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SIAM J. Financial Mathematics manuscript #M134281; receipt of new submission

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sifin@siam.org

sifin@siam.org
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sifin@siam.org Kam, 4 Jun 2020 jam 00.16 ☆

Kepada:
djefles79@yahoo.com

Cc:
Nahla.DHIB@univ-cotedazur.fr
Francine.DIENER@univ-cotedazur.fr
Marc.DIENER@univ-cotedazur.fr

Dear Djaffar Lessy,

Thank you for submitting "May microcredit lead to inclusion?". Your paper has been assigned MS#M134281.

You can check on the status of the paper by logging in at <https://sifin.siam.org> and following the live manuscripts link.

You will receive notice after the review process has been completed. You can send inquiries to sifin@siam.org at any time. It's helpful if you refer to your paper by title, by the manuscript number, and by your name.

The authors listed for your submission are Djaffar Lessy, Nahla Dhib, Francine Diener, and Marc Diener, and as Corresponding Author you represent that any and all co-authors are aware of and agree with this submission. The Editors-in-Chief has been notified of your submission and all further correspondence will be sent only to you as the Corresponding Author.

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We are including additional information below that we encourage you keep on hand as reference. Please do not hesitate to write if you have any questions.

Regards,

Heather Blythe
Senior Publications Coordinator
SIAM
Email: blythe@siam.org
Phone: 215-382-9800, ext. 352
Fax: 215-386-7999

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RE: Questions about submitting a manuscript (SIFIN M134281) 3

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Brian Fauth <fauth@siam> Jun, 28 Agu 2020 jam 23.00 Kepada: djaffar lessy



Brian Fauth

fauth@siam.org + Tambah ke kontak

Djaffar, thank you for your note. Your submission has been well received and assigned to a SIFIN Associate Editor for review. Currently, we are waiting for referee reports to be completed, which is consistent with this stage of review.

We thank you again for your patience during this challenging time.

My best to you,

Brian Fauth
Editorial Associate
SIFIN

From: djaffar lessy [mailto:djefles79@yahoo.com]
Sent: Friday, August 28, 2020 4:14 AM
To: Brian Fauth <Fauth@siam.org>; SIFIN <sifin@siam.org>
Subject: Re: Questions about submitting a manuscript

Dear Brian/SIAM Journal,

I have submitted a paper in your journal since 86 days ago, by the title "May microcredit lead to inclusion?" but until now, we have not received the review result. Can you please give me information about this?

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From: djaffar lessy [mailto:djefles79@yahoo.com]
Sent: Friday, August 28, 2020 4:14 AM
To: Brian Fauth <Fauth@siam.org>; SIFIN <sifin@siam.org>
Subject: Re: Questions about submitting a manuscript

Dear Brian/SIAM Journal,

I have submitted a paper in your journal since 86 days ago, by the title **"May microcredit lead to inclusion?"** but until now, we have not received the review result. Can you please give me information about this?

Thank you before.

Best regards,
Djaffar Lessy



Brian Fauth

fauth@siam.org
+ Tambah ke kontak



djaffar lessy <djefles79@yz> Sab, 29 Agu 2020 jam 01:11 ☆
Kepada: Brian Fauth

Dear Brian,

Thanks for your information.

Best regards,
Djaffar Lessy

> Tampilkan pesan asli

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SIFIN M134281, follow-up to request for revision

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sifin@siam.org Kepada: djefles79@yahoo.com

Kam, 1 Okt 2020 jam 20.57

Dear Djaffar Lessy,

This is the follow-up message referred to in the decision letter regarding May microcredit lead to inclusion?. When you are ready to submit your revision use the link below.

https://sifin.siam.org/cgi-bin/main.plex?el=A3Q2mEk5A5yjk6l6A9fidFq8aElwFNbgzAnMvqJ6brgZ

[NOTE: The embedded link above is specific to you as the recipient, and logs you into your account. Do not forward an email with an embedded link to others. If you want to share the content first DELETE THE LINK.]

Please include a response to the referee with detailed information on the actions taken in view of the report.

Regards,

Brian Fauth Editorial Associate fauth@siam.org 215-382-9800, ext. 358 215-386-7999 (fax)



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sifin@siam.org

Kepada: djefles79@yahoo.com

Kam, 1 Okt 2020 jam 20.57

Dear Djaffar Lessy,

Your manuscript, "May microcredit lead to inclusion?," has completed this round of review.

Though I can't accept it for publication at this time, I encourage you to read the reports and revise the paper following referee suggestions.

Also, with your revision, include a response to the review editor and referees with detailed information on the actions taken.

If you do not intend to make changes and send a revised version of the paper, please let me know by return email (with a cc: to sifin@siam.org). Otherwise, we're asking that you complete your revision within 3 months, by December 29, 2020. Be sure to let SIAM know (email both the Editor-in-Chief and sifin@siam.org) if you require more time.

Note: A second email will follow, which will include a link that you, as the corresponding author, can use when you're ready to submit the revised version. Do not forward the follow-up email to anyone else as the link is for your use exclusively, and allows access to your account.

Best regards,

Jean-Pierre Fouque Editor-in-Chief SIAM Journal on Financial Mathematics fouque@pstat.ucsb.edu

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May microcredit lead to inclusion?

Djaffar Lessy* Nahla Dhib† Francine Diener‡ Marc Diener§

Abstract

We consider a Markov-Chain model for a Microfinance Institution (MFI) borrower who can be in one of four states: Applicant (A), Beneficiary (B^- or B^+) of a small or a large loan, or included (I) in the regular banking system. Given the transition matrix we compute the equilibrium and deduce the influence of probability parameters on what is profitable to the borrower within breaking-even constraints of the MFI. We give a general theorem on the expected income flow of a Markov Chain with Income (MCI), that we then apply to our model to determine the constraints emerging from Absence of Strategic Default (ASD) requirements. These do not only bound the probabilities of success from above but sometimes also from below.

Keywords: Micro-credit, Markov Chain with Income, financial inclusion, Absence of Strategic Default.

MSC: 60J10, 60J20, 91-10, 91G40 JEL codes: C02, D24, G21, L26

1 Introduction

Microcredit we want to model here consists in small loans to poor entrepreneurs excluded from regular banking. A typical borrower is often a woman so we will use "she" when we wish to describe the questions from "her" point of view. Being poor she has no access to the regular banking system and may only apply to a Micro-Finance Institution (MFI) who does not require collateral, and not only provides loans but also supervision and coaching, a kind of education for adults. For this, and for supposed bigger default risk, MFI usually charge much higher interest rates than regular banks. Economist Muhammad Yunus [8][9] and Grameen bank were given the 2006 Peace-Nobel Price for pioneering modern microcredit since the 1970s and helping poor people to get out of poverty in Bangladesh. Microcredit is usually supported as a way of allowing its beneficiaries to leave poverty, even if this hope is often controversial, for instance when there is no clear entrepreneurial project in the loan as it is often the case in agricultural and pastoral activity [6]. In this paper we address a slightly different question, the possibility that microcredit leads to economic inclusion, in the **sens** of opportunity to poor people to have access to regular banking system to get loans for their small enterprise. We discuss this question in the

Missing comma:
"Being poor,
she..."

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framework of what we call Markov Chains with Income (MCI) considering, in addition to the Markov chain dynamic, the Expected Income Flow (EIF) as a measure for a rational behavior of borrowers. We give a general theorem relating this amount to the transition matrix P of the Markov chain, the income function f , and the actualization factor δ . Our MCI model will allow to discuss typical questions related to the issue of whether microcredit may lead to Inclusion into the regular banking system, to which poor have no access as they have no collateral nor credit-history. The model is tailored to deal with various aspects, in an as elementary as possible context.

Our approach has been inspired by the paper *Here today, gone tomorrow: Can dynamic incentives make microfinance more flexible?* [7] by G.A. Tedeschi where she considers a repeated lending of a fixed amount, provided the borrower reimburses the previous one, and is excluded of any future lending for a fixed number of time periods otherwise. She also introduces the expected income flow, as a function of parameters of the model, such as the probability to get a loan when applying or the probability to be able to reimburse the loan.

"...when applying for one..."

O. Khodr and al. [2][5] explicitly introduced a Markov chain model as a mathematical formalism of Tedeschi's approach. They extend the model from individual loan to the question of group lending and address the issue of strategic default. Similar mathematical models have also been used by N. Dhib [1] to discuss the microcredit activity in the South of Tunisia.

2 Description of the Model

In our model, we consider a MFI that works for a group of potential borrowers and whose main objective is to help each of them, by granting two successive microloans, to be accepted in the regular banking system if they have been successful, thanks to their positive credit-history. When she is granted a microloan, the borrower face high interest rates thus their small business does not produce a large net income. To model a strong incentive for inclusion, we assume that the small business allows the borrower to cover its basic living costs c but without generating any net income. On the contrary, we assume that when she is included in the regular banking system, the interest rate is much lower and allows her to generate a net income flow.

More precisely, let $Y(k)$ the production function that represents the income the borrower can get from a loan k . Assume $Y(k)$ is increasing and concave. Denote by $\overline{C}(k)$ and $\underline{C}(k)$ the cost functions, $\overline{C}(k) = c + (1 + r)k$, $\underline{C}(k) = c + (1 + r')k$ which are the sum of the basic consumption c of the borrower for one period that we assume to be constant, and the amount she has to reimburse (r and r' represent the interest rates for a microcredit and a regular credit respectively, $r > r'$). We assume the functions $Y(k)$, $\overline{C}(k)$ and $\underline{C}(k)$ are as in the figure 1, which means that a microcredit (with interest rate r) is only profitable when $k^- \leq k \leq k^+$. We will choose two kind of microloans, a small one for $k = k^-$ and a bigger one for $k = k^+$. As $Y(k^-) = \overline{C}(k^-)$ and $Y(k^+) = \overline{C}(k^+)$, none of these microloans generate profit beyond covering basic living costs. On the contrary, we assume that when included in the regular banking system the borrower receives a loan of same size k^+ and, as the interest rate r' is smaller, $r' < r$, the net income $Y(k^+) - \underline{C}(k^+) = b > 0$ is positive,

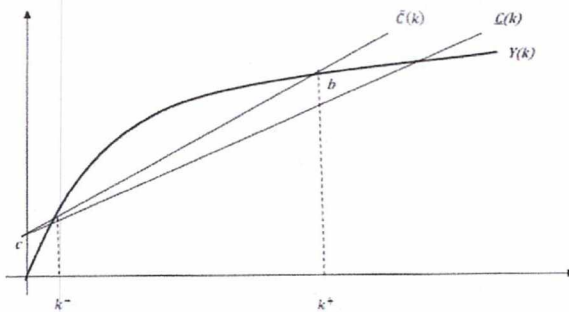


Figure 1: Production function and cost functions depending on the interest rate of the loan.

this loan is now profitable, generating a net benefit b , as long as the borrower is successful and thus stays at state I .

To describe the dynamic of the model, we use the following Markov chain. We assume the borrower may be in one of four states: Applicant (A) asking for a small loan, Beneficiary (B^-) of a small loan, Beneficiary (B^+) of a large loan, and Included (I) in the regular banking system. The set of states is $S := \{A, B^-, B^+, I\}$ and the probabilities to move from one state to another is given in the following figure:

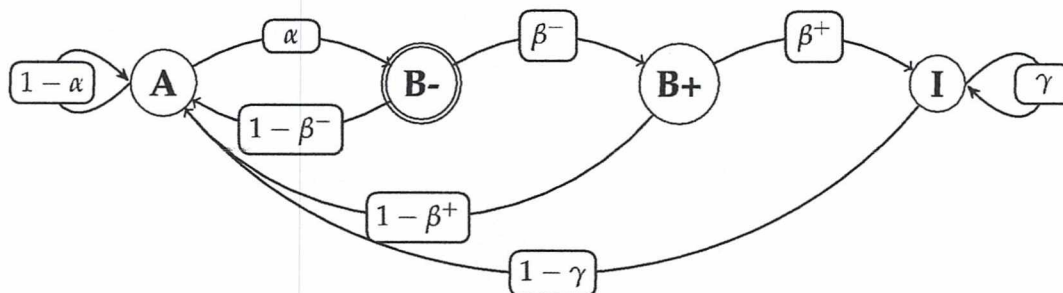


Figure 2: The four states of the potential borrower (Applicant for a loan (A), Beneficiary of a small loan (B^-), Beneficiary of a large loan (B^+) and Included (I)) and the probabilities to move from one state to another.

An applicant A may either become a borrower B^- with probability α or stay at state A with probability $1 - \alpha$. We can see α as the proportion of successful applicants in the population targeted by the MFI. This proportion can be small even if the MFI willingly grants loans. A borrower at the state B^- is either successful in her business and able to repay her loan with probability β^- and then able to get a new larger loan k^+ , or she can't reimburse her loan and she returns to state A with probability $1 - \beta^-$. Similarly the borrower at the state B^+ is either able to repay her loan and she then becomes Included and gets again a loan k^+ but with a better interest rate r' from the regular banking system or she can't reimburse her loan and she returns to state A with probability $1 - \beta^+$. The

two parameters β^- and β^+ can be seen as the probabilities of success of the small business granted by the small k^- and large k^+ microloans. Finally, the borrower in state I is either successful and reimburses her loan then she will stay in state I and get again the same loan with probability γ , or returns at state A with probability $1 - \gamma$, if she can't reimburse her loan. Denote by P the transition matrix of the Markov chain:

$$P = \begin{pmatrix} 1 - \alpha & \alpha & 0 & 0 \\ 1 - \beta^- & 0 & \beta^- & 0 \\ 1 - \beta^+ & 0 & 0 & \beta^+ \\ 1 - \gamma & 0 & 0 & \gamma \end{pmatrix} \quad (1)$$

Oxford comma

To summarize, the dynamic of the population of potential borrowers is given by a Markov chain with four states and with a transition matrix depending on four parameters, α , β^- , β^+ and γ and to describe the income produced by the business thanks to the different loans, we assume an absence of net income when the borrower gets her loan from an MFI and a positive net income b when she is included in the regular banking system.

3 The mathematical structure of Markov Chain with Income

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To better understand the model, it is useful to see it as an example of a general mathematical structure, we introduce as Markov Chain with Income (MCI). The idea is to consider not only the stochastic dynamic of an agent moving from one state at time t to another state at time $t + 1$, with law given by the Markov chain X , but also an income function f (profit or loss) the agent can get moving along this dynamic and a discount factor δ allowing to compute the present value of the income flow that the agent can get in the future.

Definition 3.1. We call Markov Chain with Income (MCI) a *triple* (X, f, δ) where Triplet

1. X is a Markov Chain $(X_t)_{t=0,1,\dots}$ with finite states space $\mathcal{S} = (S_i)_{1,\dots,i_{\max}}$ on a probability space $(\Omega, \mathcal{F}, \mathbb{P})$, with transition $i_{\max} \times i_{\max}$ matrix $P = (p_{ij})_{1 \leq i,j \leq i_{\max}}$, $p_{ij} = \mathbb{P}(X_t = S_j \mid X_{t-1} = S_i)$ and initial distribution π_0 .
2. f is a function $f : \mathcal{S} \times \mathcal{S} \rightarrow \mathbb{R}$, $(S_i, S_j) \mapsto f(S_i, S_j)$ called income function.
3. $\delta \in (0, 1)$ is a discount factor.

Given an MCI (X, f, δ) , we can consider the random variable on Ω which represents the present value of the income-flow the agent can get moving along the dynamic of the Markov chain X

Definition 3.2. Given an MCI (X, f, δ) , we call Income Flow of the MCI the random variable F_X given by

$$F_X = \delta f(X_0, X_1) + \delta^2 f(X_1, X_2) + \dots = \sum_{t>0} \delta^t f(X_{t-1}, X_t). \quad (2)$$

When the initial distributions π_0 of X is simply $\pi_0(S) = 1$ for some state $S \in \mathcal{S}$, we will denote by w^S the expectation of F_X :

Definition 3.3. Let (X, f, δ) be an MCI and assume the initial distribution of the Markov chain X is $\pi_0(S) = 1$ for some $S \in \mathcal{S}$. We call Expected Income Flow (EIF) starting at state S and denote by w^S the following conditional expectation:

$$w^S = \mathbb{E}(F_X \mid X_0 = S)$$

and we denote by $W = {}^t(w^{S_1}, \dots, w^{S_{i_{\max}}})$ the vector of all expected income flows starting at states S_i . Similarly, for any $S \in \mathcal{S}$, define \bar{w}^S by

$$\bar{w}^S = \mathbb{E}(f(X_0, X_1) \mid X_0 = S),$$

and by $\bar{W} = {}^t(\bar{w}^{S_1}, \dots, \bar{w}^{S_{i_{\max}}})$ the vector of all expected incomes for the first time step.

We have the following result:

Lemma 3.1 (Induction formula for the EIF). Assume the initial distribution of X is such that $\pi_0(S_i) = 1$ for some $S_i \in \mathcal{S}$. Then

$$w^{S_i} = \delta \bar{w}^{S_i} + \delta \sum_{1 \leq j \leq i_{\max}} p_{ij} w^{S_j}. \quad (3)$$

Proof. We have

$$\begin{aligned} w^{S_i} &= \mathbb{E} \left(\delta f(X_0, X_1) + \sum_{t>1} \delta^t f(X_{t-1}, X_t) \mid X_0 = S_i \right) \\ &= \delta \bar{w}^{S_i} + \delta \mathbb{E} \left(\sum_{t>1} \delta^{t-1} f(X_{t-1}, X_t) \right) \\ &= \delta \bar{w}^{S_i} + \delta \sum_{1 \leq j \leq i_{\max}} \mathbb{E} \left(\sum_{t>1} \delta^{t-1} f(X_{t-1}, X_t) \mid X_1 = S_j \right) p_{ij} \\ &= \delta \bar{w}^{S_i} + \delta \sum_{1 \leq j \leq i_{\max}} p_{ij} w^{S_j} \end{aligned}$$

the last equality uses the fact that the Markov chain Y^{S_j} defined on $\Omega_j = \{X_1 = S_j\}$ by $Y_t^{S_j} = X_{t+1}$, thus with initial distribution $\mu_0^{Y^{S_j}}(S_j) = 1$, has the same law as (X, π_0) with $\pi_0(S_j) = 1$. \square

Theorem 3.1. Let (X, f, δ) be a Markov Chain with Income. The vector of expected income flows W is given by

$$W = \delta(\mathbb{I} - \delta P)^{-1} \bar{W} = \delta \left(\sum_{t=0}^{\infty} (\delta P)^t \right) \bar{W}, \quad (4)$$

where P is the transition matrix of X and $\bar{W} = {}^t(\bar{w}^{S_1}, \dots, \bar{w}^{S_{i_{\max}}})$ the vector of expected incomes for the first time step.

Proof. By the induction formula (3) for the EIF we have

$$w^{S_i} = \delta \bar{w}^{S_i} + \delta \sum_{1 \leq j \leq i_{\max}} p_{ij} w^{S_j}$$

for each state $S_i \in \mathcal{S}$. Thus using vectors W and \bar{W} , this can be written $W = \delta \bar{W} + \delta P W$, or $(\mathbb{I} - \delta P)W = \delta \bar{W}$. Now, using the norm $\|P\| = \max_i \{\sum_j |p_{ij}|\}$, as $\|\delta P\| = |\delta| \|P\| = \delta \cdot 1 < 1$, we see that the infinite sum $\sum_{t=0}^{\infty} (\delta P)^t$ converges normally to $(\mathbb{I} - \delta P)^{-1}$, thus theorem 3.1 is proved. \square

The following result gives a general formula for the derivatives of the expected income flow's vector W with respect to its parameters that can be useful when studying sensibility of the model to its parameters.

Corollary 3.1. *Let $M = \mathbb{I} - \delta P$. Assume that the transition matrix P and the vector of expected incomes for the first time step \bar{W} are C^1 functions of some parameter $p \neq \delta$. Then we have*

$$\frac{\partial W}{\partial p} = -\delta M^{-1} \frac{\partial M}{\partial p} M^{-1} \bar{W} + \delta M^{-1} \frac{\partial \bar{W}}{\partial p}, \quad (5)$$

$$\frac{\partial W}{\partial \delta} = M^{-1} (\mathbb{I} + \delta P M^{-1}) \bar{W}. \quad (6)$$

Proof. As $MM^{-1} = \mathbb{I}$, we have $\frac{\partial M}{\partial p} M^{-1} + M \frac{\partial M^{-1}}{\partial p} = 0$, so

$$\frac{\partial M^{-1}}{\partial p} = M^{-1} M \frac{\partial M^{-1}}{\partial p} = -M^{-1} \frac{\partial M}{\partial p} M^{-1}.$$

Formula (5) follows then from (4) $W = \delta (\mathbb{I} - \delta P)^{-1} \bar{W}$. Moreover, clearly $\frac{\partial M}{\partial \delta} = \frac{\partial}{\partial \delta} (\mathbb{I} - \delta P) = -P$ as P does not depend on δ , so, again from $\mathbb{I} = MM^{-1}$, we have $0 = \frac{\partial M}{\partial \delta} M^{-1} + M \frac{\partial M^{-1}}{\partial \delta} = -PM^{-1} + M \frac{\partial M^{-1}}{\partial \delta}$ thus $\frac{\partial M^{-1}}{\partial \delta} = M^{-1} P M^{-1}$, and thus (4) implies

$$\frac{\partial W}{\partial \delta} = \left(M^{-1} + \delta \frac{\partial M^{-1}}{\partial \delta} \right) \bar{W} = (M^{-1} + \delta M^{-1} P M^{-1}) \bar{W} = M^{-1} (\mathbb{I} + \delta P M^{-1}) \bar{W}$$

\square

4 Consequences for our model

4.1 Explicit formulas

We come back to our model for which the states space is $\mathcal{S} = \{A, B^-, B^+, I\}$, and P is given by (1). Recall that, for the sake of simplicity, we chose the microloans k such that the value of the production function $Y(k)$ covers the living expenses c of the borrower and the reimbursement $(1+r)k$ of the loan at the large MFI rate r : the small loan k^- is then chosen to optimize the chances β^- of success (or minimize the risk for the MFI), and the large loan k^+ in order to allow the borrower to show her ability to manage a big loan.

Spelling

It's confusing. Either: "the amount of this large loan is the same amount than the one given by the IMF, but at a better interest rate"
 Or "the amount of this large loan is the same amount than the one given by the regular bank, but at a worse interest rate"

Assuming that the amount of this large loan is the same amount than the one given by the regular bank, but at a better interest rate $r' < r$, leads to a benefit $b = k^+(r - r')$ for the borrower (see figure 1) when included. So the income function is

$$f(S', S'') = \begin{cases} k^+(r - r') & \text{if } S' = I = S'' \\ 0 & \text{in all other cases.} \end{cases} \quad (7)$$

Notice that, for any state $S \in \mathcal{S}$, the expected income flow w^S is a function of all parameters $\alpha, \beta^-, \beta^+, \gamma, \delta, k^-, k^+, r, r'$ of the model. Let $M = \mathbb{I} - \delta P$, $\Delta = \det(M)$, and C be the transposed of the co-factors matrix of M so that $M^{-1} = \frac{1}{\Delta}C$. A somewhat lengthy but straight forward computation shows that

Proposition 4.1. For $\delta \in (0, 1)$, the inverse matrix of $M = \mathbb{I} - \delta P$ is given by $M^{-1} = \frac{1}{\Delta}C$, with

$$C = \begin{pmatrix} 1 - \delta\gamma & \delta\alpha(1 - \delta\gamma) & \delta^2\alpha\beta^-(1 - \delta\gamma) & \delta^3\alpha\beta^-\beta^+ \\ C_{2,1} & C_{2,2} & C_{2,3} & C_{2,4} \\ C_{3,1} & C_{3,2} & C_{3,3} & C_{3,4} \\ \delta(1 - \gamma) & \delta^2\alpha(1 - \gamma) & \delta^3\alpha\beta^-(1 - \gamma) & C_{4,4} \end{pmatrix} \quad (8)$$

with

$$\begin{aligned} C_{2,1} &= \delta - \delta(1 - \delta)\beta^- - \delta^2\gamma - \delta^2(1 - \delta)\beta^-\beta^+ + \delta^2(1 - \delta)\beta^-\gamma \\ C_{2,2} &= 1 - \delta + \delta\alpha - \delta(1 - \delta)\gamma - \delta^2\alpha\gamma \\ C_{2,3} &= \delta(1 - \delta)\beta^- + \delta^2\alpha\beta^- - \delta^2(1 - \delta)\beta^-\gamma - \delta^3\alpha\beta^-\gamma \\ C_{2,4} &= \delta^2(1 - \delta)\beta^-\beta^+ + \delta^3\alpha\beta^-\beta^+ \\ C_{3,1} &= \delta - \delta(1 - \delta)\beta^+ - \delta^2\gamma \\ C_{3,2} &= \delta^2\alpha - \delta^2(1 - \delta)\alpha\beta^+ - \delta^3\alpha\gamma \\ C_{3,3} &= 1 - \delta + \delta(1 - \delta)\alpha - \delta(1 - \delta)\gamma + \delta^2\alpha\beta^- - \delta^2(1 - \delta)\alpha\gamma - \delta^3\alpha\beta^-\gamma \\ C_{3,4} &= \delta(1 - \delta)\beta^+ + \delta^2(1 - \delta)\alpha\beta^+ + \delta^3\alpha\beta^-\beta^+ \\ C_{4,4} &= 1 - \delta + \delta(1 - \delta)\alpha + \delta^2(1 - \delta)\alpha\beta^- + \delta^3\alpha\beta^-\beta^+. \end{aligned}$$

and,

$$\begin{aligned} \Delta &= \det(\mathbb{I} - \delta P) = \\ &= (1 - \delta)(1 + \delta\alpha - \delta\gamma + \delta^2\alpha\beta^- - \delta^2\alpha\gamma + \delta^3\alpha\beta^-\beta^+ - \delta^3\alpha\beta^-\gamma) > 0. \end{aligned} \quad (9)$$

So Δ is a degree one polynomial for each parameter α, β^-, β^+ , and γ , and so are all coefficients $C_{i,j}$ of matrix C .

Proof. Straight forward computation shows that $\frac{1}{\Delta}C(\mathbb{I} - \delta P) = \mathbb{I} = \frac{1}{\Delta}(\mathbb{I} - \delta P)C$. The fact that $\Delta > 0$ for $\delta \in (0, 1)$ follows from the fact that Δ is a continuous function of δ , equal to 1 for $\delta = 0$ and can't vanish on $[0, 1)$ as $\Delta = \det(\mathbb{I} - \delta P)$ and $M = \mathbb{I} - \delta P$ is invertible. \square

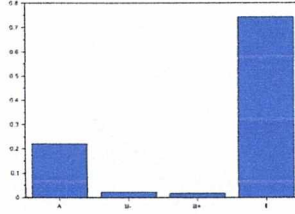


Figure 3: The equilibrium distribution $\pi^\infty = (\pi_A^\infty, \pi_{B^-}^\infty, \pi_{B^+}^\infty, \pi_I^\infty) = \pi^\infty(\alpha, \beta^-, \beta^+, \gamma)$ between the four states, for $(\alpha, \beta^-, \beta^+, \gamma) = (0.1, 0.75, 0.9, 0.98)$

4.2 Proportions of agents types in the population at equilibrium

The dynamic of most of the Markov chains involved in such models have a useful property: whatever the initial distribution of the agents among the different states, the dynamic modifies the distribution in such a way that when time tends to infinity, this distribution tends to a limit distribution. This result is a consequence of the Perron-Frobenius theorem that will give proposition (4.2) bellow. We will then draw some consequences in terms of microcredit activity of the MFI.

Proposition 4.2. Let $(X_t)_{t \geq 0}$ be the above Markov Chain with initial distribution π_0 . Assume that all probability parameters α , β^- , β^+ , and γ are neither equal to 0 nor 1, so that P is irreducible. Let π_t denote its distribution at time t . Then $\lim_{t \rightarrow \infty} \pi_t = \pi^\infty$ where

Confusing notation

$$\pi^\infty = (\pi_A^\infty, \pi_{B^-}^\infty, \pi_{B^+}^\infty, \pi_I^\infty) = \pi^\infty(\alpha, \beta^-, \beta^+, \gamma) = \frac{(1 - \gamma, \alpha(1 - \gamma), \alpha\beta^-(1 - \gamma), \alpha\beta^-\beta^+)}{D(\alpha, \beta^-, \beta^+, \gamma)}, \quad (10)$$

where $D(\alpha, \beta^-, \beta^+, \gamma) = 1 - \gamma + \alpha(1 - \gamma) + \alpha\beta^-(1 - \gamma) + \alpha\beta^-\beta^+$.

Eliminate "there is"

Eliminate "satisfies"

Proof. As P is a stochastic matrix, i.e. positive with line coefficients adding up to 1 and as $P^3 > 0$, the matrix P is primitive and Perron-Frobenius theorem applies. Thus 1 is a left-eigenvalue and there is P has a unique positive corresponding left-eigenvector π^∞ , with coefficients adding up to 1. It is easy to check that the vector π^∞ given by (10) satisfies is this eigenvector. In addition, we have $\lim_{t \rightarrow \infty} \pi_0 P^t = \pi^\infty$ for any initial distribution π^0 and $\lim_{t \rightarrow \infty} P^t = P^\infty$ exists, with all lines of P^∞ equal to π^∞ . \square

Notice that the limiting proportions $(\pi_A^\infty, \pi_{B^-}^\infty, \pi_{B^+}^\infty, \pi_I^\infty)$ of applicants and borrowers in the population given by the previous proposition are only reached when t tends to infinity. But when microcredit activity of an MFI is running on a specific group of people for a while, one can consider these proportions as valid (or about to be valid). This is why it can be interesting for an MFI to take them into account when trying to improve its activity. This is the purpose of the following two results.

Proposition 4.3. The limit proportion π_I^∞ of people getting access to regular credit thanks to microcredit and the proportion $\pi_{B^-}^\infty + \pi_{B^+}^\infty + \pi_I^\infty$ of people who can self-finance their activity thanks to a loan (microcredit or regular credit) are both increasing functions of the success probability parameters α , β^- , β^+ and γ .

Proof. From proposition 4.2 we have

$$\pi_I^\infty = \frac{\alpha\beta^-\beta^+}{(1-\gamma) + (1-\gamma)\alpha + (1-\gamma)\alpha\beta^- + \alpha\beta^-\beta^+}$$

$$\pi_{B^-}^\infty + \pi_{B^+}^\infty + \pi_I^\infty = 1 - \pi_A^\infty = 1 - \frac{(1-\gamma)}{(1-\gamma) + (1-\gamma)\alpha + (1-\gamma)\alpha\beta^- + \alpha\beta^-\beta^+}$$

We then observe that both proportions involve homographic functions $\varphi(x) = \frac{ax+b}{cx+d}$ for x equal to α, β^-, β^+ and $(1-\gamma)$, for some positive or zero a, b, c and d , and with $a = 0$ or $b = 0$. Considering the sign of $\varphi'(x) = (ad - bc)/(cx + d)^2$, it is easy to see that φ is increasing when $b = 0$ and decreasing when $a = 0$. The result follows then easily from that remark considering the eight different functions φ involved. \square

The fact that to favor in the long run inclusion (π_I^∞) or access to self-financed activity ($\pi_{B^-}^\infty + \pi_{B^+}^\infty + \pi_I^\infty$), one has to increase the probabilities of success α, β^-, β^+ and γ , is easy to understand. But we will see in the next section that other issues will create limitations on these parameters. Now, let us consider another consequence of proposition 4.2. We will use the fact that the long run proportion is $\frac{\pi_{B^+}^\infty}{\pi_{B^-}^\infty}$ which gives an estimation of the long run proportion of small and large loans in the portfolio of the MFI is equal to β^- . As the risk that the MFI faces on small and large loans are not the same, this allows to compute a minimal interest rate it has to charge.

The MFI faces different risks with their small loans k^- with success rate β^- and their large loans k^+ with success rate β^+ . This leads to a minimal average interest rate r_0 it needs to charge to its borrowers to **brake even**. Of course the actual interest rate r the MFI will charge has certainly to be much larger than r_0 as **this** interest rate takes also in charge the MFI's costs for educating and monitoring its customers.

Spelling: "brake even"

It is somewhat confusing what "this" refers to

Proposition 4.4. *If the MFI borrows itself at rate ρ , the minimal interest rate r_0 it has to charge to brake even is r_0 such as*

$$(1 + r_0) = (1 + \rho) \frac{1 + \beta^- \frac{k^+}{k^-}}{\beta^- (1 + \beta^+ \frac{k^+}{k^-})} = (1 + \rho) \frac{\frac{1}{\beta^-} + \frac{k^+}{k^-}}{1 + \beta^+ \frac{k^+}{k^-}}. \quad (11)$$

Proof. According to (10), we have $\frac{\pi_{B^+}^\infty}{\pi_{B^-}^\infty} = \beta^-$. So, for each small loan of amount k^- the MFI gives β^- large loans of amount k^+ , so a total capital $k = k^- + \beta^- k^+$, that gives an expected reimbursement $\beta^- k^- (1 + r) + \beta^+ \beta^- k^+ (1 + r)$, thus an **average reimbursement rate**

What is "average reimbursement rate" formally?

$$\beta^0(r) = \frac{\beta^- k^- (1 + r) + \beta^- \beta^+ k^+ (1 + r)}{k^- + \beta^- k^+} = \beta^- (1 + r) \frac{k^- + \beta^+ k^+}{k^- + \beta^- k^+}.$$

So, to break even, as the MFI borrows k at interest rate ρ , it has to charge a minimum interest rate r_0 such that $k(1 + \rho) = k\beta^0(r_0)$. Thus $1 + \rho = \beta^- (1 + r_0) \frac{k^- + \beta^+ k^+}{k^- + \beta^- k^+}$, which leads to (11). \square

The fact that the minimal rate r_0 is decreasing in the parameters β^- and β^+ is easy to understand. Too small values of β^- and β^+ (probabilities of success of small and large microloans) may lead to very large values of r_0 . For example, in the case of $\frac{k^+}{k^-} = 4$, $\beta^- = 0.75$ and $\beta^+ = 0.9$, formula (11) leads to an $r_0 = 0.20579..$

4.3 Absence of strategic default

Default, in the context of loan, corresponds to the fact that the borrower does not pay back $k(1+r)$ that was agreed upon for a loan of k granted at rate r . Usually this happens when the borrower faced unexpected difficulties; anyway, the contract between lender and borrower decides what would happen in this case, such as the lender becomes the owner of what was given by the borrower as collateral. The default is called strategic when the borrower could actually pay but prefers to face the consequences that were also agreed upon, as it turns out to be preferable for the rational borrower to default than to reimburse. The context of microfinance involving "poor"=borrower without collateral and "rich"=lender makes the question of strategic default quite embarrassing, as often the contract between both parties is not just based on rationality but also on moral. **Some authors** interpret default rules as a "punishment" for not paying. Considering the expected income flow in this question as counterpart allows to return into a rational approach. For us *Absence of Strategic Default* (ASD) is a requirement for a model for microfinance. In the context of the model introduced here ASD means that a successful borrower reaching some state S^+ from a state S^- should be better off with w^{S^+} than with keeping for her $k(1+r)$ she should have payed back and just have w^A as expected income flow. From a quantitative point of view, ASD can be summarized by the following result:

Citation needed

Or k^- ?

Do you mean β^+ and β^- ?

Proposition 4.5. *ASD holds for a set $\alpha, \beta^-, \beta^+, \gamma, \delta, k^-, k^+, r, r'$ of parameters if and only if following inequalities hold:*

$$w^{B^+} \geq (1+r)k^- + w^A \quad (12)$$

$$w^I \geq (1+r)k^+ + w^A \quad (13)$$

Proof. The two conditions here are just the explicit constraint of ASD for a successful borrower reaching B^+ from B^- and reaching I from B^+ . There is no possible strategic default for a successful borrower reaching B^- from A as she did not get yet a loan and thus has nothing to reimburse. Finally, for a successful borrower reaching I from I , ASD requires $w^I \geq (1+r')k^+ + w^A$, which results from (13), as $r' < r$. \square

"In" instead of "at"

At proposition 4.3 we have seen that, to favor inclusion (i.e. to increase π_I^∞) or to favor access to self-financed activity (i.e. to increase $\pi_{B^-}^\infty + \pi_{B^+}^\infty + \pi_I^\infty$) it suffice to increase, as much as possible, any of the probability of success α, β^-, β^+ , or γ , upper limitation having to emerge from elsewhere. The next proposition deals with the question whether ASD creates upper, or lower limitations in some or in all these parameters. To that purpose, let us define the two following functions ASD^- and ASD^+ :

"Suffices"

$$ASD^-(\alpha, \beta^-, \beta^+, \gamma) = w^{B^+} - w^A - (1+r)k^- \quad (14)$$

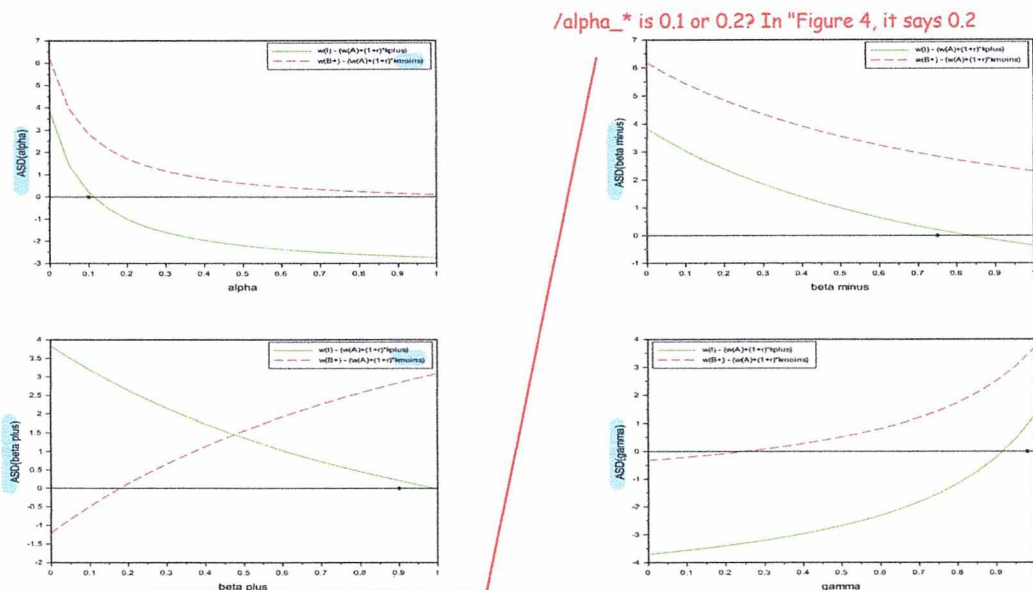
$$ASD^+(\alpha, \beta^-, \beta^+, \gamma) = w^I - w^A - (1+r)k^+, \quad (15)$$

Actually is enough with "non negative"

Inconsistent spelling of "microloan"

the first, ASD^- , having to stay positive to avoid strategic default on a small micro-loan k^- , the second, ASD^+ , having to stay positive to avoid strategic default on a large micro-loan k^+ . The following proposition observes that these two functions are monotonic with respect to each of the variables α , β^- , β^+ , or γ . So, provided other parameters $(\delta, k^-, k^+, r, r')$ are such that it exists at least one $p_* = (\alpha_*, \beta_*^-, \beta_*^+, \gamma_*)$ such that both $ASD^-(p_*)$ and $ASD^+(p_*)$ are positive. The question of whether there is an upper or lower limitation depends on whether these functions are decreasing or increasing. In figure 4 and 5 we used $\delta = 0.95$, $k^- = 1$ (the choice of numéraire), $k^+ = 5$, $r = 0.20$, $r' = 0.04$ and found a $p_* = (\alpha_*, \beta_*^-, \beta_*^+, \gamma_*) = (0.1, 0.75, 0.9, 0.98)$.

Need to improve writing style. It is not clear what you are trying to say



Says: "moins"

Figure 4: Check of Absence of Strategic Default: here we chose $p_* = (\alpha_*, \beta_*^-, \beta_*^+, \gamma_*) = (0.2, 0.75, 0.9, 0.98)$ for which ASD is granted, and we have plotted the partial functions with value $w^{B^+} - (1+r)k^- - w^A$ (dashed line, ASD for a small micro-loan k^-) and $w^I - (1+r)k^+ - w^A$ (solid line, ASD for a large micro-loan k^+) who have to stay positive, when changing one of the coordinate. We see that to guarantee ASD one can lower α and β^- , increase γ , but β^+ has to stay between a lower and an upper limit.

"Coordinates"

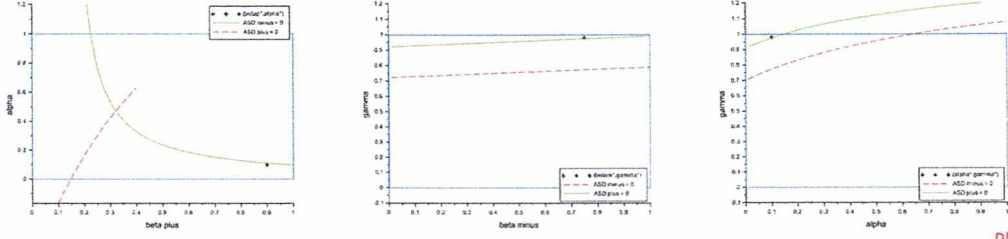
Inconsistent spelling of microloan

Not "who" should be "which"

Proposition 4.6. Function ASD^- and ASD^+ are well defined on $[0, 1]^4$ and all their partial functions are monotonic on $[0, 1]$. Both functions are decreasing for α and β^- , so Absence of Strategic Default (ASD) may lead to an upper limitation on these variables. They are both increasing functions of γ , so ASD may lead to a lower limitation on γ . With β^+ , function ASD^- is increasing and ASD^+ is decreasing, so ASD may require β^+ to stay in an interval.

Proof. By theorem 3.1 and proposition 4.1 we have "And using equation (7)"

$$W = \frac{\delta}{\Delta} C^t(0, 0, 0, E(f(X_0, X_1) | X_0 = I)) = \frac{\delta(r - r')k^+\gamma}{\Delta} C e_4, \text{ where } e_4 = {}^t(0, 0, 0, 1),$$



Plans or planes?

Figure 5: Border of the intersection of the ASD-domain of $[0,1]^4$ with the three *plans* with equation $(\beta^-, \gamma) = (\beta_*^-, \gamma_*)$, $(\beta^+, \alpha) = (\beta_*^+, \alpha_*)$, and $(\alpha, \gamma) = (\alpha_*, \gamma_*)$, the star-marked point being in the domain. Dashed line expresses ASD for a small *micro-loan* k^- and solid line expresses ASD for a large *micro-loan* k^+ .

Inconsistent spelling of
microloan

so we have the following explicit values of functions ASD^- and ASD^+ :

$$ASD^-(\alpha, \beta^-, \beta^+, \gamma) = \delta(r - r')k^+ \frac{\gamma(C_{3,4} - C_{1,4})}{\Delta} - (1 + r)k^-, \text{ and}$$

$$ASD^+(\alpha, \beta^-, \beta^+, \gamma) = \delta(r - r')k^+ \frac{\gamma(C_{4,4} - C_{1,4})}{\Delta} - (1 + r)k^+.$$

As matrix P is stochastic and $0 \leq \delta < 1$, $\Delta = \det(\mathbb{I} - \delta P) > 0$ for any $(\alpha, \beta^-, \beta^+, \gamma) \in [0,1]^4$, and by explicit formulas (8) and (9) we see that both ASD^- and ASD^+ are homographic functions of each variable α , β^- , β^+ , and γ , with pole only at $\Delta = 0$, so outside $[0,1]^4$. Thus all these partial functions are monotonic decreasing or increasing, depending on whether the difference of their values at 1 and at 0 is negative or positive. Thus we have just to check the sign of $ASD^\pm(\alpha = 1) - ASD^\pm(\alpha = 0)$, and similar for β^- , β^+ , and γ .

Here for α and ASD^- . Let $N^- = \gamma(C_{3,4} - C_{1,4}) = \delta(1 - \delta)\beta^+\gamma(1 + \delta\alpha)$. We have

$$ASD^-(\alpha = 1) - ASD^-(\alpha = 0) = \delta(r - r')k^+ \left[\frac{N^-(\alpha = 1)}{\Delta(\alpha = 1)} - \frac{N^-(\alpha = 0)}{\Delta(\alpha = 0)} \right]$$

$$= \delta(r - r')k^+ [N^-(\alpha = 1)\Delta(\alpha = 0) - N^-(\alpha = 0)\Delta(\alpha = 1)] / \Delta(\alpha = 0)\Delta(\alpha = 1).$$

As already mentioned, $\Delta > 0$, so the denominator $\Delta(\alpha = 0)\Delta(\alpha = 1)$ is positive and so is $\delta(r - r')k^+$, so the sign of $ASD^-(\alpha = 1) - ASD^-(\alpha = 0)$ is just the sign of $N^-(\alpha = 1)\Delta(\alpha = 0) - N^-(\alpha = 0)\Delta(\alpha = 1)$. Elementary computation shows that this difference is $-\delta^3(1 - \delta)^2\beta^-\beta^+\gamma(1 + \beta^+ - \delta\gamma)$, so it is negative and thus ASD^- is a decreasing function of α .

Similarly, with $N^+ = \gamma(C_{4,4} - C_{1,4}) = \gamma(1 - \delta + (1 - \delta)\alpha + \delta^2(1 - \delta)\alpha\beta^-)$ and now the sign of $ASD^+(\alpha = 1) - ASD^+(\alpha = 0)$ is just the sign of $[N^+(\alpha = 1)\Delta(\alpha = 0) - N^+(\alpha = 0)\Delta(\alpha = 1)]$. Elementary computation shows that this difference is $-\delta^3(1 - \delta)\beta^-\beta^+\gamma$, so it is negative and thus ASD^+ is a decreasing function of α too.

By reasoning in the same way for the three others parameters β^- , β^+ , and γ , we understand that the other statements in the proposition follow from similar elementary

computations, namely

$$\begin{aligned}
 & N^-(\beta^- = 1)\Delta(\beta^- = 0) - N^-(\beta^- = 0)\Delta(\beta^- = 1) \\
 & \quad = -\delta^3(1 - \delta)\alpha(1 + \delta\alpha)\beta^+\gamma(1 + \delta(\beta^+ - \gamma)) < 0 \\
 & N^+(\beta^- = 1)\Delta(\beta^- = 0) - N^+(\beta^- = 0)\Delta(\beta^- = 1) \\
 & \quad = -\delta^2(1 - \delta)\alpha\gamma[\alpha(1 - \delta)(1 - \delta\gamma) + \delta\beta^+(1 - \alpha)] < 0 \\
 & N^-(\gamma = 1)\Delta(\gamma = 0) - N^-(\gamma = 0)\Delta(\gamma = 1) \\
 & \quad = +\delta(1 - \delta)(1 + \delta\alpha)\beta^+\Delta(\gamma = 0) > 0 \\
 & N^+(\gamma = 1)\Delta(\gamma = 0) - N^+(\gamma = 0)\Delta(\gamma = 1) \\
 & \quad = +(1 - \delta)(1 + \alpha + \delta^2\alpha\beta^-)\Delta(\gamma = 0) > 0 \\
 & N^-(\beta^+ = 1)\Delta(\beta^+ = 0) - N^-(\beta^+ = 0)\Delta(\beta^+ = 1) \\
 & \quad = \delta(1 - \delta)(1 + \delta\alpha)\Delta(\beta^+ = 0) > 0 \\
 & N^+(\beta^+ = 1)\Delta(\beta^+ = 0) - N^+(\beta^+ = 0)\Delta(\beta^+ = 1) \\
 & \quad = -\delta^3(1 - \delta)\alpha\beta^-\gamma(1 + \alpha + \delta^2\alpha\beta^-) < 0
 \end{aligned}$$

Question: interpretation of why α , β^- and γ are only bounded in one direction? □

The fact that ASD is an antagonist constraint to the wish of the MFI to favor inclusion or self microfinancing is in line with regular-banking “**common sense**”: a too large chance to get a microloan (parameter α), a too large chance to succeed in a micro loan (parameters β) or in a regular loan (parameter γ) brings a too large incentive to default when there is no counterpart. The previous result just provide a **quantitative upper limit** for these parameters as a function of the different parameters of the model.

Spelling: "common sense"

γ one has a lower limit by previous Proposition

Note: Some were lower limits or within an interval

More interesting is to understand how a lower-limit can occur. Let us consider first the case when ASD^- creates a lower limit for β^+ : so we have to understand why a rational beneficiary of a small loan may prefer to keep for her the $(1 + r)k^-$ (and w^A) than becoming B^+ and its w^{B^+} , i.e. getting a large micro-loan k^+ . The fact that there is here a lower limit for β^+ just shows that this rational borrower needs to have enough chances to succeed in this new large-loan enterprise. If not, she is better-off with keeping the $(1 + r)k^-$ she would be able to pay and apply again for a future possible small-loan: a rational micro-entrepreneur needs to have enough chances to succeed in her business to get a chance, after one more successful step, to be Included in the regular banking system **thanks microcredit**. The same happens (with even a higher lower-limit) for a rational borrower-with-no-counterpart of k^+ : if she has too little chances γ to succeed when getting a large regular-banking loan, even when having succeeded (“by chance”, possibly), then, if she is just rational, she should keep the $(1 + r)k^+$ for her (and w^A) when she is entitled to become Included rather than to pay back her loan. This phenomenon may be a reason why microcredit **has not more success to lead** to the regular banking system. **This should encourage MFI to even more concentrate on improving the chances of success of their beneficiaries of a large loan k^+ , here (β^+) and also later in their enterprise when Included (γ).**

"Has not had more success..."

Style: "Getting its"

"Thanks to"

I get and like the idea, but the writing style needs work

5 Discussion and Conclusion

In this paper we have modeled the successive loans that a micro-entrepreneur, who initially has no access to a regular banking system, can get thanks to the action of an MFI. For this we have considered an elementary four-states Markov chain which reduces the real situations to four possible states: potential applicant (A), beneficiary of a micro loan, first small (B^-) and then larger (B^+), and finally a **regular-banking** loan when included (I) in this banking system, with a risk at any time to drop back in the applicant state when not reimbursing a loan, because of an economic accident or just strategic default, if preferable for her. The simplicity of the model allows to compute explicitly the equilibrium distribution and then check that the better the chances to reach the next step the better for increasing the fraction of micro-entrepreneurs who get finally access to regular banking or at least can self-finance their job. Usually one considers that the main drawback for potential micro-entrepreneur to get a loan is that they can't offer any counterpart and the risk of strategic default this would create for the lender. Generalizing an idea of G. Tedeschi [7] we consider the expected income flow EIF as the counterpart that the borrower would lose in case of default. We propose a general concept of Markov Chain with Income (MCI) and give a general theorem for computing this expectation as a function of the present state, that can be applied to much more general situations or finer models. It allows to compute the EIF explicitly and understand that strategic default does not only emerge from too easy access to a micro-loan, but also from too little chances to succeed in her micro enterprise, so requiring education efforts towards borrowers from a rational MFI. Clearly the model we offer can be extended in the MCI framework to become more realistic. The general results given here allow to check the influence of any change in the model, especially on the effect favoring access to regular banking thanks to microcredit. Of course this modelling research would largely benefit from a Randomized Controlled Trials approach [3][4] to make the model and its various parameters not only realistic but also useful.

"Collateral"

Style

Missing a comma: "...next step, the better for..."

Improve style

It is not clear which expectation you are referring to

Improve style

References

- [1] N. Dhib. Les effets du microcrédit sur le développement économique en Tunisie: d'une étude statistique vers une modélisation mathématique. In *Thèse d'économie, Université de Sfax, Tunisie*, 2017.
- [2] F. Diener, M. Diener, O. Khodr, and P. Protter. Mathematical models for microlending. In *Proceedings of the 16th Mathematical Conference of the Bangladesh Mathematical Society*, 2009.
- [3] E. Duflo. Expérience, science et lutte contre la pauvreté. In *Savoirs contre pauvreté*, <https://www.college-de-france.fr/site/esther-duflo/inaugural-lecture-2009-01-08-18h00.htm>. Collège de France, 2008.
- [4] E. Duflo. *Lutter contre la pauvreté. (I) Le développement humain, (II) La politique de l'autonomie*. La République des Idées. Seuil, 2010.

- [5] O. Khodr. Modèles dynamiques des innovations du microcrédit. In *Thèse de Doctorat, EDSFA, Laboratoire J-A Dieudonné, UNS, Parc Valrose, 06108 Nice, France, 2011*, pp. 1–61.
- [6] S. Morvant-Roux, I. Guérin, M. Roesch, and J.-M. Servet. Politiques d'inclusion financière, microfinance et financement de l'agriculture: les cas de l'Inde et du Mexique. *Mondes en Développement*, 38.3(151), pp. 9–24, 2010. <https://www.cairn.info/revue-mondes-en-developpement-2010-3-page-9.htm>.
- [7] G. A. Tedeschi. Here today, gone tomorrow : can dynamic incentives make microfinance more flexible ? *Journal of Development Economics*, 80, 2006, pp. 84–105.
- [8] M. Yunus avec Alan Jolis. *Vers un monde sans pauvreté*. JC Lattès, 1997.
- [9] M. Yunus with Alan Jolis. *Banker to the Poor : micro-lending and the battle against world poverty*. Public Affairs, 1999.

Review of “May microcredit lead to inclusion?”

General comments

This paper deals with a microfinance model, and in particular it studies the transition dynamics of the borrowers among 4 different states so as to conclude if microcredit leads to inclusion in the regular banking system. The framework is Markov chains, more specifically what the authors call “Markov Chain with Income”, which, as suggested by the name, is a combination of a Markov chain with the expected income flow. The 4 states of the Markov chain used in the paper are influenced by the approach of G.A. Tedeschi ([7] in their references). The model allows for explicit computations of the equilibrium distribution, which shows that if one wants to favor inclusion in the financial system, one needs to increase the probability of reaching the next step of the Markov Chain. Conversely, to get an upper limit for these probabilities, the authors define “Absence of Strategic Default (ASD)” requirements, which have a natural –and nice– interpretation within the microfinance framework.

Because of the writing style it is sometimes hard to understand what the authors are trying to say, particularly in the introduction, in the interpretation of the results, and in the conclusion. In the attached file, I marked most of the parts that I found confusing or with spelling mistakes. I think the paper might benefit greatly from the proofreading of a native English speaker.

This is a fairly well written paper, it is an enjoyable read and it appears to be mathematically correct, and since it is an innovative idea, **I recommend acceptance for publication** after the authors correct the minor writing observations I outlined in the report.

Detailed comments

Most of the typos I found are highlighted in the accompanying pdf, but some worth noticing are,

- The notation in proposition 4.2 is a little bit confusing. There is no need of writing $\pi^\infty(\alpha, \beta^-, \beta^+, \gamma)$
- In section 4.3 (line 11), a citation is needed
- Vertical axis of Figure 4.3 says ”moins”

Editor report on "May microcredit lead to inclusion?"

I agree with the referee that the paper is mathematically correct, provides novel insight, and is of interest to the journal readership. Moreover the topic extends a bit outside the typical range of the journal, but ties in well with financial math theory. Notably, the main results provide insight into how microfinance can be justified within the framework of rational decision making.

The referee also identified the written english as the major deficiency, and provided very helpful guidance to correct this. I also deem this to be a serious issue that the authors need to address.

The recommendation is that the paper needs major revision. Therefore, please address the following issues:

1. The most important insight seems to be the ASD (Absence of Strategic Default) concept which places the model within the context of rational behaviour from the entrepreneurs. The paper would be incomplete without this condition, in particular the whole point of the Expected Income Flow is to define this condition. However, this core explanation of the ASD concept is not described adequately in the introduction. Please correct this deficiency.
2. Since the topic (microfinance) and model description will not be very familiar to the typical reader, and the writing style is unclear at many points, the authors should undertake a major revision of the english style, grammar and spelling, presumably with the help of a native english speaker.
3. Please address all other concerns of the referee.

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Manuscript revision 5 Yahoo/Email M...



djaffar lessy <djefles7

Rab, 7 Okt 2020 jam 13.01

Kepada: sifin@siam.org

Dear Mr. Editor-in-Chief,

we thank the anonymous referee's for his work on our submitted paper "May microcredit lead to inclusion?". We fully agree with the remarks and suggestions made and have accordingly modified our paper. Hereby attached our modified version, so as 1_reviewer_attachment_2_modif.pdf in which we give the major changes we made; we of course corrected the "typos" pointed out by the referee. The paper also benefited of the proofreading of a native English (actually US) speaker, as suggested by the referee.

We thank you and SiFin for you interest in our paper and hope it will be accepted for publication in this journal.

With best regards,

Djaffar Lessy

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1_reviewer_... .pdf 750kB



ArticleInclu... .pdf 448kB



SiFin.zip 1.3MB



Brian Fauth Djaffar, please use th

Rab, 7 Okt 2020 jam 13.28



djaffar lessy Dear Brian, I have dc

Rab, 7 Okt 2020 jam 13.34

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Brian Fauth <fauth@siam.or> Rab, 7 Okt 2020 jam 13.28
Kepada: djaffar lessy

Djaffar, please use the link below to upload your revision, as per the instructions provided with the materials sent to you previously with the decision email October 1:

<https://sifin.siam.org/cgi-bin/main.plex?el=A3Q2mEk5A5yjk6l6A9ftdFq8aElwFNbgzAnMvqJ6brgZ>

Thank you.

Best,

Brian Fauth
Editorial Associate
SIFIN

Tampilkan pesan asli



Brian Fauth

fauth@siam.org
+ Tambah ke kontak

DL djaffar lessy Dear Brian, I have dc Rab, 7 Okt 2020 jam 13.34

B Brian Fauth Djaffar, I do not find Rab, 7 Okt 2020 jam 20.57

DL djaffar lessy <djefles79@yz> Kepada: Brian Fauth Kam, 8 Okt 2020 jam 02.14

Dear Brian,

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DL **djaffar lessy** <djefles79@yal> 📄 Rab, 7 Okt 2020 jam 13.34 ☆
Kepada: Brian Fauth

Dear Brian,

I have done it but it looks like it hasn't worked. I found posts like this.

There are action items pending. Please click on the links next to the arrows

Thank you.

Best regards,
 Djaffar

> Tampilkan pesan asli

↩️ ⏪ ⏩ ...

B **Brian Fauth** Djaffar, I do not find Rab, 7 Okt 2020 jam 20.57 ☆

DL **djaffar lessy** <djefles79@ya> 📄 Kam, 8 Okt 2020 jam 02.14 ☆
Kepada: Brian Fauth

Dear Brian,

I have successfully submitted the manuscript revision.

Thank you for your infromation.

Best Regarrds,

Djaffar

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Brian Fauth <fauth@siam.o> Rab, 7 Okt 2020 jam 20.57

Kepada: djaffar lessy

Djaffar, I do not find any files uploaded for your revised manuscript at all. You will not be able to move through this process until you work through each step carefully and follow the instructions. The notification you copied has no bearing on this process.

If you are on your SIFIN homepage, under Author Tasks you will find a link to M134281R. Open it, scroll down to the bottom, and you will find the Continued Halted Submission link. You may resume the process of uploading your revision there, beginning with Upload Files.

Let me know of further questions – thanks.

Best,

– Brian

> Tampilkan pesan asli



Brian Fauth

fauth@siam.org + Tambah ke kontak



djaffar lessy <djefles79@yz> Kam, 8 Okt 2020 jam 02.14

Kepada: Brian Fauth

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Best,

— Brian

> Tampilkan pesan asli



Brian Fauth

fauth@siam.org
+ Tambah ke kontak



djaffar lessy <djefles79@ya...> Kam, 8 Okt 2020 jam 02.14 ☆
Kepada: Brian Fauth

Dear Brian,

I have successfully submitted the manuscript revision.

Thank you for your infromation.

Best Regards,

Djaffar

> Tampilkan pesan asli



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SIFIN manuscript #M134281R receipt of revised manuscript follow-up Yahoo/Email M...



sifin@siam.org
sifin@siam.org
+ Tambah ke kontak

sifin@siam.org Kepada: djefles79@yahoo.com
Kam, 8 Okt 2020 jam 02.55

Dear Djaffar Lessy,

This is the follow-up referred to in the message regarding receipt of your revision. Use the link below to check on the paper's status as review continues.

https://sifin.siam.org/cgi-bin/main_plex?el=A5Q7mEk5B6yjk1F2A9ftd7lvF1yr7pTtH0ge6mE4WgZ

[NOTE: The embedded link above is specific to you as the recipient, and logs you into your account. Do not forward an email with an embedded link to others.]

Regards,

Brian Fauth
Editorial Associate
fauth@siam.org
215-382-9800, ext. 358
215-386-7999 (fax)



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sifin@siam.org

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sifin@siam.org



Kam, 8 Okt 2020 jam 02.55

Kepada: djefles79@yahoo.com

Dear Djaffar Lessy,

We have received your revised manuscript, "May microcredit lead to inclusion?."

It is now in the hands of the Editor-in-Chief, who will be in touch as soon as this revision has been evaluated.

A second email will follow, which will include a link that you can use for direct system access. Do not forward the follow-up email to anyone else as the link is for your use exclusively, and allows access to your account.

Once in the system you can check the status of your paper by selecting the "Check Manuscript Status" link. Contact sifin@siam.org with questions.

Regards,

Brian Fauth Editorial Associate fauth@siam.org 215-382-9800, ext. 358 215-386-7999 (fax)

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M134281R (May microcredit lead to inclusion?) 2 Yahoo/Email M...

sifin@siam.org Kepada: djefles79@yahoo.com Rab, 28 Okt 2020 jam 01.30

Dear authors,

You may have omitted to upload a response letter to the referees and the Associate Editor. Can you send it so we can add it to the file and proceed with the review process.

Many thanks

Jean-Pierre Fouque EIC for SIFIN

DL djaffar lessy <djefle: jpfouque54@gmail.c, sifin@siam.org Rab, 28 Okt 2020 jam 02.07

Dear Mr. Jean-Pierre Fouque,

I'm sorry for my mistake. I attach the letter.

Thank you very much.

Best Regards,

Djaffar Lessy



sifin@siam.org

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sifin@siam.org



Rab, 28 Okt 2020 jam 02.38

Kepada: djefles79@yahoo.co.id
Cc: jpfouque54@gmail.c

Djaffar, thank you for getting back to us so quickly. I have uploaded the file you provided to accompany your revised manuscript, advising Jean-Pierre and the Associate Editor of its availability.

If ever I may be of further assistance, please feel free to contact me.

My best to you,

Brian Fauth
Editorial Associate
SIFIN

From: djaffar lessy [mailto:djefles79@yahoo.com]
Sent: Tuesday, October 27, 2020 1:08 PM
To: jpfouque54@gmail.com; SIFIN <sifin@siam.org>
Subject: Re: M134281R (May microcredit lead to inclusion?)

Dear Mr. Jean-Pierre Fouque,

I'm sorry for my mistake. I attach the letter.

Thank you very much.

Best Regards,

Djaffar Lessy



sifin@siam.org

sifin@siam.org

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SIFIN M134281R, follow-up to request for revision

Yahoo/Email M...



sifin@siam.org
Kepada:
djefles79@yahoo.com

Rab, 25 Nov 2020 jam 03.25

Dear Djaffar Lessy,

This is the follow-up message referred to in the decision letter regarding May microcredit lead to inclusion?. When you are ready to submit your revision use the link below.

[https://sifin.siam.org/cgi-bin/main.plex?el=A5Q6mEk4B7yjk5\[3A9ftdFq8aElwFNbgzAnMvgJ6brgZ](https://sifin.siam.org/cgi-bin/main.plex?el=A5Q6mEk4B7yjk5[3A9ftdFq8aElwFNbgzAnMvgJ6brgZ)
[NOTE: The embedded link above is specific to you as the recipient, and logs you into your account. Do not forward an email with an embedded link to others. If you want to share the content first DELETE THE LINK.]

Please include a response to the referee with detailed information on the actions taken in view of the report.

Regards,

Brian Fauth
Editorial Associate
fauth@siam.org
215-382-9800, ext. 358
215-386-7999 (fax)



Balas, Balas ke Semua atau Teruskan



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SIFIN manuscript
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sifin@siam.org
 Kepada:
 djefles79@yahoo.com

Jum, 27 Nov 2020 jam 23.09 ☆

Dear Djaffar Lessy,

This is the follow-up referred to in the message regarding receipt of your revision. Use the link below to check on the paper's status as review continues.

<https://sifin.siam.org/cgi-bin/main.plex?el=A3Q6mEk4C6yjk4F5A9fd7lvF1yr7pTiH0qe6mE4WgZ>

[NOTE: The embedded link above is specific to you as the recipient, and logs you into your account. Do not forward an email with an embedded link to others.]

Regards,

Brian Fauth
 Editorial Associate
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sifin@siam.org
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Jum, 27 Nov 2020 jam 23.09 ☆

Dear Djaffar Lessy,

We have received your revised manuscript, "May microcredit lead to inclusion?."

It is now in the hands of the Editor-in-Chief, who will be in touch as soon as this revision has been evaluated.

A second email will follow, which will include a link that you can use for direct system access. Do not forward the follow-up email to anyone else as the link is for your use exclusively, and allows access to your account.

Once in the system you can check the status of your paper by selecting the "Check Manuscript Status" link. Contact sifin@siam.org with questions.

Regards,

Brian Fauth
 Editorial Associate
 fauth@siam.org
 215-382-9800, ext. 358
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SIAM J. Financial Mathematics manuscript #M134281R 13

Yahoo/Email M...

sifin@siam.org Kepada: djefles79@yahoo.com Rab, 25 Nov 2020 jam 03.25



sifin@siam.org

+ Tambah ke kontak

Dear Djaffar Lessy,

From the Associate Editor:

I hesitated because the authors did not adequately explain the revisions they made. I actually see no change to the paper, other than some isolated English corrections.

Most specifically, they did not address my main comment:

The most important insight seems to be the ASD (Absence of Strategic Default) concept which places the model within the context of rational behaviour from the entrepreneurs. The paper would be incomplete without this condition, in particular the whole point of the Expected Income Flow is to define this condition. However, this core explanation of the ASD concept is not described adequately in the introduction. Please correct this deficiency.

Please forward this comment to the author and ask them to address it thoroughly by modifying the introduction. Only then can I send it back to the original referee.

This needs to be addressed before we can proceed with the next round of review.

Please submit your revised manuscript within the next month, by December 24, 2020. If you do not plan to submit a revision, or if you cannot do so in the time allotted, let myself and the SIAM office (sifin@siam.org) know as soon as possible.

Note: A second email will follow, which will include a link that you, as the corresponding author, can use when you're ready to submit the revised version. Do not forward the following email to anyone else as

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SIAM J. Financial Mathematics manuscript #M134281RR 4

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sifin@siam.org

sifin@siam.org
+ Tambah ke kontak

sifin@siam.org Sab, 15 Mei 2021 jam 03:10 ☆

Kepada: djefles79@yahoo.com
Cc: diener@unice.fr

Dear Djaffar Lessy:

I am pleased to accept "May microcredit lead to inclusion?" for publication in SIAM Journal on Financial Mathematics.

No additional revision is needed. SIAM will send a separate request for your TeX file and you will also receive information about the publication process.

In the absence of information from you to the contrary, you confirm that all authors listed on the manuscript concur with publication in its final accepted form and that neither this manuscript nor any of its essential components have been published previously or submitted to another journal.

Thanks again for submitting your contribution to the journal and for your support.

Best regards,

H. Mete Soner
Editor-in-Chief
SIAM Journal on Financial Mathematics
soner@princeton.edu

Referee #1 (Remarks to the author):

Thanks for taking into account my comments. It is a really nice paper.

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Request for TeX files for SIFIN M134281

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sifin@siam.org Kepada: Djaffar Lessy

Sab, 15 Mei 2021 jam 17.20

Dear Djaffar Lessy,

Congratulations on the acceptance of "May microcredit lead to inclusion?" for publication in SIFIN. Before your paper can be published, we will need the following:

Send SIAM the TeX file for the accepted version of your paper, any style files necessary, and figure files, if any. We will also need a PDF file generated from your TeX.

Sending your files via a file compression format is preferred. SIAM accepts TAR, TGZ, RAR, or ZIP.

Click here to upload your files.

Further information on preparing your TeX, PDF and figure files, and on the journal, is available:

Preparing your TeX file

Publication Information

Journal flier

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Manuscript #	M134281
Current Revision #	0
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Submission Date	2020-06-03 11:16
Revision Due Date	2020-12-30
Current Stage	Revision Received
Title	May microcredit lead to inclusion?
Running Title	May microcredit lead to inclusion?
Manuscript Type	Research Article
Special Section	N/A
Corresponding Author	Djaffar Lessy (IAIN AMBON)
Contributing Authors	Nahla Dhib , Francine Diener , Marc Diener
Abstract	We consider a Markov-Chain model for a Microfinance Institution (MFI) borrower who can be in one of four states: Applicant (A), Beneficiary (B- or B+) of a small or alarge loan, or included (I) in the regular banking system. Given the transition matrix we compute the equilibrium and deduce the influence of probability parameters on what is profitable to the borrower within breaking-even constraints of the MFI. We give a general theorem on the expected income flow of a Markov Chain with Income (MCI), that we then apply to our model to determine the constrains emerging from Absence of Strategic Default (ASD) requirements. These do not only bound the probabilities of success from above but sometimes also from below.
Associate Editor	Assigned
Keywords	Micro-credit, Markov Chain with Income, financial inclusion, Absence of Strategic Default
Issue	2021-09-30
Prior Publication and Simultaneous Submissions	<p>With the exception of those works indicated clearly in both a cover letter and a footnote on the first page of the paper, the authors certify that the general content of the manuscript, in whole or in part, is not submitted, accepted, or published elsewhere, including conference proceedings. Authors should upload any such indicated overlapping works as supporting materials to the submission.</p> <p>The authors also certify that the general content of the manuscript, in whole or in part, will not be submitted, accepted, or published elsewhere, including conference proceedings, while it is under consideration or in production. The only exception is if the authors have received specific prior written approval from the editor-in-chief. These policies do not prohibit releasing the manuscript as a technical report, posting the manuscript to a preprint server, or publishing a short abstract at a conference or workshop that does not formally publish reviewed proceedings.</p> <p>Failure to adhere to this policy is cause for rejection of the manuscript.</p> <p>By selecting "yes," the authors of this paper confirm they read and agree to the conditions of SIAM's Policy on Prior</p>

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Novelty statement	<p>What is the novel scientific contribution of this work? (If the work builds considerably on one or more previously published papers, please state how the present work extends the previous ones.):</p> <p>In our article, we address a slightly different question, the possibility that microcredit leads to economic inclusion, in the sens of opportunity to poor people to have access to the regular banking systems to get loans for their small enterprise. We consider a Markov-Chain model for a Microfinance Institution (MFI) borrower who can be in one of four states: Applicant (A), Beneficiary (B – or B +) of a small or a large loan, or included (I) in the regular banking system. Given the transition matrix we compute the equilibrium and deduce the influence of probability parameters on what is profitable to the borrower within breaking-even constraints of the MFI. We give a general theorem on the expected income flow of a Markov Chain with Income (MCI), that we then apply to our model to determine the constraints emerging from the Absence of Strategic Default (ASD) requirements. These do not only bound the probabilities of success from above but sometimes also from below. The model we offer can be extended in the MCI framework to become more realistic. The general results given here allow to check the influence of any change in the model, especially on the effect favoring access to regular banking thanks to microcredit.</p>
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Manuscript #	M134281R
Current Revision #	1
Other Versions	M134281 M134281RR
Submission Date	2020-10-07 13:55
Revision Due Date	2020-12-24
Current Stage	Revision Received
Title	May microcredit lead to inclusion?
Running Title	May microcredit lead to inclusion?
Manuscript Type	Research Article
Special Section	N/A
Corresponding Author	Djaffar Lessy (IAIN AMBON)
Contributing Authors	Nahla Dhib , Francine Diener , Marc Diener
Abstract	We consider a Markov-Chain model for a Microfinance Institution (MFI) borrower who can be in one of four states: Applicant (A), Beneficiary (B- or B+) of a small or alarge loan, or included (I) in the regular banking system. Given the transition matrix we compute the equilibrium and deduce the influence of probability parameters on what is profitable to the borrower within breaking-even constraints of the MFI. We give a general theorem on the expected income flow of a Markov Chain with Income (MCI), that we then apply to our model to determine the constrains emerging from Absence of Strategic Default (ASD) requirements. These do not only bound the probabilities of success from above but sometimes also from below.
Associate Editor	Assigned
Keywords	Micro-credit, Markov Chain with Income, financial inclusion, Absence of Strategic Default
Issue	2021-09-30
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