

# Assessing the Impact of Recent Global Crisis on Small and Medium Enterprises (SMEs): Evidence from Indonesia

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## Abstract

In this article we examine three broad issues. The first is to measure the impact of 2008 global financial crisis on Indonesia's economy, particularly on loans extended to small and medium scale enterprises at regional level. Next is to analyze significant factors of inducing loans extended to small and medium scale enterprises. Finally, it is to fill the gap in the literature by introducing a quantitative methodology. A spatial lag model and spatial error model are used to assess the three broad issues. Regionally, quarterly panel data spanning from 2002 up to 2011 are employed to support the analysis. One of the results is the global financial crisis that negatively impacts on Indonesia economy, particularly on the performance of small and medium enterprises (SMEs). In terms of loan extended to the SMEs, there is strong and positive spatially correlation among province, showing commoving and integrating economy within the territories of Indonesia. Finally, this research suggests that interest rates is not significantly correlated with loans to SMEs, which indicates that the access to financial institutions is more important and urgent to boost the performance of SMEs in Indonesia which is reinforcing the opinion of financial inclusions for SMEs.

*Keywords:* Global financial crises; small and medium enterprises; Indonesia, spatial random; fixed effects

## 1. INTRODUCTION

In the globalization era, the occurrence of financial crises have become more often than before. Moreover, financial integration and information technology may spread it rapidly and enlarge the magnitude of the crises. Thus, it is necessary to conduct a formal study to examine the significance of financial crises on Indonesia's economies, particularly the impact of 2008 global financial crisis on small and medium scale enterprises (SMEs).

The objectives of this paper can be expressed as follows:

1. To measure the impact of 2008 global financial crisis on Indonesia's economy, particularly on loans extended to small and medium scale enterprises in regional level data and analysis.
2. To analyze other significant factors inducing loans extended to small and medium scale enterprises.
3. To fill the gap in the literature by introducing a quantitative methodology.

The setup of the rest of this paper is arranged as follows. The initial section presents an overview of the recent financial crisis. The following section presents the methodology employed in this research. The next section discusses the results of the empirical analysis. The final section presents the conclusions, policy implications and research limitations.

## **2. OVERVIEW OF THE RECENT FINANCIAL CRISIS**

### ***2.1 Causes of the Crisis***

The financial crisis that began in 2007 spread and gathered intensity in 2008, despite the efforts of central banks and regulators to restore calm. By early 2009, the financial system and the global economy appeared to be locked in a descending spiral, and the primary focus of policy became the prevention of a prolonged downturn on the order of the Great Depression. The volume and variety of negative financial news, and the seeming impotence of policy responses, has raised new questions about the origins of financial crises and the market mechanisms by which they are contained or propagated. Just as the economic impact of financial market failures in the 1930s remains an active academic subject, it is likely that the causes of the current crisis will be debated for decades to come. Here are a number of factors that have been identified as causes of the crisis. First is deregulation: against a backdrop of abundant credit, low interest rates, and rising house prices, lending standards were relaxed to the point that many people were able to buy houses they couldn't afford. When prices began to fall and loans started going bad, there was a severe shock to the financial system. Furthermore, laws such as the Gramm-Leach-Bliley Act (GLBA) and the Commodity Futures Modernization Act (CFMA) permit financial institutions to engage in unregulated risky transactions on a vast scale. The laws have been

driven by an excessive faith in the robustness of market discipline or self-regulation. Besides, the Federal mandates to help low-income borrowers (e.g., the Community Reinvestment Act (CRA) and Fannie Mae and Freddie Mac's affordable housing goals) force banks to engage in imprudent mortgage lending. The second, is the housing bubble which with its easy money policies, the Federal Reserve allows housing prices to rise to unsustainable levels pushed by cheap credit and low interest rates. The third, is financial innovation which is a new instrument in structured finance which developed so rapidly that market infrastructure and systems are not prepared when these instruments come under stress. Some propose that markets in new instruments should be given time to mature before they are permitted to attain a systemically significant size. This means giving accountants, regulators, ratings agencies, and settlement systems time to catch up. The fourth, is the crisis which has been triggered by the bubble bursting, due to increasing interest rates of which sub-prime mortgages are defaulted. Finally, the fall of Lehman Brothers amplified the speed of crises in USA and then spread into other continents easily and fast.

## ***2.2 Impact on Indonesia's Economy***

The effect of the crisis on Indonesia has been considerably less than in many other countries. The Indonesian economy has recorded better growth outcomes than most other developing economies, many of which have experienced severe recessions and significant unemployment. The Indonesian financial system has been more resilient. Notably, Indonesian banks have continued to be profitable and have not required significant capital injections from the Government.

However, the local economy and financial markets in Indonesia are not immune to economic crisis. Growth in the economy slowed to 4.63 % in 2009 from 6.01% in 2008. Growth in exports declined by 14.3% in 2009 from USD 140 billion in 2008 to USD 119 billion. The unemployment rate has risen considerably if unrecorded unemployment in 2009 is taken into account.

The most obvious impact of the financial crisis on most Indonesian households was the large decline in equity prices, particularly stock prices which reduced the wealth of Indonesian

households by nearly 47% by February 2009. However, since the trough in equity markets in February 2009, the local market had recovered tremendously and steadily. The Indonesian Rupiah also depreciated rapidly and sizably as the crisis intensified by March 2009, declining by over 129% from its August 2008 peak. Around the time of the Lehman bankruptcy, conditions in the foreign exchange market were particularly illiquid, prompting Bank of Indonesia to intervene in the market to enhance liquidity. Since March 2009, as fears abated, the Indonesian Rupiah largely recovered, reflecting the relative strength of the Indonesian economy. In line with the depreciation of Rupiah, Indonesia's international exchange reserve also declined rapidly and sizably as the crisis intensified, of which by February 2009 dropped to USD 50.5 billion from its July 2008 peak worth USD 60.6 billion.

The credit and money markets in Indonesia have also proven to be more resilient than in many other countries necessitating considerably less intervention by the Bank of Indonesia. On the whole, this reflected the health of the Indonesian banking system. The Indonesian banks had almost no holdings of the "toxic" securities that severely affected other global banks. The health of the Indonesian banking system facilitated the effectiveness of the monetary and fiscal response. This is particularly due to allowing the large easing in monetary policy to be passed through to interest rates on loans to households and businesses, in stark contrast to the outcome in other developed economies.

### **3. METHODOLOGY**

In recent years, there has been a growing interest in the specification and estimation of econometric relationships based on panel data. This interest can be explained by the fact that panel data offer researchers extended modeling possibilities as compared to purely cross-sectional data or time-series data. Panel data is generally more informative, and they contain more variation and less collinearity among the variables. The use of panel data results in a greater availability of degrees of freedom and hence increases efficiency in the estimation. Panel data also allows for the specification of more complicated behavioral hypotheses, including effects that cannot be addressed using pure cross-sectional or time-series data (Hsiao 1986; Baltagi 2001).

Two problems may arise when panel data incorporates a locational component. The first problem is that spatial dependence may exist between the observations at each point in time. The fact that distance affects economic behavior is the main reason for an observation associated with a specific location to be dependent on observations at other locations. Regional science theory points out that economic agents may change their decisions depending on (1) market conditions in the region of location as compared to other regions and (2) the distance between regions. When specifying the spatial dependence between observations, the model may incorporate a spatial auto-regressive process in the error term. Alternatively, the model may contain a spatially auto-regressive dependent variable. The first model is known as the spatial error model and the second as the spatial lag model (Anselin and Hudak; 1992).

As pointed out by Anselin et al. (2008), when specifying spatial dependence among the observations, a spatial panel data model may contain a spatially lagged dependent variable, or the model may incorporate a spatially autoregressive process in the error term. The first model is known as the spatial lag model and the second as the spatial error model. A third model, advocated by LeSage and Pace (2009), is the spatial Durbin model that contains a spatially lagged dependent variable and spatially lagged independent variables.

Formally, the spatial lag model is formulated as

$$y_{it} = \delta \sum_{j=1}^N w_{ij} y_{jt} + \alpha + x_{it} \beta + \mu_i \text{ (optional)} + \lambda_t \text{ (optional)} + \varepsilon_{it},$$

Where  $y_{it}$  is the dependent variable for cross-sectional unit  $i$  at time  $t$  ( $i=1, \dots, N$ ;  $t=1, \dots, T$ ). The variable  $\sum w_{ij} y_{jt}$  denotes the interaction effect of the dependent variable  $y_{it}$  with the dependent variables  $y_{jt}$  in neighbouring units, where  $w_{ij}$  is the  $i, j$ -th element of a pre-specified non-negative  $N \times N$  spatial weights matrix  $W$  describing the arrangement of the spatial units in the sample. The response parameter of these endogenous interaction effects,  $\delta$ , is assumed to be restricted to the interval  $(1/r_{min}, 1)$ , where  $r_{min}$  equals the most negative purely real characteristic root of  $W$  after this matrix has been row-normalized (LeSage and Pace, 2009, pp. 88-89 for mathematical

details)<sup>1</sup>.  $\alpha$  is the constant term parameter.  $x_{it}$  a  $1 \times K$  vector of exogenous variables, and  $\beta$  a matching  $K \times 1$  vector of fixed but unknown parameters.  $\varepsilon_{it}$  is an independently and identically distributed error term for  $i$  and  $t$  with zero mean and variance  $\sigma^2$ , while  $\mu_i$  denotes a spatial specific effect and  $\lambda_t$  a time-period specific effect. Spatial specific effects control for all space-specific time-invariant variables whose omission could bias the estimates in a typical cross-sectional study, while time period specific effects control for all time-specific effects whose omission could bias the estimates in a typical time-series study (Baltagi, 2005). If  $\mu_i$  and/or  $\lambda_t$  are treated as fixed effects, the intercept  $\alpha$  can only be estimated under the condition(s) that  $\sum_i \mu_i = 0$  and  $\sum_t \lambda_t = 0$ . An alternative and equivalent formulation is to drop the intercept from the model and to abandon one of these two restrictions (Hsiao, 2003).

In the spatial error model, the error term of unit  $i$ ,  $\phi_{it}$ , is taken to depend on the error terms of neighboring units  $j$  according to the spatial weights matrix  $W$  and an idiosyncratic component  $\varepsilon_{it}$ , or formally:

$$y_{it} = \alpha + x_{it}\beta + \mu_i \text{ (optional)} + \lambda_t \text{ (optional)} + \phi_{it},$$

$$\phi_{it} = \rho \sum_{j=1}^N w_{ij} \phi_{jt} + \varepsilon_{it}$$

Where  $\rho$  is called the spatial auto-correlation coefficient

To test whether the spatial lag model or the spatial error model is more appropriate to describe the data than a model without any spatial interaction effects, one may use Lagrange Multiplier (LM) tests for a spatially lagged dependent variable and for spatial error autocorrelation, as well as the robust LM-tests which test for the existence of one type of spatial dependence conditional on the other. A mathematical derivation of these tests for a spatial panel data model with spatial fixed effects can be found in Debarsy and Ertur (2010). These tests are based on the residuals of the non-spatial model with spatial fixed effects and follow a chi-squared distribution with one

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<sup>1</sup> Kelejian and Prucha (2010) point out that the normalization of the elements of the spatial weights matrix by a different factor for each row as opposed to a single factor is likely to lead to a misspecification problem. For this reason, they propose a normalization procedure where each element of  $W$  is divided by its largest characteristic root. This normalization procedure is left aside in this paper because of both assumption 1' and footnote 21 in Lee and Yu (2010a).

degree of freedom. If a non-spatial model is estimated without any fixed effects or a non-spatial model with both spatial and time-period fixed effects, the residuals of these models can be used instead (Elhorst, 2010a). Since the outcomes of these tests depend on which effects are included, it is recommended to carry out these LM tests for different panel data specifications.

To test whether the random effects model or the fixed effects model is more appropriate to describe the data, the Hausman's specification test is employed. Hausman's specification test can be used to test the random effects model against the fixed effects model (see Lee and Yu, 2010b for mathematical details)<sup>2</sup>. Another way to test the random effects model against the fixed effects model is to estimate the parameter "phi" ( $\Omega^2$  in Baltagi, 2005), which measures the weight attached to the cross-sectional component of the data and which can take values on the interval [0,1]. If this parameter equals 0, the random effects model converges to its fixed effects counterpart; if it goes to 1, it converges to a model without any controls for spatial specific effects:

$$\begin{array}{l}
 Y_{it} \quad \left\{ \begin{array}{l} \text{LOAN-SME}_{it} \quad : \text{Loan given to SME by Banks} \end{array} \right. \\
 \\
 X_{it} \quad \left\{ \begin{array}{l} \text{GDPR}_{it} \quad : \text{Gross Domestic Products regional} \\ \text{Interest}_{it} \quad : \text{Interest rates charged to SME's} \\ \text{BANK}_{it} \quad : \text{Number of office banks regionally} \\ \text{NPL-SME}_{it} \quad : \text{Non performing loans of SME's regionally} \end{array} \right.
 \end{array}$$

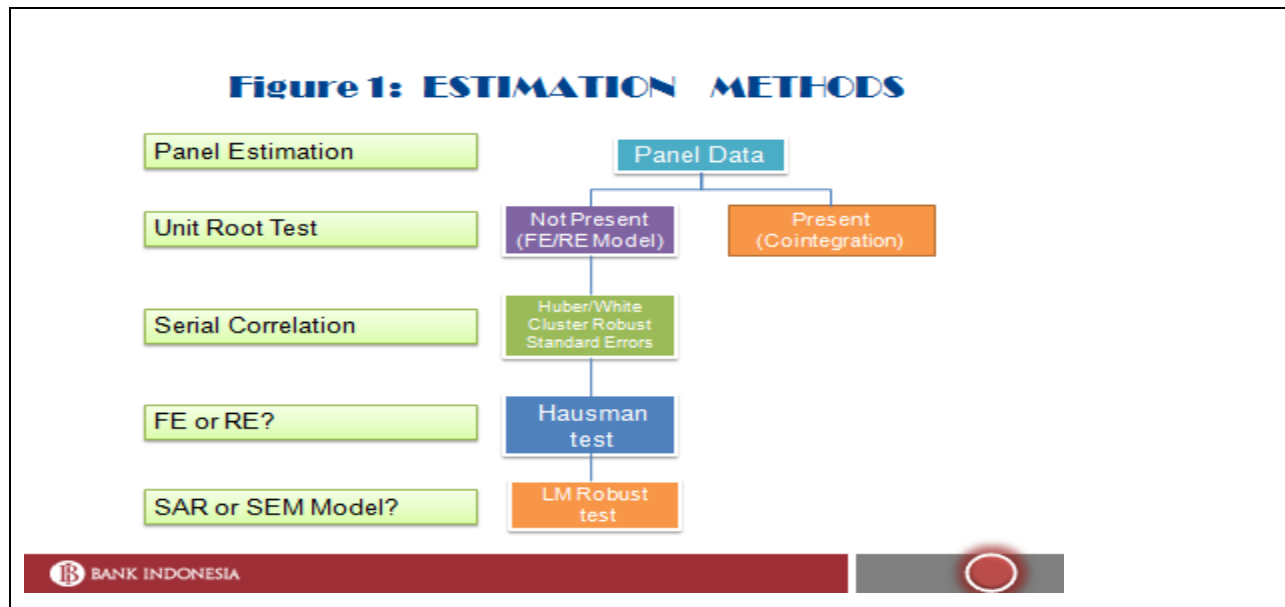
Data used in this research spanned from the first quarter of 2002 up to the fourth quarter of 2011. The detail of the data can be seen in the Table 1 below:

<sup>2</sup> Mutl and Pfaffermayr (2010) derive the Hausman test when the fixed and random effects models are estimated by 2SLS instead of ML.

Table 1:

No.	VARIABLES	EXPLANATIONS	SOURCES
1 .	Period	2002.quarter1 - 2011.quarter4	
2 .	Region	26 Province of Indonesia	
3 .	LOAN-SME	Loans extended to small and medium scale enterprises	Bank Indonesia
4 .	Interest rates	Interest rates charged to SME's loans	Bank Indonesia
5 .	GDP Regional	Gross Domestic Products of each province	Statistic Offices
6 .	NPL-SME	Non performing loan of SME's Loans	Bank Indonesia
7 .	BANK	Number of bank offices	Bank Indonesia

Figure 1 : The procedure in estimating the SAR or SEM models



#### 4. RESEARCH FINDINGS

Before estimating the models, there are several steps that must be performed. The first step is to test the stationarity of the variables used in these models. If the data are clearly stationary, we can continue to the next step which is estimating the models. Furthermore, we conduct other tests to choose the best models which will be delivered to the final conclusions of this research. The next test is the robust LM test to decide whether SAR or SEM or both models is more relevant to this analysis. The final test is Hausman test to choose whether the model is fixed effects or random effects.



The result of the stationary test is depicted in Table 2 below.

**Table 2:**

<b>Variables</b>	<b>t-star</b>	<b>t-value</b>	<b>p-value</b>
LOAN-SME	-2.53	-3.57	0.006
Interest rates	-15.00	-14.95	0.000
GDP Regional	-33.91	-33.63	0.000
NPL-SME	-17.22	-26.54	0.000
BANK	-21.86	-27.89	0.000

By employing Levin-Lin test for panel, unit root confirms the stationary of the variables. Null of unit root is rejected at 1% level of confidence. Therefore, cointegration test is not necessary, so we can proceed to the next step.

Results of the first model (Table 3), called the benchmark SAR model, can be summarized as follows:

- Fixed effect model shows that number of banks, interest rates, GDP regional, non-performing loan and spatial correlation are significant determinants of loan to SMES's.
- The signs of coefficients are as expected.
- The most important thing is that there is strong and positive spatial correlation among province, showing commoving and integrating economy within territory.

Results of the second model (Table 4), called the benchmark SEM model, can be summarized as follows:

- The random effect model shows that only interest rates are not significant determinants of loan to SMEs.
- The signs of coefficients are as expected.
- The most important thing is that this model suggests stronger and positive spatial correlation among province than SAR, showing commoving and integrating economy are guaranteed.

<b>Table 3:</b>				<b>Table 4</b>					
<b>BENCHMARK SAR MODEL : LOAN TO SME'S</b>				<b>BENCHMARK SEM MODEL : LOAN TO SME'S</b>					
<b>Variables</b>	<b>Fixed Effect</b>		<b>Random Effect</b>		<b>Variables</b>	<b>Fixed Effect</b>		<b>Random Effect</b>	
Bank	0.095	***	0.083	***	Bank	0.125	***	0.177	***
	4.762		5.149			4.201		6.165	
Interest	-0.020	**	-0.020	**	Interest	-0.203	***	-0.011	
	-2.300		-2.300			-4.277		-0.521	
Gdpreg	0.304	**	0.361	***	Gdpreg	1.259	***	2.724	***
	2.102		2.575			3.721		12.254	
Npl-sme	-0.015	**	-0.014	*	Npl-sme	-0.203	***	-0.170	***
	-1.869		-1.751			-5.844		-4.823	
spat.aut.	0.863	***	0.850	***	spat.aut.	0.936	***	0.903	***
	58.834		53.248			131.893		83.778	
<i>R-squared</i>	0.978		0.977		<i>R-squared</i>	0.780		0.976	
Observation	1040		1040		Observation	1040		1040	
<i>Hausman Test</i>	23.594				<i>Hausman Test</i>	4.1578			

The results of the third model (Table 5), called the crisis SAR model, can be summarized as follows:

- The random effect model shows that all variables are significant determinants of loan to SMEs.
- The signs of coefficients are as expected.
- The global crisis is negatively correlated with loan to SMEs at 10% level of significance.

The results of the fourth model (Table 6) which is an optimal and final model, called a crisis SEM model, can be summarized as follows:

- The random effect model shows that all variables are significant determinants of loan to SMEs except interest rates.
- The signs of coefficients are as expected.
- The global crisis is negatively correlated with loan to SMEs at 5% level of significance and the magnitude is bigger than the previous one, showing this model is the most robust among the models.

<b>Table 5</b>				<b>Table 6</b>					
<b>CRISIS SAR MODEL : LOAN TO SME'S</b>				<b>CRISIS SEM MODEL : LOAN TO SME'S</b>					
<b>Variables</b>	<b>Fixed Effect</b>		<b>Random Effect</b>		<b>Variables</b>	<b>Fixed Effect</b>		<b>Random Effect</b>	
Bank	0.099	***	0.083	***	Bank	0.124	***	0.179	***
	4.971		5.237				4.180		6.251
Interest	-0.099	***	-0.035	***	Interest	-0.200	***	-0.014	
	-2.460		-3.663				-4.223		-0.673
Gdpreg	0.370	***	0.409	***	Gdpreg	1.273	***	2.737	***
	2.547		2.924				3.781		12.382
Npl-sme	-0.124	***	-0.116	***	Npl-sme	-0.201	***	-0.167	***
	-3.961		-3.723				-5.784		-4.747
GLOBAL-C	-0.015	**	-0.014	*	GLOBAL-C	-0.192	*	-0.158	**
	-1.941		-1.743				-1.708		-2.144
spat.aut.	0.869	***	0.864	***	spat.aut.	0.934	***	0.896	***
	62.868		59.897				127.616		77.654
<i>R-squared</i>	0.978		0.977		<i>R-squared</i>	0.801		0.976	
Observation	1040		1040		Observation	1040		1040	
<i>Hausman Test</i>	2.136				<i>Hausman Test</i>	3.3631			
<i>LM Test</i>	<b>SEM/SAR</b>				<i>LM Test</i>	<b>SEM/SAR</b>			
					Robust LM test no spatial lag			35.3035	
					Robust LM test no spatial error			88.7045	

## 5. CONCLUSIONS, POLICY IMPLICATIONS AND RESEARCH LIMITATIONS

The research findings show that:

- The global financial crisis significantly and negatively impacts the performance of SMEs in Indonesia.
- In terms of loan extended to SMEs, there is a strong and positive spatial correlation among province, showing commoving and integrating economy within the territory of Indonesia.
- Interest rates are not significantly correlated with loans to SMEs. This means the access to financial institutions is more important and urgent to boost the performance of SMEs in Indonesia which reinforces the opinion of financial inclusions for SMEs.

The policy implications of this research can be summarized as follows:

- The global financial crisis needs the improvement in economic fundamentals.
- Access of SMEs to banking and financial sectors should be re-emphasized.
- The role of government in dealing with SMEs should be promoted to guarantee more equitable development.
- The regions (provinces) which lag in penetrating formal financial sectors should be pushed faster through intervention of formal institutions.

The limitations of this research are summarized as follows:

- This data and analysis in this research is limited to country (province) level.
- Further research should focus more at industry level. Hence, it has to be facilitated by the availability of industry level data in order to examine the sensitivity of each industry in anticipating the next financial crisis.

## REFERENCES

- Anselin, L., Le Gallo, J., Jayet, H. (2008). Spatial panel econometrics. In: Mátyás L, Sevestre P (eds) *The econometrics of panel data, fundamentals and recent developments in theory and practice*, 3rd edition. Kluwer, Dordrecht, pp 627-662.
- Arrelano, M., Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58(2):277-297.
- Baltagi, B.H. (2005). *Econometric analysis of panel data*, 3rd edition. Wiley, Chichester.
- Debarsy, N., Ertur, C., LeSage, J.P. (2011). Interpreting dynamic space-time panel data models. *Statistical Methodology* doi:10.1016/j.stamet.2011.02.002
- Elhorst, J.P. (2003). Specification and estimation of spatial panel data models. *International Regional Science Review* 26(3):244-268.
- Elhorst, J.P. (2010a). Spatial panel data models. In: Fischer MM, Getis A (eds) *Handbook of applied spatial analysis*. Springer, Berlin, Heidelberg and New York, pp 377-407.

Elhorst, J.P. (2010b). Matlab software for spatial panels. Paper presented at 4th World Conference of the Spatial Econometric Association, Chicago.

Elhorst, J.P. (2010c) Dynamic panels with endogenous interaction effects when T is small. *Regional Science and Urban Economics* 40(5):272-282.

Kelejian, H.H., Prucha, I.R. (1998). A generalized spatial two stage least squares procedure for estimating a spatial autoregressive model with autoregressive disturbances. *Journal of Real Estate Finance and Economics* 17(1):99-121.

LeSage, J.P., Pace, R.K. (2009). *Introduction to spatial econometrics*. CRC Press Taylor & Francis Group, Boca Raton.

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