# The impact of formal financing on small informal enterprises in Comoros

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## Working paper

**Abstract**

The purpose of this contribution is to highlight the impact of formal credit on both the turnover and the formalization of informal production units (IPUs) in Comoros. Based on informal sector survey data, we analyse the impact using a method combining Propensity Score Matching (PSM) and the Coarsened Exact Matching (CEM) developed by Iacus et al. (2012). The results show that formal credit has a positive and significant impact on both the turnover and the formalisation of IPUs. The combination of the PSM with the CEM has considerably improved the quality of the matching.

**Keywords: formal financing, informal enterprises, impact, Comoros**

**JEL classifications: G2, O1, O56**

## 1. Introduction

Micro and small business access to credit was an important component of the second World Bank global report on financial development (World Bank, 2014). This report highlights the importance of formal credit for both the investments and growth of informal businesses. It also argues that financial inclusion could help informal businesses enter the formal sector. In fact, micro and small businesses play a significant role in the entrepreneurial dynamic of developing countries. Their share in the GDP of developing economies is estimated to be between 40 and 50% (World Bank, 2014). Many of these operate in the informal sector and face challenges that hinder the growth of their activities.

Among these challenges, the lack of access to credit acts as one of the most serious obstacles (Bruhn et Love, 2014; Beck et al., 2007; Demirgüç-Kunt and Klapper, 2012; Levine, 2005). With insufficient collateral and an unsound credit history, banks loans are

not easily accessible. The informal financial sector (loan sharks, friends and relatives, etc.) constitutes their main financing alternative. However, these sources of funding are usually quite costly, inconvenient and risky. In response to this microfinance has been promoted and has played, over the past few decades, a significant role in financing certain informal businesses. For many reasons, some banks are also starting to make loans accessible to entrepreneurs from the informal sector while often using microfinancing techniques. That is the case of Equity Bank in Kenya which developed a strategy to target disadvantaged groups (Allen et al., 2012). In Comoros, we can observe that some entrepreneurs from the informal sector are also using bank loans. This new dynamic, which pulls the formal and informal sectors closer together, is at the heart of the inclusive financial paradigm. This shows that the formal financial institutions are willing to get closer to local economies. It also indicates a process of financial inclusion of informal businesses; a process that is likely to continue and may become more widespread in the coming years. But the development of closer ties between the two sectors inevitably raises questions about the impact of formal credit on micro enterprises of the informal sector. Such as, does the access to formal credit lead to the success of informal businesses? Does it encourage the formalisation of these businesses? Despite a number of research studies carried out on the informal sector, few studies have looked at the impact of formal financing on the informal sector (Akoten et al., 2006).

The goal of this contribution is to shed light on the impact of formal financing (banking and microcredit funding) on the performance of informal micro businesses. Based on data from a survey carried out in Comoros, we evaluate this impact by using the Propensity Score Matching (PSM) method combined with the Coarsened Exact Matching (CEM); a matching methodology developed recently by Iacus et al. (2012). In the best of our knowledge, this paper is the first to analyse this issue in the Comorian context. The results show that formal credit has a positive and significant impact on both the turnover and the formalisation of IPUs. The combination of the PSM with the CEM has considerably improved the quality of the matching.

## 2. **Data**

The data used in the study comes from the National Survey on labour and the Informal Sector in Comoros (NSISC) which was conducted by the national direction of statistics. The NSISC is a survey carried out with a mixed approach (household, business) that contains detailed data

on the activity conditions of Informal Production Units (IPU). The criteria used for this study to identify the production units operating in the informal sector are the non-registration of the units based on fiscal identification number, the non-keeping of written and formal accounting, and the production of commercial goods and services.

Table 1 presents the main characteristics of IPUs according to whether or not they have access to credit. The heads of IPUs who have access to credit are older and their level of education is higher. Most of them operate in professional premises and the average number of employees of these IPUs, their turnover and predisposition to be formalised are higher.

Table 1: Profil of IPUs

| | Access to credit | | | | All IPU | |
|---|---|---|---|---|---|---|
| | No | | Yes | | | |
| | Mean | Std. | Mean | Std. | Mean | Std. |
| Age | 40,52 | 13,06 | 43,46 | 13,37 | 40,66 | 13,09 |
| Male | 50,97% | 50,02% | 66,00% | 47,85% | 51,70% | 50,00% |
| Maried (Yes/No) | 79,67% | 40,26% | 94,00% | 23,99% | 80,37% | 39,74% |
| Literate (Yes/No) | 59,35% | 49,14% | 64,00% | 48,49% | 59,57% | 49,10% |
| Education (Years) | 3,79 | 4,53 | 4,88 | 5,08 | 3,84 | 4,56 |
| Professional premises (Yes/No) | 39,43% | 48,89% | 56,00% | 50,14% | 40,23% | 49,06% |
| Number of Employees | 1,48 | 1,44 | 1,80 | 1,20 | 1,49 | 1,43 |
| Turnover | 491855,7 | 3199897 | 1004500 | 2717908 | 516814 | 3178887 |
| Formal registration | 7,35% | 26,12% | 22,00% | 41,85% | 8,07% | 27,24% |
| Moroni | 15,73% | 36,43% | 10,00% | 30,30% | 15,45% | 36,16% |
| Rest of the island of Ngazidja | 35,24% | 47,80% | 22,00% | 41,85% | 34,60% | 47,59% |
| Anjouan | 30,75% | 46,17% | 54,00% | 50,35% | 31,88% | 46,62% |
| Moheli | 18,08% | 38,50% | 14,00% | 35,05% | 17,88% | 38,34% |
| Observations | 979 | | 50 | | 1029 | |

## 3. Methodology

In order to evaluate the impact of formal credit on IPUs, we use the Roy-Rubin model (Roy, 1951; Rubin, 1974). The main elements of this model are the IPUs, the treatment and the outcomes. The treatment is a binary variable $T_i$ that takes the value 1 if the IPU's head received a credit from the formal sector (microfinance or bank) and 0 otherwise. IPUs' performances that represent outcomes are measured by the turnover of the IPU and by a dichotomous variable that takes the value 1 if the IPU is formally registered and 0 otherwise. Roy-Rubin's model defines the average effect of the treatment on treated (ATT) as follow:

$$\Delta\_ATT = E(Y(1)|T=1) - E(Y(0)|T=1)$$

Where Yi(1) is the value of the outcome (turnover, registration) of the IPU i when it is treated, and Yi(0) its value when it is not. E(.) is the expected value. The fundamental problem in the estimate of the equation (1) is that we cannot simultaneously observe for any individuals i, the outcomes Yi(0) and Yi(1). The estimation of the impact relies on the construction of a counterfactual of E ($Y(0) \mid T=1$). The difference $\Delta=E(Y(1) \mid T=1) - E(Y(0) \mid T=0)$ can be calculated but it is potentially a biased estimator of $\Delta\_ATT$ (Dehejia et al., 2002), because the two groups have different characteristics. In order to get a good counterfactual while controlling for selection bias, we evaluate the impact using two matching methods. On the hand, the PSM method which matches each treated individual with a non-treated individual that has the same propensity score. This score is calculated based on a logit regression of the characteristics of the IPU (age, education, experience, gender and marital status of IPU head, number of employees, etc.) and the ones related to environment of the MFI (residence area, number of IMF the district, the property status of the local, etc.) on the treatment variable. On the other hand the PSM was combined with the Coarsened Exact Matching Method (CEM) which is a new matching approach for improving the estimation of causal effects developed by Iacus et al. (2012). The basic idea of CEM is to coarsen each factor by recoding so that substantively indistinguishable values are grouped into categories. Then the CEM algorithm creates a set of strata from the categories created in the coarsening. At every stratum, the exact matching algorithm is applied so that the treated UPIs are matched with the ones untreated in order to create an appropriate counterfactual group. Finally, the coarsened data are rejected and the uncoarsened data of matched observations are retained to estimate the treatment effect. Once an appropriate counterfactual group has been created, we can combine CEM with PSM to estimate the treatment effect. Iacus et al (2012) demonstrated that it performs better than classic matching methods like PSM. We used these variables: area of residence, the head of unit's gender, his or her qualifications, the number of employees and the knowledge of the existence of an MFI as criteria to implement the CEM.

## 4. Results

Table 1 presents the determinant of probability of access to formal credit on the matched sample. The access to formal credit seems depending on some characteristics of the IPU's head like marital status and the education level. The probability of access to formal credit is higher when the head is married. Likewise, the education has a positive effect on this probability. This result is consistent with those found in Nikaido and Jesim (2015) and Farazi (2014). In addition to the characteristics of the head, those of the IPU itself play a key role in

the access to credit. In fact, size of the IPU measured by the labour force increases the probability of access to formal credit. The IPUs that have professional premises are more likely to access to credit and the number of MFIs in the district and in the neighbouring district is positively linked to the access to credit.

Table 1: Probability to access to formal credit (logit regression) of the IPU

| | Propensity Score Matching combined with CEM | |
|---|---|---|
| **Characteristics of the head** | Coefficient | Std. |
| Gender of IPU's head=Female | 0.328 | (0.372) |
| Married = Yes | 1.493** | (0.756) |
| Age of IPU's head | 0.0180 | (0.013) |
| Education (years) | 0.0681* | (0.037) |
| **Characteristics of the UPI** | | |
| Labour force | 0.565*** | (0.183) |
| Professional premises =Yes | 0.909** | (0.404) |
| Owner of the local = yes | -0.157 | (0.438) |
| Provides service = yes | -0.0656 | (0.429) |
| Number of MFI in the district and in the neighboring district | 0.257* | (0.146) |
| Location (Ref=Moroni) | | |
| Location=Rest of the island of Ngazidja | 0.0774 | (0.612) |
| Location=Anjouan | 0.194 | (0.565) |
| Location=Moheli | 0.245 | (0.705) |
| Experience of IPU's head in the activity (year) | -0.000208 | (0.002) |
| Constant | -6.419*** | (1.154) |
| Observations | 548 | |
| *AIC* | 314.0 | |
| *BIC* | 374.2 | |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The tests presented by Table 2 allow us to estimate to what extent the propensity score balances the observed characteristics. The considerable reduction of the pseudo R2 and the p-value of the paired observations show that the propensity score balances variables in such a way that there are no significant differences between the control and the treatment groups. The combination of the CEM with the PSM approach shows better results, in terms of reduction of the bias (between 55,6% and 79%), than the PSM (between 35,8% and 59,3%).

Table 2: PSM balancing test

| | Pseudo R2 Before Matching | Pseudo R2 After Matching | P > Chi2 Before Matching | P > Chi2 After Matching | Bias reduction |
|---|---|---|---|---|---|
| **PSM** | | | | | |
| Kernel | 0.113 | 0.054 | 0.0*** | 0.892 | 59.3% |
| Nearest neighbour | 0.113 | 0.061 | 0.0*** | 0.833 | 39.6% |
| Radius | 0.113 | 0.023 | 0.0*** | 0.998 | 35.8% |
| **PSM combined with CEM** | | | | | |
| Kernel | 0.128 | 0.026 | 0.0*** | 0.999 | 79% |
| Nearest neighbour | 0.128 | 0.062 | 0.0*** | 0.932 | 55.6% |
| Radius | 0.128 | 0.026 | 0.0*** | 0.999 | 78% |

*p< 0.1, **p< 0.05, ***p< 0.001

Table 3 presents the results of the impact of access to formal credit on the turnover and on formal registration of the IPUs' of the informal sector. Results show that access to formal credit has a positive impact on the turnover and IPUs' registration. The impact on the turnover is evaluated between 581 031 KMF (1 180 €) and 600 458 KMF (1 220.52 €), for the PSM, and between 528 346 KMF (1 073.94 €) and 556 588 KMF (1 131.31 €), for the combined method. We can observe that the impact on the turnover becomes significant when we combine the PSM with the CEM, which shows the contribution of the CEM method to the improvement of the matching. Regarding the impact on formal registration, both methods provide convergent results.

Table 3: Impact of access to formal credit

| | PSM | | PSM combined with CEM | |
|---|---|---|---|---|
| **Turnover** | ATT | Std. | ATT | Std. |

| | | | | |
|---|---|---|---|---|
| Kernel estimator | 600458 | 649312 | 528346* | 321613 |
| Nearest neighbour | 581031 | 412868 | 556588* | 320401 |
| Radius | 591498 | 425407 | 534609* | 328662 |
| **Formal registration** | | | | |
| Kernel estimator | 12.77%** | 6.3% | 11.66%* | 6.6% |
| Nearest neighbour | 13.8%** | 6.2% | 12%* | 6.4% |
| Radius | 10.27%* | 6.3% | 12%* | 6.5% |

$^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.001$

## 5. Conclusion

This contribution attempts to analyse the impact of formal credit (bank credit and micro-credit) on the turnover and formalization of IPUs in the informal sector in Comoros. Using the PSM and the Coarsened Exact Matching approach, we demonstrate that formal credit has a significant positive effect on IPUs' turnover. These results show the importance of formal credit for informal businesses in Comoros. Access to bank credit or to micro-credit allows them to significantly reinforce their business. Additionally, it is a way to promote formalisation of informal businesses. Informal entrepreneurs that request formal credit make the effort to register, not only to conform themselves to banks' expectations, and those of microfinance institutions, but also to increase their chances of obtaining credit. Access to formal credit encourages them to be more efficient, which in turn improves their results.

The convergence of both approaches shows the robustness of our results and attests that formal credit has a real impact on IPUs' commercial results and on their formalisation. Moreover, using the CEM has allowed us to improve the PSM. This result is in line with that of Iacus et al. (2012), who demonstrated that combining the PSM with the CEM performs better in terms of reducing imbalances than the classical PSM.

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