PRESS
Advances in Social Science, Education and Humanities Research (ASSEHR), volume 186
15th International Symposium on Management (INSYMA 2018)

Do local suppliers and local buyers benefit from foreign direct investment?: evidence from Indonesia

Suyanto & Yenny Sugiarti
University of Surabaya, Surabaya, Indonesia

ABSTRACT: This study examines the impact of foreign direct investment on the local suppliers as well as on the local buyers in Indonesian manufacturing industries. The effect of FDI on local suppliers is tracked down using the backward effect on the efficiency performance and the effect on local buyers is evaluated through the forward effect on the technical efficiency. Stochastic Frontier Method is applied as the method of estimation on 3,318 firms for 13 year period (total 43,134 observations). The panel data are constructed using the survey of large and medium firms conducted by Indonesian Central Board of Statistik (BPS). The results show that the existence of foreign firms in Indonesian manufacturing sector reduce inefficiency of not only local firms in the same industries but also local suppliers and local buyers.

Keywords: foreign direct investment, local buyers, local suppliers, manufacturing industries Indonesia

1 BACKGROUND

Research on productivity spillovers of Foreign Direct Investment (FDI) has been developed significantly in the last two decades. The first group of literature, among others by Suyanto & Salim (2013), and Sari et al. (2016) for Indonesia, by Anwar & Nguyen (2012) for Vietnam, Wang et al. (2013) for China, Fujimori and Sato (2015) for India, Kim (2015) for South Korea, Khalifah et al. (2015) for Malaysia, and Markusen & Trofimenko (2009) for Columbia focuses on the impact of FDI on local companies in the same industry (horizontal spillovers). The results of these studies are mixed.

The second group of literature which is more recent evaluates the impact of FDI on local supplier firms (backward linkages) as well as local buyer firms (forward linkages). The FDI spillover impact on local suppliers is high knowledge transfer because foreign companies set up a certain level of quality standards on raw materials from local suppliers (Marlevede et al. 2014). Foreign companies provide technical and managerial training to their suppliers (Gorg & Seric 2016). The empirical studies those indicated an impact of FDI on suppliers are Liang (2017), Suyanto et al. (2014), Wang & Wong (2016).

In addition, FDI affects local buyers through high quality and standardized products (Havranek & Irsova 2011, Xu & Sheng, 2012). The high quality product from MNC that used by local buyers as material for production contributes to the improvement of the efficiency of local buyer's products (Girma et al. 2015, Suyanto et al. 2009). In contrast, Rojec & Knell (2017) argue that the evidence concerning the impact of FDI on buyer firms is still rare. These mixed findings require further studies on the issue. This current research is one of the efforts to enlighten the issue.

2 RESEARCH METHOD

The method of analysis in this study was Stochastic Production Frontier (SPF). Unlike the traditional estimation of productivity that estimates the mean value of all observed firms, the SPF measures the deviation to the best practice firms. The SPF for panel data is discussed in Coelli et al. (2005) and Kumbakar & Lovell (2000).

The model used in this study was adopted from the SPF method of Battese & Coelli (1995) that can be written in linear translog equation as follows:

$$lny_{it} = \beta_0 + \sum_{n=1}^{N} \beta_n lnx_{nit} + \frac{1}{2}\sum_{n=1}^{N}\sum_{k=1}^{K} \beta_{nk} \ln x_{nit}\, lnx_{kit} + \beta_t t + \frac{1}{2}\beta_{it} t^2 + \sum_{n=1}^{N} \beta_{nt} lnx_{nit} t + v_{it} - u_{it} \quad (1)$$

where y is output; x represents the variables affecting output (labor, capital, material and energy, so N = 4); i is the i-th company; t is the year t; n is the n-th input variable and u is defined as:

$$u_{it} = \mathrm{FDI_{it}}\gamma + \mathrm{G_{it}}\delta + \varphi_{it} \quad (2)$$

where FDI is the vector (1xj) for the FDI variable in firm i at time t, γ is the vector (jx1) for coefficients, G is the vector (1xp) other exogenous variables in firm i at time t, and δ is the vector (px1) for coefficients of other exogenous variables.

The FDI variable includes three variables, namely (1) the impact of FDI on local firms in similar industries (horizontal FDI); (2) the impact on the local supplier firms (backward); (3) the impact variables of FDI on local buyer firms (forward). These three variables were used simultaneously in estimation and also used separately in estimates. Thus, there was an estimation model for all three FDI variables together and there are estimation models for each of the three individual variables.

3 RESULTS AND DISCUSSION

Table 1 provides the estimation results of the FDI impact on local firms' productivity. The estimates are on total firms as well as domestic firms only. The Table presents also basic production input results for labour (LnL), capital (LnK), material (LnM) and energy (lnE). one would note that the first degree input variables in production function have significant coefficients for all models, except Forward Spillover 2. However, the interacting variable between material and energy and the second degree variable of material and variable of energy have significant coefficients*(The full estimation is not presented in Table 1 due to page limitation, but it is available upon request.). As the impact of each input to output depends on the combination of the coefficients of all terms involving the input (first and second orders, including the interacting variable between inputs), the direct effects of each input to output is represented by the output elasticity with respect to each input*(The output elasticity of inputs is available with the author and would be provided upon request).

Moving to the inefficiency function (the lower part of Table 1), the estimated coefficients of FDI (which take the value of one if the firm is a foreign-owned firm and zero if the firm is a domestic firm) are negative and highly significant at the 1% level, suggesting that foreign-owned firms are, on average, less inefficient than domestic firms, keeping other variables constant. This result supports the mainstream premise that foreign firms generally possess a more updated knowledge and have more experience in serving markets, so that they are more efficient than domestic firms. This finding is in line with the theoretical argument of Kwon & Chun (2013) and empirical findings in Suyanto et al. (2009) and Sari et al. (2016).

As expected, the coefficient of FDIHorizontal has a negative sign and is statistically significant at the 1% level, meaning that the presence of FDI reduces inefficiency of firms in the same industry, which is in line with the finding of Suyanto et al. (2014) and Sari et al. (2016). Similarly, FDIBackward and FDIForward have also negative and highly significant coefficients, which indicate negative effects of FDI on technical inefficiency (or positive technical efficiency spillovers) on suppliers and buyers, respectively. Although this study uses a longer time period by including the period of crisis, the findings are in line with Sari et al. (2016) on the ground that FDI at the industrial level generates positive spillovers to firms in the same industry, firms in upstream industries, and firms in downstream industries.

4 CONCLUSION

This current study examines the impact of FDI on local firms in the same industry, local supplier firms, and local buyer firms. The results show that FDI provides positive spillovers on local firms in the same industry, local supplier firms, and local buyer firms.

REFERENCES

Anwar, S. & Nguyen, L.P. 2014. Is Foreign Direct Investment Productive? A Case of the Regions of Vietnam. *Journal of Business Research* 67(7): 1376-1387.

Battese, G.E. & Coelli, T.J. 1995. A Model for Technical Inefficiency Effects in a Stochastic Frontier Production Function for Panel Data. *Empirical Economics* 20 (2): 325-332.

Coelli, T.J., Rao, D.S.P., O'Donnell, C.J. & Battese, G.E. 2005. *An Introduction to Efficiency and Productivity Analysis*. 2nd ed. New York: Springer.

Fujimori, A. & T. Sato. 2015. Productivity and Technology Diffusion in India: The Spillover Effects from Foreign Direct Investment. *Journal of Policy Modelling* 37(4): 630-651.

Girma, S., Y. Gong, H. Gorg, & Lancheros, S. 2015. Estimating Direct and Indirect Effects of Foreign Direct Investment on Firm Productivity in the Presence of Interaction between Firms. *Journal of International Economics* 95(1): 157-169.

Gorg, H. & Seric, A. 2016. Linkages with Multinationals and Domestic Firm Performance: The Role of Assistance for Local Firms. *The European Journal of Development* 28(4): 605-624.

Havranek, T. & Irsova, Z. 2011. Estimating Vertical Spillovers from FDI: Why Results Vary and What the True Effect is. *Journal of International Economics* 85(2): 234-244.

Khalifah, N.A., Salleh, S.M. & Adam, R. 2015. FDI Productivity Spillovers and the Technology gap in Malaysia's Electrical and Electronic Industries. *Asia Pacific Economic Literature* 29(1): 142-160.

Kim, M. 2015. Productivity Spillovers from FDI and the Role of Domestic Firm's Absorptive Capacity in South Korean Manfacturing Industries. *Empirical Economics* 48(2): 807-827.

Kumbhakar, S.C. & Lovell, C.A.K. 2000. *Stochastic Frontier Analysis*. Cambridge: Cambridge University Press.

Kwon, C. & Chun, B.G. 2015. The Effect of Strategic Technology Adoptions by Local Firms on Technology Spillover. *Economic Modelling* 51(1): 13-20.

Liang, F.H. 2017. Does Foreign Direct Investment Improve the Productivity of Domestic Firms? Technology Spillovers, Industry Linkages, and Firm Capabilities. *Research Policy* 46(1): 138-159.

Markusen, J. R. & Trofimenko, N.. 2009. Teaching Locals New Tricks: Foreign Experts as a Channel of Knowledge Transfer. *Journal of Development Economics* 88(1): 120-131.

Merlevede, B., Schoors, K. & Spatareanu, M. 2013. FDI Spillovers and Time since Foreign Entry. *World Development* 56(1): 108-126.

Rojec, M. & Knell, M. 2017. Why is There a Lack of Evidence on Knowledge Spillovers from Foreign Direct Investment?. *Journal of Economic Surveys* In Press. DOI: 10.1111/joes.12207

Sari, D.W., Khalifah, N.A. & Suyanto, S. 2016. The Spillover Effects of Foreign Direct Investment on the Firms' Productivity Performances. *Journal of Productivity Analysis* 46(2-3): 199-233.

Suyanto, Bloch, H. & Salim, R.A. 2014. Which Firms Benefit from Foreign Direct Investment? Empirical Evidence from Indonesian Manufacturing. *Journal of Asian Economics*. 33(1): 16-29.

Suyanto & Salim, R.A. 2013. Foreign Direct Investment Spillovers and Technical Efficiency in Indonesian Pharmaceutical Sector: Firm Level Evidence. *Applied Economics* 45(3): 383-395.

Suyanto, R. A. Salim, dan H. Bloch. 2009. Does Foreign Direct Investment Lead to Productivity Spillovers? Firm Level Evidence from Indonesia. *World Development* 37(12): 1861-1871

Wang, Y. 2010. FDI and Productivity Growth: The Role of Inter-Industry Linkages. Canadian Journal of Economics 43(4): 1234-1272.

Wang, D. T., F. F. Gu, D. K. Tse, dan C. K. Yim. 2013. When does FDI Matter? The Role of Local Institutions and Ethnic Origins of FDI. *International Business Review* 22 (2): 450-465.

Wang, M. and M. C. S. Wong. 2016. Effect of Foreign Direct Investment on Firm-Level Technical Efficiency: Stochastic Frontier Model Evidence from Chinese Manufacturing Firms. *Atlantic Economic Journal* 44(3): 335-361.

Xu, X. and Y. Sheng. 2012. Are FDI Spillovers Regional? Firm-Level Evidence from China. Journal of Asian Economics 23(3): 244-258.

Appendix

Estimates of Stochastic Production Frontiers on the FDI Spillover Effects for Firms in The Same Industry, Backward Industry, and Forward Industry

Source: Author's Calculation using the model specified in Equations (1) and (2). Notes: The estimations include time trend, interacting parameters between inputs, interacting parameters between inputs and time trend, age of firm, and crisis. The t-statistics are in parenthesis. *** denotes 1% significance level, ** denotes 5% significance level, and * denotes 10% significance level.

Variable	All Firms			Domestic Firms		
	Horisontal Spillovers 1	**Backward Spillovers 1**	**Forward Spillovers 1**	**Horisontal Spillovers 2**	**Backward Spillovers 2**	**Forward Spillovers 2**
Production Frontier *(Dependent variable: lnY)*						
Constant	1.144***	1.214***	1.117***	1.128***	1.285***	1.132
	(37.08)	(37.58)	(37.01)	(34.42)	(38.01)	(1.31)
LnL	0.601***	0.608***	0.614***	0.595***	0.619***	0.579
	(32.87)	(30.65)	(31.07)	(28.85)	(30.12)	(0.94)
LnK	0.180***	0.177***	0.175***	0.197***	0.192***	0.205
	(17.34)	(16.01)	(15.86)	(17.42)	(17.22)	(0.70)
LnM	0.212***	0.198***	0.192***	0.175***	0.159***	0.164
	(19.41)	(18.03)	(17.16)	(15.27)	(13.69)	(0.30)
LnE	0.244***	0.253***	0.255***	0.263***	0.250***	0.270
	(26.16)	(27.08)	(27.42)	(27.79)	(27.64)	(1.53)
Inefficiency Function *(Dependent variable: u)*						
Constant	0.078***	0.124***	0.062***	0.053***	0.117***	0.216
	(21.59)	(16.05)	(23.09)	(23.54)	(14.60)	(0.33)
FDI	**-0.008****	**-0.011****	**-0.010****	-	-	-
	(-6.56)	(-8.82)	(-10.76)			
FDIHorizontal	**-0.126****	-	-	**-0.150*****	-	-
	(-88.00)			(-6.56)		
FDIBackward	-	**-0.085****	-	-	**-0.072*****	-
		(-18.88)			(-21.79)	
FDIForward	-	-	**-0.124****	-	-	**-0.122****
			(-25.00)			(-2.30)
Sigma-squared (σ_S^2)	0.033***	0.033***	0.033***	0.031***	0.032***	0.032*
	(195.31)	(144.52)	(140.34)	(142.70)	(138.00)	(1.69)
Gamma (γ)	0.005***	0.024***	0.001***	0.137***	0.035***	0.004
	(20.78)	(10.66)	(8.32)	(18.23)	(8.57)	(0.51)
No. of Establishments	3,318	3,318	3,318	-	-	-
No. of Observations	43,134	43,134	43,134	40,042	40,042	40,042