COVID-19, financing and sales decline of informal sector MSMEs in Senegal

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Abstract

Using the survey data collected on informal sector MSMEs in Senegal, this study performs logit and propensity score matching (PSM) both to examine the determinants of access to credit, the decline in sales, and the business growth prospect in the 12 months following the COVID-19 pandemic and to assess the impact of credit on the MSMEs sales decline. We find that being a male manager and aged 46–55 years old reduces the likelihood of a decline in sales, whereas those who are 25–35 years present a high probability of experiencing a decrease in sales due to COVID-19. Being between 25 and 35 and 36–45 years old with a formalized MSME increases the probability of having access to loans. MSMEs that undertake manufacturing businesses appear more pessimistic about the future. More importantly, PSM findings show that MSMEs with loans have a higher average treatment effect of sales decline than their counterparts. This suggests that the greater the access to credit, the greater the difference in sales decline between MSMEs with credit and their counterpart without. The policy implications underline the importance of extended maturities and direct government financial support—not debt—to help the most affected informal sector MSMEs recover from the COVID-19 pandemic adverse effects.

1 | INTRODUCTION

Like many countries around the world, COVID-19 has had a significant impact on Senegal’s economic performance and healthcare systems. Over the past decade, the country has achieved economic growth averaging about 6.40% per year. This performance has been accompanied by an improvement in the business environment, but major challenges remain with the highly informal nature of much of the country’s economic activity and difficulty experienced by micro, small and medium enterprises (MSMEs) in accessing finance. Indeed, although Senegal has worked to promote MSMEs, implementing different plans and using various instruments, those in the informal sector have received less support. This seems to be exacerbated with the COVID-19 crisis, which is having a major impact on the Senegalese economy, leading the government to prioritize significant support to formal sector enterprises.

More generally, in Phase 1 of the crisis responses, the government set up a financing mechanism linked to the financial sector of FCFA 200 billion, with FCFA 100 billion dedicated to SMEs. Given the conditions required to access the financing, informal sector firms have been ignored, despite the fact that these enterprises have been more severely affected by COVID-19. Yet this sector contributes significantly to GDP and especially...
employment in Senegal. Similarly, informal sector firms receive only 4.6% from the banking sector and 13.6% from microfinance institutions (National Agency of Statistics and Demography [ANSD], 2013). According to a study based on an initial survey conducted by the Agence de Développement et d’Encadrement des Petites et Moyennes Entreprises (ADEPME, 2020), 90% of MSMEs have been negatively affected by the crisis. In particular, 64.1% of MSMEs claim to have lost between 60% and 100% of their turnover and 25.9% resorted to postponing investments.

With the necessity to relaunch MSMEs activities, it is important to bear in mind the constraints related to demand and supply sides. Given ambiguity over the prospects of benefitting from government stimulus measures in Senegal, informal sector MSMEs have to seek financing, mainly in the form of loans, from financial institutions. Although loans are recognized as important for business recovery and growth (Adegboye & Iweriebor, 2018; Nwosu & Orji, 2017; Ogbeide & Adeboje, 2020), it is well known that the current pandemic and the associated economic crisis have amplified the credit crunch for MSMEs (Tyson, 2020), particularly those in the informal sector. Several issues remain about the loan impact in the case of informal sector MSMEs, especially for those that were able to access credit before the crisis: is credit a powerful tool to limit the effect of negative changes in the sales of informal sector MSMEs? Does credit to informal sector MSMEs help them mitigate the effect of changes in sales and have a positive overview for their business in the 12 months following the COVID-19 pandemic? The answer to these questions appears to be important. It could guide public policy-makers in their support to MSMEs, and especially in the implementation of measures that could make a difference in this context of generalized crisis.

The impact of loans on informal sector MSMEs is one area for which research is lacking and hence this study addresses this shortcoming using recent data and robust quantitative analysis. Our main goal is to identify the determinants of access to credit, sales decline and business growth prospect for the 12 months following the COVID-19 pandemic and assess the impact of credit on the sales decline due to COVID-19. To do this, we perform a treatment effect method based on propensity score matching (PSM). We use data from the survey conducted by the ANSD of Senegal on monitoring the impact of COVID-19 on MSMEs in the informal sector.

The rest of the paper is organized as follows: Section 2 provides a brief background context and literature review and Section 3 describes the data and methodology used in the study. Section 4 presents the empirical results. The last section is the conclusion.

2 | CONTEXT AND LITERATURE REVIEW

2.1 | Context and stylized facts

The persistence of the informal sector can be seen either as the result of the difficulty of the formal sector to create enough jobs for the active population or as an expression of a dynamism in African economies (Njangang et al., 2020; Njiifen, 2014). In Senegal, the nonagricultural informal sector accounts for the majority of the country MSMEs. It represents between 40% and 50% of GDP (Medina et al., 2017) and contributes to 96.4% of jobs generated, according to the Integrated Regional Survey on Employment and the Informal Sector (ANSD & AFRISTAT, 2017). MSMEs in the informal sector are diversely confronted by various vulnerabilities, depending on their degree of informality or formality. The recent COVID-19 outbreak has strongly affected MSMEs and most of the informal MSMEs encountered new challenges (Resnick et al., 2020). Indeed, restrictions on movements and sudden downscaling of economic activities to contain the spread of COVID-19 have had a strong impact on informal enterprises and resulted in reduced earnings, limiting economic activities, and job losses (Baldé et al., 2020; Danquah et al., 2020; International Labour Organisation [ILO], 2020).

The COVID-19 outbreak has negatively affected a high number of MSMEs (90%) in Senegal (ADEPME, 2020), and similar results are observed in the West African region. A cross-country analysis carried out by Baldé et al. (2020) on three countries (Burkina Faso, Mali and Senegal) shows that around 65% of MSME surveyed in Burkina Faso, 76% in Mali and 73% in Senegal report a decrease in their earnings in the informal economy. The share of individuals who were working in early March but lost their job at the beginning of the COVID-19 pandemic is higher in Senegal with around 29% individuals, followed by Mali (about 23%) and then Burkina Faso (22%). They also show a significant and positive effect of informality on job loss across the three countries, suggesting that informal workers were more likely to
lose their jobs in each country. However, differences in the magnitude of the marginal effects suggest that informal workers in Senegal had the highest tendency to lose their jobs as a result of the pandemic, followed by Burkina Faso and then Mali. One finding is that informal workers in Senegal are more likely to experience a decrease in earnings than formal workers. These results show informal sector MSMEs in Senegal were severely affected by the COVID-19 outbreak which has resulted in economic crisis.

Despite this situation, in addition to the higher contribution of the informal sector to GDP and employment, Senegalese informal sector MSMEs are less supported by the government. The government has instituted a stimulus package of FCFA 200 billion to provide financial assistance to businesses, in addition to other measures such as free supply of water and electricity to households, fiscal measures (postpone tax collection) and concessional loans to businesses to help them to pay their workers (Baldé et al., 2020). Although these policies may have good intentions, they are only aimed at formal enterprises, and it remains to be seen whether enterprises would be willing to use concessional loans to pay workers (Baldé et al., 2020). Moreover, these policies are not focused on informal sector MSMEs. Equally, many MSMEs (74%) in Senegal were not aware of the financing support measures taken by the government and other partners, but they were 94% convinced of the usefulness of support to get out of the crisis (ADEPME, 2020).

If the crisis led some MSMEs to individually adapt their activities and change their working methods (ADEPME, 2020; OPTIC et al., 2020), it has also shown that, to cope with low demand and supply challenges, traders who worried about upcoming business costs intend to use cash on hand rather than taking out loans or selling assets (Bishi et al., 2020). In Senegal, 68% of MSMEs seem not to approach financial institutions for emergency loans even when their microenterprise situation was tricky (ADEPME, 2020). For the majority, it is probably due to the auto-selection process, because among about 274 firms that have turned to a financial institution to cope with the crisis, only about 18% have received an adequate response to their loan demand.

2.2 Literature review

As stated above, the majority of informal sector MSMEs did not have access to these various supports of the Senegal government to meet their business needs. As we know, lack of finance hinders not only the creation of new MSMEs but also constrains the growth of existing ones (Lakuma et al., 2019) particularly in the recovery phase as it is in Senegal. Informality is often seen as an important obstacle to accessing loans but when informal sector MSMEs have access to finance, this positively impacts on their performance. Said differently, the firm performance is positively related to access to external finance in Senegal (Quartey et al., 2017).

A study conducted on a specific loan project by GTZ et al. (2010) in India, shows that informal MSMEs’ access to credit has enabled them to enhance their production capacity, hire more workers and process more orders. Entrepreneurs have been able to change their old machines with new and more efficient ones when their sales and profits increase.

Other studies confirm the positive correlation between credit and sales growth (Gubert & Roubaud, 2011; Hill et al., 2012; Irfan, 2017; Martinez-Sola et al., 2014; Yazdanfar & Öhman, 2015) though showing that the relationship is not always conclusive. For Irfan (2017), whereas trade credit (short-term loan) is found to increase sales, long-term financing has a significant negative effect on sales growth. From managers’ perspectives, it is beneficial to increase their firm’s growth efficiently by mobilizing commercial credit. More specifically, Gubert and Roubaud (2011) show that in times of crisis, the impact of credit from ADéFI, a microfinance institution in Madagascar, is much less clear. They reveal that, in a recessionary economic context, the impact of credit is more ambiguous, partly because financial institutions mainly provide loans to the biggest microenterprises which are more fragile in times of economic recession because of higher fixed costs. Lakuma et al. (2019) find a converging result that access to finance boosts MSMEs’ growth relative to large firms in Uganda, but they also find that, using firms’ individual responses, access to finance has a negative effect on medium-sized firms but no effect on firms of other sizes (particularly micro and small). In other words, if endogeneity is properly controlled, the results show that finance helps firms grow.

As it is evidenced that credit can play a role in revitalizing informal sector MSMEs activities, the brief literature review reveals that in a recessionary economic context, the impact of the credit is more nuanced. In this study, we will be interested in analysing the impact of credit on MSMEs’ sales decline and the determinants of the growth prospect for the 12 months following the COVID-19 outbreak.
3 | DATA AND EMPIRICAL STRATEGY

3.1 | Data

The study uses the most recent (2020) surveys data set on informal sector MSMEs in Senegal collected by the ANSD of Senegal with the perspective to monitor the impact of COVID-19 on nonagricultural informal production units (IPUs). The survey was conducted between June and August 2020, and was nationally representative. That means the sample included firms located in all regions of the country. Due to the context of COVID-19, data collection was carried out through telephone interviews. Considered as a high-frequency phone survey, this data set is the first phase of the survey dealing with the economic activities of informal sector production units. The results should be used as a framework for decision-making to better understand the impact of COVID-19 on the business sector.

Data was collected at the individual MSME level with the aim to capture the impact on individual businesses. According to ANSD, the methodology is based on the random selection of a nationally representative sample of 785 IPUs from the list of 5,837 nonagricultural IPUs identified in the first phase of the ERI-ESI (2017). The IPUs are drawn in proportion to the total number of workers in the stratum (industry). From the list, managers of informal sector MSMEs were contacted for interview; if managers were not available for interview for various reasons, the next in line of authority was contacted. In the end, we had 598 valid observations for consideration in this analysis.

The data cover areas such as basic information on MSMEs, production, sales and employment, expenses and charges, aid, assistance, and prospects. The main objectives of the survey are the following (ANSD, 2013): (i) identifying the sectors of activity most affected by the pandemic; (ii) identifying the main channels through which the pandemic is affecting IPUs; (iii) assessing the impact of the pandemic on the turnover of the IPUs; (iv) assessing the impact of the pandemic on unemployment and underemployment; (v) assessing the different adaptation and survival strategies of IPUs in the face of the consequences of the pandemic.

Table 1 presents a summary of the outcome variables. The first outcome variable is the sales variation of informal sector MSMEs following COVID-19. This variable has three modalities: sales decline, constancy of sales, increase in sales. As the COVID-19 theory suggests that it negatively affects business activity, our interest will then focus on the ‘sales decline’ as the first outcome binary variable. Indeed, 78.8% of MSMEs’ managers report a decline in sales compared to the same period in 2019. Although we do not have the real absolute data of sales, the intensity of the drop could be assessed qualitatively by considering the proportion of drop declared: less than 25%, 25%-50%, 50%-75% and more than 75%. As such, 31.4% and 24.6% declare that they have experienced a drop in sales of between 25% and 50% and between 50% and 75%, respectively. As stated earlier, we will only focus on ‘sales decline’ as the first binary outcome.

The second outcome variable of interest is the ‘expected growth in sales’ over the 12 months following COVID-19: 72.7% of MSMEs’ managers expect an increase in sales, compared to 9.5% who expect a decrease in sales and 17.7% who assume sales to remain constant. This variable also presents three modalities: decrease in sales, constancy of sales, increase in sales. Table 1 shows that 25.1% and 25.8% of the managers declare that they expect an increase in sales of between 25% and 50% and between 50% and 75%, respectively, whereas only 7.2% and 14.7% say that they expect an increase of less than 25% and more than 75%, respectively. We will only consider ‘business growth prospect’ as the second binary outcome variable.

We note that 39.3% of MSMEs’ managers had a loan at the time of the survey, most of which had been taken out before the occurrence of COVID-19. This means that 60.7% did not have a loan; 11.9% of MSMEs’ managers indicate that they would like to take out a loan to cope with the consequences of COVID-19. Nevertheless, managers wanted the government to take additional response and recovery measures, in particular the establishment of a support fund for the most affected sectors (79.4%) and a policy of extending the maturity of loans (36.8%).

Table 2 provides some descriptive statistics of key variables included in our regression estimation. These variables include type of enterprise, key business sectors, area of residence, gender of enterprise manager, age of MSMEs’ manager (group of age), manager education level, and being registered in the Trade and Personal Property Credit Register (form of formalization).

As the treatment variable is access to credit, the treatment group consists of MSMEs’ managers who have access to credit for their business and the control group is MSMEs’ managers who do not have access to loan. Figure 1 shows that all types of MSMEs (with loan and without credit) experienced a decline in sales due to COVID-19. Particularly for MSMEs with credit, 84.3% faced a decrease in sales whereas 15.7% reported a constancy or increase in sales compared to the same period in 2019. For MSMEs without a loan, the share is 75.2% for those that have faced a decline in sales and 24.8% for those that did not face a decline.
TABLE 1 Summary of outcome and treatment variables

|                          | %  | Obs. | SD  | Min. | Max. |
|--------------------------|----|------|-----|------|------|
| **Sales variation following COVID-19** |    |      |     |      |      |
| Decrease                 | 78.8 | 471  | 0.4093 | 0   | 1    |
| Constant                 | 8.4  | 50   | 0.2770 | 0   | 1    |
| Increase                 | 2.3  | 14   | 0.1513 | 0   | 1    |
| Missing data             | 10.5 | 63   |       |      |      |
| **Proportion of sales decline** |    |      |     |      |      |
| Less than 25%            | 13.4 | 80   | 0.3407 | 0   | 1    |
| Between 25% and 50%     | 31.4 | 188  | 0.4647 | 0   | 1    |
| Between 50% and 75%     | 24.6 | 147  | 0.4309 | 0   | 1    |
| More than 75%           | 11.7 | 70   | 0.3218 | 0   | 1    |
| **Credit (current)**     | 39.3 | 235  | 0.4888 | 0   | 1    |
| **Expectation for business growth over the next 12 months** |    |      |     |      |      |
| Decrease                 | 9.5  | 57   | 0.2939 | 0   | 1    |
| Constant                 | 17.7 | 106  | 0.3822 | 0   | 1    |
| Increase                 | 72.7 | 435  | 0.4457 | 0   | 1    |
| **Expected percentage increase in sales** |    |      |     |      |      |
| Less than 25%            | 7.2  | 31   | 0.2585 | 0   | 1    |
| Between 25% and 50%     | 25.1 | 150  | 0.4339 | 0   | 1    |
| Between 50% and 75%     | 25.8 | 154  | 0.4376 | 0   | 1    |
| More than 75%           | 14.7 | 88   | 0.3546 | 0   | 1    |
| **Credit for COVID-19**  | 11.9 | 71   | 0.3237 | 0   | 1    |
| **Support fund**         | 79.4 | 479  | 0.4045 | 0   | 1    |
| **Maturity extension**   | 36.8 | 220  | 0.4826 | 0   | 1    |

Abbreviations: Max., maximum; Min., minimum; Obs., observation; SD, standard deviation.
Source: Author’s calculation from ANSD survey data (Senegal).

Therefore, we conduct different tests, particularly a proportion test⁷ on Stata (Table 3), which confirms that there is a strong difference in business sales decline between the two groups (treatment group and control group). The proportions are statistically different from each other at any level greater than 0.8%.

3.2 | Econometric model

The focus of the empirical analysis is to examine the impact of credit on sales decline of informal sector MSMEs following the COVID-19 pandemic. Before calculating this effect, we first formulate a standard logit with marginal effect to estimate the determinants of access to credit, sales decline and business growth prospect. Consistent with dichotomous dependent variables, the logit estimation technique regression is employed to assess the decision to access credit or otherwise. It is specified as follows:

\[ Y_i = \beta X_i + u_i \]  

where \( Y_i = 1 \), if the manager of an informal sector MSME makes a choice to get a loan and \( Y_i = 0 \), if the individual makes a choice not to access credit. Equation (1) represents a model with a binary choice involving an estimation of the probability of a manager of a MSME in Senegal having access to credit \( (Y_i) \) given a set of factors \( (X_i) \) which are considered exogenous to the individual. It is expressed as:

\[ P(Y_i = 1) = f(X_i, \beta_i) \]  

\[ P(Y_i = 0) = 1 - f(X_i, \beta_i) \]
where \( Y_i \) is the observed response of the \( i \)th individual MSME’s manager who access credit or not and \( Y_i = 1; Y_i = 0 \) and \( X_i \) are the set of characteristics as defined. The logit model uses the logistic cumulative function to estimate the probability as follows:

\[
P(Y = 1) = \frac{e^{u}}{1 + e^{u}}
\]  

(4)

\[
P(Y = 0) = 1 - \frac{e^{u}}{1 + e^{u}}
\]  

(5)
where $u = \beta_i X$. The probability model is a regression of conditional expectations of $Y$ on $X$. The same analysis is carried out for the ‘growth prospect’ as a binary outcome.

Then, we estimate binary treatment (access to credit) and binary outcome model (sales decline) using the PSM methods. These models address the issue of endogeneity by modelling the decision of a manager of an informal sector MSME jointly with the outcome variables. The models are laid out as follows (Woldemichael, 2020):

$$T_i^* = \beta^T w_i + \epsilon_i^T$$  
(6)

$$d_i^* = \beta^d x_i + \gamma^d T_i + \epsilon_i^d,$$  
(7)

where $T_i = 1(T_i^* > 0)$; $d_i = 1(d_i^* > 0)$, $1(\cdot)$ is the indicator operator; $\{T_i^*, d_i^*\}$ are the latent variables; $\gamma^d$ is the treatment effect parameter; $\{\beta^T, \beta^d\}$ are vectors of slope parameters to be estimated; $\{\epsilon_i^T, \epsilon_i^d\}$ are the error terms; $w_i = [x_i z_i]$ is a vector of covariates in the selection equation; and $z_i$ is a vector of exogenous variables excluded from $x_i$. In this model, we assume that the error terms are jointly and normally distributed as $\epsilon_i \sim N(0, \Sigma)$, where $\Sigma = \begin{bmatrix} 1 & 0 \\ 0 & \Sigma_{rd} \end{bmatrix}$, and $\Sigma_{rd}$ is the covariance term capturing selection on unobservables.

We will particularly focus on the PSM, which helps to reduce the selection bias in non-randomized data sets, which is the case in this study. Two steps are generally followed in PSM. Conducting a logit regression model in which a set of control variables is considered to estimate a propensity score; and choosing a matching algorithm to match the partners with similar propensity scores between the treated and the untreated (control) groups. Afterwards the measurement of the treatment impact is done through calculating the average treatment effect on treated subjects (ATT) through another regression which could be done with binary or continuous outcome (Austin, 2011; Austin & Stuart, 2017). Alongside the PSM used with kernel, we will consider other PSM versions or matching techniques to test the robustness of our results, such as the treatment effects Psmatch, nearest neighbour, and PSM with radius on Stata.
4 | MAIN FINDINGS AND DISCUSSION

4.1 | Determinants of access to credit, sales decline and business growth prospect

The logistic regression is used to estimate the conditional probability of informal sector MSMEs’ access to credit, the decline in their sales and their business growth prospects. The results in Table 4 display the marginal effects of logit estimations.

4.1.1 | Access to credit (Columns 1 and 2)

The marginal effects for age 25–35 and 36–45 years old and for being registered are positive and significant at 5% and 10%, respectively. The other variables are not significant. The results seem to suggest that being the head of an informal sector MSME that is registered, whereas being aged 25–35 and 36–45 years old are likely to increase the probability of accessing credit from formal financial institutions by 11.6%, 15.0% and 10.2%, respectively. The result regarding the status of registered MSMEs is practically intuitive. Indeed, being formalized could be seen as a form of professionalization of informal sector MSMEs and this may influence the perception of financial institutions in their credit allocation policy. As MSMEs are identified, in case of default, it might be less difficult, to a certain extent, to recover loans. However, the result that young managers, especially those aged 25–35 years old, have a higher probability of accessing credit is surprising, especially when the marginal effect for managers of MSMEs aged 46–55 years old is not statistically significant, although positive. It could mean that financial inclusion policies for youth tends to show its effects, whereas older managers in the informal sector are less and less interested in credit.

4.1.2 | Sales decline (Columns 3 and 4)

The marginal effects of variables such as being male, aged 25–35 years old, having access to credit and having financial problems are positive and significant at 10% and 5%, respectively. This indicates that being a manager of an informal sector MSME with these characteristics increases the likelihood of sales decline. Although the result regarding access to credit is startling, it may be understandable. Indeed, although credit is supposed to strengthen managers’ ability to develop businesses, it can become a serious issue in a crisis period, when managers have to deal with repaying credit interest and face other problems at the same time. This could contribute to a decline in sales. However, findings show that being a MSME manager aged 46–55 years old reduces the probability of a drop in sales, which could suggest that the higher the MSME manager’s age, the greater the resilience to the crisis. Their resilience could be the result of both the qualifications and experience acquired by mature managers over time and the possibility of having been able to gather financial capital and/or diversify their sources of revenue that enable them to cope with the impact of the crisis.

4.1.3 | Business growth prospect (Columns 5 and 6)

The marginal effects of having financial problems and facing sales decline are positive and significant at 5%, indicating that managers of MSMEs who face financial challenges and sales decrease are 12.3% and 11.4% more likely to report a positive growth perspective for the 12 months following the COVID-19 outbreak. The interpretation of these results is not easy, particularly given the previous finding on the impact of the financial problem on sales decline. Maybe it would be useful to differentiate between short and medium or long terms. In the short term, having a financial problem has a negative impact on sales, especially in a crisis context. However, managers with financial problems can trust the future due to their knowledge of the context in which their business was developing before the crisis. As the precrisis socioeconomic context in Senegal was favourable and dynamic, this may lead some MSMEs’ managers to believe in the end of the current crisis. Then, it is obvious that their perception of the future appears positive. The marginal effect of manufacturing activity is negative and significant at 10%, indicating that being a MSME in the manufacturing sector might probably decrease by 8.4% the likelihood of having a positive business prospect over the next 12 months. These results suggest that MSMEs that undertake manufacturing businesses tend to be more pessimistic about the future. This pessimism could also be explained by the inter-sectoral linkage issues. Indeed, manufacturing firms use inputs
from other sectors that are also affected by the crisis. As the supply of these inputs is affected, this has an impact on the manufacturing sector. Hence, this might have a negative impact on their investment intention. This result underlines the urgency of improving the business environment to help MSMEs revive their activities.

### 4.2 Impact of credit on sales decline based on PSM

Table 5 presents results from the logistic estimation for PSM confirming the findings described in the previous section. For managers, being between 25 and 35 and 36–45 years old increases the probability of accessing loans. As well, registered MSMEs have a higher probability of getting a loan.

The effectiveness of the econometric analysis by PSM can be appreciated through the graphs in Figure 2 and the results at the bottom of Table 5. Figure 2 indicates that the density of propensity scores plots is similar after matching
than before matching. The propensity score overlap is also checked. Although two treated and two untreated are Off-Support, overall we find that the overlap in p-scores between the two groups is good; that is, for the majority of p-scores, in both the comparison and treatment groups.

The lower part of Table 5 summarizes the average treatment effects (ATT) results, which are calculated based on the propensity scores and kernel matching procedure regarding the effects of credit on sales declines. Our theoretical hypothesis was that credit should have an effect limiting sales decline for MSMEs that have access to credit compared to MSMEs that do not.

| Credit                  | Logit estimations for PSM | SE  | z   |
|-------------------------|---------------------------|-----|-----|
| Small enterprise        | 0.385                     | 0.269| 1.43|
| Medium enterprise       | −0.122                    | 0.337| −0.36|
| Manufacturing           | 0.138                     | 0.205| 0.67|
| Agriculture             | −0.421                    | 0.336| −1.25|
| Transport and storage   | −0.067                    | 0.411| −0.16|
| Urban                   | −0.156                    | 0.196| −0.80|
| Male                    | −0.003                    | 0.236| −0.01|
| 25–35 years old         | 0.612**                   | 0.267| 2.29|
| 36–45 years old         | 0.422*                    | 0.243| 1.74|
| 46–55 years old         | 0.351                     | 0.265| 1.33|
| Primary                 | 0.039                     | 0.236| 0.16|
| Medium                  | −0.326                    | 0.326| −1.00|
| Secondary               | −0.302                    | 0.399| −0.76|
| Superior                | −0.543                    | 0.537| −1.01|
| Literate in Arabic      | 0.029                     | 0.244| 0.12|
| National languages      | 0.905                     | 0.957| 0.95|
| Registered              | 0.481**                   | 0.205| 2.35|
| Financial problem       | 0.073                     | 0.263| 0.28|
| Intercept               | −0.833**                  | 0.306| −2.73|
| N                       | 598                       | 0.026| 20.79|
| Pseudo R²               | 0.026                     | 0.2902| 0.2902|
| Wald χ²                 | 235                       | 0.034| 2.213|

Note: ** Significant at 5% and * Significant at 10%.

Abbreviations: Coef., coefficient; PSM, propensity score matching; SE, standard error.
Source: Author’s calculation from ANSD survey data (Senegal).
The results confirm those obtained with the logit estimations. The difference of treatment effect between the treated group and the control group is positive ($ATT = 0.076; t = 2.21$) and statistically significant at 5%. That means, MSMEs with loans have a higher average treatment effect of sales decline compared to their matching part with the same propensity score. A 10% increase in the credit access rate for MSMEs with credit could lead to an increase in the difference in sales decline of 0.8% compared to the control group. This key result partly converges with Lakuma et al. (2019) and

**FIGURE 2** Overlap graph and density plot of the propensity scores in matched sample (access to credit)

![Overlap graph and density plot of the propensity scores in matched sample (access to credit)](image)

**TABLE 6** Treatment effects: other techniques and matching algorithms

|                  | $ATT$ Tffects psmatch | $ATT$ Tffects nnmatch | $ATT_{Radius}$ |
|------------------|-----------------------|-----------------------|----------------|
| Untreated (on support) | 363                   | 363                   | 359            |
| Treated (on support)   | 233                   | 233                   | 235            |
| $ATT/ATE$          | 0.846                 | 0.100                 | 0.084          |
| $SE$              | 0.034                 | 0.057                 | 0.034          |
| $t$-statistic      | 2.27**                | 1.75*                 | 2.47**         |

**Note:** ** Significant at 5% and * Significant at 10%.

**Abbreviation:** $SE$, standard error.

**Source:** Author’s calculation from ANSD survey data (Senegal).

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Gubert and Roubaud (2011) who found, respectively, that access to finance can have a negative effect on medium-sized firms and that the impact of the credit is limited in a recessive economic context partly because of higher fixed costs. Moreover, this result questions the public policy in Senegal, which would consist in promoting credit (debt) to businesses in this crisis context.

4.3 Robustness test

We use other treatment effect models in combination with nearest-neighbour and radius matching techniques (Table 6). All three techniques found that the average treatment effect is statistically significant in increasing sales decline for MSMEs that have credit compared to MSMEs that do not. These results are convergent with those of Table 5. Overall, the robustness test shows that the alternative matching algorithms are generally quite similar to those obtained when the kernel method is used, sometimes a slight difference.

5 CONCLUSION

This study examines the determinants of access to credit, sales decline and business growth prospect following the COVID-19 outbreak and assesses the impact of credit on the sales decline due to COVID-19, of informal sector MSMEs. We perform both logit and treatment effect analysis based on PSM. Being a male and aged 46–55 years old reduces the likelihood of sales decline. On the contrary, those aged 25–35 years old have a high probability of seeing their sales decline. Results also show that being aged 25–45 years old and having a registered MSME increases the probability of getting a loan. However, informal sector MSMEs that undertake manufacturing businesses appear pessimistic regarding the future whereas managers who struggle with financial issues tend to have a higher likelihood of expecting an increase in sales in the next 12 months.

Regarding the ATT analysis, our finding shows that MSMEs with credit present a higher average treatment effect of sales decline compared to their counterparts with the same propensity score. Accordingly, it seems to suggest that the greater the access to credit, the greater the difference in sales decline between MSMEs with credit and their counterparts without credit in the pandemic period. This may mean that the debt (credit), without complementary measures, is unlikely to help MSMEs in the informal sector mitigate the negative effect of COVID-19 in sales variation, particularly because its impact on the prospect of business growth over the next 12 months is not conclusive. This can be explained by the fact that in times of crisis, the continued repayment of credit is an important expense for MSMEs, that can prevent them from investing in their business by increasing production or paying more for their raw materials. In this light, the finding highlights the importance of extending loan maturities and direct government financial support, by subvention and not debt, to revive the business of informal sector MSMEs, especially the most negatively affected and pessimistic ones.

The analysis tends to support the Senegal government’s current engagement in creating room for inclusive growth focused on MSMEs. These efforts in favour of informal sector MSMEs should limit as much as possible the phenomenon of debt financing in this period of crisis. An improvement of the business environment as well as a growing interest in supporting the formalization of these informal sector MSMEs and access to an appropriate amount of financing could have a positive impact in terms of inclusive growth. This is an opportunity for a deep transformation of MSMEs to become more resilient to certain external shocks. But significant financial resources are needed in addition to nonfinancial measures to support this change.

ENDNOTES

1 The Senegalese economy was expected to grow by 2.8% in 2020 at best and 0.3% at worst according to the African Economic Outlook (African Development Bank, 2020).

2 In fact, as sub-Saharan Africa has the highest proportion of financially constrained SMEs (54%) in the world, the financing gap for MSMEs is estimated at US$915.4 million (c. €781 million) or 7% of GDP, in Senegal (IFC, 2017).

3 An impacted company that is a potential beneficiary will have to meet the following criteria: be registered in the Trade and Personal Property Credit Register (RCCM) before 29 February 2020; have at least five employees on permanent or fixed-term contracts as of 29 February 2020; have lost at least 33% of its turnover due to the COVID-19 pandemic (comparison between Q1 2019 and Q2 2020 and between the 12 months preceding, respectively, March 2019 and March 2020 have financial statements for the last 3 years. For companies
with less than 3 years of existence, they must have all available financial statements and a business plan; not benefit from State aid in similar funds; and not have had a downgraded credit during the last 12 months before 29 February 2020.

5 National agency for the development and supervision of SMEs in Senegal.

6 Different levels of formalization do exist in Senegal: firms paying no taxes, firms paying taxes but still unregistered, registered enterprises, enterprises registered and declaring themselves or their staff to the social security system, and so forth. Informal activities are financed through savings and borrowing, often from family or community resources and rarely through loans from suppliers, banks and microcredit institutions.

7 It tests for equality of proportion with the main hypothesis H0 which assumes that there is no statistical evidence to reject equality between the proportion of two groups considering a variable of interest.

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