The effect of a credit policy change on microenterprise upward transition and growth: evidence from Indonesia

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Submission date: 09-Jun-2021 10:26AM (UTC+0800)
Submission ID: 1603176406
File name: erprise_upward_transition_and_growth_evidence_from_Indonesia.pdf (989.57K)
Word count: 11081
Character count: 55444

Eurasian Business Review
https://doi.org/10.1007/s40821-020-00170-w

REGULAR ARTICLE

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Received: 30 August 2019 / Revised: 11 August 2020 / Accepted: 27 August 2020
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Abstract

This paper attempts to establish a causal relationship between a government micro and small enterprises (MSEs) credit promotion policy and MSEs' upward transitions and growth. Indonesian firm level data in conjunction with the cancellation of a mandatory MSE credit policy in 2001 by the Indonesian government are employed in the analysis. Firstly, estimations of the year-on-year micro to small size category transitions indicate the negative effect of the policy change on the upward transition of micro firms. Secondly, causal effect analysis using difference-in-differences (DiD) estimation, by employing the policy change as an exogenous shock on the MSE credit availability and setting medium and large enterprises (MLEs) as the counterfactual group, suggests that the policy cancellation reduces the probability of a micro firm to become a small firm by 1.3% relative to the MLEs' probability of transitioning between size categories. The negative effect on turnover growth is also identified.

Keywords Mandatory credit policy · Microenterprise · Upward transitions · Growth

JEL Classfication G28 · L25 · O17

1 Introduction

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Micro and small enterprises (MSEs) provide employment and income for substantial proportions of the population in many developing countries. The real and potential importance of these firms is also apparent in Indonesia. More than 90% of firms in

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Electronic supplementary material The online version of this article (https://doi.org/10.1007/s40821-020-00170-w) contains supplementary material, which is available to authorized users.

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Published online: 25 September 2020

Indonesia are MSEs and they provide more than 90% of the country's total employment (Ministry of Cooperatives and SMEs 2013). Due to their ability to generate employment and income, promoting MSEs has been identified as one of the ways to help the poor exit poverty and to support economic growth (Mead 1994; Liedholm and Mead 1999; Cook 2001). However, MSEs often experience various constraints to growth compared to larger sized firms. Access to finance is often cited as one of the most important constraints faced by MSEs (Berger and Udell 1998; Schiffer and Weder 2001; Ayyagari et al. 2007; Rosengard and Prasetyantoko 2011).

MSEs rely on both informal and formal financing to fulfil their capital needs. Since informal financing is often limited in scale, banks can potentially play an important role in satisfying MSEs financial needs. Unfortunately, MSEs typically face more significant difficulties in securing bank loans than do large firms (Schiffer and Weder 2001; Ayyagari et al. 2007; Beck and Demirguc-Kunt 2006). Governments in developing countries frequently design and implement policies to help MSEs gain access to financing from banks, such as mandatory credit allocation policies. With this type of policy, commercial banks, usually state-owned, are required to allocate a certain proportion of their funding specifically to the MSE sector. The Philippines, India, Pakistan, Sri Lanka, and Indonesia are among the countries that have had or have this type of policy (ADB 2015). In Indonesia, the MSE obligatory credit policy was implemented for the first time in 1990. In 2001, the policy, which required banks to allocate 20% of their credit portfolio for MSEs, was cancelled. Since MSEs play an important role in employment generation, it is essential to rigorously examine the impacts of this policy change. Doing so will bring greater understanding to how governments can support MSEs' growth through enhancing credit access.

Evaluating the effect of the policy change in 2001 is particularly relevant at present. In 2011, Bank Indonesia reinstated the mandatory MSE credit for commercial banks (Bank Indonesia 2011). Commercial banks are required to gradually achieve 20% MSE credit allocation by 2018, starting from 2013 (Bank Indonesia 2012). While the future looks promising for MSEs in Indonesia, prior to this study, there had been no empirical evidence showing that requiring banks to allocate a specific proportion of credit to MSEs has actually helped MSEs. This study helps to fill this gap by specifically measuring the effect of the policy change on the upward transition and growth of microenterprises in Indonesia. This study also contributes to the relatively small sub-literature on MSEs in developing countries by particularly focusing on their size dynamics.

Using Indonesian firm level data and the case of MSE credit policy cancellation, the objectives of this study are twofold: first, this study tries to examine the policy change effect on MSEs' upward transitions and, second, to identify to what extent MSEs, particularly micro firms, are credit constrained.

In the analysis, firstly, synthetic panel data estimation is set up using repeated cross-section survey data on MSEs to identify the year-on-year MSE transitions before and after the policy change. Secondly, setting up the credit policy cancellation as an exogenous shock on the availability of MSE credit, a difference-in-differences (DiD) estimation is employed to determine if a causal relationship exists between the policy change and MSEs' upward transitions and growth.

The results from the synthetic panel data analysis indicate some degree of negative effect of the policy change on the upward transition of microenterprises. These results are further confirmed using the DiD estimation, where MSEs are set as the treatment group and medium and large enterprises (MLEs) are employed as the control group. In the DiD estimation, the repeated cross-section dataset of the MSE survey is first constructed as a pseudo panel dataset before being merged with the panel data of medium and large enterprises (MLEs). The DiD estimation results suggest consistently negative and significant effects of the 2001 policy change on micro firms' upward transitions in terms of turnover. In this case, the policy change reduces the probability that a micro firm will transition upwards to become a small firm by 1.3% relative to the probability that medium firms will become large firms. While the effect of the policy change on turnover growth is not statistically significant, the sign of the interaction term consistently suggests the presence of a negative effect. These results imply that MSEs, especially microenterprises, are indeed credit constrained. Additionally, whilst remain debateable, a negative effect of the policy change on employment is also identified.

The remainder of this paper proceeds as follows: Sect. 2 discusses the mandatory MSE credit quota policy and a review on the context of the study considering the case of Indonesia. Section 3 presents the data and the empirical methodology. Section 4 describes the results and analysis. Section 5 summarizes and provides conclusions to the study.

2 Review on the mandatory credit allocation policy

2.1 Mandatory credit allocation policy to improve access to finance

Despite the ongoing controversies regarding whether MSEs are really credit constrained and whether improving MSEs' access to finance will subsequently improve their growth, governments and international donors continue to put considerable efforts and funding towards providing access to finance. For example, in 2013, the World Bank managed a portfolio of US$3.2 billion for promoting MSE access to finance in more than 60 countries around the globe (World Bank 2013). Governments, in both developed and developing countries, have also implemented various programs and policies to ease MSEs' credit constraints. One such policy is the mandatory credit allocation policy, which requires banks to allocate a certain percentage of their credit portfolio to specific sectors.

Korea, the Philippines, India, Pakistan, Sri Lanka, and Indonesia are among some of the countries that have implemented such a targeted lending policy aimed at certain sectors, including MSEs (ADB 2015). Korea is probably the only developed country that has this type of mandatory lending policy in place. In executing the policy, the Bank of Korea not only stipulates minimum MSE loan ratios for each type of bank, it also encourages the banks to disburse loans to MSE beyond the established ratios (ADB 2015). In India, every bank is required to allocate at least 40% of their net credit to priority sectors, which includes small-scale manufacturing firms (Banerjee and Duflo 2014). In the Philippines, the Magna Carta policy, introduced

in 1991, requires banks to allocate 10% of their loan portfolio to MSEs. The latest revision in 2008 was made to specifically include microenterprises. Unfortunately, a recent report evaluating banks' performance post 2008 revision finds an increasing trend of banks' noncompliance to the stipulated proportion (Khor et al. 2015). In Indonesia, a similar problem regarding bank noncompliance was also apparent before the policy was cancelled in 2001. While there has been some attention given to the issue of bank compliance, studies on the effect of this policy and its impact on MSEs have been fairly limited. This study attempts to fill the gap in this particular research area by providing an empirical evaluation using the case of Indonesia.

2.2 Study context: mandatory MSE credit policy in Indonesia

In Indonesia, apart from providing a large share of the country's employment, MSEs have also been shown to have positive welfare impacts on the poorest households. Vial and Hanoteau (2015) employ quintile analysis on the Indonesian household panel data to find that participating in microenterprises increases households' welfare, with the strongest effects found for the sample's poorest households. Nevertheless, as in other developing countries, MSEs in Indonesia often mention the lack of access to finance as one of the most important constraints to their business development (Rosengard et al. 2001; Bank Indonesia 2005; Johnston and Morduch 2008).

Responding to the issue of MSEs' access to finance, there have been several initiatives in Indonesia. Requiring mandatory MSE credit from banks is one such initiative by the Indonesian government. The policy was introduced in 1990, when the Indonesian government and Bank Indonesia, as the banking regulator, rolled out a policy package called the 'Paket Januari 1990' (January 1990 Package), which included a directed credit program called Kredit Usaha Kecil (Small Business Credit, or KUK).[1] In the program, all banks in Indonesia were required to allocate 20% of their total credit portfolio exclusively for small enterprises. At that time, the maximum small business credit loan was Indonesian Rupiah (IDR) 200 million.[2]

This policy was revised in April 1997, before the beginning of the East Asian financial crisis, by raising the maximum loan size to IDR 350 million and increasing the mandatory share to 22.5 or 25% of banks' net credit expansion (Bank Indonesia 2001). After the financial crisis, in January 2001, Bank Indonesia issued a regulation which effectively suspended the previous regulation that obliged banks to allocate 22.5% of their credit portfolio to small business credit (Bank Indonesia 2001b). With the abolishment of the mandatory MSEs credit allocation, Bank Indonesia merely encouraged banks to provide some funding to MSEs, without imposing any specific proportions.

[1] Microenterprise credit is included in this category, as it covers any amount of loan up to the maximum of IDR 200 million. The term 'micro enterprises' as a separate category from small enterprises was not used until it was included in Bank Indonesia regulation no 7/39/2005. The microenterprise as a separate category was further formally acknowledged in the 2008 Micro, Small & Medium Enterprise Act No. 20, which was the result of the amendment of the 1995 Small Enterprise Act No. 9.

[2] In June 2019, in average, USD 1 approximately equals to IDR 14,000.

There have been very few studies attempting to analyze the effect of the mandatory credit policy on MSEs in Indonesia. This could be due to limited available data regarding both credit disbursement and MSEs in Indonesia in the 1990s. There were more credit data published after the 1997 financial crisis. A study by Ravics (1998) claims that the mandatory credit quota had little effect on microenterprises due to the broad definition of the loan. By contrast, McGuire et al. (1998) and Timberg (1999) argue that the policy was one of the most important directed credit programs in Indonesia. Unfortunately, both are primarily descriptive studies, and they do not try to establish the quantitative impact of the policy on MSEs.

There are even fewer studies that specifically examine the effect of the mandatory credit policy change in 2001. Siregar (2004) breaks down loan types by different groups of banks to explain the fall of bank lending after the 1997 crisis, particularly with respect to the policy change on MSE credit in 2001. He finds that the mandatory credit allocation policy abolishment was responsible for the decline in the percentage share of outstanding small enterprise loans from private and state banks since the first quarter of 2001.

3 Data and empirical methodology

3.1 Data

To provide empirical evidence on the effect of the policy change on the MSE sector, we use the data of the Survei Usaha Terintegrasi (SUSI) or Integrated Survey on Small-Scale Establishments (ISSE), carried out annually by the Badan Pusat Statistik (BPS)/Indonesian Statistics Office from 1998 to 2005. The surveys only cover MSEs. The surveys record firms' financial information, such as production costs and gross sales, with later rounds also including firms' assets values. The surveys also record information related to various constraints experienced by MSEs, including liquidity constraints. It is important to note that the ISSE surveys are repeated cross-sectional surveys. One of the major drawbacks of such repeated cross-sectional data is that individual firms are not tracked over time; as such, the firms' growth and transitions cannot be tracked over time. One of the ways to circumvent this problem is by constructing a synthetic panel dataset based on time-invariant variables from the repeated cross-section dataset. Table 1 summarizes the number of observations and the available time-invariant variables in each survey round. It is noticeable that there have been some changes in the information collected throughout the MSE survey rounds.

In addition to the MSEs data, we also employ data on medium and large manufacturing firms over the same period, from 1998 to 2005. The data are also collected by BPS and constitute a census of all manufacturing firms in Indonesia with more than 20 employees. These data are employed to establish a counterfactual for the policy change. Although there are exiting and entering firms in the MLEs survey from year to year, to analyze transitions between MLEs, it is possible to create a panel dataset because each surveyed firm is assigned a unique identity that remains the same over time.

Table 1 List of time-invariant variables in each MSE survey round. Source: MSE survey 1998–2005

Survey rounds	Number of observations	Time-invariant variables
SUSI 1998	88,788	(1) Operating before 97 (2) Gender (3) Birth year (4) Education (5) Business sector (6) District/province
SUSI 1999	85,156	
SUSI 2000	54,586	
SUSI 2001	55,712	
SUSI 2002	53,959	
SUSI 2003	42,194	(1) Gender (2) Birth year (3) Education (4) Business sector (5) District/province
SUSI 2004	198,335	(1) Year business start (2) Gender (3) Birth year (4) Education (5) Business sector (6) District/province
SUSI 2005	194,260	

It is necessary to note that the firm level in the survey datasets are at the establishment level. In the case of the MLE manufacturing survey, a large majority of the observations correspond to single plant firms.

3.2 The effect of a drop in credit availability on firms

Following a model developed by Banerjee and Duflo (2014), consider there to be only two lenders, the "bank" and the "market", and let r_b and r_m represent the interest rates charged by the bank and the market, respectively. Following the results of empirical studies showing that the rate charged by the bank is smaller than that of the market, we assume that $r_b \leq r_m$.

On the firm side, consider that the inputs for the production of the firm are paid for using working capital. Some parts of working capital are financed by banks, and other parts from the enterprise's market borrowing. In this case, $k = k_b + k_m$ is total available working capital, where k_b is total bank capital available to the firm, k_m is total market capital. Assume that this working capital constraint is binding.

The policy change analyzed in this study involves a possible drop in the availability of MSE credit from the bank due to the abolishment of obligatory MSE credit allocation. This policy change, however, had no relation to the interest rate charged by the banks. Figures 1 and 2 describe possible consequences of the policy. In the figures, the horizontal axes represent the amount of working capital, k, and the vertical axes represent the output, $F'(k)$. The downward sloping curve represents the marginal product of capital, $F'(k)$, and the step function represents the supply of capital.

Case 1: If the firm is not credit constrained in the sense that it can borrow as much as it needs at the market rate, but cannot do the same via bank loans, then the policy change that causes a contraction in the availability of MSE credit from banks

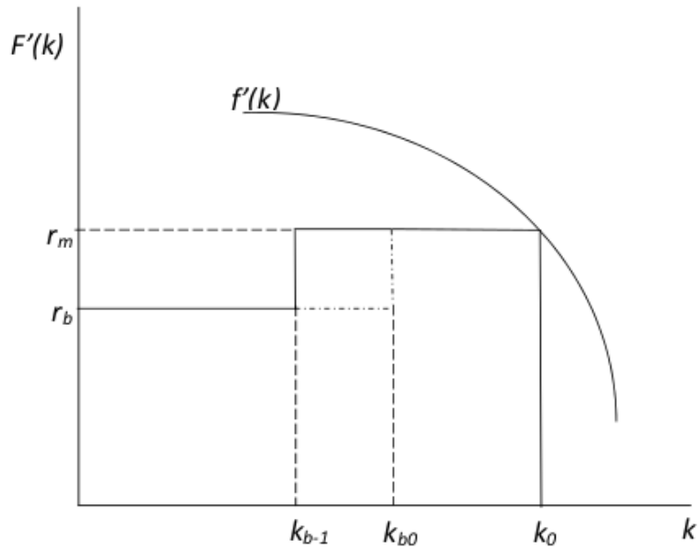


Fig. 1 The effect of credit policy change if a firm is not credit constrained

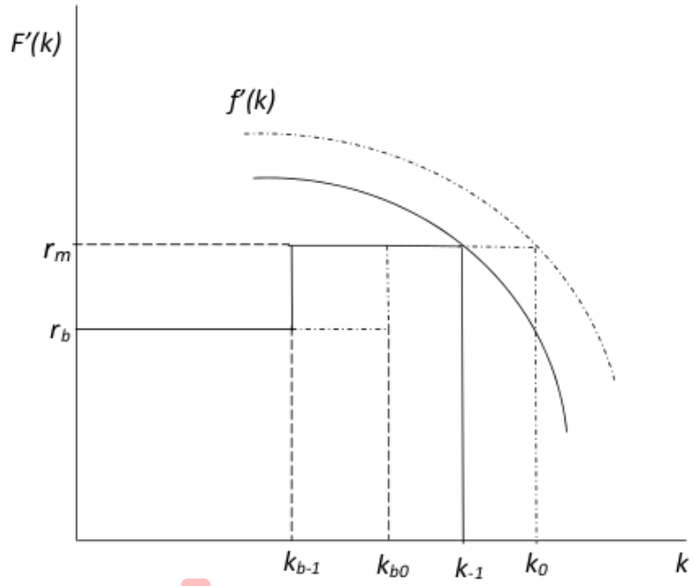


Fig. 2 The effect of policy change if a firm is credit constrained

would lead to an increase in the firm borrowing from the market. Initially, the firm only borrows from the market to cover the capital from k_{b0} to k_0, but after the policy change the firm must borrow more from the market to finance the capital from k_{b-1} to k_0. The firm's profit will decrease as it would have to pay the higher market interest rates, since $r_b < r_m$. Nevertheless, the firm's total capital and output would decrease only if the market credit fails to fully substitute for the firm's previous bank loan.

Case 2: The firm is credit constrained in terms of both bank and market loans. Because the bank offers a lower interest rate than the market, the firm will borrow up to the maximum possible amount from the bank, k_{b0}. The firm will also borrow from the market until it reaches the total investment value of k_0. As available MSE credit from the bank drops to k_{b-1}, and since the firm cannot increase its market loan due to credit constraints, the firm will not be able to maintain its total layout at k_0 and will hence lower it to k_{-1}. Thus, the policy change would lead to a decrease in the firm's total outlay, output, and profits, without any change in the amount borrowed from the market.

Based on this simple credit constraint model, one can see that there is a possible negative effect of the policy change on the firm in both cases. However, in Case 2, there is a larger negative impact on the firm. The firm will have to downsize its business due to the policy change if it is truly credit constrained. Relating to the policy change analyzed in this study, on average, one should see more downward transitions in the periods after the policy change came into effect if MSEs in Indonesia were truly credit constrained.

3.3 Empirical methodology

In focusing on the upward transition of micro enterprises becoming small enterprises, the role of factors that determine the probability of upward transitions of microenterprises between two points in time can be estimated using OLS:

$$\Pr\left(n_{i1} < z \ \ and \ \ n_{i2} \geq z\right) = p'_{i1}\beta + q'_{i1}\gamma + r'_{i1}\theta + \alpha_i + u_{it}, \tag{1}$$

where $\Pr\left(n_{i1} < z \ \ and \ \ n_{i2} \geq z\right)$ is the probability that firm i at time $t=1$ was a micro firm, indicated by any variable n below the threshold z that measures the size of the firm (e.g., number of employees, capital, or turnover), and at time $t=2$ became a small firm, indicated by the measure n being equal or above the threshold z. p'_{i1} is the vector of entrepreneur/business owner characteristics of firm i, q'_{i1} is the vector of firm i's characteristics, r'_{i1} is the vector of business environment measures, andβ, γ, and θ are the vectors of unknown parameters to be estimated. α_i is the individual firm fixed effects, and u_{it} represents the error term. It is possible to consistently estimate the model using the pooled ordinary least square (POLS) method if the α_i individual firm fixed effects were not correlated with the explanatory variables. However, this assumption is not reasonable considering that some of the explanatory variables are individual firm characteristics, such as the entrepreneur's ability, which are difficult to measure and are likely to be correlated with the individual effects. In the panel data structure, the problem can be minimized by controlling individual time-invariant heterogeneity using the panel fixed effects estimation model.

Due to the potential for time trends, it is difficult to justify an interpretation of a causal relationship between the policy change and the difference in micro firms' upward transitions, if any such difference exists, without comparing MSEs to another group that may not be influenced by the change. Hence, we make use of MLEs, which are not directly influenced by the policy change, and employ them as a quasi-experimental control group. It is possible that MLEs could be affected by

Table 2 Classification of enterprise size in Indonesia. Source: Indonesian Act no. 20 of 2008 and BPS

Classification	Indonesian Act no. 20 of 2008		Indonesian Statistics (BPS)
	Value of total assets, excluding land and building	Annual turnover	Employment
Micro enterprise	Maximum IDR 50 million	Maximum IDR 300 million	1–4 employees (including owners)
Small enterprise	IDR 50 million to 500 million	IDR 300 million to 2.5 billion	5–19 employees
Medium enterprise	IDR 500 million to 10 billion	IDR 2.5 billion to 50 billion	20 to 100 employees
Large enterprise	More than IDR 10 billion	More than IDR 50 billion	More than 100 employees

the changes in MSE policy. Removal of lending quotas for MSEs could make more credit available for MLEs. We argue against this possibility by noting that banks in Indonesia typically fail to get close to exhausting their credit limit, based on reserves (Hamada 2016; Satria et al. 2016). In addition, the banks did not totally abandon MSE financing to relocate the whole body of funding to MLEs. Hence, removal of the lending quota would not be freeing up scarce credit for MLEs.

With MSEs as the treatment group and MLEs as the control group, a DiD estimation is employed to identify the causal effect of the policy change in 2001 on micro-enterprises' upward transitions.

3.4 Identifying firm transitions

To analyze firm transitions, we adopt a method developed by Dang et al. (2014), originally designed to examine household income mobility using repeated cross-section surveys. The problem in analyzing firms' transitions is similar to the problem in household income mobility when no genuine panel dataset exists. The business turnover and the number of employees are employed to represent firm size to analyze the transition of firms over time.[3] The firm size classification by turnover is based on the Indonesian Act no. 20 of 2008 on Micro, Small, and Medium enterprises, while the firm size classification by the number of employees is based on the Indonesian Statistics (BPS) definition. Table 2 summarizes these classifications.

It is necessary to note that number of employees may not be a valid measure of firm size in the context of credit constraint. It is possible that as firms gain access to more credit, they may reduce the number of workers in favor of machinery. We include transitions based on number of workers as an additional analysis since this variable has two advantages. Firstly, it is more accurately remembered by entrepreneurs compared to other firm outcomes, such as sales or output and, secondly,

[3] The value of physical assets is another term used to identify firm size. Unfortunately, in the dataset, the value of the assets is only recorded in the survey years of 2004 and 2005.

deflating is not required when using the number of workers (Mead and Liedholm 1998).

Adopting the methodology in Dang et al. (2014), assume there are two rounds of repeated cross-sectional firm surveys, denoted by round 1 and round 2. Let n_{it} be the number of workers of firm i at survey round t, where $t = 1, 2$, and z is the number of worker threshold that differentiates between micro and small firms.[4] Then, to estimate the fraction of micro firms in the first round who graduate and become small firms in the next round, one can estimate

$$\Pr(n_{i2} > z \ \ and \ \ n_{i1} \leq z) \tag{2}$$

while the fraction of micro firms who remain as micro firms in the second round can be estimated by:

$$\Pr(n_{i2} \leq z \ \ and \ \ n_{i1} \leq z) \tag{3}$$

The firms' upward transition measures are based on the joint probability that a firm is a micro firm in the first survey round and becomes a small firm in the second round. Similarly, the firm's downward transition measures are based on the joint probability that a firm is not a micro firm in the first round and becomes a micro firm in the second round.

Repeated cross-sectional survey data are not suitable to estimate joint probabilities because firms are interviewed only once, either in the first or in the second round of the survey. The relationship between the number of workers and firms' time-invariant characteristics in each round can be estimated using:

$$n_{it} = \beta_t' x_{it} + \varepsilon_{it} \quad t = 1, 2 \tag{4}$$

where x_{it} is a vector of time-invariant characteristics of firm i at survey round t, and ε_{it} is an error term. The problem of repeated cross-sections is that the n_{i1} and n_{i2} of the same firms are not known. However, it is possible to obtain the lower and upper bound estimates of firm transitions. The bounds depend on the joint distribution of the error term in the first and the second round.

Using two repeated cross sections collected at two points in time, the steps to obtain lower bounds and upper bounds of the transition are as follows:

Step 1: Using the data in survey round 1 and round 2, estimate Eq. (4) $n_{it} = \beta_t' x_{it} + \varepsilon_{it}$. Then, retrieve the parameter estimates $\widehat{\beta}_t'$ and the predicted residuals $\widehat{\varepsilon}_{it}$.

Step 2: Compute the mean and the variance of the residuals from each period, $\widehat{\mu}_{\varepsilon_t}$ and $\widehat{\sigma}^2_{\varepsilon_t}$.

Step 3: Set the residual correlation $\widehat{\rho}_j, j \in \{LB, UB\}$ such that $\widehat{\rho}_{LB} = 0$ and $\widehat{\rho}_{UB} = 1$. Note that *LB* denotes Lower Bound and *UB* denotes Upper Bound.

Step 4: Sort the residuals from period 2, $\widehat{\varepsilon}_{i2}$, from lowest to highest.

[4] The same approach applies when turnover is used to identify the transitions.

Step 5: For each $j \in \{LB, UB\}$, draw n_2 pairs of residuals $\left(\tilde{\varepsilon}_{i1}, \tilde{\varepsilon}_{i2}\right)$. Then rank residual pairs from lowest to highest based on the value of ε_{i2}.
Step 6: Pair the first element $\tilde{\varepsilon}_{i2}$ of each sorted residual pair $\left(\tilde{\varepsilon}_{i1}, \tilde{\varepsilon}_{i2}\right)$ with the sorted $\hat{\varepsilon}^{j}_{i1}$.
Step 7: For each $j \in \{\text{Est}, LB, UB\}$, estimate $n^{j}_{i1} = \hat{\beta}_1 X_{i2} + \hat{\varepsilon}^{j}_{i1}$.
Step 8: Estimate the transition measure $M_j(\hat{n}^{j}_{i1}, n^{j}_{i2})$
Step 9: Repeat Steps 5 to 8 R times, in this case, we repeat the process 500 times.
Step 10: For each $j \in \{LB, UB\}$, take the average of $M_j(\hat{n}^{j}_{i1}, n^{j}_{i2})$ across all iterations.

In order to estimate the lower and upper bounds of the transition, we modify the command written by Dang (2013) to suit the transition threshold of micro to small firms.

3.5 Difference-in-differences estimation

A counterfactual analysis to evaluate the effect of the cancellation of the mandatory MSE credit allocation requires a treatment group and a control group, the latter of which is not influenced by the policy change. If the credit policy change only affects MSEs, then one should not see a difference in the transition or growth of MLEs before and after the policy change. Hence, MLEs in Indonesia during the same time period are employed as the control group. DiD estimation is implemented to establish the counterfactual analysis. A DiD estimator is used to address the time-invariant unobservable differences between control and treatment firms before the policy change (Meyer 1995; Wooldridge 2002; Angrist and Pischke 2008; Gertler et al. 2011). The following model captures the impact of the credit policy change on firms' upward transitions:

$$UT_{it} = \beta_0 + \beta_1 MSE_i + \beta_2 P_{t-1} + \beta_3 \left(MSE_i \times P_{t-1}\right) + \gamma K_{it} + \varepsilon_{it} \tag{5}$$

where UT_{it} is a binary variable indicating upward transition that takes a value of 1 if firm i is equal to or above the threshold of upward transition in period t and 0 if not. For micro firm to small firm, the threshold is five employees for number of employees and IDR 300 million per year for turnover. For medium to large firms the threshold is 100 employees for number of employees and IDR 50 billion per year for turnover or gross production. MSE_i is a binary variable that equals 1 for MSEs and 0 for MLEs. P_{t-1} is a binary variable equal to 0 for the baseline period before the policy change (1998 to 2000) and equal to 1 for the post-policy change period from 2001 to 2005. The policy change variable is set as a lag variable referring to the results in the previous section, where there is indication that the effect of the policy change starts to appear one period after the policy change occurred. The variable, $MSE_i \times P_{t-1}$ is the interaction of firm type and credit policy change periods, and K_{it} is a vector of control variables, including the real GDP, provincial and sectoral dummy. The real GDP is included as a control variable to consider the macroeconomic effect of the economic growth on the enterprises. Lastly, ε_{it} is the random error.

An issue with the above estimation is that firms with very low number of employees and/or sales may only make a small upwards transition, but as the upward transition does not pass the threshold, the firms would still be coded 0 in the upward transition variable. Therefore, another estimation model is set up by focusing the effect of the policy change on the growth of number of employees and real turnover or production value, rather than on the upward transition passing the threshold. The estimation model is:

$$G_{it} = \theta_0 + \theta_1 MSE_i + \theta_2 P_{t-1} + \theta_3 \left(MSE_i \times P_{t-1}\right) + \delta K_{it} + \epsilon_{it} \tag{6}$$

where G_{it} is annual growth in terms of number of employees and/or sales or production value. The rest of the variables have the same definition as the specification in Eq. (5). The identifying assumption in Eqs. (5) and (6) is:

$$Correlation(P_{t-1}, \epsilon_{it}) = 0 \tag{7}$$

which implies that the obligatory MSE credit policy cancellation is an exogenous shock to the supply of credit to MSEs. This is likely the case, as the policy change was implemented by Bank Indonesia, an independent banking and monetary authority, and the policy applies to all commercial banks in Indonesia that supply credit to MSEs.

To determine the regressions on the binary variable of the upward transition, panel data linear probability model (LPM) and panel data logit estimation with firm and year fixed effects are employed. In the LPM regression, robust standard errors are obtained. In the growth dependent variable, panel data regressions with firm and year fixed effects with robust standard errors are employed.

3.6 Setting up the dataset for DiD estimation

To carry out the DiD estimations, the MSE survey dataset needs to be merged with the MLEs survey dataset to form a single dataset. In combining the two datasets, two preparatory steps are required. First, observations from the MSE surveys are repeated cross-section survey data; while they are taken from the same population pool, the actual firms covered change in each survey. Meanwhile, the MLEs data comes from a panel survey, apart from the entry and exit of the firms during the survey rounds. Therefore, for the MSE dataset, a pseudo panel dataset is constructed from the repeated cross-section survey data by grouping observations into cohorts on the basis of time-invariant shared characteristics, and then generating the cohort variables as the mean values of the included observations (Deaton 1985; Verbeek 1992).

Second, the MSE surveys' sample is drawn from the same population basket, the National Economic Census 1996.[5] This makes the sampling of the MSE surveys fixed. The same circumstance needs to be replicated for the MLEs survey. The manufacturing survey is implemented as a census by sending a questionnaire to every

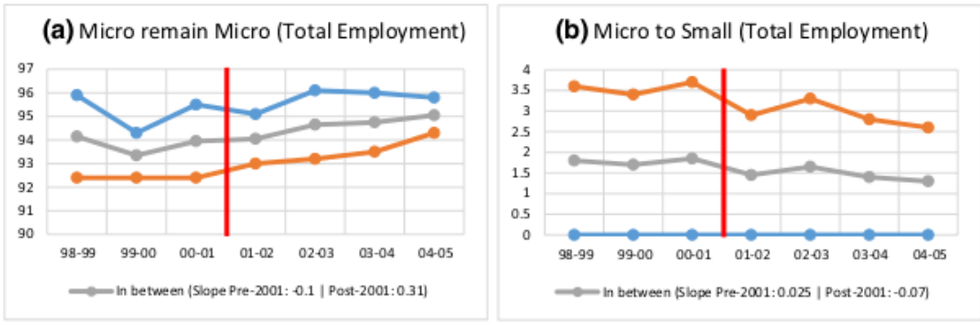
[5] The Indonesian National Economic Census is implemented every ten years in the year ending with a 6.

Table 3 Summary statistics for difference-in-differences estimation. Source: Calculated from MSE survey and Medium and Large firm 1998–2005

Variables	Before policy change (1998–2000)			After policy change (2001–2005)		
	Obs	Mean	Std. Dev	Obs	Mean	Std. Dev
Micro and small enterprises (pseudo panel data)						
Gender (1 = male, 0 = female)	8277	0.533	0.499	14,086	0.543	0.498
Age	8277	45.018	14.249	14,086	43.046	14.671
Education (4 levels)	8277	2.459	1.102	14,086	2.468	1.105
Total employees	8277	2.024	1.915	14,086	1.983	1.738
Upward transition (employment)	4836	0.049	0.217	11,804	0.039	0.193
Monthly revenue (IDR)	8277	5,015,890	28,900,000	14,086	4,920,081	18,900,000
Monthly real revenue (IDR)	8277	4,418,639	26,900,000	14,086	2,993,331	12,700,000
Upward transition (revenue)	4984	0.026	0.159	12,089	0.026	0.160
Upward transition (real revenue)	5000	0.019	0.137	12,241	0.015	0.120
Annual employment growth	5131	29.258	111.271	12,471	29.697	110.066
Medium and large manufacturing firms (panel data)						
Total employees	59,827	202.068	689.382	73,693	239.168	848.674
Upward transition (employment)	26,194	0.028	0.165	46,229	0.022	0.147
Monthly revenue (000 IDR)	64,255	22,200,000	183,000,000	107,115	33,500,000	312,000,000
Monthly real revenue (000 IDR)	64,255	19,300,000	157,000,000	107,115	20,100,000	186,000,000
Upward transition (revenue)	39,693	0.015	0.121	97,841	0.023	0.152
Upward transition (real revenue)	39,907	0.011	0.104	100,184	0.016	0.126
Annual employment growth	38,364	6.685	84.463	72,122	7.792	787.076

firm with more than 20 workers. To create a fixed sample of MLEs, only firms identified in the 1998 survey are included in the sample for the estimation, even though the study covers the period from 1998 to 2005. Upon completion of these steps, the MSE pseudo panel data can be merged with the data on MLEs.

Table 3 presents the summary statistics of the constructed dataset for the DiD estimations. Looking at the MSE data, there are differences before and after the 2001 policy change. After the policy change, there are more firms run by male individuals, with younger age, and higher average education. As MSEs are mostly owned by households, these changes could be due to the transfer of firms from an older member of the household, i.e. father or mother, to the younger household member, i.e. son or daughter. However, there is a slight decrease in the average number of employees and some substantial drop in the average monthly revenue. Interestingly, there is a slight increase regarding the average annual employment growth during the periods after the policy change.



Notes:

1. Horizontal axes represent year-on-year transition periods and the vertical axes represent the percentage of firms.
2. The vertical line represent the time of the MSE credit policy change.
3. The number of replications for the estimates is 500 times.
4. In between= (Lower Bound + Upper Bound)/2.
5. Standard errors in the estimations are clustered at the district level.

Fig. 3 Firm transitions by total number of workers based on the synthetic panel data estimation

Comparing the MLE panel data to the MSE pseudo panel data, significantly higher figures for the former are observed. One exception is average annual employment growth; MSEs' employment growth rates are significantly higher compared to the MLEs. This is because MSEs are small in terms of employment size, and hence any additional employee would result in a large growth figure. Meanwhile, for MLEs, an additional employee would only lead to a small percentage growth due to their already larger size. Comparing the figures for MLEs before and after the 2001 policy change suggests growth in terms of number of employees and turnover. The information on paid/unpaid employment is excluded because it is not available in the MLEs survey.

4 Results and discussion

4.1 MSE transition estimations

Figures 3, 4, 5 present the year-on-year (YOY) estimates of MSEs' transitions using synthetic panel data constructed from the MSE repeated cross-section surveys from 1998 to 2005. The results in these graphs are obtained using the following time-invariant variables: business owner year born, gender, education, firm sector, operating before 1997, starting year, and firm location using provincial identification. Since the policy change occurred in 2001, the points before 2001–2002 should be considered as the years when the mandatory MSE credit was still in place, and those from 2001 to 2002 as the periods after the policy was cancelled. As the main focus of this study is the upward transition of micro firms to become small firms, we present two graphs for each measurement, one graph for the firms that do not make any transition, i.e. micro firms that remain micro, and another graph on the firms that make an upward transition, from micro to small.

We include three lines in each graph, the lower bound (blue lines), the upper bound (orange lines), and the in-between (grey lines). Both the lower bound and the upper bound are obtained from the estimations, while the in-between value is the simple average of the lower and upper bounds in each transition period. To identify if there is a change due to the cancellation of the MSE credit policy, we include the value of the linear trend slope for the in-between figures for the periods before and after 2001. The detailed values to construct the graphs are available in the appendix.

Figure 3 depicts the estimation results of the YOY MSE transitions based on total workers. In Fig. 3a, prior to 2001, the negative slope of the in-between line suggests that there was a decreasing trend of micro firms remaining as the same sized firms. In Fig. 3b, in the pre-2001 period, some of these micro firms made upward transitions. In the post-2001 period, there is an increasing trend of micro firms remained in the same category, suggested by the positive slope in Fig. 3a. This is also reflected in the post-2001 period in Fig. 3b., where there is a declining trend of upward transitions by micro firms.

Another way to identify the effect of the policy change on micro firms is by comparing the average percentages of firms making or not making transitions before and after 2001. In Fig. 3a, before 2001, on average, 93.8% of micro firms remained as micro firms in each transition period. After 2001, the average figure increases to 94.63%. On the other hand, in Fig. 3b, prior to 2001, on average, 1.78% of micro firms graduated to become small firms, as opposed to only 1.45% after 2001. This suggests that the policy change has had a negative effect on micro firms' upward transitions, as measured by total number of workers.

Focusing only on paid workers, as shown in Fig. 4, the trend is relatively the same as in the case of total employment. Not surprisingly, as most workers in micro enterprises are unpaid family workers, more micro firms remain micro after the policy change, which implies that there are less paid workers within the micro firm sector than before the policy change. On average, 96.92% of micro firms remained the same before 2001, while this figure increased to 97.26% after 2001. Meanwhile, on average, 0.95% of micro firms made upward transitions before 2001, and this decreased to 0.85% after 2001.

Another important measure for defining micro and small firms is turnover. Figure 5 depicts the transition of firms based on real turnover. The deflator is generated based on the consumer price index by keeping 1998 as the base year (1998 = 100). Only looking at micro firms who remain the same in Fig. 5a, it seems that there is no negative effect of the policy change. There is a declining trend after 2001, suggested by the negative slope. However, the declining trend of micro firms remaining micro does not translate into an increasing trend of micro firms making upward transitions after 2001. In Fig. 5b, the slope is negative after 2001. This may suggest that the declining percentage of micro firms that remain micro firms is due to some micro firms exiting the market, i.e. closing down. Thus, this result also suggests a negative effect of the policy change on the upward transition of micro firms, as measured by total turnover.

The results in Fig. 3 through Fig. 5 suggest that there are negative effects due to the cancellation of the mandatory MSE credit in 2001 on MSEs' upward transitions. The results also imply that MSEs are credit constrained as modeled in simple credit

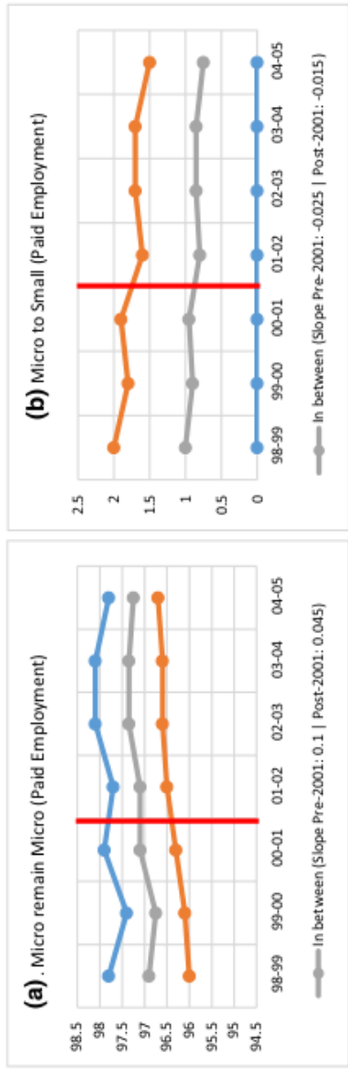


Fig. 4 Firm transitions by number of paid workers based on the synthetic panel data estimation. Same notes as Fig. 1 apply

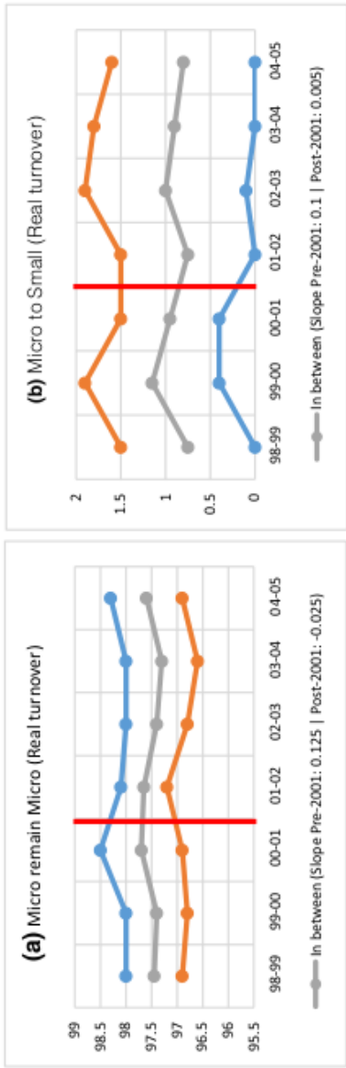


Fig. 5 Firm transitions by Real Total Turnover based on the synthetic panel data estimation. Same notes as Fig. 1 apply

constraint model. However, while the results suggest the negative effects of the policy change on MSEs' transitions, it is difficult to confirm that the effects on turnover and number of employees are significant. In this regard, it is necessary to establish a counterfactual estimation to validate the effects of the 2001 policy change. The following section discusses the results of the counterfactual analysis using a difference-in-differences estimation approach.

4.2 DiD estimation results

The following tables present the DiD estimation results on micro firms' upward transitions in terms of number of employees and turnover as well as MSEs' number of employees and turnover growth. The interaction term between the treatment group, MSEs, and the policy change is the main interest of these estimations. Puhani (2012) shows that if one holds the treatment group and the treatment constant, but allows the interaction term to vary, then the treatment effect on the treated is represented by the coefficient of the interaction term.

Table 4 presents the DiD estimation results on micro firms' upward transitions to small firms based on number of employees definition (the 5 employees' threshold). Across all specifications, in the number of employees measurement, the negative and statistically significant coefficients of the interaction term of the MSE treatment group and the lagged policy change suggest that the probability of MSEs upward transitions are negatively affected by the policy change. Specifically, in columns (1)–(3) presenting the estimations of the panel linear probability model with fixed effects, MSEs are 1.3% less likely to transition upward, relative to MLEs. Similarly, using logit model with fixed effects, in columns (4)–(6), the policy change also suggests a negative effect on the probability of upward transitions of MSEs relative to MLEs. However, coefficients in the logit estimation are in log-odds units, and therefore cannot be directly compared to the results of the LPM estimation. The odd ratios of the logit coefficients in columns (7)–(9) help us to identify the strength of the effect.[6] It is necessary to note that odds ratios show the effect of the explanatory variables in multiplicative terms (Buis 2010). The odds ratio of the interaction term shows how much the effect of the policy change differs between MSEs and MLEs. If we focus on column (9), the negative effect of the policy change on MSEs' upward transitions is 0.58 times greater than that for MLEs.

Table 5 presents the DiD estimations to identify the effect of the policy change on annual number of employees growth. Consistent with Table 4, the interaction term suggests a negative effect on the MSEs' growth on the number of employees. However, the effect is not statistically significant. This could be because the estimation in Table 4 specifically measures the policy change's effect on micro firms making the upward transition to small firms in terms of number of employees, while in Table 5, the effect is measured on the number of employees growth of all MSEs, which carries more variation.

[6] The logit fixed effects model does not allow the computation of the marginal effects, as these effects depend on the value of the fixed effects, which are not estimated.

Table 4 DiD estimation results for probability of upward transition by employment

Variables	LPM FE (robust)			LOGIT FE			LOGIT FE Odds Ratio		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged policy change (PCH t-1)	0.004***	−0.002	0.004**	0.322***	0.028	0.386***	1.379***	1.101	1.471***
	(0.001)	(0.001)	(0.002)	(0.075)	(0.081)	(0.118)	(0.103)	(0.129)	(0.173)
MSE * Lagged policy change	−0.013***	−0.013***	−0.013***	−0.575***	−0.581***	−0.544***	0.563***	0.552***	0.580***
	(0.003)	(0.003)	(0.003)	(0.114)	(0.115)	(0.115)	(0.064)	(0.063)	(0.067)
Constant	0.027***	0.029***	4.862***						
	(0.001)	(0.001)	(1.152)						
Lag Real GDP growth	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Survey year	No	No	Yes	No	No	Yes	No	No	Yes
Sectoral dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	89,063	89,063	89,063	7393	7393	7393	7393	7393	7393
Number of firm ID	18,159	18,159	18,159	1647	1647	1647	1647	1647	1647

Standard errors in parentheses

***p < 0.01, **p < 0.05, *p < 0.1

Table 5 DiD estimation results for Annual Employment Growth

Variables	(1)	(2)	(3)
Lagged policy change (PCH t−1)	0.733	1.245	−7.719
	(3.860)	(4.465)	(7.283)
MSE * Lagged policy change	−1.333	−1.312	−1.965
	(10.278)	(10.278)	(10.287)
Constant	10.180***	9.972***	−6,830.401
	(2.504)	(2.665)	(4,390.269)
Lag real GDP growth	No	Yes	Yes
Survey year	No	No	Yes
Sectoral dummy	Yes	Yes	Yes
Province dummy			
Observations	128,088	128,088	128,088
Number of firm ID	23,623	23,623	23,623

Standard errors in parentheses

***p < 0.01, **p < 0.05, *p < 0.1

Table 6 shows the DiD estimation results for the probability of micro firms' upward transitions using the turnover definition (the IDR 25 million monthly turnover threshold). Consistent with the results in terms of number of employees, the negative and statistically significant coefficients of the interaction term indicate the negative effect of the policy change on the probability of upward transitions by micro firms. The results are consistent across all specifications. The estimates of panel linear probability model with fixed effects, columns (1)–(3), suggests that MSEs are 1.1% less likely to transition upward, relative to MLEs. This magnitude is slightly lower compared to the effect of the policy change on firm transitions when measured by number of employees. In column (7), only main variables included, the negative effect of the policy change on MSEs' upward transitions is 0.42 times greater than for MLEs. The effect decreases to 0.40 when survey year is included, and becomes 0.39 when GDP growth is added. All in all, the effects are slightly smaller compared to Table 4.

Table 7 presents the DiD estimation results on annual turnover growth. Again, the results are consistent with those in Table 6, showing a negative coefficient of the interaction term across all specifications. They are also similar to those of Table 5 on the number of employees growth, where the coefficient of the interaction term is negative, but not statistically significant.

Unlike the employment measurement, in Tables 4 and 5, which may not indicate credit constraint, using the turnover measurement is more reliable for determining whether firms are really credit constrained. Table 7 implies that microenterprises are credit constrained, as their probability to transition upward decreases due to the drop in MSE credit availability resulting from the policy change.

In the fixed effects model estimation, Tables 4, 5, 6 and 7, the provincial and sectoral dummy variables are eliminated as both are time invariant variables. In addition to the fixed effects estimation, we also estimate the random effects model to

Table 6 DiD estimation results for probability of upward transition by turnover

Variables	LPM FE (robust)			LOGIT FE			LOGIT FE Odds Ratio		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged policy change (PCH t−1)	0.004***	−0.000	−0.001	0.477***	0.075	0.022	1.612***	0.767**	1.023
	(0.001)	(0.001)	(0.001)	(0.058)	(0.064)	(0.106)	(0.094)	(0.082)	(0.108)
MSE × lagged policy change	−0.010***	−0.010***	−0.011***	−0.868***	−0.932***	−0.933***	0.420***	0.403***	0.394***
	(0.002)	(0.002)	(0.002)	(0.142)	(0.144)	(0.144)	(0.059)	(0.057)	(0.057)
Constant	0.013***	0.015***	−0.620						
	(0.000)	(0.000)	(0.671)						
Lag real GDP growth	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Survey year	No	No	Yes	No	No	Yes	No	No	Yes
Sectoral dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	157,332	157,332	157,332	572	8572	8572	8572	8572	8572
Number of firm ID	24,042	24,042	24,042	1730	1730	1730	1730	1730	1730

Standard errors in parentheses

***p < 0.01, **p < 0.05, *p < 0.1

Table 7 DiD estimation results for annual turnover growth

Variables	(1)	(2)	(3)
Lagged policy change (PCH t−1)	−23.657	−84.889***	−89.686*
	(26.501)	(30.564)	(50.264)
MSE × lagged policy change	−26.172	−28.561	−28.899
	(72.930)	(72.928)	(72.982)
Constant	161.919***	185.963***	-3,459.674
	(17.168)	(18.179)	(30,326.792)
Lag real GDP growth	No	Yes	Yes
Survey year	No	No	Yes
Sectoral dummy	Yes	Yes	Yes
Province dummy	Yes	Yes	Yes
Observations	137,495	137,495	137,495
Number of firm ID	24,610	24,610	24,610

Standard errors in parentheses

***p < 0.01, **p < 0.05, *p < 0.1

maintain the effect of the provincial and sectoral dummy variables. In general, the results are remain the same, where the interaction terms have the negative signs suggesting the negative effect of the policy change on the MSEs. Nevertheless, the fixed effects estimations are preferred as the Hausman tests suggesting the rejection of the null hypothesis that the individual-level effects are adequately modeled by a random effects model across all model specification.

The DiD estimation results are consistent with the results of the estimations using synthetic panel data presented earlier. The DiD estimation results provide a counterfactual support by including MLEs as the control group in the analysis. These results confirm the negative effect of the cancellation of the obligatory MSE credit, particularly towards microenterprises. The results from the DiD estimation on transitions based on turnover also imply that micro firms are indeed credit constrained, as indicated by the decreasing probability of these firms to make upward transitions to become small firms. Furthermore, the findings confirm the negative effect of the policy change on MSEs as modeled in the simple credit constraint model discussed in the earlier section.

4.3 Validating the DiD estimations

One of the key assumptions needed to ensure internal validity of DiD models is the common trend assumption. This assumption requires that in the absence of treatment, the difference between the 'treatment' and 'control' group is constant over time. While it is not easy to identify the existence of the common trend in the usual linear DiD estimation, it may be more complicated in the case of nonlinear DiD, such as is the case with the DiD logit estimation model. To address this, we apply an approach that employs 'leads' and 'lags', developed by Autor (2003) and further discussed by Pischke (2005, 2016).

Table 8 DiD validation estimation

	Coef	Robust Std. Err	z	$P>z$	[95% Conf. Interval]	
MSE*Dummy t−2	0.002	0.003	0.670	0.503	−0.004	0.009
MSE*Dummy t-1	0.003	0.003	0.860	0.392	−0.003	0.009
MSE*Dummy t+1	−0.010	0.002	−3.970	0.000	−0.014	−0.005
MSE*Dummy t+2	−0.007	0.002	−3.340	0.001	−0.011	−0.003
MSE*Dummy t+3	−0.001	0.002	−0.260	0.793	−0.004	0.003
MSE*Dummy t+4	0.013	0.002	7.580	0.000	0.009	0.016
Constant	0.025	0.001	35.870	0.000	0.024	0.027

The idea in using leads and lags is to include the interactions of the time dummies and the treatment indicator (MSE) for the periods prior to the policy change in 2001, and to use the period when the treatment takes place as the baseline dummy. The interactions in the periods after the 2001 policy change are expressed relative to the omitted period, which serves as the baseline. Specifically, we estimate the following regression equation:

$$UT_{it} = \beta_0 + \beta_{-1}\left(MSE_i \times DT_{t-2}\right) + \beta_{-2}\left(MSE_i \times DT_{t-1}\right) + \beta_1\left(MSE_i \times DT_{t+1}\right) + \beta_2\left(MSE_i \times DT_{t+2}\right) + \beta_3\left(MSE_i \times DT_{t+3}\right) + \beta_4\left(MSE_i \times DT_{t+4}\right) + \varepsilon_{it} \quad (8)$$

where UT_{it} is the same outcome variable as Eq. (5), a binary variable indicating upward transition that takes a value of 1 if firm i is equal to or above the threshold of upward transition in period t and 0 if not. DT is a dummy time variable for each transition period where the minus signs indicate pre-treatment periods and the plus signs indicate post-treatment periods. If the outcome trends between the treatment and control groups are the same, then the coefficients of the pre-policy change period should be insignificant. This would indicate that the difference in differences is not significantly different between the two groups in the periods prior to the policy change. Table 8 presents the result of the estimation testing the validity of the DiD on firm transitions by turnover value.

The result shows that the coefficients of the interactions in the periods prior to the policy change are insignificant, confirming the validity of the DiD estimates. Autor (2003), in addition to validating the DiD estimation, shows that the interactions of the time dummies after the policy change with the treatment indicator also identify the trend of the treatment effect. In this case, it turns out that the negative effect diminishes in the fourth period after the policy change.

5 Summary and conclusions

This study establishes a causal relationship between the suspension of a pro-MSE credit policy and MSEs' upward transitions and growth over the period from 1998 to 2005 in Indonesia. In the analysis, firstly, we identify the year-on-year MSE

transitions before and after the policy change using synthetic panel data estimation. Then, using a DiD estimation approach, we establish a causal relationship between the policy change and MSEs' upward transitions and growth by employing the policy cancellation as an exogenous shock on the availability of MSE credit.

The synthetic panel data results suggest that the change in the credit policy negatively impacting the upward transition of micro firms. The results of the DiD estimations, setting up MSE as the treatment group and MLEs as the control group, further confirmed the negative effect of the 2001 policy change on micro firms' upward transitions. The presence of the policy change's negative effect on the growth of number of employees and turnover is also apparent, although they are not statistically significant. To identify whether MSEs are truly credit constrained, we rely on the effect of the policy change on business turnover. The negative and statistically significant effect of the policy change on the probability of upward transitions of MSEs when measured by turnover implies that MSEs are indeed credit constrained.

These findings are relevant to the design and implementation of policies intended to support the MSE sector. In terms of access to finance, the results imply that policies should be highly specific to their target group. For instance, effective policy instruments will likely vary when considering very small microenterprises, with only one or two workers, or when targeting microenterprises that are ready to make the upward transition to become small firms. Taking this specificity under consideration will allow prospective policy initiatives to achieve a measurable impact.

This study is limited to examining the effect of the policy change on MSEs via the exogenous shock in terms of credit availability to the MSE sector. Further study may explore the effect of the policy cancellation on the possible decrease of competition among banks involved in MSE financing resulting from the fact that banks were no longer obliged to allocate credit to MSEs. Empirical studies have confirmed that higher competition improves MSEs' access to finance (Beck et al. 2004; Black and Strahan 2002; Kerr and Nanda 2009; Carbó-Valverde et al. 2009).

Acknowledgements The author thanks Russell Toth and Shyamal Chowdhury for their helpful comments in the earlier version of this paper. The author also thanks two anonymous reviewers for their insightful comments and suggestions.

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