 | 0.53 | 0.50    | 0   | 1   |

### Table 2 Correlation matrix

|          | Sales chg. | SMEs   | MM use | Fin. obs. | Bus. city | Firm age | Mgr. exp. | Pt. of larger | Service |
|----------|------------|--------|--------|-----------|-----------|----------|-----------|--------------|---------|
| Sales chg. | 1.00       |        |        |           |           |          |           |              |         |
| SMEs     | -0.15***   | 1.00   |        |           |           |          |           |              |         |
| MM use   | 0.05       | 0.11***| 1.00   |           |           |          |           |              |         |
| Fin. obs. | -0.13***   | 0.13***| 0.06   | 1.00      |           |          |           |              |         |
| Bus. city | 0.14***    | -0.15***| 0.04 | -0.01     | 1.00      |          |           |              |         |
| Firm age  | 0.03       | -0.19***| -0.15***| -0.09*** | -0.10**  | 1.00     |           |              |         |
| Mgr. exp. | -0.03      | -0.20***| -0.10 | -0.04     | -0.03    | 0.59***  | 1.00      |              |         |
| Pt. of larger | 0.09**    | -0.27***| -0.02 | -0.04     | 0.12***  | 0.04     | 0.02      | 1.00        |         |
| Service   | -0.09***   | 0.03   | -0.03  | 0.03      | 0.01     | -0.10** | -0.05     | -0.01       | 1.00    |

* p < 0.1.
** p < 0.05.
*** p < 0.01.
where Sales change represents the dependent variable. SMEs indicates whether a firm is an SME. MM use denotes whether a firm uses MM. X includes a set of control variables, and ε is the error term. The coefficient, β₃, is of our particular interest and it is expected to be significantly positive.

4 | RESULTS

4.1 | Descriptive analysis

We begin by examining the relation between firm size and the varying degrees of sales decline: (1) minor decrease or increase (sales decrease by less than 30% or increase), severe decrease (sales decrease by between 30% and 70%) and catastrophic decrease (sales decrease by 70% or more). Figure 1 illustrates the distribution of the varying degrees of sales decline for SMEs (481 firms) and large firms (120 firms). Consistent with the literature (e.g., Asgary et al., 2020), SMEs tend to be more vulnerable and susceptible to sales shock during the pandemic. While over 70% of the SMEs...
experienced severe or catastrophic sales decrease, less than 50% of the large firms saw such a drop. The significant discrepancies are noted on the two extremes of the spectrum, highlighting the vulnerability of SMEs. On the left end, the proportions of minor sales decrease or increase are 29% for SMEs and 55% for large firms, and the difference is statistically significant ($z = 4.74$, $p$ value = 0.00). On the right end, 30% of the SMEs and 16% of the large firms experienced catastrophic sales decreases, with the difference again being significant ($z = -2.61$, $p$ value = 0.01).

The adoption rates of MM among SMEs and large firms were, respectively, 21% (102 out of 481) and 10% (12 out of 120) in 2019 (see Figure 2). These somewhat biased figures are in line with the literature that the majority of MM business users are SMEs (Mas & Ng’weno, 2012; Nan et al., 2021). Considering that about 490 MM accounts per 1,000 Zambian adults were actively used in 2019 (IMF, 2020a), the adoption rate of MM in the Zambian business community appears to be low as this figure lags far behind that in other African countries; for example, in 2012, it was 50% in Kenya, 51% in Uganda and 59% in Tanzania (Islam et al., 2018).

Furthermore, we explore the potential interaction effect of SMEs and MM use on sales shock (see Table 3). Both MM users (88%) and non-users (88%) invariably underwent a decrease in sales, with only a slight and insignificant difference observed in the percentages of firms experiencing catastrophic sales loss (24% vs. 28%). Even comparing MM users and non-users using the sub-sample of SMEs, the discrepancy is not substantial (88% vs. 90%). Nonetheless, an interesting result surfaces when we focus exclusively on the group of SMEs that experienced catastrophic sales decreases: SMEs using MM appear to have been less likely to see disastrous sales drop (24%) than non-users (31%). This statistically significant difference indicates that MM users tend to be more resilient and thus more likely to withstand the sales shock. Next, we turn to regression analysis to assess whether this withstanding effect is firmly held.

### 4.2 Regression analysis

Table 4 reports the estimation results. The main effects of SMEs are significantly negative across all the models, which is consistent with the literature that SMEs tend to be more vulnerable than large firms in times of crisis (e.g., Asgary et al., 2020). The main effects of MM use are neither significant nor consistent in signs. Despite the weak level of significance, the interaction effect of SMEs and MM use turns out to be statistically significant and positive. This shows that SMEs using MM are more capable to withstand the external shocks imposed by Covid-19 and therefore less likely to experience a catastrophic drop in sales. This result lends support to our conjecture regarding the favourable impact of MM on improving the resilience of SMEs during the Covid-19 pandemic.

Four of the control variables have significant effects on the level of sales change. First, firms facing a higher level of financial obstacles are more likely to see a severe decline in sales. This result agrees with Amin and Viganola (2021)

| **TABLE 3** Comparison of mobile money users and non-users |
|-----------------------------------------------------------|
| % of firms experiencing sales decrease due to Covid-19     | Mobile Money User |
|                                                          | Yes  | No  | Sig. |
| % of firms experiencing sales decrease by 70% or more     | 0.24 | 0.28 |      |
| % of SMEs experiencing sales decrease due to Covid-19     | 0.88 | 0.90 |      |
| % of SMEs experiencing sales decrease by 70% or more     | 0.24 | 0.31 | *    |

$^p < 0.1$.

$^{*}p < 0.05$.

$^{**}p < 0.01$. 
that sales decline is significantly lower for firms with better access to finance in developing countries during the Covid-19 pandemic. Second, older firms are more likely to withstand the sales shock, which is also in accordance with the findings of Amin and Viganola (2021) that old firms are better positioned to preserve long-standing relationship with key stakeholders such as skilled workers and suppliers. Third, top manager’s experience has a negative impact on sales change. This is likely because more experienced and thus older managers may be less responsive in adopting new anti-crisis routines and strategies than their younger counterparts. Finally, establishments that affiliated with a larger firm are more likely to survive the sales shock, possibly as a result of the support from their parent organization. Except for those related to financial obstacle, these results contrast somewhat with the findings established in normal times. For instance, in their study on the impact of MM on firm investment, Islam et al. (2018) found insignificant negative impacts of firm age and top manager’s experience. Similarly, Gosavi (2018) documented a significantly negative impact of firm age when examining the relation between MM and firm productivity. These discrepancies are arguably attributable to the different research contexts and backgrounds (unrest times vs. normal times), which deserve further investigation in future research.

Although a back-of-the-envelope calculation shows that the net effect for SMEs is positive ($0.08 = 0.36 – 0.28$), it is not clear whether this positive interaction effect is statistically sufficient to offset the negative main effect. To provide robust evidence, we conduct a net effect analysis drawing on the insights of the likelihood ratio tests (Vuong, 1989). The null hypothesis here is that the net effect is equal to zero (i.e., $\beta_3 = -\beta_1$ in Equation 2). Assuming that the null hypothesis is valid, we can factor out $\beta_3$ (or $\beta_1$) and construct a new variable: $SMEs_{\times}MM = SMEs \times MM use - SMEs$. We then use this variable to estimate the reduced model:

$$Sales change = \theta_0 + \theta_1 MM use + \theta_2 SMEs_{\times}MM + \Gamma'X + \epsilon.$$  (3)

According to the likelihood ratio tests (Vuong, 1989), the hypothesis testing involves a comparison between the squared residuals (SR) of Equation 2 (the full model) and those of Equation 3 (the reduced model). The results of this comparison are presented in Table 5. The $p$ value (0.83) shows that there is insufficient evidence leading us to reject

| TABLE 4  Regression results | DV: sales change |
|-----------------------------|-----------------|
| SMEs (1 = yes; 0 = no)      | $-0.23^{**}$ (0.09) | $-0.24^{**}$ (0.10) | $-0.28^{***}$ (0.11) |
| MM use (1 = yes; 0 = no)    | 0.10 (0.10)      | -0.21 (0.17)       |
| SMEs $\times$ MM use       | 0.36$^{*}$ (0.20) |
| Financial obstacle         | $-0.07^{**}$ (0.03) | $-0.08^{**}$ (0.03) | $-0.08^{**}$ (0.03) |
| Main business city (1 = yes; 0 = no) | $-0.06$ (0.17) | $-0.04$ (0.17) | $-0.04$ (0.17) |
| Firm age (log)              | 0.13 (0.08)      | 0.13 (0.08)       | 0.14 (0.08)       |
| Top manager’s experience (log) | $-0.16^{*}$ (0.09) | $-0.15^{*}$ (0.09) | $-0.15^{*}$ (0.09) |
| Part of a larger firm (1 = yes; 0 = no) | 0.14 (0.08) | 0.14 (0.08) | 0.14 (0.08) |
| Service sector (1 = yes; 0 = no) | $-0.12$ (0.09) | $-0.11$ (0.09) | $-0.11$ (0.09) |
| Constant                    | 4.42$^{**}$ (0.24) | 4.39$^{**}$ (0.25) | 4.41$^{**}$ (0.25) |
| Region dummies              | Yes             | Yes             | Yes             |
| Prob. $>$ $F$               | 0.00            | 0.00            | 0.00            |
| $R^2$                       | 0.11            | 0.11            | 0.11            |
| Obs.                        | 500             | 500             | 500             |

$^{*}p < 0.1.$

$^{**}p < 0.05.$

$^{***}p < 0.01.$
the null hypothesis. Put differently, the net effect that combines the negative main effect and the positive interaction effect is equal to zero. We can thus safely conclude that the negative effect, which reflects the inherent vulnerability of SMEs, is effectively cancelled out by the positive interaction effect of SMEs incorporating MM into their daily business.

The analysis so far has rested on the assumption that SMEs using MM before the outbreak (ES-19) would continue to use MM and there would be no new adoption after the break (ESCovid-20). To show that our results are not indeed subject to this assumption, we next relax it by exploring a scenario where non-MM users before the break turned into MM users at some point after the break. Such a scenario is likely to be the case given the anecdotal evidence that MM has become the preferred exchange mechanism in Zambia in response to the government’s call to reduce the use of cash (Phiri, 2020), which has led to an exponential growth in the number of MM subscribers from 3 to 4.5 million in 2020 (Malakata, 2020). To calculate the likelihood of non-users becoming users, we first estimate the following probit model:

\[
\text{MM use} = \gamma_0 + \gamma_1 \text{Presales} + \Gamma' X + \epsilon, \tag{4}
\]

where the dependent variable and control variables remain the same as explained in Equation 2. \text{Presales} represents the annual sales revenue of a firm in the previous fiscal year. Since the purpose here is to obtain optimal predicting power (as opposed to explanatory power), we use the continuous variable, \text{Presales}, instead of the indicator variable, SMEs, as a proxy for firm size. The results are shown in Table 6. As expected, the total annual sales in the previous

| TABLE 5 Results of net effect analysis |
|---------------------------------------|
|                                        |
| Mean | Std Error | 95% conf. interval | t stats | p value |
| SR (full model) | 0.9823 | 0.1130 | 0.7603 | 1.2044 |
| SR (reduced model) | 0.9824 | 0.1130 | 0.7604 | 1.2045 |
| Diff. | -0.0001 | 0.0005 | -0.0011 | 0.0009 | -0.21 | 0.83 |

| TABLE 6 Results of probit regression |
|---------------------------------------|
|                                        |
| DV: MM Use                            |
| Previous annual sales (log)           | –0.11*** (0.03) |
| Financial obstacle                    | 0.01 (0.05) |
| Main business city (1 = yes; 0 = no)  | –0.96*** (0.34) |
| Firm age (log)                        | –0.19* (0.10) |
| Top manager’s experience (log)        | –0.02 (0.11) |
| Part of a larger firm (1 = yes; 0 = no) | –0.03 (0.18) |
| Service sector (1 = yes; 0 = no)      | –0.10 (0.13) |
| Constant                              | 1.40*** (0.55) |
| Region dummies                       | Yes |
| Prob. > \chi^2                      | 0.00 |
| Pseudo R^2                           | 0.08 |
| Obs.                                  | 551 |

*p < 0.1.

**p < 0.05.

***p < 0.01.
year is negatively associated with MM use, suggesting that smaller firms are more likely to use MM. Tellingly, firms operating in a main business city are less likely to use MM. One plausible explanation is that cash was still the ‘king’ in main business cities before the pandemic. Finally, younger firms are more receptive to emerging technologies. Based on these results, we compute the predicted probabilities of firms using MM.

Panels a and b in Table 7 summarize the predicted probabilities of using MM for MM users and non-users, respectively. The average predicted probability of using MM for MM users (0.26) is, as expected, higher than that for non-users (0.18). We can now construct a new indicator variable, Predicted MM use, as follows:

\[
\text{Predicted MM use} = \begin{cases} 
1, & \text{if MM use} = 1 \\
1, & \text{if MM use} = 0 \text{ and } Pr \geq 0.26 + 2 \times 0.12 \\
0, & \text{otherwise,}
\end{cases}
\]

where we assume that existing MM users continue their use and anticipate that previous non-users become MM users when their predicted probabilities are at least two standard deviations \(2 \times 0.12\) higher than the average predicted probability for MM users (0.26). As a result, 44 previous non-users (32 SMEs and 12 large firms) are predicted

| TABLE 7 | Predicted probabilities of using mobile money |
|-----------------|---------------------------------|
| (a) Predicted probabilities for mobile money users | |
| Prob. | Obs | Mean | Std Dev | Min | Max |
| 107 | 0.26 | 0.12 | 0.05 | 0.54 |

| (b) Predicted probabilities for non-users | |
| Prob. | Obs | Mean | Std Dev | Min | Max |
| 444 | 0.18 | 0.10 | 0.01 | 0.51 |

| TABLE 8 | Regression results with predicted MM use |
|-----------------|---------------------------------|
| DV: sales change | |
| SMEs \(1 = \text{yes}; 0 = \text{no}\) | \(-0.23^{**} (0.09)\) | \(-0.24^{**} (0.10)\) | \(-0.32^{***} (0.11)\) |
| Predicted MM use \(1 = \text{yes}; 0 = \text{no}\) | 0.12 (0.10) | | \(-0.23 (0.15)\) |
| SMEs \(\times\) Predicted MM use | | | 0.42 (0.19) |
| Financial obstacle | \(-0.07^{**} (0.03)\) | \(-0.07^{**} (0.03)\) | \(-0.07^{**} (0.03)\) |
| Main business city \(1 = \text{yes}; 0 = \text{no}\) | \(-0.06 (0.17)\) | \(-0.04 (0.17)\) | \(-0.03 (0.17)\) |
| Firm age (log) | 0.13 (0.08) | 0.14 (0.08) | 0.14 (0.08) |
| Top manager’s experience (log) | \(-0.16^{*} (0.09)\) | \(-0.16^{*} (0.09)\) | \(-0.16^{*} (0.09)\) |
| Part of a larger firm \(1 = \text{yes}; 0 = \text{no}\) | 0.14 (0.08) | 0.14 (0.08) | 0.14 (0.08) |
| Service sector \(1 = \text{yes}; 0 = \text{no}\) | \(-0.12 (0.09)\) | \(-0.11 (0.09)\) | \(-0.11 (0.09)\) |
| Constant | 4.42^{***} (0.24) | 4.37^{***} (0.25) | 4.42^{***} (0.25) |
| Region dummies | Yes | Yes | Yes |
| Prob. > F | 0.00 | 0.00 | 0.00 |
| R² | 0.11 | 0.11 | 0.12 |
| Obs. | 500 | 500 | 500 |

\(p < 0.1\).
\(p < 0.05\).
\(p < 0.01\).
to have become MM users after the outbreak. This indicator variable is then used to estimate the full model (Equation 2).

As reported in Table 8, the key results are consistent with the earlier results (cf. Table 4) that the main effect of SMEs is significantly negative and the interaction effect between SMEs and Predicted MM use are significantly positive at an even stronger level of significance. Not only this, the results for control variables remain qualitatively unchanged, with only negligible changes in the coefficient estimates. Again, we conduct a net effect analysis to evaluate whether the negative main effect is neutralized by the favourable interaction effect in this exploratory scenario. The p value (0.97) presented in Table 9 reveals that the unfavourable effect resulting from firms being small-/medium-sized during the pandemic is effectively offset by the SMEs’ use of MM.

To check the robustness of our results, two extra analyses are performed. First, we loosen up the boundary condition for the variable Predicted MM use. Herein, previous non-users are anticipated to use MM when their predicted probabilities are at least one standard deviation (as opposed to two standard deviations) higher than the average predicted probability for MM users. This results in 65 new MM users (53 SMEs and 12 large firms) after the outbreak. This variable with a relaxed boundary condition is used to re-estimate the full model. Second, we re-estimate all models with survey weights. The ES-19 survey provides weights at three levels—strict, median and weak—which are computed under different eligibility assumptions (World Bank, 2020c). These analyses, including the subsequent net effect checks, consistently show that the main results are firmly held, pointing to the resilient implications of MM use for SMEs.³

5 | DISCUSSION

This paper investigates the impact of MM on SMEs' resilience and the associated business outcome in the midst of the Covid-19 pandemic in Zambia. In this context, our results are consistent with the literature that SMEs are more likely to suffer severe sales shock during the pandemic. We also find that the unfavourable effect of SMEs’ vulnerability is effectively counteracted by the favourable effect of SMEs using MM. That is, SMEs using MM tend to be more resilient and less likely to experience catastrophic sales losses. These findings make a key contribution to the literature and have important policy implications.

5.1 | Mobile money: A resilience-fostering tool

Our findings point to the depth and breadth of MM as a tool for fostering resilience. By depth, we mean the persistent role of MM in improving SMEs’ resilience during and after external shocks. Given the survey timeframes involved in this study, the findings relate to the short- to medium-term resilience impacts of MM on SMEs. As noted earlier, the responsiveness and efficiency of logistics (rapidity), the expanded sources of financing options (scale) and the digital opportunities to reconfigure resources in a novel and timely way (flexibility) enabled by MM, taken together, afford SMEs the capabilities to withstand the sales shock and adapt to a disturbing business environment. SMEs using MM are thus more likely to sustain business continuity and achieve longevity over the long term, even if

| TABLE 9 | Results of net effect analysis with predicted MM use |
|----------|-----------------|-----------------|-----------------|----|-------|
|          | Mean | Std Error | 95% conf. interval | t stats | p value |
| SR (full model) | 0.9794 | 0.1126 | 0.7582 | 1.2007 |
| SR (reduced model) | 0.9795 | 0.1126 | 0.7583 | 1.2008 |
| Diff. | −0.0001 | 0.0025 | −0.0051 | 0.0049 | −0.04 | 0.97 |
the pandemic lingers on far longer than expected. MM-enabled long-term resilience is quite plausible, not only because of the inherent digitality of MM that is associated with desirable business outcomes (Nan et al., 2021), but also because of the rapidly changing environment that has morphed almost overnight into a cash-lite economy.

By breadth, we refer to the extensive role played by MM for the business community as a whole. Our findings are believed to under-estimate the favourable impact of MM. It should be noted that both the ES-19 and ESCovid-20 surveys focus on formal firms, leaving out the entire informal sector. The informal sector plays a pivotal role in Zambia, accounting for as much as 50% of GDP (Phiri & Nakamba-Kabaso, 2012) and 90% of the employed population (ILO, 2018). Informal firms are more financially constrained than their formal counterparts (Nichter & Goldmark, 2009), and they run a higher risk of failure in such a hostile environment. Given that MM has been used more widely in the informal sector than in the formal sector (Nan et al., 2021), informal firms are expected to benefit from using MM as much, if not more, than formal firms during the Covid-19 pandemic. Although little evidence has been established to support this contention, it seems likely that MM fosters the resilience of SMEs in both formal and informal sectors and therefore the Zambian business community as a whole.

Despite these encouraging findings, the role of MM should be interpreted with caution. We are by no means arguing that MM is a silver bullet. MM on its own cannot provide a magical solution to the vulnerability of SMEs in times of crisis. The extent to which the use of MM contributes to the development of new capabilities that support SMEs’ resilience essentially depends on how MM is reconfigured with complementary organizational resources and assets to prompt internal changes that constitute a resilient response to external shocks. Due to the limited data availability, examination of such a configurational causality is beyond the scope of this paper. Nonetheless, our findings warrant future research to investigate the mechanisms through which MM use enables (or constrains) improvements in the resilience of SMEs in times of crisis.

5.2 | Contributions and policy implications

This paper makes a key contribution to the intersection of development studies, information systems (IS) and SMEs. Following the Covid-19 outbreak, scholars in IS and SMEs have highlighted the important role of digital technologies for SMEs to withstand unpredicted shocks (Akpan et al., 2020; Papadopoulos et al., 2020). However, this line of research remains underexplored, and limited empirical evidence has been documented (Papadopoulos et al., 2020). This paper addresses this research gap by documenting the impact of MM on SMEs’ resilience during the pandemic. More importantly, this study contributes to development studies as our findings point to the aggregate outcome that MM can act as a digital shield to enhance the overall resilience of the business community and thus as a digital prescription to help maintain sustainable development.

Our findings have several important policy implications. The key insight is that the use of digital technologies should be positioned as an important constituent of relief and recovery packages for developing countries. Policy responses for SMEs have traditionally focused on fiscal and monetary measures, for example, preventing the depletion of working capital; enhancing SMEs’ access to liquidity and helping SMEs maintain their investment level (OECD, 2009). We are not against these essential measures that have proven to be effective. Our point here is that combating unpredicted shocks is not just about money, it is also about digital technologies. While monetary support provides a quick fix for SMEs, the increasing use of digital technologies may yield a more sustainable solution, as our findings suggest. A number of SSA countries including Zambia are going in the right direction by loosening the previous constraints on MM, for example, by cutting transaction fees and relaxing balance and transaction limits (IMF, 2020b).

However, more can and should be done in a systematic way to facilitate MM use. This requires a paradigm shift from simply viewing MM as a digital payment method towards perceiving it as a digital financial infrastructure, which, when sunk into socioeconomic structures and arrangements, holds the potential to improve the resilience of the entire business community (Nan, 2021). On the supply side, regulatory agencies should work in concert with
MM providers to enact an enabling regulatory environment, in particular by promoting the intra-operability across different MM services and the inter-operability between MM ecosystem and banking system. On the demand side, a range of financial literacy and training programmes should be developed to enhance the awareness of MM benefits. More in this point, MM can be used as a digital distribution channel through which relief and stimulus funds are delivered to firms under financial stress due to Covid-19. While such a MM-based financial aid delivery has been increasingly adopted to protect households with financial difficulties in developing countries (CGAP, 2020; Davidovic & Prady, 2020), its potential for helping the business community, especially SMEs, is yet to be explored.

5.3 | Limitations and future research

This paper has two limitations, which inform future research. First, the limited data availability has not allowed us to develop detailed measures for MM use and SMEs' resilience. Future studies should focus on the multiple dimensions of MM use (e.g., scope and frequency) and explore the impacts on the various attributes of SMEs' resilience (e.g., flexibility and rapidity). Second, this study was conducted in a single country, Zambia. Replication research in other developing countries is invited to reaffirm or repudiate our findings. In addition, we encourage scholars to go beyond the organizational level and investigate the multifaceted implications of MM for business communities and national economies.

6 | CONCLUSION

The Covid-19 pandemic has brought a series of unprecedented challenges, in particular threatening the well-being and survival of SMEs in developing countries. As yet, there is a lack of understanding of how SMEs can mitigate the impacts of the pandemic. Among other issues, how could SMEs improve their resilience in times of crisis? Do emerging digital technologies like mobile money (MM) make a difference? If so, to what extent does MM help SMEs improve their resilience and survive sales shock? Answers to these questions are critical for scholars, practitioners and policymakers to deal more effectively with unexpected disturbances. As a pioneering effort in this direction, this paper highlights the resilience implications of MM by documenting that SMEs using MM in their daily business are able to more effectively counteract their inherent vulnerability so that they are less likely to see catastrophic sales drop amidst of the Covid-19 pandemic. Our findings suggest that MM can indeed serve as a digital shield that provides support for the entire business community in developing countries during the pandemic. A key policy implication is that supporting the widespread use of digital technologies like MM should be positioned as equally important to the monetary component of anti-crisis packages in developing countries.

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DATA AVAILABILITY STATEMENT
The merged data set used in this study comes from two surveys released by the World Bank: Enterprise Survey 2019 Zambia and Enterprise Survey follow-up on Covid-19 Zambia. The Enterprise Survey data are freely available for scholars at the World Bank Enterprise Surveys data portal (https://www.enterprisesurveys.org/portal/) or from the authors upon request.

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ENDNOTES

1 For the detailed survey questions and measurements, please refer to the World Bank Enterprise Surveys data portal at https://www.enterprisesurveys.org/portal/.

2 For the sake of space, the estimation results for the reduced model are not reported here. They are available upon request.

3 For the sake of space, the results of the robustness checks are not reported here. They are available upon request.

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