Chapter 12

A Survey of Micro-data Analyses in Indonesia

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March 2009

This chapter should be cited as
Aswicahyono, H. (2009), 'A Survey of Micro-data Analyses in Indonesia', in Corbett, J. and S. Umezaki (eds.), *Deepening East Asian Economic Integration*. ERIA Research Project Report 2008-1, pp.456-472. Jakarta: ERIA.

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Globalizing corporate activities, deepening economic integration and its impact on the performance of local firms has increasingly become a subject of extensive discussion. As a result, a growing body of literature on this subject has developed rapidly. This paper provides a survey and evaluation of this literature. It seeks to find in the literature answers to important questions such as: why some firms export abroad and others do not, why some firms fail to survive under intense pressure from globalization, whilst others do and why some choose to invest abroad rather than export. Since MNE is becoming more important, it is also necessary to survey the impacts of the presence of MNE and exporting activities on domestic firms. However, analysis on the subject for developing countries is sparse. This paper, therefore, pays particular attention to the empirical micro analysis of Indonesian firm performance

1. Introduction

Interest in the impact of globalizing corporate activities and deepening economic integration on the performance of local firms has developed over the last decade. The interest has led to a new and rapidly expanding body of literature on the subject. As a result, the literature has generated new insights on why some firms export abroad and others do not, why some firms fail to survive under intense pressure from globalization, whilst others do and why some choose to invest abroad rather than export. Another strand of literature seeks to answer the question whether the presence of MNE and exporting activities has a positive impact on domestic firms. In short, the new literature sheds light on the key drivers of globalization and the impact of the phenomenon on local firms' performance.

It goes without saying that the impact of globalization and economic integration differs between countries, depending on the stages of economic development, industrial structures and policy environment within which firms operate. The extent to which important questions posed above can be answered also depends on the nature and the quality of the available dataset. It is therefore important to review the literature in the context of the specific conditions surrounding a country. This paper reviews the rapidly growing literature of micro-data analyses on the themes in Indonesia.

2. Export Decision

Recent empirical literature on international trade has put heterogeneity as its core aspect. One important aspect of this heterogeneity is firms' participation in international trade: some firms export abroad and others do not. It raises an obvious question: what are the determinants of firms participation in exports. For example, using a sample of 650 Columbian firms throughout the 1980s, Roberts and Tybout (1997) found a significant impact of sunk costs on the decision to export. In their paper, they detected the presence of

sunk costs by testing if the previous export activity of the firm could be used to explain its current status, and found that previous participation in exporting increases the probability of current export activity by up to sixty percent.

Another important hypothesis is whether sunk costs can be affected by spillovers from other firms. Aitken, Hanson and Harrison (1997), for example, suggest that a firm in an export intensive sector may find its cost of entering the foreign market reduced by the export activity of other firms. Moreover, Aitken et al. hypothesise that such spillovers would be even larger from multinational companies. The reason they suggested is that the presence of MNC might operate as a "natural conduit for information about foreign markets, foreign consumers, and foreign technology" to domestic firms. Aitken et al tests this hypothesis empirically on a sample of Mexican firms from 1986-1990, and found that multinational firms do have a positive spillover effect on the probability of domestic firms exporting

Sjoholm and Takii (2003) focus their analysis on the role of foreign network on export participation of Indonesian firms. In particular, they hypothesized that foreign contracts may increase the likelihood of exports. The model they use is profit maximizing firms decision to export (or not to export) under the existence of sunk entry costs. They use firm level Indonesian manufacturing panel data between 1990 and 2000. The dataset contains 197,195 observations for 26,987 plants during 1990-2000. From the model, they derive time- specific dummy variables and time-variant plant-specific variables, while the amount of foreign contacts was captured by a dummy variable on foreign ownership and a dummy variable for imports of intermediate goods. In addition, they include several control variables, such as public ownership, labor productivity, capital intensity, scale economies, and 3- digit ISIC level industry dummy variables. The paper employed OLS, fixed effect, and GMM approach. Even though, the authors prefer GMM methods due to its superiority in terms of unbiasedness and efficiency, they include OLS and fixed effect model in order to compare the result with previous studies.

The study confirms the relatively high export orientation and flexibility of foreign-owned plants, in the sense that foreign-owned plants that began their operation in Indonesia

by producing only for the domestic market are more likely than domestically-owned plants to start exporting. Inclusion of plant specific variables such as size, capital intensity, and labor productivity do not change the result of the study.

A similar study regarding the role of foreign ownership in exporting can be found in Ramstetter and Takii (2005). Instead of using industry dummy variables, they ran regression to 13 Indonesian manufacturing industries from 1990 through 2000 separately. The foreign influence is captured by dummy variables for minority, majority and wholly-foreign plants, while the control variables are capital intensity, production-worker intensity, size and vintage. There is not much discussion on the econometric technique that they use except that they utilized Tobit estimator.

The results confirm the previous study. They found that differences between MNCs and local plants remained positive and statistically significant even after the influences of factor intensities, plant size, and plant vintage were accounted for. Second, the results indicated that the size of these differences was usually reduced by accounting for the influences of factor intensities, plant-size, and plant vintage. Third, heavily-foreign MNCs tended to have the highest export propensities, but differences among foreign ownership groups were statistically insignificant in about half of the industry-period combinations examined. Statistically significant differences among foreign plants were concentrated in the mid- to late-1990s and in five industries, textiles, plastics, basic metals, metal products, and electric and precision machinery.

Narjoko and Atje (2007) is another literature on the decision to export. The paper tries to explain the sluggish export performance during and after the crisis. It uses the same firm level panel data from Industrial statistics for the period of 1997-2004. They estimate to set of equations. They use the Probit model to estimate the first equation that explains a plant's probability to export. The second equation explains the growth of a plant's export propensity. To avoid selection bias for the second equation, they employ Heckman's two-steps estimation procedure, within which, the computed inverse Mills ratio in the first equation is added in the explanatory variables of the second equation. The explanatory variables for the two equations are more or less similar to the previous study: previous year

export, capital intensity, skill intensity, labor productivity, foreign ownership, size, age, and imported –input dependence. However, since the primary concern is to analyze the impact of the crisis on a firm's export performance, they add financial leverage as an explanatory variable.

The major findings from the econometric analysis can be summarized as follows. First, being an exporter in the previous year significantly increases the probability to remain as an exporter in the current year. However, the result suggests the impact of exporting history was higher in the recovery rather than in the crisis and early recovery period (1999-2000). Second, the results strongly support the self- selection hypothesis, where firms need to be efficient to compete in highly competitive export markets. Third, in general, firms with some foreign ownership are suggested to have a higher chance to participate in exports compared to their domestic counterparts. However, the importance of this effect is shown to have been much weaker during the period 2002-04. Finally, the paper shows that the extent of financial constraint does not matter in determining the export supply response of the exporter.

3. Firm's Survival

The second important question is what determines survival of firms under globalization. There are three channels through which globalization may influence firms' survival: reduction in trade cost, competition from importing products, and foreign capital share.

Studies that look into the impact of foreign capital shares on firms' survival are rare, even for developed economies, and most of the studies show inconclusive results. For example, Bernard and Jensen (2002) found that U.S. multinationals are substantially less likely to close than other U.S. plants over five year intervals. However, after controlling for establishment characteristics, they found the opposite result. Gorg and Strobl (2003) found that Irish plants with majority foreign ownership were less likely to survive. Ozler

and Taymaz (2004) found similar results to that of Bernard and Jensen (2002) for developing countries. Their analysis of foreign and domestic establishments in the Turkish manufacturing industry for the period 1983-96 indicates that foreign establishments have a higher survival probability. However, when the establishment characteristics are controlled for, domestic establishments have the same survival probability.

Bernard and Sjoholm (2003) pose an intriguing concern that reliance on foreign nationals may be a risky development strategy as foreign firms are likely to be less rooted in the local economy and may be quicker to close down production. Using data from 1975-1989[1] and employing semi parametric estimation of the hazard function, they found that plants with some foreign ownership are far less likely to close down compared to completely domestic- owned plants. However, the difference in firms'survival rate is not the result of plants nationality of ownership, but is caused by plant characteristics. Controlling for size and productivity, they reveal that foreign ownership is associated with *increased* probability of closure. Using information on changes of ownership, they further test the result and found that foreign ownership, rather than unobserved plant characteristic, is associated with the lower survival rate.

Narjoko and Hill (2007) analyze firms' survival within an economic crisis situation. They focus their attention on export and ownership variables by regressing the percentage change in RVA on export and foreign ownership over the period 1998-2000. To test whether the level of foreign ownership matters, they include foreign ownership dummy and interaction term between the dummy and foreign ownership level. Various control variables such as size, age, financial leverage, import dependence, industry concentration, import penetration, trade protection, and dummy variables representing region and industry are also included in their equation. Finally, to avoid censoring bias, they employed Heckman's two-step estimation technique.

The result is consistent with studies of other crisis episodes, foreign ownership and prior export orientation are found to be highly significant determinants of survival and

[1] The reason for not using the more recent data is that beginning in 1990, plants were excluded from the sample if their size fell below 20 employees. Thus it is not possible to know if a plant exits in the 1990s because of closure or because of decrease in size.

recovery. The effects of firm size are ambiguous, a result which tends to refute the popular notion that smaller firms are more adaptable in times of crisis. The industry in which firms are located, in particular its factor proportions, is also found to be significant.

4. FDI Spillovers

Multinationals are distinguishable from local firms because the proprietary technology that MNCs owned allows them to compete successfully with local firms. Moreover, the entry of foreign firms disturbs market equilibrium and forces local firms to take action to protect their market share and profits. Those two factors may create various externalities that benefit local firms. The channel through which these externalities spillover to domestic firms are: increased competition, labor turnover, or through demonstration.

Spillover effect has been tested by a large number of papers and summarized by Gorg and Greenway (2004). They found that robust empirical support for positive spillovers is, at best, mixed. There are two explanations for the mixed results, first the positive competition effect from the presence of MNC may be outweighed by the negative impacts of the decrease in production per firm. Second, the heterogeneity of MNC and domestic firms makes it difficult to pin point the impact of MNC since not all types of MNC provide spillover benefits, and not all types of domestic firms have the capacity to obtain spillover effects.

The first important question that needs to be answered is whether foreign firms have a higher level of productivity compared to domestic firms. Applying simple regression techniques to 1991 manufacturing establishment data and after controlling for skill level, capacity utilization, scale and industry dummy, Blomstrom and Sjoholm (1998) found that foreign establishments have comparable high levels of labor productivity. By adding minority and majority owned foreign affiliates dummy, they also show that both minority and majority- owned foreign affiliates are more productive than domestic firms. Moreover,

the coefficients for those two dummy variables are similar in size and a chi-square test can not reject the hypothesis of equal coefficients.

A more detailed and longer time period (1975-2000) analysis by Takii and Ramstetter (2004) confirm the early findings. They found that MNCs generally had much higher average labor productivity than local plants and these differentials persisted after accounting for electricity consumption per worker, size and vintage. They also found that there was also a large variation in productivity differentials across industries and time, with statistically significant differentials most common in chemicals, metal products, and transportation machinery. However, unlike the previous findings, they found significant differences between minority, majority, and heavily-foreign MNCs, with lower labor productivity for minority and heavily-foreign MNCs compared to the majority-foreign MNCs.

The second question relevant to the themes is whether the presence of foreign firm affiliates creates positive externalities that spillover to domestic firms. Blomstorm and Sjoholm (1998) examined the spillover hypothesis by testing whether labor productivity in local firms varies with the degree of foreign production in an industry. They found a positive and statistically significant coefficient of FDI, which suggests that domestic establishment benefit from the presence of foreign establishments in the same 5-digit industry. Given the previous finding of no labor productivity differences between minority and majority- owned foreign affiliates, they expect a larger spillover from minority- owned foreign affiliates. But, regression results contradicted their expectation; the degree of foreign ownership of an establishment did not seem to affect the amount of intra-industry spillovers in Indonesian manufacturing.

Tomohara and Takii (2005) provide an analysis of another channel through which positive externalities from foreign establishment's spillover to domestic establishments. Using the generalized method of moments they estimated the dynamic model using panel data to examine whether foreign direct investment benefit workers employed by domestic companies in a host developing country. They found that the MNCs had positive externalities on the wage level of domestic companies. They also found that employees in

domestic companies enjoyed increased wages through two spillover channels, those resulting from increased productivity and those resulting from equity concerns.

5. Export Spillovers

In the theoretical IO and trade literature, it is often argued that participation in export activities may be beneficial to a country because of increased productivity through reallocation of resources from inefficient firms to more efficient firms (self-selection hypothesis), and through learning by exporting. Moreover, the benefit may be magnified if we can find the existence of productivity spillovers from exporting. Sethupathy (2007) argued that there are three channels for export spillover. First, under economies of agglomeration, the knowledge accumulated from learning by exporting could easily spillover to other firms in the same industry (horizontal spillovers). Second, a highly competitive international market forced the exporting firms to use higher quality inputs. This could result in exporting firms sharing knowledge and technology with their upstream partners in order to improve the inputs that they receive (upstream spillovers). Finally, the exporting firm's improved productivity could lead to higher quality input for its downstream partners, which in turn could have a positive effect on downstream productivity (downstream spillovers).

The export spillover hypothesis has been tested through various studies. Alfarez and Lopez (2006) summarized the studies and stated that: "these studies either do not find evidence that export activity increases the probability of exporting (e.g. Clerides et al., 1998; Barrios et al., 2003; Bernard and Jensen, 2004) or find that only multinational exporters generate spillovers (e.g. Aitken et al., 1997; Greenaway, et al., 2004; Ruane and Sutherland, 2004). The effect of exporting activity on export intensity of exporters is also not clear. While some find a positive effect of exporting activity by multinationals on export intensity (e.g. Greenaway, et al., 2004) others find a negative effect (e.g. Ruane and Sutherland, 2004)".

Using plant-level data from Chile, Alfarez and Lopez (2006), in general, found upstream export spillover. However, distinguishing between foreign and domestic firms, they found heterogeneity in the channel of spillovers. Exporting by foreign-owned plants generates positive spillovers in all directions, while domestic exporters increase productivity of their suppliers and, to a lesser extent, that of plants in the same sector.

Sethupathy (2007) used two-step methodology to estimate the effect of exposure to exporting on productivity. First, he estimated plan level productivity. Second, using GMM he regressed the TFP result with lag TFP, dummy for whether the plant became an exporter in the previous period, and three proxies to measure the extent of exposure to horizontal, upstream, and downstream relationship. He found productivity gains to downstream firms of approximately 2.5-5.0% during the period 1990-1996. However, he did not find the presence of spillovers upstream or horizontally.

6. Industrial Demographics and Productivity Growth

Mainstream economic literature usually uses representative plant approach in the estimation of TFP growth. However, if all plants were identical, the only source of TFP growth would be productivity improvements occurring through simultaneous productivity improvement within plants. However, this simplification is in stark contrast to the fact that plants differ in various characteristics such as, size, age, factor proportions, technology, as well as productivity levels and growth rates. Moreover, representative plant approach masks the microeconomic dynamic due to changing plant demography.

Using yearly Industrial data 1975-1995 at the plant level Vial (2008) decompose TFP growth into intra-plant TFP growth, market share reallocation among incumbents and plant turnover effect. The paper used three decomposition methods: (i) TFP aggregated with market shares, (ii) TFP aggregated with market shares, TFP relative to the average, (iii) TFP aggregated with market shares and time- average market shares, TFP relative to the average – time average)

The author found that the main source of aggregate productivity growth stems from the entry of high productivity plants and the exit of low productivity plants. But, the net entry effects tend to fade as productivity levels of entrants, incumbents, and exiters converge. The author also found that the effects of market share reallocation among incumbents remain unclear, with conflicting results depending on the methodology used. The author distinguished several episode in his/her analysis and found that the highest aggregate productivity gains occur after the de-regulation period of 1986-1994. However, de-regulation seems to have a stronger positive impact on incumbents' productivity gains than on the net entry effect.

7. Conclusion

The empirical literature review in general shows the positive impacts of globalizing corporate activities and deepening economic integration on the performance of local firms. The review pays special attention to the role of MNCs and export oriented firms, and found that in general, firms which are foreign-owned, export-oriented, and particularly both, have higher productivity and are more likely to recover quickly from crisis. More over, the presence of MNCs and exporting activities not only benefits the firms internally but also produces external spillovers that benefits local and non-exporting firms. The decomposition analysis suggests that entry and exit dynamics play an important role in the aggregate productivity level. Another important finding is that the highest aggregate productivity gains occur after the de-regulation period. The survey, therefore, supports the case for open trade and FDI policies within a dynamic flexible market environment that allows aggregate productivity improvements and the spread of the productivity gains through entry, exit, and spillovers.

Despite the accumulated knowledge on the impact of globalizing corporate activities and deepening economic integration on the performance of local firms in Indonesia, there are still many unanswered questions. First, there is anecdotal evidence that the relationship

weakened during and after the crisis. This requires further updates of the analysis. Second, there is no literature that deals with the selection and switching of destination and type of products. Currently, data limitation prevents researchers to dwell on the issue. It is therefore important to supplement the current database with a subsample that provides information on the issues. Finally, the challenges of incorporating specific policies remain. This can be done through finding better proxy variables for the specific policies or supplement the analysis with in- depth case studies.

Appendix 1: Indonesian Manufacturing Industries Data

The data for the Indonesian manufacturing industries are documented by the Indonesian Central Bureau of Statistic (Badan Pusat Statistik, BPS). With some modification to suit Indonesian conditions, BPS uses the International Standard Industrial Classification (ISIC) for all economic activities. The Indonesian Census of Manufacturing is part of a decennial Economic Census, while the Survey of Large and Medium Scale Manufacturing is conducted annually in intercensal years, aimed (not always successfully) at complete coverage of all establishments with 20 or more workers. Depending on the year, there are up to 160 variables including firm identification, sector classification, type of ownership, exports, and input and output variables. The aggregate data at five- digit ISIC level are available in published summary form in Statistik Industri (SI), while the firm level data can be obtained from BPS in electronic form.

The census and survey data attempt to cover all establishments with twenty or more workers. In 1985 BPS changed field procedures and improved them further in 1988 and 1990. Before 1985, field procedures were deficient in identifying new establishments and merely replaced establishments that ceased operation so that the number of firms between 1975 and 1985 remained more or less constant. The new field procedures were conducted through a door-to-door enumeration. As a result, a number of establishments showed a sharp increase in 1985, 1988 and 1990. Realizing the majority of establishments had started before they were included in the annual survey, BPS decided to correct this under-coverage by 'back casting' the history of establishment discovered after entry. The variables back casted are output, value- added and total number of workers.

The biggest impact of the back cast was on the number of establishments, with employment less affected, and nominal value added even less. This pattern occurs because most of the under-enumerated back cast establishments were smaller in terms of employment and value added per worker. In terms of trends, the growth in the number of establishments and employment in the back cast series was far smoother than in the SI data. However, the value added trend remained more or less the same.

The discussion of the data sources above draws attention to the fact that there are two data sources - the SI data and the back cast series. The SI data are superior in terms of the variables they covered but show apparent under-coverage. On the other hand, the back cast data cover all firms in the manufacturing sector but only report four variables, output, intermediate input, value added and number of workers. The under-coverage in the SI data suggests any analysis using this sample, pre and post 1985, may be misleading. This is especially relevant to an examination of the effects of trade reform during the 1980s. Hence, with these data flaws, it will be more difficult to test whether changes in the 1980s are due to trade reform or to the altered sample size of the industry database.

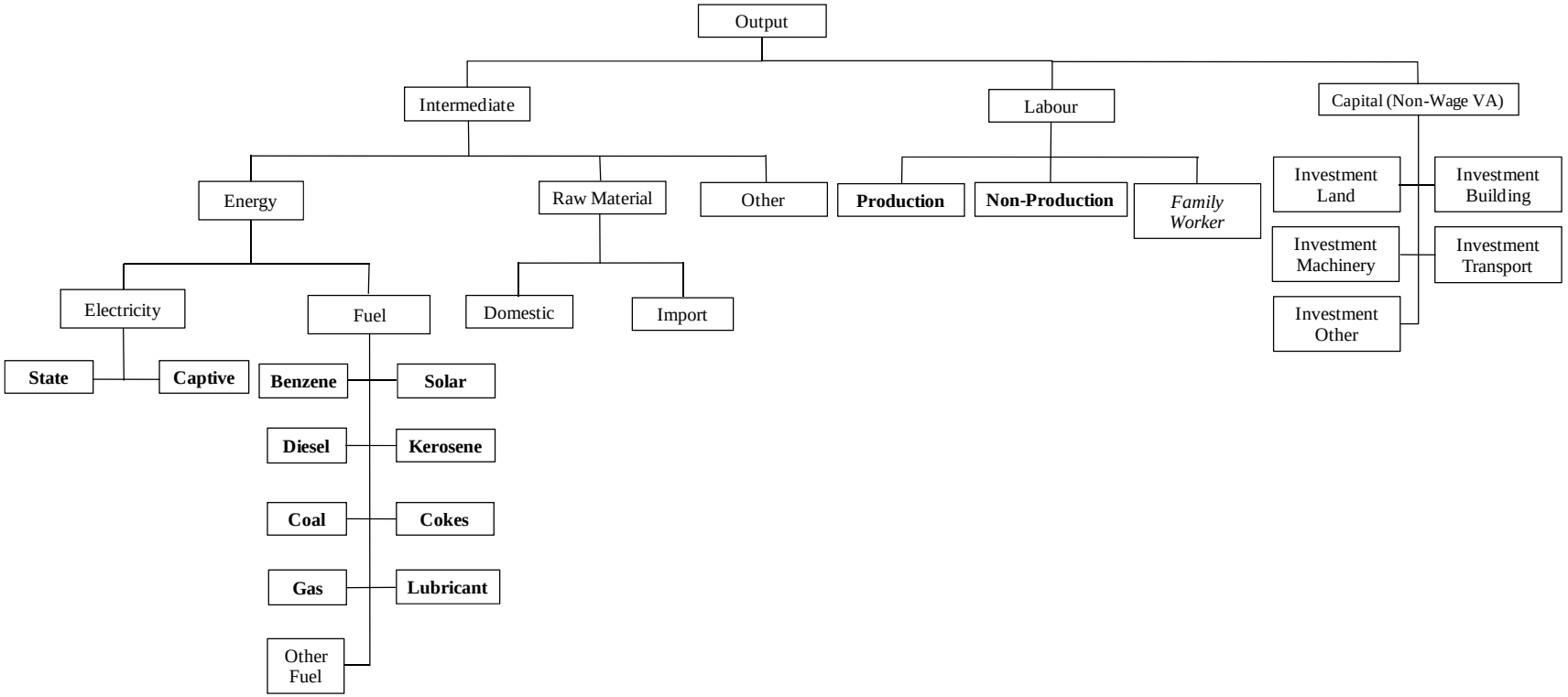
Another complication of using Indonesian manufacturing industries data is the changing in ISIC code. From 1975-1990 there were119 industries (ISIC rev1), from 1991-199. There were 286 industries (ISIC rev2). In 2000, BPS changed the classification into ISIC rev 3 with around 300 industries.

Appendix 2: Data Structure in SI and Back cast Data

Figure 1 gives the input-output relationship and important variables that are available in the back cast and SI data.

The figure shows that SI data cover more extensive classifications of inputs than that of the backcast data. On the other hand, as has been indicated in Figure 4.1, back cast data are more complete in firm's coverage compared with SI data. The most extensive classification in the SI data is the energy input. Unfortunately, the share of energy input in total intermediate input is rather small (6 percent on average), while raw material inputs, which take up more than 80 percent of intermediate inputs on average, have very limited disaggregation.

Figure 1: Data Structure in SI and Back Cast Data



Notes: Bold letter: value and quantity are available. Italics: only quantity is available. Otherwise only value is available

References

Alvarez, R. & Ricardo Lopez (2006) "Is Exporting a Source of Productivity Spillovers?," Caepr Working Papers 2006-012, Center for Applied Economics and Policy Research, Economics Department, Indiana University Bloomington

Aitken, B. & Hanson, G. H. & Harrison, Ann E., 1997. "Spillovers, foreign investment, and export behavior," *Journal of International Economics*, Elsevier, vol. **43**(1-2), pages 103-132, August.

Barrios, S., Görg, H., and E. Strobl (2003). "Explaining Firms' Export Behavior: R&D, Spillovers and the Destination Market," *Oxford Bulletin of Economics and Statistics* **65**(4): 475-496.

Bernard, A. B., & J. Bradford Jensen (2004). "Why Some Firms Export," *Review of Economics and Statistics* **86**(2): 561-569.

Bernard, A. B. & J. Bradford Jensen (2002). "The Death of Manufacturing Plants," NBER Working Papers 9026, National Bureau of Economic Research, Inc.

Bernard and Sjoholm (2003), Foreign Owners and Plant Survival, Tuck School of Business Working Paper No. 03-30

Blomstrom and Sjoholm (1998), Technology Transfer and Spillovers: Does Local Participation with Multinationals Matter? NBER Working Paper 6816

Clerides, S. K., Lach, S., and J. R. Tybout (1998). "Is Learning by Exporting Important? Micro-Dynamic Evidence from Colombia, Mexico and Morocco," Quarterly *Journal of Economics* **113**(3): 903-947.

Gorg, H. & Eric Strobl (2001), "Multinational Companies, Technology Spillovers and Plant Survival: Evidence for Irish Manufacturing," European Economy Group Working Papers 8, European Economy Group.

Gorg, H. & Greenway, D. (2004). Much Ado about Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment? *The World Bank Research Observer*, **19** (2), 171-197

Greenaway, D., Sousa, N., and K. Wakelin (2004). "Do Domestic Firms Learn to Export from Multinationals?" *European Journal of Political Economy* **20**(4): 1027-1043.

Narjoko and Atje (2007), Promoting Export: Some Lessons from Indonesian Manufacturing, ARTNeT Working Paper Series, No. **32**

Narjoko and Hill (2007), Winners and Losers during a Deep Economic Crisis: Firm-Level Evidence from Indonesian Manufacturing

Ozler, Sule & Erol Taymaz (2004) "Does foreign ownership matter for survival and growth? Dynamics of competition and foreign direct investment," ERC Working

Papers 0406, ERC - Economic Research Center, Middle East Technical University, revised Mar 2004.

Ramstetter and Takii (2005), Exporting and Foreign Ownership in Indonesian Manufacturing, 1990-2000, ICSEAD Working Paper Series Vol. 2005-15

Roberts, Mark J & Tybout, James R, 1997. "The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs," *American Economic Review*, American Economic Association, vol. **87**(4), pages 545-64, September.

Ruane, F., and Sutherland, J. (2005). "Foreign Direct Investment and Export Spillovers: How Do Export Platforms Fare*?" IIIS Discussion Paper* No**. 58**, Institute for International Integration Studies (IIIS), Trinity College Dublin.

Sethupathy, P.G. (2007) Does Exporting Lead to Productivity Spillovers in Horizontal or Vertical Industries? Evidence from Indonesia, University of Columbia Discussion Paper Series, No. 0708-01

Sjoholm and Takii (2003), Foreign Networks and Exports: Result from Indonesian Panel Data, ICSEAD Working Paper Series Vol. 2003-33

Takii and Ramstetter (2004), Multination Presence and Labor Productivity Differentials in Indonesian Manufacturing, 1975-2001, ICSEAD Working Paper Series Vol. 2004-15

Tomohara and Takii (2005), Foreign Direct Investment and Wage Spillovers in Indonesian Manufacturing Industries, ICSEAD Working Paper Series Vol. 2005-05

Vial, V. (2008), How Much Does Turnover Matter? Evidence from Indonesian Manufacturing Total Factor Productivity Growth, 1975-95, Oxford Development Studies, 2008, vol. 36, issue 3, pages 295-322