

Narjoko, Dionisius A.; Atje, Raymond

Working Paper

Promoting Export: Some Lessons from Indonesian Manufacturing

ARTNeT Working Paper Series, No. 32

Provided in Cooperation with:

Asia-Pacific Research and Training Network on Trade (ARTNeT), Bangkok

Suggested Citation: Narjoko, Dionisius A.; Atje, Raymond (2007) : Promoting Export: Some Lessons from Indonesian Manufacturing, ARTNeT Working Paper Series, No. 32, Asia-Pacific Research and Training Network on Trade (ARTNeT), Bangkok

This Version is available at:

<https://hdl.handle.net/10419/178390>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



Asia-Pacific Research and Training Network on Trade
Working Paper Series, No. 32, February 2007 (rev. 5/07)

Promoting Export: Some Lessons from Indonesian Manufacturing

By

Dionisius A. Narjoko*

Raymond Atje*

*Dionisius A. Narjoko and Raymond Atje are senior researcher Centre for Strategic and International Studies (CSIS), Jakarta, Indonesia. The authors would like to thank Imelada for an excellent research assistant. The views presented in this paper are those of the authors and do not necessarily reflect the views of CSIS, ARTNeT members, partners and the United Nations. This study was conducted as part of the Asia-Pacific Research and Training Network on Trade (ARTNeT) initiative, aimed at building regional trade policy and facilitation research capacity in developing countries. This work was carried out with the aid of a grant from the World Trade Organization (WTO). The technical support of the United Nations Economic and Social Commission for Asia and the Pacific is gratefully acknowledged. Any remaining errors are the responsibility of the author. The authors may be contacted at dion.ardiyanto@anu.edu.au and raymond_atje@csis.or.id

The Asia-Pacific Research and Training Network on Trade (ARTNeT) aims at building regional trade policy and facilitation research capacity in developing countries. The ARTNeT Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about trade issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. ARTNeT working papers are available online at: www.artnetontrade.org. All material in the working papers may be freely quoted or reprinted, but acknowledgment is requested, together with a copy of the publication containing the quotation or reprint. The use of the working papers for any commercial purpose, including resale, is prohibited.

Table of content

Executive Summary	i
I. Introduction	1
II. Literature Review	2
2.1 Overview of the macroeconomic situation during the 1990s and the early 2000s.....	2
2.1.1 Economic growth	2
2.1.2 Monetary indicators	4
2.1.3 Exchange rate and export performance.....	5
2.2 The impact of sharp exchange rate depreciation	8
2.3 ‘Self-selection’ hypothesis and sunk-cost in exporting.....	9
2.3 Some possible explanations from the Asian crisis literature on the sluggish export performance during and after the crisis	11
III. Data and methodology	14
3.1 Data	14
3.2 Methodology	17
3.2.1 Statistical analysis	17
3.2.2 Case Study.....	20
IV. Empirical results and analysis	21
4.1 The firm export-supply response during the period 1993-2004: a descriptive analysis.....	21
4.2 The econometrics analysis	27
4.2.1 Hypotheses	28
4.2.2 Results	29
4.2.3 Discussion	33
4.3 Some insights from firm-level case study.....	34
4.3.1 The interviews results: a summary.....	34
The garment-and-textile company (Firm 1).....	34
4.3.2 Some key findings from the interviews	37
4.2 Brief analysis on the cost for exporting	38
V. Summary, conclusion and some possible policy recommendations...	41
a. Some possible policy recommendations	42
References	44
Appendix 1 The measurement of variable used in the regressions ...	47

Executive Summary

The improved terms of trade for Indonesia, as a result of the sharp exchange rate depreciation after the 1997/98 economic crisis, was expected to improve the country's export performance. As documented by some studies, however, the evidence conflicts the prediction. Although some explanations have been offered in the literature, those which focus on firm behaviour are scarce, and almost all of these concentrate on macroeconomic factors. This study attempts to fill this gap and aims to draw some lessons from Indonesia's experience, by examining the export-supply response of firms in Indonesian manufacturing. The study asks two questions. First, what is the picture of export-supply response of firms in Indonesian manufacturing during and after the 1997/98 economic crisis?, and second, which factors determine the firms' export-supply response?

Utilising the rich plant level data of non-oil and gas manufacturing, the descriptive analysis suggests that, among other, the strong persistency might have been the main explanation for the sluggish export performance. In other words, the lack of export response could be caused by the inability of firms in immediately engaging in export activities.

The description is confirmed by the econometric analysis. Being able to provide a more robust quantitative method, the econometric analysis is able to provide more insights into the issue. The following are the main points from the econometric analysis. First, the improved terms of trade from the exchange rate depreciation is likely to have been captured only by plants which had been exporting prior to crisis. This suggests it is likely to observe a success response from firms that have had some exporting experience, but not necessarily so for firms that sell their entire output to the domestic market. The redirection is likely to happen but with a lag. Second, the unsuccessful export supply response may have been because firms were not ready or not prepared to enter export markets. Third, the analysis support the Blomstrom and Lipsey's (1993) proposition that it is easier for foreign firms to increase their export or redirect sales in the event of positive economic shock.

The in-depth interviews provide more insights into the topic by supplementing the finding from the statistical analysis. Three main findings were derived. First, the availability of networks determines the success of firms in responding to the improved terms of trade. The interviews suggest companies that engage in industrial networks performed relatively better in terms of exports during and after crisis, than those that did not. Second, limited access to capital and deteriorated infrastructure were often mentioned as the main constraints for a successful response. Third, unlike what is commonly believed, the role of trade facilitators does not appear to have given significant positive impact to firm export supply response. This study suggests the role of trade facilitators could be industry specific.

The findings from this study are clearly relevant for policy making in Indonesia. The major implication is that the policy should be focused on encouraging firms to start exporting, even if a firm is domestically oriented. The reason for this is

obvious. The empirical analyses indicate and confirm that exporting in Indonesian manufacturing is costly and could be very slow business activity to be initiated.

Encouraging firms to start exporting could be done in many ways. One, which also indicated by the empirical findings, is by attracting much higher flow of foreign direct investment (FDI). Again, the reason is obvious, foreign ownership is shown to have been important for shaping a successful export supply response after the crisis. An important policy action is streamlining the procedure and process for establishing business or exporting from Indonesia. As also noted in many reports, Indonesia currently stays at the bottom of the global ranking in this particular area.

I. Introduction

Indonesia enjoyed a more competitive terms of trade during and after the 1997/98 economic crisis, as a result of sharp exchange rate depreciation in 1998. The real effective exchange rates in the early 2000s were still considerably below their pre-crisis level, although they had been appreciating in the last few years. The exchange rate for the period 1999-2003, for example, on average was about 25 per cent lower than its real value in the 1996 (before the crisis). The better terms of trade was expected to have improved the country's export performance. However, several studies (e.g. Dwor-Frecaut et al. 2000; Duttagupta and Spilimbergo 2004; World Bank 2000) have demonstrated that the evidence conflicts this prediction. The growth of non-oil and gas exports in terms of value contracted by 4 per cent in 1998 (the peak of the crisis) and was about 2 per cent on average for the period 2000-2003, which was considerable low compared to about 12 per cent average growth during the period 1991-95 (pre-crisis period).

Although some explanations have been offered in the literature, those which focus on firm behaviour are scarce, and almost all of these concentrate on macroeconomic factors. This study attempts to fill this gap and aims to draw some lessons from Indonesia's experience, by examining the export-supply response of firms in Indonesian manufacturing. It asks, in particular, two questions. First, what is the picture of export-supply response of firms in Indonesian manufacturing during and after the 1997/98 economic crisis?, and second, which factors determine the firms' export-supply response? The second question essentially builds on the first, based on the empirical findings discussed in the study.

The study utilises a rich annual data set on medium and large plants in the Indonesian manufacturing from 1993 to 2004, which covers the high-growth pre-crisis period, the peak of the crisis and the recovery period. The choice of manufacturing industry was motivated mainly because of the data availability, and the fact that the industry had been the major source of Indonesia's export growth in the last two decades before the crisis (Hill 1996). The study adopts both quantitative and qualitative method. The former draws some descriptive statistics and conducts an econometric analysis, utilising the plant-level data. The latter, meanwhile, conducts a case study of few firms in textile-and-garment and electronics industry, by way of interviewing the senior managers of these firms. The case study aims to supplement to supplement the results from quantitative method.

This report is organised as follows. Section 2 reviews the relevant theoretical and empirical literature. Section 3 describes the methodology adopted by this study, including the description of the data base and list of topics for the firm-level interviews. Section 4 presents the results and analysis, consisting of the descriptive analysis, econometric analysis, and the results of the firm-level interviews. Finally Section 5 summarises the study, concludes, and outlines few possible policy implications.

II. Literature Review

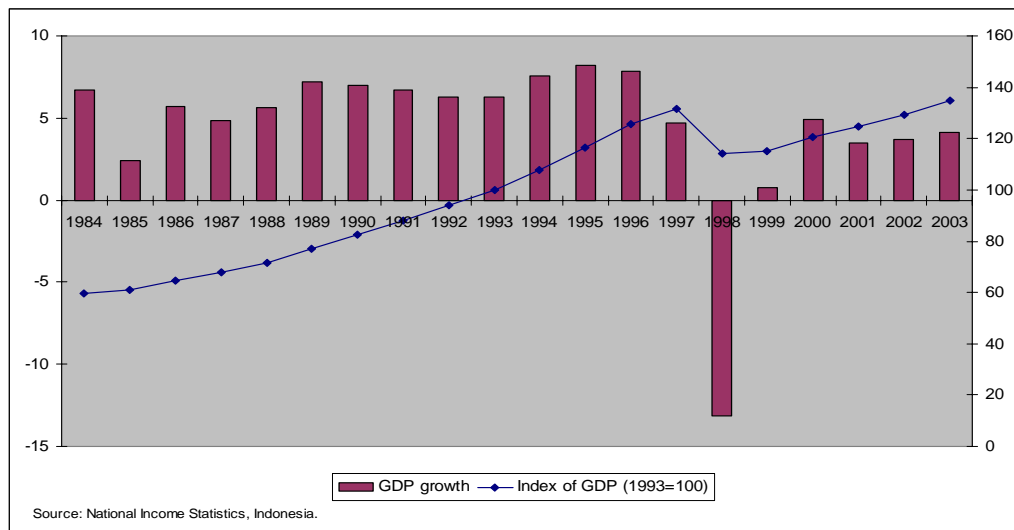
2.1 Overview of the macroeconomic situation during the 1990s and the early 2000s

This sub-section describes the performance of several macroeconomic indicators between the 1990s and 2000s, focusing on the impact of crisis and the macroeconomic performance after the crisis. The motivation for the description is twofold. First, export performance of a country does not only depend on the characteristics of industry and firm, but also on an overall macroeconomic performance. Second, it is important to provide the reader with background information about the macroeconomic situation during the period of the sluggish export-supply response.

2.1.1 Economic growth

The crisis severely affected Indonesia's economy. The economy contracted by 14.1 per cent in 1998 after growing rapidly in the 30 years before the crisis (see Figure 2.1). In historical context, the contraction in 1998 was far deeper than any other recession that Indonesia had experienced (Hill 1999). The severe impact of the crisis appears even harsher when the short-term trend in the GDP is considered. The GDP index in the figure shows that the level of the GDP in 1998 was about the same of that in 1995, implying that the crisis had 'cost' Indonesia three years of economic growth.

Figure 2.1 Annual GDP growth and Indices, 1984-2003 (% , 1993=100)



In spite of the deep contraction, the economy began to recover in 1999, which was indicated by 0.8 per cent growth in they year. By 2000, the rate of growth was back to the 1997 rate at the beginning of the crisis, although well below the pre-crisis trend growth.

The momentum of recovery, however, was only short-lived. The growth fell by about 2 per cent in the following year, and was only picking up at much slower than the pre-crisis period. The latter is shown by a much-lower slope of the over-time growth trend over the period 2001-04, compared to the trend over the early 1990s to just before the crisis.

Table 2.1 shows that the impact of the crisis was different across sectors in the economy. Focusing first on the peak of the crisis (1998) construction, finance and trade, hotel and restaurant were the most severely affected sectors. The massive contraction in construction sector was probably caused by the delay of many projects. As noted by Johnson (1998), the demand for cement in Indonesia's major cities was substantially reduced in early 1998. The contraction in the finance sector largely reflected the difficulties faced by the banks. As shown by the figures, the contraction in this sector was largely explained by the bank, rather than the non-bank, financial sectors. Manufacturing, particularly non-oil and gas, contracted at about the economy-wide average.

Table 2.1 GDP growth by broad sectors of economy (%), 1996-2003

Sectors	1996	1997	1998	1999	2000	2001	2002	2003
Agriculture	3.1	1.0	-1.3	2.2	1.9	1.7	2.0	2.5
Mining & Quarrying	6.3	2.1	-2.8	-1.6	5.5	1.3	2.5	0.5
Manufacturing Industries	11.6	5.3	-11.4	3.9	6.0	3.1	3.4	3.5
Oil & Gas	11.1	-2.0	3.7	6.8	-1.7	-3.5	1.2	0.6
Non-oil & Gas	11.7	6.1	-13.1	3.5	7.0	3.9	3.7	3.8
Electricity, Gas & Water Supply	13.6	12.4	3.0	8.3	7.6	8.2	6.0	6.8
Construction	12.8	7.4	-36.4	-1.9	5.6	4.4	4.9	6.7
Trade, Hotel & Restaurant	8.2	5.8	-18.2	-0.1	5.7	3.7	3.8	3.7
Transport & Communication	8.7	7.0	-15.1	-0.8	8.6	7.8	8.0	10.7
Finance	6.0	5.9	-26.6	-7.2	4.6	5.4	5.7	6.3
Bank	3.0	5.1	-37.9	-13.6	5.5	6.8	6.4	6.2
Other non-bank financial sectors	10.4	8.5	-17.2	1.8	3.9	4.8	4.2	4.4
Services	3.4	3.6	-3.8	1.9	2.3	3.1	2.1	3.4
Public Administration	1.3	1.2	-7.3	1.7	1.4	1.1	0.4	0.9
Private Services	7.4	7.9	1.9	2.4	3.8	6.2	4.5	6.8
Gross Domestic Product (GDP) growth	7.82	4.70	-13.13	0.79	4.92	3.45	3.69	4.10

Source: National Income Statistics

Turning to the early recovery period (1999-2000), much of the large variation and patterns recorded in 1998 persisted into the following year. Bank-financial and construction sectors contracted further, by 15 and 1.9 per cent respectively. Meanwhile, non-oil and gas manufacturing seemed to begin recovering as it grew by 3.5 per cent.

As noted, however, the sign of recovery appeared unstable. Excluding finance and services sector, and to some extent agriculture sector, the growth declined in the following year until 2003. The table shows that manufacturing experienced a rather large downfall, from about 5 per cent in 2000 to a rather flat rate of growth of 3 per cent over the period 2001-03.

2.1.2 Monetary indicators

To get a picture of the performance of monetary indicators, it is useful to examine the trend of money supply, inflation and interest rates over the period 1997-2003/04. Money supply is represented by base money (M0), inflation is computed using the consumer price index (CPI) and the interest rates are represented by one-month Bank Indonesia Certificate (SBI) and the three-month time deposit. The trends are given in Figures 2.2 and 2.3.

Figure 2.2 Inflation (% , year-on-year) and base money (M0) (indexed at Jan 1997=100), January 1997 - December 2003

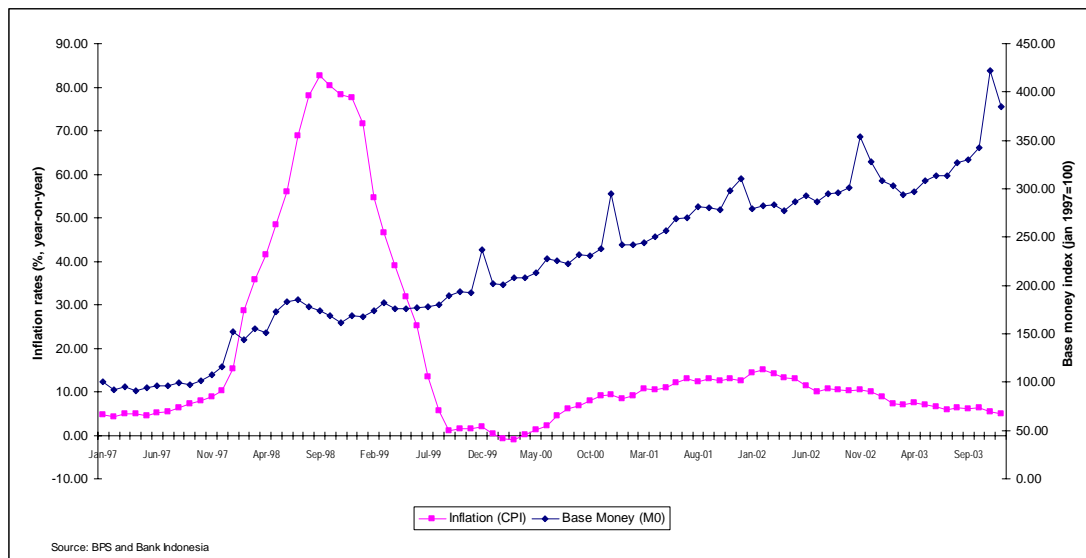
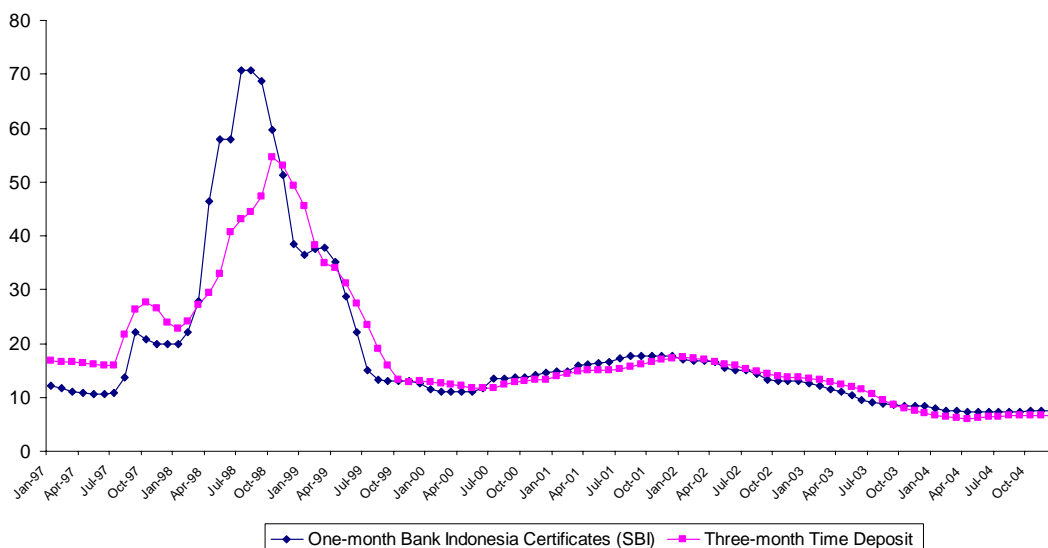


Figure 2.3 Interest rate (% p.a.), January 1997 – December 2004



Money supply continued to increase from the onset of the crisis (Figure 2.2). The jumps in January and May 1998 were during a time of a mounting crisis of confidence characterised by bank runs. The runs forced BI to inject liquidity support

to prevent the banking system from collapse. As a result, base money increased by about 60 per cent in the first six months of 1998. BI finally managed to control the base money growth from August.

Figure 2.2 shows that the impact of the crisis on inflation was dramatic. Inflation began to increase in the second half of 1997 when the crisis had just started, but it rose rapidly in since January 1998 and reached 82 per cent in September. A number of factors simultaneously contributed to the sudden increase. The sharp exchange rate increased the price of imported goods and the drought in early 1998 contributed to substantial increases in food prices. The excessive monetary expansion also contributed to high inflation. In fact, the figure shows that inflation moved closely with base money, albeit with a lag and it thus confirms the conventional inflation theory.

Interest rates increased substantially in September 1997 in response to the rapid exchange rate depreciation. The September one-month SBI rate doubled from about 11 per cent in July. Similarly, the three-month time deposit rates rose from 16 per cent in July to 26 per cent in September. The rates had been declining since then, but this was occurred the period of high inflation. As a result, real interest rates were negative, which consequently caused a strong disincentive to hold the Rupiah. SBI rates had been increased dramatically since September 1997 and reached a peak of about 71 per cent in July 1998. The rising trend was followed by a similar trend in time deposits although the increase was not as dramatic as that seen in SBI rates. Interest rates began to decline in September after BI regained control over the base money growth, and almost reached the pre-crisis level at the end of 1999.

The central bank appeared to continue the momentum it had in 1999 to further control the inflation. The base money kept increasing at about the same rate of growth over the period 2000-03 (see Figure 2.2). As shown in the figure, this strategy seemed to have been successful. Inflation peaked in January 2002 and started to decline, reaching to the pre-crisis level of below ten per cent in December 2003. The decline in inflation also helped the interest rate to move down (see Figure 2.3). At the end of 2004, the interest rates were about half of their level in early 2002.

2.1.3 Exchange rate and export performance

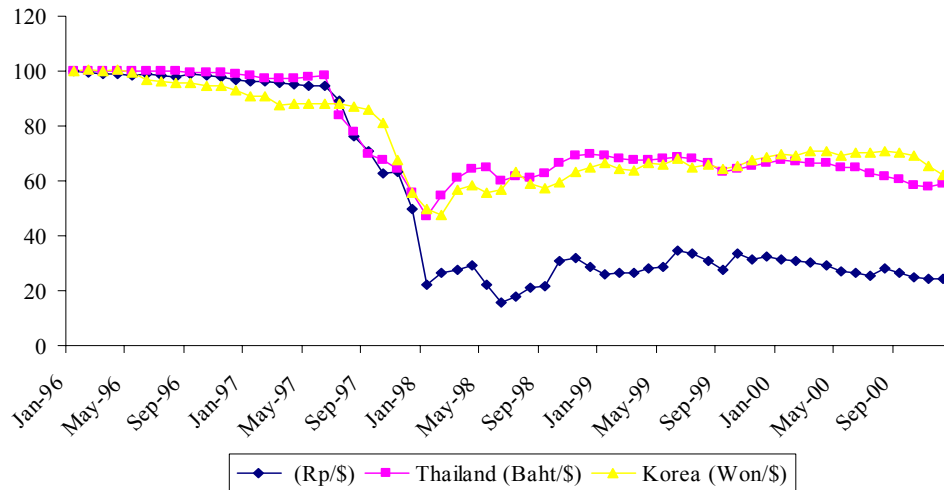
The crisis severely affected the exchange rate. By 1999, the exchange rate had lost about 70 per cent of its nominal value from 1996 (See Figure 2.4). The excessive monetary expansion in 1998 played a major role in this sharp depreciation. The nominal depreciation was translated into a sharp real depreciation in 1998 and hence boosted Indonesia's competitiveness. The improved competitiveness, however, did not last long as the nominal appreciation took place in 1999 and 2000.

Despite the nominal appreciation, the sharp depreciation still helped to improve Indonesia's competitiveness. Figure 2.5 indeed shows this. The Rupiah real effective exchange rate (REER) was about ten per cent more competitive than the other crisis-affected countries' REER over the period 1999-2001. The Rupiah REER was only to be comparable to the other countries' REER during the period 2001-04.

The significantly higher competitiveness of Indonesian real exchange rate to the other crisis-affected countries' real exchange rate seemed to have last only until

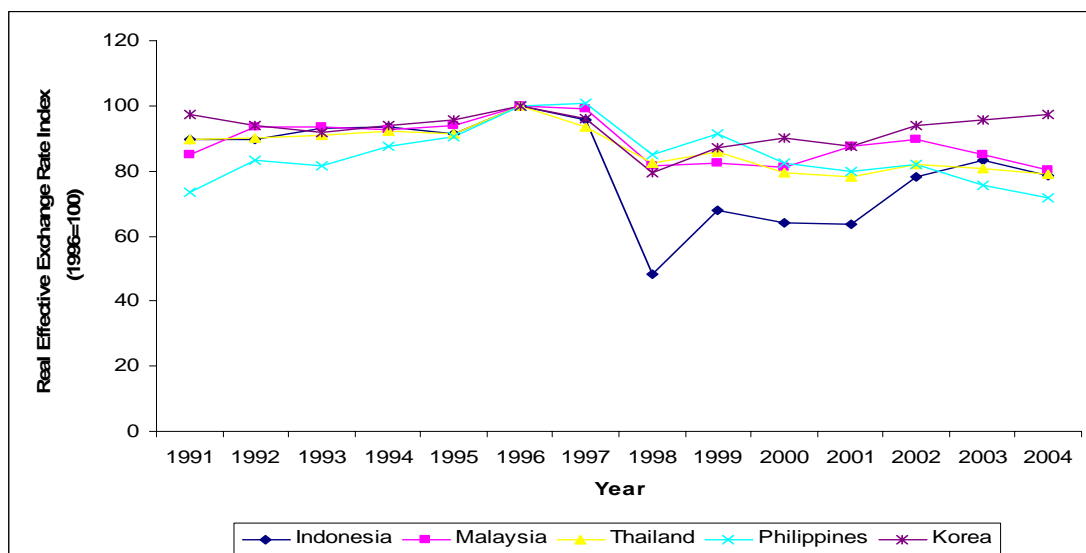
2002 (Figure 2.5). The Rupiah REER was about the same with that of Malaysia and Thailand over the period 2003-04. The Philippines even was more competitive than Indonesia and the other countries over this period. Even so, the Rupiah real exchange rate was still about 15 per cent more competitive than the rate before the crisis.

Figure 2.4 Nominal exchange rate movements of several crisis-affected countries (index, 2006 = 100), 1991-2000



Source: CEIC data base

Figure 2.5 Real exchange rate movements of several crisis-affected countries (index, 2006 = 100), 1991-2004



Exchange rate depreciation is expected to improve export performance of the countries affected by the crisis. However, several studies (e.g. World Bank 2000; Duttagupta and Spilimbergo 2004) have demonstrated that the evidence conflicted with this prediction. As shown in Table 2.2, export growth in terms of the value of all crisis-affected countries contracted adversely in 1998, ranging from 4 per cent in Indonesia to nearly 16 per cent in the Philippines. This sluggish export supply response played a role in prolonging the crisis in these countries, and more

importantly, is puzzling from an analytical point of view (Dutttagupta and Spilimbergo 2004).

Table 2.2 Trends in export of East Asian countries, 1991-98.

a. By export value

Country	Growth (%)					
	1991-95	1996-98	1995	1996	1997	1998
Indonesia	12.3	2.9	14.3	10.4	2.4	-4.1
Malaysia	20.7	0.6	25.8	9.6	1.6	-9.3
Thailand	19.3	-1.9	25.3	1.5	1.6	-8.9
Philippines	17.4	3.0	24.3	15.5	9.1	-15.7
Korea	15.2	2.2	31.6	4.0	7.5	-5.0
World	8.2	2.3	18.6	5.0	3.9	-1.9

b. By export volume

Country	Growth (%)					
	1991-95	1996-98	1995	1996	1997	1998
Indonesia	11.1	6.2	7.9	8.2	7.8	2.5
Malaysia	15.5	6.7	17.6	7.2	10.8	2
Thailand	14.3	2.9	15.5	-1.8	6.6	3.9
Philippines	9.5	12.6	12	8.6	20.9	8.3
Korea	14.9	16.6	24	13	23.6	13.3
World	6.7	6.9	8.9	6.1	10.3	4.3

Source: Adapted from Table 3.1 in World Bank (2000)

Table 2.2 describe in more detail the sluggish export supply response for Indonesian manufacturing exports. The average export growth of Indonesian manufacturing was only 7 per cent during the crisis period (1997-2000), which was way below the pre-crisis average growth of 12 per cent despite the sharp real exchange rate depreciation over this period (see Figure 2.5). The some appreciation in the real Rupiah exchange rate appeared to further deteriorate the export performance. The average export growth declined even further to about 1 per cent over the 2000-04 period, from already very low of 7 per cent on average during the crisis period.

While disappointing, there was a large variation in the export performance across the broad sectors within the manufacturing sector. The rest of Table 2.2 points this out. At the extreme, three sectors, namely basic metal, food-and-beverages, and motor vehicle increased their exports between the crisis and post-crisis period.

In contrast to this positive performance was the very disappointing performance of some sectors which Indonesia has its comparative advantage, and many of these had actually been the Indonesian export-oriented industries (labour- and resource-intensive industries). Sectors included in this group were furniture, paper-and-paper products, textiles, wearing apparel, and wood-and-wood products.

Table 2.2 Growth of Indonesian manufacturing exports (%), 1991-2004

	Average Pre-crisis (1991-96)	Average Crisis (1997-2000)	Average Post-crisis (2000-04)
Total export	12.0	7.0	1.1
Basic metals	5.4	14.1	17.5
Chemicals	21.0	14.8	6.6
Electricity machinery	50.0	21.3	7.3
Fabricated metal products	26.2	9.7	-1.7
Food and beverages	15.8	3.2	18.2
Furniture	31.9	5.6	0.7
Machinery and equipment	47.7	24.0	7.8
Motor vehicle	54.0	16.2	28.0
Non-metallic metal	11.2	26.3	2.9
Other transport equipment	34.1	7.9	3.7
Paper and paper products	40.3	23.7	-1.3
Consumer electronics	70.4	30.9	-1.9
Rubber and plastic	29.9	14.9	11.6
Textiles	16.2	6.7	-2.4
Tobacco products	18.2	4.3	3.8
Wearing apparel	14.8	9.5	-1.5
Wood and wood products	8.2	-5.3	-2.5
Publishing and printing	24.8	21.4	1.6
Tanning and dressing of leather	25.0	-1.9	-5.4

2.2 The impact of sharp exchange rate depreciation

The usual argument for the impact of exchange rate depreciation on firms relates to potential change in their competitiveness. For firms producing tradable goods, sharp exchange rate depreciation can benefit local firms by raising import prices. This causes consumers to substitute towards domestically-produced goods and, by lowering production costs relative to firms in other countries, provides cost advantages in export markets (Desai et al. 2004). The cost advantages are derived from the decline in the relative costs of labour faced by firms in the country depreciating its exchange rate (Forbes 2002a). Several studies, in particular Forbes (2002a, 2002b), provide evidence that exchange rate depreciation improves the performance of firms that produce tradables. More generally, Ghei and Pritchett (1999) summarise the empirical evidence on the impact of exchange rate depreciations on exports, and conclude that exchange rate depreciations mostly translated to an improved export performance.

Despite this evidence, some factors might mitigate the impact of improvement in competitiveness. The first is competitive depreciation, which means that the expansionary effect of exchange rate depreciation in a country (through exports) may not materialise if the trade competitors of the country also undertake similar depreciation.¹ The second is a period of high inflation during the crisis, which limits

¹ Competitive depreciation has long been recognised as a major constraint on export expansion (Gupta et al. 2003).

the extent to which the nominal exchange rate depreciation translates into a real depreciation.

The third factor is firms' production structure. As shown in the theoretical framework developed by Forbes (2002a), the short-run benefit of exchange rate depreciation on a firm's production costs (i.e. lowered relative labour costs) depends on the share of imported input used in production. If the share is large, exchange rate depreciation increases the costs of capital and thereby weakens the positive impact of lower production costs from the cheaper labour.

The last factor involves exchange rate depreciation and firms' financial constraints, working through 'the balance sheet channel'. If a large share of firm debt is denominated in foreign currency, exchange rate depreciation may diminish their net worth by inflating the domestic-currency value of the debt, and hence lowering the firms' ability to increase investment. The negative impact of the depreciation on the firms' financial constraints, however, is less likely to affect export-oriented companies, since there is a better match between foreign-currency revenue and foreign-currency debt.²

2.3 'Self-selection' hypothesis and sunk-cost in exporting

Exchange rate depreciation increases firms' incentive to export. Whether the advantage can be captured, however, depends on some other factors. Literature on exporting suggests that firm efficiency is one such factor. The argument, which is often termed as the 'self-selection hypothesis', is based on the notion that export markets are far more competitive than domestic firms, which allow only the most productive firms to survive (Aw and Hwang 1995).

Many empirical studies have established support for this hypothesis. In particular, productivity is found to be significantly different between exporters and non-exporters (e.g. Bernard and Jensen 1999). For Indonesian manufacturing, Sjöholm and Takii (2003) observed that exporting plants are larger and more productive. They found that labour productivity of these plants was about twice as high as non-exporting plants and this difference seems to have increased over time during the 1990s.

Differences between exporters and non-exporters, however, are not only limited to productivity. Several other studies have also found significant differences in terms of the other characteristics, including size, ownership and capital intensity. For example, Bernard et al. (1995) and Bernard and Jensen (1999) documented that exporters in US manufacturing are larger, more productive, more capital intensive, pay higher wages, and employ more skilled workers. A similar finding was also observed for developing countries (e.g. Aw and Hwang 1995; Berry 1992).

² For Mexican firms in the 1990s, this was in fact the case. Firms which borrowed abroad were largely exporters (Aguiar 2005; Krueger and Tornell 1999). A similar characteristic was also evident for firms in the South East Asian countries. The World Bank's firm-level survey in 1998 revealed that firms in these countries which borrowed abroad were mostly exporters, foreign and large firms (Kawai et al. 2000).

The presumption underlies the ‘self-selection’ hypothesis is that there are additional costs involved in participating in export markets. These costs, which usually involve high fixed costs, include transport costs and expenses related to establishing distributional channels and production costs in adapting products for foreign tastes (Bernard and Jensen 1999).

The presumption has an important implication. That is, it produces persistence in export participation. Once a firm decides to service an export market in a period of time, it tends to stay an exporter in the next period of time. To illustrate this, a variant model of decision to export with sunk entry-costs, first developed by Roberts and Tybout (1997) is presented below, borrowing from Campa (2004).³ The expected profits of a rational, profit-maximising firm i at time t , $\hat{\pi}_{it}$, are given by

$$\hat{\pi}_{it} = Y_{it} [\pi_{it} (X_t, Z_t)] - N_{it} \square (1 - Y_{it-1}) \quad (2.1)$$

where π_{it} is gross profit from exporting, which is not adjusted for entry costs and depends on X_t and Z_t , which denote exogenous factors that affect profitability (e.g. exchange rate) and firm-specific factors, respectively. N_{it} is the entry cost faced by the firm and Y_{it} is an indicator variable that takes the value of 1 if the firm exports in t and 0 otherwise. The value of $\hat{\pi}_{it}$ depends on whether the firm exported or not in the previous year (i.e. whether $Y_{it-1} = 1$ or $Y_{it-1} = 0$). If the firm exported in the previous year, $\hat{\pi}_{it} = \pi_{it}$, but if the firm did not export in the previous year, it must pay entry cost, $\hat{\pi}_{it} = \pi_{it} - N_{it}$.⁴

The firm is assumed to plan the sequence of its export participation to maximise expected current and discounted future profits net of entry costs,

$$V_{it}(\Omega_{it}) = \max E_t \left(\sum_{s=t}^{\infty} \delta^{s-t} \hat{\pi}_{it} | (\Omega_{it}) \right) \quad (2.2)$$

where E_t is an expectation operator conditioned on the set of information at time t (Ω_{it}) and δ is a time discount rate. Firm i chooses the current value of Y_{it} that satisfies the Bellman’s equation :

$$V_{it}(\Omega_{it}) = \max \left(\hat{\pi}_{it} + \delta E_t [V_{it+1}(\Omega_{it+1}) | Y_{it} = 1] \right) \quad (2.3)$$

Solving the first-order condition of 2.3, firm i will decide to export when

$$\begin{aligned} & \pi_{it} (X_t, Z_t) + \delta \left[E_t [V_{it+1} + 1(\Omega_{it+1}) | Y_{it} = 1] \right] - E_t [V_{it+1} + 1(\Omega_{it+1}) | Y_{it} = 0] \\ & \geq N_{it} \square (1 - Y_{it-1}) \end{aligned} \quad (2.4)$$

³ This model is similar to that of Bernard and Wagner (1998) regarding the specification of entry costs.

⁴ In Roberts and Tybout (1997), the entry costs are allowed to be the function of exporting history.

From equation 2.4, it is clear how the sunk entry-costs produce persistence in export participation. Positive sunk entry costs (i.e. $N_{it} > 0$) implies that the decision to export is dependent on time. This can clearly be seen by supposing there are no sunk entry-costs (i.e. $N_{it} = 0$) which collapses equation 2.4 to $\pi_{it}(X_t, Z_t) \geq 0$ and leaves the decision to export as a purely static process (i.e. independent of time).

The role of sunk costs in affecting a firm's decision to export has been another important topic in the empirical literature. While there has not been much study on this topic, a few studies do agree that sunk costs are a large and significant source of persistence in exporting. For example, Roberts and Tybout (1997) found that exporting experience in the previous year had a strong and positive effect in determining export participation in the current year for plants in Colombian manufacturing. Similar findings can also be observed in Campa (2004) and Bernard and Jensen (2004) for Spain and US manufacturing plants, respectively.

2.3 Some possible explanations from the Asian crisis literature on the sluggish export performance during and after the crisis

Several possible explanations for the sluggish export response have been popularised in the Asian crisis literature. The most common is the decline in demand for exports during the few years before the crisis. Reflecting this, Table 2.1 shows the substantial decline in export growth in 1996 and 1997 across all countries affected by the crisis. Decomposing the source of export growth in the period 1995-96, ADB (2002) revealed that 86 per cent of decline can be attributed to a weakening export demand. Several factors underlie the weakened demand. First, these countries specialised in trading among themselves. According to World Bank (2000), intra-regional exports accounted for about 40 per cent of East Asia's total exports. Therefore, when a region-wide export shock hits, as occurred in 1995 and 1996, these countries are likely to experience some decline in their exports because they are not able to diversify their exports to other markets. In addition to the high trade intensity within the region, many product sectors in which these countries specialised, such as textiles, garments and footwear, experienced a slump in 1995 and 1996 (World Bank 2000; ADB 2002). Finally, the depreciation of the Japanese yen against the US dollar contributed to lower price-competitiveness of these countries' exports, since their currencies were effectively pegged to the US dollar. The effect of weakened export demand was mostly manifested through the decline in prices, instead of volume. According to the ADB (2002), about two-thirds of the decline in export value (in US dollars) was due to a decline in export prices (also in US dollar terms).

The other explanations for the sluggish export response during the crisis include the contraction in credit to private sectors (credit crunch hypothesis) and, as noted in Section 2.1, the impact of competitive depreciation. That is, the export decline in a country which experienced sharp exchange rate depreciation during the crisis might have been due to currency depreciation by its competitors. Duttagupta and Spilimbergo (2004) tested these explanations by estimating the short- and long-run export demand and supply equations of several Asian countries (Indonesia, Malaysia, Thailand, Korea, Singapore and Hong Kong). Their results provide only weak support for the credit-crunch hypothesis, primarily because there was mixed evidence about the relationship between the domestic credit variable and export

supply price. In addition to this, they found a relatively quick adjustment in export supply, ranging between 1.5 and 2 years. As one would expect, the adjustment would have been longer than what was found if the credit-crunch hypothesis was true.

Duttagupta and Spilimbergo's findings on the credit-crunch hypothesis are consistent with findings in other studies (Dwor-Frecaut et al. 2000; Gosh and Gosh 1999; Krueger and Tornell 1999). Drawing on the Mexican currency and banking crisis in 1994, Krueger and Tornell showed that firms in tradable sectors were not significantly affected by of credit crunch. They attributed the success of exporting firms in the tradable sector to the fact that, since the early 1990s, most of these firms had been able to obtain trade financing from the international capital market.

Duttagupta and Spilimbergo provide some evidence supporting the competitive devaluation explanation. From the supply side, they found that nominal depreciation resulted in lower export prices, suggesting that exchange rate depreciation should increase the export demand in a country. However, from the demand side they found that the export demand elasticity with respect to competitors' price was positive and large. Thus, export demand in a country would be reduced substantially if the country's export competitors also reduced their export price.

Empirical studies examining how firms or exporters responded to an economic crisis have been sparse, but two are worth reviewing – Blomstrom and Lipsey (1993) and Lipsey (2001). Both examine the export response of US affiliates in some Latin America countries to the 1980's debt crisis. Lipsey (2001) extended the analysis in the context of the Asian 1997/98 crisis.

The studies focus on the role of foreign ownership as an important determinant in a successful response to the crises. They argue that it is easier for multinationals to redirect sales from domestic to export markets (Blomstrom and Lipsey 1993, p.109). The capacity to switch from domestic to external markets, being well connected to the latter through global distribution channels and better knowledge than local firms in terms of international marketing skills, are the reasons behind the argument.

Blomstrom and Lipsey showed that both export growth and the propensity of US affiliates in some Latin American countries increased dramatically during the 1980's crisis. However, they noted that these increases could partly be attributed to the decrease in domestic sales rather than an increase in production. Any increase from production is suggested to have happened over a longer time period after the crisis.

Lipsey (2001) shows that exports of US and Japanese affiliates increased at a higher rate than the rate of the total host countries' export in 1997 and 1998, resulting in an increase in the affiliates' share in the countries' exports.⁵ Providing more evidence on sales redirection, Lipsey shows the ratio of exports to total sales of US manufacturing affiliates in East Asia increased significantly in 1998. For the crisis-affected countries, the largest change is observed for Indonesia and Malaysia. Between 1997 and 1998, the ratio increased from 17 to 32 per cent for Indonesia and from 68 to 85 per cent for Malaysia.

⁵ The figure for Japanese manufacturing was limited only until 1997.

More generally for the case of Indonesia, there were additional factors contributing to the sluggish export response. First, the social and political instability in 1998 caused international buyers to cancel export orders and shift to other countries. Rosner (2000) provides some support for this. He shows that exports of manufactured goods declined sharply during the second half of 1998 and, more importantly, his interviews with several textile, garment and footwear manufacturers confirmed that many companies suffered severe cutbacks in orders after the 1998 riots. The second factor causing the poor export performance was the rejection of Indonesian letters of credit from the beginning of 1998, which severely affected imports of some crucial products (Johnson 1998). The fall in imports would have been expected to affect the export performance of manufacturers who use a great deal of imported intermediate inputs or raw materials in their production. Finally, the poor export performance was also caused by the shortage of containers (Johnson 1998), since the collapse of imports greatly reduced the number of containers entering the country.

Similar to the picture during the peak of the crisis, only little is known about the sluggish export performance in a few years after the crisis. Despite this, few studies (e.g. James et al. 2003; Aswicahyono et al. 2004; Aswicahyono and Hill 2004) speculated several possible explanations. The first is the deteriorating infrastructure and export/import facilities. The deterioration is argued to have significantly lowered the competitiveness of Indonesian exporters *vis-à-vis* exporters in other countries. For example, Ray (2003) documented that the cost of lifting containers in Tanjung Priok, one of the major ports in Indonesia, is the highest among the other eight major ports in Asia. In addition, the export/import procedure in the country has been significantly more costly, cumbersome and unpredictable (Aswicahyono et al. 2004). It was reported that garment exporters take about 7 to 10 days to get consignments from factory to ship.

The other possible explanation is the decline in competitiveness of Indonesian exporters, due to the rising labour cost and deteriorating investment climate. The former is related to the mandated minimum wage and dismissal procedure. In 2001 the government introduced a law that increases the severance rates between 19 to 63 per cent. According to Aswicahyono et al. (2004), Indonesia's dismissal regulations were among the most costly in East Asia. As noted in James et al. (2003), the rising labour cost severely impacted firms in labour-intensive industry. That is, a 20 per cent increase in the cost in apparel industry would lead to about 4 per cent increase in total cost. As for the investment climate, few (e.g. Thee 2003) have reported that Indonesia has been an unattractive location for foreign direct investment (FDI). Business communities from Indonesia's major export destination countries, such as Japan and Korea, often complain about how costly it is for doing business in Indonesia.

III. Data and methodology

This study attempts to answer the research questions by way of statistical analysis and case study. Before detailing the method for the empirical analysis, it is important to firstly present the description of the data used in the statistical analysis.

3.1 Data

The main data set for the quantitative analysis is the annual manufacturing surveys of medium- and large-scale establishments (*Statistik Industry*, or *SI*), from 1993 to 2004.⁶ The period covers the pre-crisis (1993-96), peak crisis (1997-99), early recovery (1999-2001), and the recovery (2001-04). The establishments are defined as those with 20 or more employees. The surveys are undertaken by the Indonesian Central Board of Statistics (*Badan Pusat Statistik* or BPS) and, as noted in many studies, the *SI* data are considered one of the best by the standard of developing countries. They cover a wide range of information on the establishments, including some basic information (ISIC classification, year of starting production, location), ownership (share of foreign, domestic and government), production (gross output, stocks, capacity utilisation, share of output exported), material costs and various type of expenses, labour (head-count and salary and wages), capital stock and investment, and sources of investment funds.

The data, however, have several limitations. First, they do not include information which can identify whether an establishment is a single-unit or a part of a multi-plant firm. As a result, establishments owned by an enterprise can not be linked up, and hence the number of enterprises is over-numerated: some plants may have been counted as firms whereas in practice they are not. Unfortunately, the extent of the over-numeration is unknown. Nevertheless, there are two reasons which suggest it might not have been large. First, a separate BPS publication that lists the surveyed firms reveals that the number of multi-plant firms is not large, i.e. about 500 to 1,000 firms out of more than 15,000 firms surveyed each year by BPS in the early 2000s.⁷ Second, each plant might be run as an independent business, as plants owned by a multi-plant firm are not necessarily interconnected. However, this is likely to occur if each of the plants produces different goods.

The other limitation is that the surveys produce only annual data. In the study on firm behaviour, the ideal situation is to have high-frequency data, either monthly or quarterly, because firms' adjustment could happen within a short period of time.

Finally, a few variables relevant to this study are not available. For example, the variable that identifies whether or not plants are owned by business groups (conglomerates) is not available. Being part of a business group might be important in shaping the firm's response because the group might support the financially-distressed firms during the peak of the crisis, owing to its business operation in diverse markets.

⁶ Obviously it would be useful to have the most recent year (i.e. 2005). At the time when the research proposal for this study was made, however, the latest year of available data is 2004 (this information was acquired from a communication between Mr Narjoko and a BPS official).

⁷ This information was provided by Dr. Sadayuki Takii.

It is important to make a clarification here related to the unit of observation. That is, throughout this study, the terms of ‘firm’, ‘company’ and ‘plant’ are used interchangeably. In principle, the unit of observation of interest is firm (company), but, because of the data limitations, plant is used as the unit of observation. In other words, a single plant is considered as a firm. While this assumption clearly has a limitation – as it does not acknowledge the existence the multi-plant firms – it is still reasonable to accept the assumption, for the two reasons outlined above.

Table 3.1 provides some descriptive statistics computed from the data. The statistics indicate that most of the plants are medium plants, defined here by number of employees. This is clearly seen from the median of the data, which ranges from 45 to 60 employees over the three years considered in the table. The statistics on the number of employees also inform us that the distribution is very-skewed one – and it is skewed to the left – indicating that there are relatively only few very large plants in the data. A similar picture can be derived from the statistics of the amount of sales, where one of the aspects is the very high variation across the plants. The amount of sales increases by more than 2,000 per cent when another 50 per cent of plant population is included in the distribution, i.e., from 25 to 75 percentile.

Table 3.1 Some descriptive statistics of the SI data, 1995, 2000, and 2003

	1995	2000	2003
Size (number of employees)			
Mean	245.2	246.2	210.3
Median	58	55	48
Percentiles:			
5%	22	21	21
25%	30	28	26
75%	180	177	145
95%	988	1036	861
Sales (thousand of Rupiah)			
Mean	12,100,000	35,900,000	39,400,000
Median	660,246	1,320,125	1,935,240
Percentiles:			
5%	54,057	103,331	140,000
25%	187,854	382,715	539,606
75%	3,963,223	9,023,527	12,000,000
95%	47,500,000	127,000,000	150,000,000
Percentage of exported sales			
Mean	68.5	74.7	n.a.
Median	80.0	90.0	n.a.
Percentiles:			
5%	6.0	10.0	n.a.
25%	41.0	50.0	n.a.
75%	100.0	100.0	n.a.
95%	100.0	100.0	n.a.
Distribution of plant by status of ownership (%)			
Foreign	2.8	7.4	5.7
Domestic	95.2	89.6	92.1

Government	2.0	3.0	2.2
------------	-----	-----	-----

Notes: 1. The statistics computed for the percentage of exported sales were done only for a subset of exporting plants.

2. Definition of the status of ownership:

- a. Foreign if the plant has any positive share of foreign ownership.
- b. Domestic private if the plant has 100 % of private ownership.
- c. Government if the plant has a positive private ownership share, but not 100%, and a positive government ownership share.

Regarding exporting behaviour, the statistics suggest that most of exporting plants in the data base export-oriented plants. The median for the percentage exported sales is very high, i.e., 80 or 90 per cent. In addition, even when only 25 per cent of plants in the distribution is considered, i.e. the 25 percentile, the percentage exported sales is already reaches a large number, which is about 40 per cent or more.

Turning to the distribution of plants by its ownership characteristics, the statistics indicate that almost all plants in the distribution are domestic-private plants. Despite this, a more interesting inference perhaps is derived from examining the statistics over time. It is shown that the proportion of foreign plants had actually been actually increasing over the period 1993 to 2003, or over the ten years period. While this could only be a random change in the distribution over the time, the authors predict that this could be due to some structural change as a result of the crisis.

In addition to the *SI* data, other information is used for adjusting the data base and constructing the variables, with the following detail:

- Concordance Tables between ISIC (International Standard Industrial Classification) Revision 2 and 3, provided by BPS (BPS 2000).
- Wholesale Price Index (WPI) data at two- and three-digit industry level, provided by BPS.

Oil and gas refining sectors (ISIC 353 and 354) are excluded. They were only included in the survey in the 1990s and, by comparing their aggregate figures between *SI* and other data sources (i.e. National Income Statistics published by BPS), it is clear that the data are still weak.

By matching the plants according to the plant-code variable (*PSID*), two periods of plant-level panel are constructed: **Period 1** (1994-2000) and **Period 2** (2002-04). The division, while is not desirable, is unavoidable. This is because there seems to have been a systematic error in the data entry for *PSID* variable in the survey year of 2001. Data examination done by the authors found a sudden jump in the firm entry and exit rates in the industry for 2001. Based on the authors' prior knowledge on the industry's firm entry and exit rates, the sudden jump is likely the result of data-entry breakdown, rather than an actual change of firm behaviour. Further data examination suggested the extent of mistakes in the *PSID* data entry for the period 1994-2000 and 2000-02 is low, and thus motivated the study to divide the panel data period.

3.2 Methodology

3.2.1 Statistical analysis

Two aspects of export-supply response are addressed in this study: the change in export participation and export intensity. These aspects are motivated by the fact that any aggregate change in export performance (i.e. at country- or industry-level) is a result from two different, but related, firm behaviours. First, existing exporters can increase or decrease their exported output. They may increase by redirecting output to foreign markets or by expanding exports. Included in this mechanism are exporters that switch from exporting to non-exporting. The second behaviour is where non-exporters that have been domestically oriented switch to participate in foreign markets. The second mechanism can also be achieved by new firms entering the industry.

a. Descriptive analysis

The statistical analysis is divided into two parts: descriptive and econometric analysis. The descriptive analysis aims to gauge the picture of export supply response of firms in Indonesian manufacturing during and after the crisis. In principle, it constructs and analyses some transition matrices that describe the movement in exporting status and class of exporters (i.e. low, moderately or highly intensive exporters) of the continuously operating and exporting plants, respectively, over the period 1994-2004.

The descriptive analysis is extended to examine the role of foreign ownership. The matrices are reconstructed, dividing the groups of plants according to their ownership status. This study follows the approach by the other studies, in particular Narjoko (2006), in categorising the plants. In particular, three dummy variables were created for every plant i : domestic-private ($DPRI_i$), foreign ($DFOR_i$) and state-owned plants ($DGOV_i$). $DPRI_i$ and $DFOR_i$ are defined as

$$DPRI_i \begin{cases} = 1 & \text{if the share of domestic-private ownership in} \\ & \text{plant } i \text{ is equal to 100 per cent} \\ = 0 & \text{otherwise.} \end{cases}$$

$$DFOR_i \begin{cases} = 1 & \text{if } FOR_i > 0 \text{ per cent} \\ = 0 & \text{otherwise.} \end{cases}$$

Three joint venture groups of plants, which are foreign-government, foreign-domestic and foreign-government-domestic, are considered foreign plants (i.e. $DFOR_i = 1$). This consideration is based on previous empirical studies which suggest the share of foreign ownership does not necessarily reflect the extent of control. According to Aswicahyono and Hill (1995), many Indonesian case studies

have demonstrated that local partners often play a relatively minor role even when they hold the majority of equity. This is particularly true for matters related to finance and technology. Moreover, Ramstetter (1999) demonstrated that one important role of foreign ownership is to widen a firm's access to international market. For plants in Indonesian manufacturing, he showed the propensity to export was even higher for plants with a low foreign ownership share (10 to 50 per cent), compared to that for the domestic plants.

The other groups of plants not considered are state-owned plants and the group of government-domestic private. Following a similar argument as for $DFOR_i$, the government-domestic group is classified as 'government' and hence, $DGOV_i$ is defined as

$$DGOV_i \begin{cases} = 1 & \text{if } GOV_i > 0 \text{ per cent} \\ = 0 & \text{otherwise.} \end{cases}$$

b. The estimating equations

The empirical models for econometric analysis are given as the following, in their general form:

$$EP_{i,t} = \alpha_0 + \alpha_1' X_{i,t} + \varepsilon_{i,t} \quad (3.1)$$

$$EXPG_{i,t} = \frac{EXP_{i,t} - EXP_{i,t-1}}{EXP_{i,t-1}} = \beta_0 + \beta_1' X_{i,t} + \mu_{i,t} \quad (3.2)$$

where equation 3.1 and 3.2 are export participation and export propensity adjustment equations, respectively. i represent plant i , t represents the years for the period 1997-2004. $EP_{i,t}$ is a binary variable which takes the value of 1 if the plant was exporting in year t and 0 otherwise. $EXPG_{i,t}$ is the annual growth of a plant's export intensity (EXP_i) in year t . EXP_i is defined as the ratio of exports to total output. X_i is set of explanatory variables capturing the plant characteristics. Year and industry dummy variables are included to control for differences across years, industries and region, respectively.

The models are estimated within the panel-data framework. The estimation uses the fixed-effect method, and therefore, the effect of unobserved factors should be taken into account. The decision to adopt fixed-effect method – rather than random-

effect method – was motivated by the argument that the unobserved factors are firm-specific, including, for example, management capability and method of production.⁸

Equation 3.1 is estimated within the framework of a binary choice model (i.e. probit or logit), instead of a linear probability model (LPM). This is mainly because the predicted probability derived from LPM may lie outside the 0-1 region, which is clearly not reasonable in practice.⁹

To facilitate hypothesis testing and organise the empirical analysis, estimations were done in two steps. In the first step, equation 3.1 was estimated for the full sample, consisting of exporting and non-exporting plants. The emphasis here is on export participation response and the hypothesis testing on exporting history. In the second step, equation 3.2 was estimated only for the exporting sample. The emphasis here is on export propensity response.

For the estimation in the first step, a more detailed empirical model can be rewritten as follows – with one of the independent variables is exporting history, or the previous year export participation (EP_{t-1})

$$EP_{it} = \alpha_0 + \alpha_1 EP_{i,t-1} + \alpha_2 X_{i,t} + \varepsilon_{i,t} \quad (3.3)$$

There is a potential endogeneity problem in estimating equation 3.3, with exporting history (EP_{t-1}) being the endogenous variable. EP_{t-1} is likely endogenous because there is strong persistence in the variable correlates with ε_{it} . Previous studies (e.g. Roberts and Tybout 1997; Campa 2004) found a very strong effect from the previous years' exporting status on the current decision to export. To correct for this problem, the instrumental variable approach was adopted.

In this situation, two alternative estimation methods can be used: joint estimation and two-step procedure. The two-step procedure is more attractive because of its computational advantage. The equation for endogenous variable (as a function of the instrumental variables) is not estimated jointly with the equation of interest (i.e. equation 3.3), which computationally can be very complicated. Mimicking the standard 2SLS approach, the two-step procedure firstly estimates the endogenous variable, by LPM, before estimating equation 3.3 by the binary choice model. Despite the advantage, the two-step procedure often gives less consistent and efficient estimates than maximum likelihood estimation (MLE) estimates (Wooldridge 2002, p.476). For this reason, the equation was estimated using the joint estimation method.

An important statistical issue regarding estimation of equation 3.2 is “sample censoring”. The dependent variables, $EXPG_{it}$, can only be calculated for pairs of

⁸ The unobserved factors are commonly known as α_i in panel-data estimation literature (e.g. Wooldridge 2000).

⁹ Despite this, a binary response model also has a number of shortcomings. One important one is that the potential for bias arising from neglected heterogeneity (i.e. omitted variables) is larger in a binary choice model than in a linear model. Wooldridge (2002) nevertheless pointed out that estimating a binary response model by a binary choice model still gives reliable estimates, particularly if the estimation purpose is to obtain the direction of the effect of explanatory variables.

plants that remained as exporters in t and $t-1$. Therefore, the sample is likely to be truncated, particularly during the peak of the crisis, and estimating equation 3.2 on the selected sample may lead to biased estimates. To guard from a potential of bias, Heckman's (1976) two-step estimation method was used to correct this problem. In the first step, equation 3.1 is estimated using the probit model and the inverse Mills ratio is computed for every observation. In the second step, equation 3.2 was estimated on the selected sample, adding the computed inverse Mills ratio as another explanatory variable.

3.2.2 Case Study

In the case study, this study adopts some in-depth interviews with firm senior-level manager as the research method. While the interview results might be subjective – and therefore might be bias too –, this method is still appropriate to supplement the statistical analysis, considering the time and resource limitation. It is therefore important to bear in mind about this weakness when interpreting the results.

Two industries are chosen to facilitate a comparison of extreme cases, namely textile and garment, and electronics industry. These industries were known to be two of important sectors in the Indonesian manufacturing industry. The former represents the traditional export-oriented industries while the latter represents the new export-oriented industries. The approach, which is commonly known as multiple-case studies, is adopted for the reason that it provides a more robust results compared to the single-case study approach (Yin 1984).

The interview aims to more gain insight into the extent of the firm export-supply response to the more competitive exchange rate environment and factors that determine the firms' response. Special attention is given to the factors that can not be represented by some variables extracted from the *SI* data base.

The interview, in particular, asked the following topics:

1. The impact of the weakened exchange rate during and after the crisis on the company's decision to export.
2. The extent of success of the firms in increasing their exports or in redirecting their sales orientation from domestic to export market.
3. The determinants of the export-supply response during and after the crisis. In particular, the study asks the importance and the mechanism of the following factors in determining the response:
 - The difference in efficiency between exporters and non-exporters.
 - Exporting history.
 - Foreign ownership
 - Access to trade and financial supports.
 - Access to foreign markets.
 - Export-supporting facilities and infrastructure.
4. The major issues that hinder export expansion in response to the more competitive exchange rate situation.

IV. Empirical results and analysis

4.1 The firm export-supply response during the period 1993-2004: a descriptive analysis

Some descriptive tables are presented to assist the discussion, drawing from the data for the period 1993-2000 (**Period 1**) and 2002-04 (**Period 2**).¹⁰ As noted, the data for 2001 were not included since there seems to have been a systematic error in the data-entry for plant-code variable.¹¹

We start the analysis by examining the simple transition rates that describe the movement of plants in export market. These are given in Table 4.1. The time was divided into three sub periods: pre-crisis (1993-96), deep crisis (1997-99) and recovery (1999-2000 and 2002-04).¹²

Table 4.1 Transition rates of plants (%) in export market: 1993-2000 and 2002-04.

a. Pre-crisis

Year t status	Year t+1 status	1993-4	1994-5	1995-6	Average 1993-96
No export	No export	93.5	94.3	92.2	93.3
	Export	6.5	5.7	7.8	6.7
Export	No export	26.5	22.2	15.6	21.5
	Export	73.5	77.8	84.4	78.5

b. Deep crisis

Year t status	Year t+1 status	1996-7	1997-8	1998-9	Average 1996-99
No export	No export	95.5	100.0	85.0	93.5
	Export	4.5	0.0	15.0	6.5
Export	No export	49.8	85.3	87.4	74.2
	Export	50.2	14.7	12.6	25.8

Recovery period

Year t status	Year t+1 status	1999-2000	2002-03	2003-04	Average 1999-2004
No export	No export	94.1	92.6	92.4	93.0
	Export	5.9	7.4	7.6	7.0
Export	No export	18.1	27.1	27.6	24.2
	Export	81.9	72.9	72.4	75.8

The transition rates presented in Table 4.1a clearly reflect the export-oriented industrialisation in Indonesia. The number of firms that become exporters are suggested to have been increasing over the period 1993-96, as well as the number of firms that stay at export markets. The latter strongly highlights the extent of export orientation. The transition rates for the plants that stay in exporting state increased by about 10 percentage points only within two years period.

¹⁰ Unless otherwise stated, the figures in the tables were computed by the authors from the data base.

¹¹ See Section 3.1.

¹² Here, we put together the early recovery (1999-2000) and recovery (2002-04) period to simplify the analysis.

The picture, however, changes dramatically during the deep crisis period. Table 4.1b reflects the severe impact of the crisis on the Indonesian economy. Unlike the figure for the pre-crisis period, the extent of plants that were out of export market was very high in this period, reaching about 75 per cent of the total exporters on average. There was, however, an interesting finding that despite the high exit rate, there were about 15 per cent of plants that switched to become exporters in 1999. It is worth noting here that this rate is about twice the rate in the pre-crisis period. It thus shows a quick recovery of the exporting plants which, among other, could be attributed to the sudden increase in the competitiveness from the sharp exchange rate depreciations during this period.

The early but quick recovery in 1999 seems to have continued in the following years. As shown in the Table 4.1c, the average of transition rates over the 1999-2004 period was similar to the average rates of the pre-crisis period (1993-96).

Based on this statistics, one thus could argue that the extent of export participation has recovered, and as noted, one factor fuelling the rapid recovery was the boost in competitiveness from exchange rate depreciation. A caveat, however, immediately applies. That is, while providing a similar statistics, the transition rates in the recovery period provide substantially different picture to that during the pre-crisis. In particular, the extent of export orientation seems to have been weakened after the crisis. The rate showing the plants that had become non-exporters in the recovery period, for example, increase substantially from 18 to about 28 per cent, in contrast to the rapid decline from 25.5 to 15.6 per cent over the 1993-96 period (i.e. pre-crisis). Given the depreciated real exchange rate, these statistics therefore do not really show a credible recovery. In contrast, it may have shown a disappointing and worrying outlook, because the statistics simply mean that some considerable amount of exporting plants actually had left the export markets.

Table 4.1 also provides more insights into what had happened during the recovery period. It suggests a strong persistency of firms in either state of their status in export market ('exporting' or 'non-exporting'). Accordingly, this might explain why the export did not respond to the improved terms of trade. This is shown particularly by the figures for pre-crisis and recovery period (Table 4.1a and c). The transition rates from non-exporting to exporting in these periods are about the same (i.e., about 7 per cent), implying almost 93 per cent of the non-exporters in these periods stayed as they were. The strong persistency is also shown for those that had operated in export market, that is, about 78 per cent of plants stayed as exporters in export markets in the two periods.

Table 4.1 suggests the lack of export response to the improved terms of trade could be caused by the inability of the firms in immediately engaging in export activities. This suggestion is consistent and supports the 'self-selection' hypothesis, and in particular, the model of 'sunk cost' of exporting (Roberts and Tybout 1997).¹³ Thus, according to the theory, the lack of export response is not because firms were not attracted to the improved competitiveness, but simply because starting to export

¹³ See Section 2.2 for the more detailed discussion about the hypothesis.

(for those which had not been exporting earlier) or expanding export market (for those which had been exporting) is not necessarily cheap activities for firms.

This proposition could imply that the non-exporter that switched to become exporters should have been the firms that seriously have prepared themselves to sell their product and compete in international market. The data support this proposition. Presenting the distribution of the new exporting plants in the period 1993-2000 by export intensity class, Table 4.2 shows about more than half of the new exporting plants were classified as plants with high export intensity (export intensity of greater than 0.5).¹⁴ Moreover, the extent to which the switching firms are really serious in exporting seems to have been higher after the crisis. The distribution of the new exporting plants classified in the high export intensity class in 2000 (i.e., the recovery period) was about 10 percentage points higher than the distribution in the pre-crisis period.

Table 4.2 Distribution of the new exporting plants (%) by export intensity class, 1993-2000.

	Pre-crisis				Deep crisis			Recovery Period
	1994	1995	1996	Average	1997	1999	Average	2000
Export intensity class:								
Low	11.0	14.4	13.7	13.0	6.2	5.2	5.7	8.2
Medium	29.0	31.5	37.3	32.6	18.9	22.1	20.5	27.7
High	60.0	54.2	49.1	54.4	74.9	72.8	73.8	64.1

Notes: 1. Export intensity is defined as the ratio of exports to output in plant i , or EXP_i .

2. Definition of export intensity groups:

Low: $0 < EXP_i < 0.1$

Medium: $0.1 \leq EXP_i < 0.5$

High: $EXP_i \geq 0.5$

3. The distribution is not available for 2003 since SI data do not provide information for export propensity for the data published after 2000.

The next two tables examine the behaviour of the existing exporters. The examination is important because an increase in aggregate export is a result of two different firm behaviours. In addition to the behaviour of the non-exporters that switch to become exporters, which has been addressed in the previous two tables, existing exporters can increase their exported output, either by redirecting their output or expanding their exports.

Table 4.3 gives the transition matrices that describe the movement in export intensity of the continuously exporting plants during the period 1995-2000.¹⁵ It suggests large numbers of exporting plants in the pre-crisis period (1995-96) increased export intensity during the period 1997-2000. About 70 percent of plants with low export intensity in the pre-crisis period moved to the class of plants with

¹⁴ Because of the data limitation, we were able to examine the behaviour of the new exporting plants only until the data for 2000. The variable documenting the plant export intensity unfortunately is not included in the data set for the data published after 2000.

¹⁵ See the previous footnote for the reason of why Table 3.3, as well as Table 3.4, did not include the statistics for 2002-04.

higher export intensity in 1999 and 2000. Similarly, almost 50 percent of plants with medium export intensity in the pre-crisis period moved to the class of plants with high export intensity. The table also suggests, for a given export intensity class, there is some degree of persistence in which plants are unlikely to have been downgraded to lower export intensity classes. For example, less than 10 percent of exporting plants with high export intensity in the pre-crisis period were downgraded to medium class export intensity in all years between 1997 and 2000.

Table 4.3 Distribution of continuously exporting plants (%) by export intensity classes, period 1995-96 to 2000.

1995-96	1997			1998		
	Export intensity class:			Export intensity class:		
	Low	Medium	High	Low	Medium	Large
Export intensity class:						
Low	59.1	27.0	13.9	65.5	31.0	3.4
Medium	10.7	54.8	34.4	4.3	46.4	49.3
High	0.6	8.4	91.0	0.6	8.3	91.2

Table 4.3 continued

Table 4.3 concluded

1995-96	1999			2000		
	Export intensity class:			Export intensity class:		
	Low	Medium	Large	Low	Medium	Large
Export intensity class:						
Low	30.0	34.0	36.0	26.2	38.9	34.9
Medium	10.4	41.7	47.9	8.4	45.3	46.3
High	1.4	8.3	90.3	0.9	7.8	91.2

Note: See Table 4.2 for the definition of export intensity classes.

Table 4.4 shows the percentage difference in export intensity of continuously exporting plants during the 1997-2000 and 1995-96 periods. Plants with all output exported in the periods (i.e. plants with export intensity equal to 1) were excluded from the sample because retaining them would have been likely to understate the statistics. The mean and median of the difference are -14 and -10 per cent for the peak of the crisis (period 1997-98), reflecting the severity of the impact on exports. However, the average becomes positive for the recovery period (1999-2000).

The table shows very a large variation in the difference, even in the recovery period. The percentage difference for about 50 percent of the observations is bounded between -21 and 23 percent (i.e. the difference between the 75th and 25th percentiles). The bounding spread widens significantly, to between -84 and 92 percent, when another 30 percent of observations are added (i.e. the difference between the 90th and 10th percentiles). The description that many exporting plants sharply contracted their exported output is in line with the general perception that an export-led recovery did not materialise despite the large boost to competitiveness. The other part of the picture, which indicates a large expansion in export performance, suggests there are factors which allowed some plants to avoid the constraints of the export-led recovery.

Table 4.4 Percentage difference in plant export propensity ($\% \Delta \text{EXP}_{it}$) between periods 1997-2000 and 1995-96: descriptive statistics.

Statistics	Percentage differences in plant export intensity ($\% \Delta \text{EXP}_{it}$)	
	Between 1997-98 and 1995-96 (Peak of the crisis)	Between 1999-2000 and 1995-96 (Recovery)
Mean	-14.5	3.8
Median	-9.8	1.0
Standard deviation	69.1	89.5
Interquartile range	50.3	44.3
Percentiles:		
10%	-73.4	-84.2
25%	-43.1	-21.3
75%	7.3	22.9
90%	44.4	91.6

Did foreign ownership matter?

The tables so far point to the importance of sunk cost of exporting and ability to compete in international market as a potential determinants of the export supply response of Indonesian manufacturing firms during and after the crisis. As reviewed, the other potential determinant besides these two is foreign ownership.

Table 4.5 disaggregate the transition rates presented earlier in Table 4.1 by plant ownership status. The table seems to suggest that the likelihood of a firm to switch to become an exporter is higher for firms with foreign ownership. Excluding the rates for the deep crisis period, the transition rates from non-exporting to exporting were significantly higher for the group of foreign than those for the group of domestic-private plants. The fact that the difference applies for both the recovery and pre-crisis periods provide more support for the 'self-selection' hypothesis and the sunk-cost model of exporting.

The role of foreign ownership in determining the success of export response can clearly also be seen in the movement from exporting to non-exporting. That is, exporting foreign firms are suggested to have survived better in export market. Again, excluding the rates for the deep crisis period, the transition rates reflecting this were higher for the group of foreign plants, compared to the group of private-domestic plants, both for the recovery and pre-crisis periods.

Table 4.5 Transition rates of plants (%) in export market by status of ownership: 1993-2000 and 2002-03.

Foreign plants

		Pre-crisis				Deep crisis				Recovery period			
Year t status	Year t+1 status	1993-4	1994-5	1995-6	Average	1996-7	1997-8	1998-9	Average	1999-2000	2002-03	2003-04	Average
No export	No export	72.1	74.6	70.6	72.4	89.3	100.0	59.8	83.0	77.6	67.9	66.7	70.7
	Export	27.9	25.4	29.4	27.6	10.7	0.0	40.2	17.0	22.4	32.1	33.3	29.3
Export	No export	19.2	15.8	9.9	14.9	44.5	80.6	87.1	70.7	14.5	13.4	13.1	13.7
	Export	80.8	84.2	90.1	85.1	55.5	19.4	12.9	29.3	85.5	86.6	86.9	86.3

Private domestic plants

		Pre-crisis				Deep crisis				Recovery period			
Year t status	Year t+1 status	1993-4	1994-5	1995-6	Average	1996-7	1997-8	1998-9	Average	1999-2000	2002-03	2003-04	Average
No export	No export	95.0	95.3	93.4	94.6	95.9	100.0	87.5	94.5	96.0	93.4	93.2	94.2
	Export	5.0	4.7	6.6	5.4	4.1	0.0	12.5	5.5	4.0	6.6	6.8	5.8
Export	No export	27.9	23.3	17.1	22.8	50.7	85.9	87.2	74.6	15.8	30.2	30.8	25.6
	Export	72.1	76.7	82.9	77.2	49.3	14.1	12.8	25.4	84.2	69.8	69.2	74.4

Government-owned plants

		Pre-crisis				Deep crisis				Recovery period			
Year t status	Year t+1 status	1993-4	1994-5	1995-6	Average	1996-7	1997-8	1998-9	Average	1999-2000	2002-03	2003-04	Average
No export	No export	83.4	88.6	84.3	85.4	89.8	100.0	72.0	87.3	91.8	86.1	86.3	88.1
	Export	16.6	11.4	15.7	14.6	10.2	0.0	28.0	12.7	8.2	13.9	13.7	11.9
Export	No export	32.0	31.5	18.7	27.4	55.7	93.2	100.0	83.0	24.5	28.4	28.9	27.3
	Export	68.0	68.5	81.3	72.6	44.3	6.8	0.0	17.0	75.5	71.6	71.1	72.7

Note: 1. Foreign plants is defined as plants with positive foreign ownership share.

Private domestic plants are defined as plants with 100 per cent of private domestic ownership share.

Government plants are defined as plants with either 100 per cent of government ownership share or a joint venture between private-domestic and government plant.

Table 4.6 Percentage difference in plant export propensity ($\% \Delta EXP_{it}$) between periods 1997-2000 and 1995-96 by ownership status: descriptive statistics.

Statistics	Percentage differences in plant export intensity ($\% \Delta EXP_{it}$)	
	Between 1997-98 and 1995-96 (Deep crisis)	Between 1999-2000 and 1995-96 Recovery)
Mean		
Foreign	-6.97	21.80
Private domestic	-17.03	-1.26
Government	-12.60	8.00
Median		
Foreign	-7.69	5.13
Private domestic	-10.50	0.00
Government	-10.97	1.00
Standard deviation		
Foreign	67.10	102.10
Private domestic	70.28	87.89
Government	60.64	65.30
Interquartile range		
Foreign	54.90	48.90
Private domestic	49.10	44.62
Government	68.00	28.87

Table 4.6, which displays the summary statistics of the percentage difference in export intensity between the 1997-2000 and 1995-96 (pre-crisis) periods, provides a picture for the importance of foreign ownership in shaping the export supply responses. The average contraction in export intensity during the peak of the crisis is lowest for the group of foreign plants. As for the recovery period, the average expansion in export intensity is higher for the group of foreign plants.

However, the statistics for the variation in the differences do not really suggest a superiority of foreign plants. While the variation during the peak of the crisis is similar across the group of plants, it changes significantly in the recovery period. The variation is significantly higher for the group of foreign plants, relative to the other groups of plants. This suggests foreign plants did not necessarily respond better than other plants in terms of export intensity.

4.2 The econometrics analysis

The descriptive analysis above has suggested two factors that contributed to the lack of positive export response of the firms on the improved terms of trade, namely the inability of the firms in immediately engaging in export activities and foreign ownership. This result, however, may not be robust, since some other factors may at the same time also contributed to the result. Therefore, it is necessary to conduct an econometrics analysis to ensure the robustness of the results. In what follows, the estimating equations 3.1 (or 3.3) and 3.2 were estimated.

4.2.1 Hypotheses

Recalling the equations, the plant's export participation in the previous year ($EP_{i,t-1}$) represents the inability of firms in immediately engaging in export activities, and based on the theory reviewed in Section 2, it is expected to be positively related to the current year export participation ($EP_{i,t}$). The importance of foreign ownership is represented by FOR , the variable that defines the share of foreign ownership share in a plant. Based on the literature reviewed in Section 2, it is also expected to be positively related to the $EP_{i,t}$.

In addition to $EP_{i,t}$ and FOR , the regression included some other plant-level independent variables to control for the other firm-level characteristics. The inclusion of these variables is important since, as noted in Geroski (1998), emphasising the role of firm characteristics has become an increasingly important consideration in the empirical studies examining firm performance. The followings are these variables and their respective hypothesis. Appendix 1 presents the measurement of the variables:

Size (SIZE)

The impact of size on export supply response is difficult to predict a priori. Larger firms may respond positively because of advantage stemming from economies of scale, sophisticated management, and wide international network. Despite this, a negative relationship may also occur, i.e. smaller firms respond better than the larger ones. This is because small and medium firms in Indonesia often use some specific ways or channels, such as sub-contracting and using informal sources, to engage themselves in export markets.

Age (AGE)

The effect of firm age is also ambiguous. On the one hand, older firms tend to be more experienced, suggesting a positive relationship between age and export supply response. On the other, adjustment to a change in business environment could be more difficult to older firms; younger firms tend to be more dynamic than the older ones. A positive relationship may also be observed because younger firms in Indonesia tend to be exporters, owing to the export-oriented policies in the late 1980s and early 1990s (Ramstetter 1999).

Plant-level labour productivity (LP) and factor intensity (PCI or PSI)

Fiercer competition in export markets means firms need to be efficient in order to survive, i.e., "self-selection hypothesis". This suggests a positive relationship between plant level labour productivity and export supply response. Plant level factor intensity, i.e. capital intensity and skill intensity, are also expected to be positively related to export response. The argument is that plants using advanced technology and employing skilled workers are able to be more cost-efficient. Despite this, a negative relationship might be observed for skill intensity. Along with high inflation, higher labour quality implies higher wage expenses, which could have mitigated the increase in competitiveness unless labour was willing to take lower real wages and salary during the crisis. In addition to reflecting differences in costs, plant level factor

intensity is also able to capture the difference in product quality. Product quality is another important factor as it is often asserted that the foreign market requires a more sophisticated quality of goods than domestic markets.

Financial leverage (*LEV*)

Credit contraction could also be one of the important factors affecting the low export supply response in the previous sub-section. The argument is that the lack of loanable funds increases this financial constraint, reduces investment and hence undermines the boost to competitiveness from the sharp exchange rate depreciation. Therefore, we expect a negative relationship between financial leverage and export supply response.

Import dependency (*IMDEP*)

The extent to which exchange rate positively affects the profitability of exporting firms depends on the share of imported input they use in production. The positive impact is only minimal if production involves a large share of imported input, since higher expenditure on imported input counteracts the relative lower labour costs (Forbes 2002a). Accordingly, the share of imported input to total input is expected to be negatively related to export-supply response.

4.2.2 Results

Table 4.7 and 4.8 present the maximum likelihood estimation results of the export participation equation (i.e. equation 3.1 or 3.3) for the period 1993-2000 (**Period 1**) and 2002-04 (**Period 2**), respectively. Several specification were tried at the experimental stage, and they revealed that *LP*, *PCI* and *PSI* gave better results – in terms of R-squared – if they were included separately. The experiment also revealed that *LP*, *SIZE* and *AGE* were better to be included in their natural logarithm value, instead of in their nominal value. The estimations for the period 2002-04 did not include *AGE* variable because information to compute the variable is not included in the *SI* survey for the period. The tables report the robust standard error since data examination revealed that the variance is heteroscedastic. The Wald test for exogeneity of confirm that $EP_{i,t}$ is endogeneous. The estimations used two year lags of the EP_i for the 1993-2000 estimations, one year lag of EP_i for the 2002-04 estimations, and all other independent variables as the instruments.

The coefficients of $EP_{i,t-1}$ from the estimations of Period 1 and 2 are both positive (Table 4.7 and 4.8). Therefore, being an exporter in the previous year significantly increases the probability to stay as exporter in the current year. Comparing the results between the two periods, however, the magnitude of the coefficients is substantially larger for the results of Period 2. This suggests the impact of exporting history was higher in the recovery rather than in the crisis and early recovery period (1999-2000).

Considering that improved terms of trade during and after the crisis, one possible explanation for this large difference is the severe impact of the crisis, which in turn constrained the firms to increase their exported production. A support for this

proposition is shown by the coefficient of *LEV*, which represents the degree of firms' financial constraint. The degree of financial constraint is relevant to see this point because the Indonesian financial sector, which intermediates the flow of fund from public to business sector, collapsed during the crisis. The coefficients of *LEV* switch from negative to positive in the estimation result of Period 1 and 2. Although the coefficients are less significant for the results of Period 2, this finding suggests that firms were no longer financially constrained to start exporting during the recovery period. This finding, i.e. the negativity of *LEV*, also indicates that many firms in Indonesia still rely on external sources to finance their export activities.

Table 4.7 The determinants of export participation, the period 1993-2000

Independent variable	Dependent variable		
	EP _{t-1}	EP _{t-1}	EP _{t-1}
Exporting in the previous year (EP) _{t-1}	0.246 (17.86)**	0.247 (17.86)**	0.242 (17.55)**
Capital intensity (PCI _t)	3.90 ^a (0.83)		
Skill intensity (PSI _t)		0.001 (0.88)	
Labour productivity (ln(LP _t))			-0.016 (8.13)**
Foreign ownership (FOR _t)	0.126 (5.33)**	0.126 (5.33)**	0.131 (5.56)**
Financial leverage (LEV _t)	-0.001 (1.47)	-0.001 (1.47)	-0.003 (2.97)**
Size (ln(SIZE _t))	0.027 (5.56)**	0.027 (5.48)**	0.020 (4.11)**
Age (ln(AGE _t))	1.81 ^b (0.94)	1.61 ^b (0.83)	1.90 ^b (0.99)
Imported-input dependence (IMDEP _t)	0.030 (2.43)*	0.030 (2.41)*	0.032 (2.59)**
Constant	0.057 (1.65)+	0.059 (1.68)+	0.148 (4.06)**
Wald chi-squared	19820.38	19812.49	19963.13
Observations	53278	53269	53278

Notes: 1. Absolute value of z statistics in parentheses

2. + significant at 10%; * significant at 5%; ** significant at 1%

3. The coefficients of the dummy variables for year and regions are suppressed to simplify the presentation.

4. The coefficients of the dummy variables for industry (at two-digit level) are reported in Table 4.11.

a. The coefficient was multiplied by 10⁻⁹ to improve presentation.

b. The coefficient was multiplied by 10⁻⁴ to improve presentation.

Turning to the group of variables that represent firm-level labour productivity and factor intensity, the results are rather disappointing. Of all three relevant variables, i.e. *ln(LP)*, *PCI* and *PSI*, only the coefficients of *ln(LP)* are statistically significant. Moreover, there is a conflicting result. The coefficient of *ln(LP)* for Period 1 is negative whereas it is positive for Period 2. The result for Period 1, which is not consistent with the theory, implies that, during the crisis, it had been more difficult for a more productive firm to switch to exporting than a less productive firm. While this might be true, the result could have also been affected by the fact that almost all firms

greatly suffered from the crisis, and thus even a very productive firm should have a great difficulty in positively responding to the significantly improved competitiveness from the sharply depreciated exchange rate. This result actually is consistent with the previous finding, which was the negativity of *LEV* variable. Looking from this perspective, a very productive and efficient firm should have been having difficulty from not having enough financial support from banks (e.g. in the form of working capital) to expand its export albeit the higher chance it had.

The positive and strongly significant $\ln(LP)$ coefficient for the result of Period 2 strongly supports the self-selection hypothesis, where firms need to be efficient to compete in highly competitive export markets.

Table 4.8 The determinants of export participation, the period 2002-04

Independent variable	Dependent variable		
	EP _{t-1}	EP _{t-1}	EP _{t-1}
Exporting in the previous year (EP) _{t-1}	2.772 (3.67)**	2.648 (3.39)**	2.227 (2.78)**
Capital intensity (PCI _t)	1.36 ^a (0.62)		
Skill intensity (PSI _t)		0.033 (1.44)	
Labour productivity ($\ln(LP_t)$)			0.071 (3.25)**
Foreign ownership (FOR _t)	0.442 (1.78)+	0.476 (1.87)+	0.537 (2.16)*
Financial leverage (LEV _t)	0.078 (1.25)	0.083 (1.33)	0.120 (1.85)+
Size ($\ln(SIZE_t)$)	0.152 (1.63)	0.166 (1.73)+	0.202 (2.14)*
Imported-input dependence (IMDEP _t)	0.026 (0.26)	0.036 (0.36)	0.044 (0.44)
Constant	-2.546 (8.84)**	-2.600 (8.84)**	-3.364 (7.71)**
Observations	11203	11202	11203

Notes: 1. Absolute value of z statistics in parentheses

2. + significant at 10%; * significant at 5%; ** significant at 1%

3. The coefficients of the dummy variables for year and regions are suppressed to simplify the presentation.

4. The coefficients of the dummy variables for industry (at two-digit level) are reported in Table 4.12.

a. The coefficient was multiplied by 10^{-10} to improve presentation.

The coefficients of *FOR* are positive across the specifications for the results of Period 1 and 2. Therefore, firms with some foreign ownership would have higher chance to participate in export compared to their domestic counterparts. In addition, and perhaps is more importantly, the statistical significance of the coefficients however is larger for the result of Period 1 compared to those of Period 2. This suggests that foreign partners (i.e. parent companies) tended to help their severely affected domestic partners. This finding supports the other observation by Blomstrom and Lipsey (1993) reviewed earlier.

The coefficient of $\ln(SIZE)$ are positive across all specification and for both periods, albeit much less statistically significant for the results of the specification in Period 2. This suggests larger plants had higher probability of participating in export over the periods. This finding, while supporting a general hypothesis that the probability of exporting increases with size, also provides another evidence to support the self-selection hypothesis. This is because one possible reason for the positive relationship is the cost advantage derived from the economies of scale.

The result on the other variables, meanwhile, suggests that older firms tend to have been easier to start exporting than younger firms. The coefficients of $\ln(AGE)$ are negative and statistically insignificant. This finding accords the theoretical prediction although less consistent with the situation in Indonesia where many of the exporting firms should be relatively young. This is because the export-oriented industrialisation in Indonesia was only started in late 1980s or early 1990s.

Table 4.9 The determinants of the change in export intensity, the period 1993-2000

Independent variable	Dependent variable		
	EXPG _t	EXPG _t	EXPG _t
Capital intensity (PCI _{i,t-2})	8.22 ^a (1.55)		
Skill intensity (PSI _{i,t-2})		-0.002 (0.14)	
Labour productivity (ln(LP _{t-2}))			-1.068 ^b (0.01)
Foreign ownership (FOR _{i,t-2})	0.198 (1.79)+	0.195 (1.76)+	0.195 (1.77)+
Financial leverage (LEV _{i,t-2})	-2.63 ^c (0.21)	-1.70 ^c (0.13)	-1.96 ^c (0.16)
Size (ln(SIZE _{i,t-2}))	-0.001 (0.03)	0.0003 (0.01)	-0.0002 (0.01)
Age (ln(AGE _{i,t-2}))	-0.001 (0.55)	-0.001 (0.57)	-0.001 (0.56)
Imported-input dependence (IMDEP _{t-2})	-0.192 (2.42)*	-0.198 (2.49)*	-0.199 (2.50)*
Inverted Mills ratio	0.979 (2.88)**	0.970 (2.85)**	0.948 (2.83)**
Constant	-0.607 (1.85)+	-0.593 (1.81)+	-0.595 (1.82)+
Observations	5283	5283	5283

Notes: 1. Absolute value of z statistics in parentheses

2. + significant at 10%; * significant at 5%; ** significant at 1%

3. The coefficients of the dummy variables for year, industry (at ISIC two-digit level) and regions are suppressed to simplify the presentation.

a. The coefficient was multiplied by 10^{-8} to improve presentation.

b. The coefficient was multiplied by 10^{-4} to improve presentation.

c. The coefficient was multiplied by 10^{-5} to improve presentation.

Table 4.9 presents the estimation results for the adjustment in export propensity (i.e. equation 3.2) for the period 1993-2000 (Period 1). The estimations for

the period 2002-04 (Period 2) were not conducted since *SI* data for this period do not provide information about the plants' export propensity. Based on the results in the experimental stage, Table 4.9 presents the results with two-years lag in all explanatory variables. This is to ensure that specifications are identified and that explanatory variables are exogeneous.

The estimated coefficients of the inverse Mills ratio are positive and statistically very significant across the specifications, suggesting a positive correlation in the disturbance between the export participation and export propensity growth equation, and therefore, neglecting this correlation would likely to give bias in the result of the export propensity growth equation.

The result in general shows a similar picture to that of the export participation equation. Few important points, nevertheless, are worth mentioning. First, for the variables representing the self-selection hypothesis, namely $\ln(LP)$, *PSI* and *PCI*, only the coefficient of $\ln(LP)$ is positive, while the coefficients of the other two variables are negative. Nevertheless, all of these coefficients are highly statistically insignificant, suggesting that being superior to other firms – in terms of efficiency – did not affect the change in their export response to the improved competitiveness.

Second, the result also highlights the importance of foreign ownership. The coefficient of *FOR* are consistently positive across the specifications and statistically significant, albeit only at 10 per cent level. This finding also confirms the earlier observation in the descriptive analysis.

Third, in contrast to the result of export participation equation, the result in Table 4.9 does not indicate that the extent of financial constraint matter in determining the export supply response of the exporters. The coefficients of *LEV* are very statistically insignificant, indicating the low confidence level of the estimated coefficients.

4.2.3 Discussion

Several points are worth mentioning regarding the above estimation results.

First, the positive and rather strong effect of exporting history, captured by $EP_{i,t-1}$, highlights the presumption that exporting is costly and often a slow business activity to initiate. This brings an important implication. That is, the improved terms of trade from the exchange rate depreciation is likely to have been captured only by plants which had been exporting prior the period with the improved terms of trade, or in other words, before the crisis. This perhaps could explain the low switching rate from non-exporting to exporting observed in the descriptive analysis. The finding suggests it is likely to observe a quick adjustment for firms that have had some exporting experience, but this is not necessarily so for firms that sell their entire output to the domestic market. The redirection is still possible, although it likely happens with a lag.

Second, the findings that support the self-selection hypothesis provide another reason for the observed low switching rate from non-exporting to exporting. That is, the low switching rate may be because most non-exporting plants were either not ready or not prepared to switch. Supporting this, it is often observed that new

exporters exhibit similar characteristics to established exporters. Bernard and Jensen (1999) found that new US exporters show similar characteristics two or three years before they actually begin to export. Hallward-Driemeier et al. (2002) found many domestic-private exporters in some Asian countries closely resembled foreign exporters, which was interpreted as an indication that the focus of exports is the likely intent right from when firms are first created.

Third, the findings regarding foreign ownership strongly supports the proposition by Blomstrom and Lipsey (1993) that it is easier for foreign firms to increase their exported output or redirect sales in the event of positive economic shock.¹⁶ The finding which shows that the effect of foreign ownership was particularly important in the Period 1 supports the view that subsidiaries are likely to have been financially supported by their parent companies.

Fourth, related to the previous point, the finding of the less importance of the impact of foreign ownership on export participation during the period 2002-04 may have reflected the growing supply-side constraint stemming from some structural problems. As reviewed in the beginning, some studies have noted that deteriorating infrastructure and uncondusive investment policy have substantially increased the cost of production, including the rigid labour policy. Thus, during this period, the relative competitiveness of being foreign firms is likely to have been offset, and hence, the chance of some foreign firms to be able to positively respond the improved terms of trade should have been lowered. The supply-side constraint presumably would also negatively affect domestic firms, not only the foreign ones. Therefore, it is not a surprise if one observes a low aggregate increase in export given the improved terms of trade after the crisis.

4.3 Some insights from firm-level case study

This study undertook some in-depth interviews with senior-level managers of few firms in the Indonesian manufacturing, located in greater Jakarta. As noted, the interviews aim to gain more insights into the questions of the study and supplement the result of the statistical analysis. Because of the very limited respondents, some biases in the findings are unavoidable and hence the findings are not attempted to address the issue in great detail.

The respondents were three firms from textile-and-garment and electronic industry.¹⁷ The main characteristics of these firms are given in Table 4.10.

4.3.1 The interviews results: a summary

The garment-and-textile company (Firm 1)

The firm produces under an Original Equipment Manufacturing (OEM) arrangement for a leading brand, but most of this is limited to fabric purchases and

¹⁶ Our finding is also consistent with the finding of Blomstrom and Lipsey on the response of the Latin America's firms to the exchange rate crisis in 1980s.

¹⁷ At the beginning of the study, we sent out 12 letters for interview. Out of these letters, we received five feedbacks, saying that there are willing to be interviewed. However, due to some problems and many rearrangements for the interview, at the end we only managed to have three interviews.

Cut-Make-Trim (CMT). The remaining segments, for example, selecting suppliers, design, and technological specifications, mostly come from buyers. Customers typically provide the firm with some exact prototype product orders. Tight schedules are a frequently encountered difficulty. Since the firm does not undertake all of their own procurement, overdue supplies often causes problems in meeting required response times.

Table 4.10 The main characteristics of the interviewed firms

Firm	Main products	Characteristics
Firm 1	Textiles and garments	Large and domestic-owned company, vertically integrated firm, domestic and export orientation
Firm 2	Electronic components: touch screen for computer monitor and other electronic devices.	Large and joint-venture company, domestic and export orientation
Firm 3	Consumer electronics: television sets, audio products and computer monitors	Large and domestic-owned company; domestic and exports orientation

Lack of market information prevents the firm from directly exporting to the end market, requiring instead that they go through intermediaries (importers, wholesalers, sourcing agents, or distributors). This furthers curtails the firm’s profit margin. The products are mass production elements, thus sensitive to cost structure changes i.e. labour, fuels. The company also mentioned a problem with rising wages and fuel costs, which further eroded comparative advantage. Common strategies for facing increased competition are economical use of capacity through maintaining little inventory while upgrading machinery.

As crisis hit, it tried to adjust supply by switching to a relatively cheaper suppliers. The firm struggled to survive in the few months following the beginning of the crisis because almost all of its output, i.e. about 90 per cent, was sold domestically. The firm, in its attempt to increase the likelihood of survival, started to initiate export expansion activities, through their established marketing channels. Finally, the firm successfully redirected much of its output to their new expanded export market. During the crisis, it was able to increase its export propensity from about 10 to 45 per cent. The firm continued to maintain its crisis-export propensity even until now.

It was admitted by the manager that the success of the firm in redirecting their sales to export markets was, to large extent, due to its experience in selling small portion of their product overseas. The manager also mentioned that the firm’s experience and networks made its attempt to redirect sales much easier than the other similar domestic firms that sell all of their output domestically. The success, however, was not without a cost. The firm had to reduce its employment in the attempt to increase productivity and efficiency, mainly to increase its competitiveness - *vis a vis* exporters from other countries – in its export markets.

The firm used the services of foreign bank to get the working capital and letter of credit (LC). This is because the industry was classified into a high-risk industry by the central bank during the peak of the crisis, which obviously constrained the firm to acquire loans from domestic banks.

The joint-venture electronic company (Firm 2)

Foreign ownership and trade networks cushioned the firm from the severe impact of crisis. The latter comes as the result of technology transfer that allows the firm to produce the goods that competitive – in terms of quality – in export markets. This occurred after its Japanese principal was taken over by an U.S company. The take over facilitated the firm to increase its export competitiveness by providing technical and capital assistance which eventually resulted in an upgraded technology capability of the firm. The significant technology upgrading is clearly indicated by the fact that, unlike most subsidiaries which rarely acquired either technological or design capability or both from their principals, the firm claimed to have started conducting research and development (R&D) of its own.

Access to export market did benefit the firm during crisis. It gained from access to export market provided by its foreign counterparts. The counterparts, apart from their main responsibility to provide raw materials and other inputs, connect most of the company buyers. Considering the large variation of the buyers' preference, the firm has always been successful in exercising this strategy because it has a flexible production system, which allows it to quickly respond to the changing consumers' needs, such as a limited production of a variety of models and shorter manufacturing cycle. Despite this success, the firm was forced to increase its domestic sales, mainly because of the growing consumer goods demand domestically. At the moment, the firm sells about 80 per cent of its products to domestic market and exports the rest

The domestic-owned electronic company (Firm 3)

As a strategy to overcome the impact of crisis, the firm entered the licensing agreement to sell products under foreign brand name. Like the other firm that engaged in industrial networks, the management realized that the company would benefit from the bigger network that the counterpart has. Almost 70 per cent of its total production was exported under the foreign brand name. While the company focuses on ASEAN market – indicated and proven by the establishment of branch office in Singapore –, the marketing activities for the other international markers are conducted through its foreign counterparts.

In terms of getting new export markets access, it is worth mentioning here that the firm could get the access through foreign banks, as one of its major source for external financing, as much as it could get from its own marketing activities and foreign counterparts.

The partnership agreement with the foreign counterparts did save the company from the severe impact of the crisis as it had more access to input and export market. Because of its strong export orientation, the collapse of domestic market during the crisis did not severely affect its performance.

4.3.2 Some key findings from the interviews

The interviews summarised above provide us with four major points that are worth highlighting.

First, the availability of networks determines the success of firms in responding to the improved terms of trade. The interviews suggest companies that engage in industrial networks performed relatively better in terms of exports during and after crisis than those that did not. The interviews determine at least four types of networks that a firm can engage in: trade, production, technology and ownership. Firms that had trade and flexible production network could easily switch their outputs from domestic to export markets, and adjust their production strategy in order to benefit from the Rupiah depreciation. Thus, and as indicated by the experience of two firms we interviewed, firms that had been exporting long before the crisis performed well in boosting their export performance, since they were not necessarily facing an expensive cost to enter a new market. Unlike the impact of trade networks, one aspect of production network, i.e. the flexibility of a firm in choosing the source of inputs, appears to only slightly cushion the companies from severe impact of the crisis.

The ownership network matters by providing financial assistance and market access. As in the case of electronic component firm, the ownership network resulted in a technology upgrading, which in turn helped the firm in improving the quality of the goods that are able to compete in highly competitive export markets. Moreover, which was also illustrated by this company, the ownership network does not necessarily work by giving the company with market access, but also by providing the company with access to some much cheaper production inputs.

Second, among several other factors, limited access to capital and deteriorated infrastructure are often mentioned as the main factors hindering the ability of companies in taking positive impact from the sharp exchange rate depreciation. The textile-and-garment firm, for example, complained about the lack of government's support to facilitate technology upgrading, particularly for the upgrading towards a more energy efficient technology – in response to the increasing trend in the fuel price.

It is important to note here that foreign and joint venture banks – instead of domestic banks or financial institutions – are more reliable in providing financial supports for exporters. As in the case of textile-and-garment firm, financial supports during the peak of the crisis, and even up until now, was mainly provided by a Japanese bank. This is an interesting finding for Indonesia, bearing in mind that the policy specifies that foreign banks should allocate 50 per cent of their credit to export credit. It is also worth mentioning here that, according to the experience of the interviewed firms, the relationship with foreign banks do help firms to establish marketing and production networks, and thus reinforces the positive impact of having the relationship with foreign banks.

Third, unlike what is commonly believed, the role of trade facilitators does not appear to have given significant positive impact to firm export supply response. In the case of the firms we interviewed, the role trade facilitator was very limited, except for the textile-and-garment firm. As for the other two companies, they set up their own

marketing office in the prospective export markets and explored export markets through different channels, including trade exhibitions and internet. This, however, is rather contradictory to the fact that many Indonesia's companies prefer to export on fob (freight on board) basis, and thus they would be better off by using the service of trade facilitators.

Fourth, unreliable supporting industries prove to have inhibited the response of firms to the improved terms of trade. As indicated by the managers, unreliable domestic source forced firms to import the input materials and hence made the firms to bear a high import cost, owing to the large exchange rate depreciation. For firms in some industries, particularly the low-skilled export oriented industries – such as textile-and-garment – this weakness often put the firm in uncompetitive situation *vis-à-vis* its competitors from other countries.

4.2 Brief analysis on the cost for exporting

The econometric analysis earlier has shown the importance of cost for exporting in determining the success of a firm in switching from non-exporter to exporter. Accordingly, it is important to further elaborate this subject, and this subsection aims to do so.

Ideally, elaborating the subject should be done by measuring the extent of the export cost. While appealing, measuring such cost is very difficult, and might be not possible to be done. This is not only because the survey data used in this study do not have information that reveal the cost, but also because there could be just too many cost items that can be considered as the cost for exporting. Equally important, even if we could details the exact cost items, there is likely large variation in the extent of the cost across firms, industry, and different export destinations.

Considering the difficulty, this study adopted the 'second-best' approach by examining the extent of the coefficient of the dummy variables for industry in the regression of the determinants of export participation.¹⁸ This approach presumes that export cost varies across industries. It is important to note that the approach is a rather crude method in measuring the exporting cost, in the sense that it 'infers' rather than 'measures' the extent of the exact cost. Nevertheless, it is definitely the best method to adopt given the limitation in the data.

Table 4.11 and 4.12 present the coefficients of the industry dummy variables from the regression of the export participation equation for Period 1 (1993-2000) and 2 (2002-04). It is worth mentioning here that the definition of the two-digit ISIC used in the regression is different between Period 1 and 2. This is because of the change in the use of ISIC version in the survey. To avoid the 'dummy-variable trap', dummy variables for ISIC 31 (food, beverages, and tobacco) and ISIC 15 (food and beverages) was used as the based dummy variable for the regression of Period 1 and 2, respectively.

Consider, first, the result from Table 4.11, the exporting cost during the crisis in garment-and-textile and basic chemical industries (ISIC 32 and 35, respectively) is

¹⁸ A referee suggested the authors to adopt this approach.

suggested to have been lower than the exporting cost in food-and-beverages industry. The coefficients of the dummy variables for these industries are negative across the three specifications, albeit only the coefficients of the dummy variables for the garment-and-textile have strong statistical significance. This finding is consistent with the fact that these industries are the industries that Indonesia has its comparative advantage. Garment-and-textile and basic chemical industries are the labour- and resource-intensive industry, respectively.¹⁹

The results, meanwhile, suggest that the cost for exporting in the other industries were about the same with the exporting cost in the food-and-beverages industry. The coefficients of the dummy variables representing these industries are very statistically insignificant.

Table 4.11 The coefficients of dummy variable for industry (at two-digit level of ISIC) from the determinants of export participation, the period 1993-2000

Independent variable	Dependent variable		
	EP _{t-1}	EP _{t-1}	EP _{t-1}
Dummy variable for ISIC 32 (Textile, garment and footwear)	-0.086 (2.15)*	-0.086 (2.14)*	-0.086 (2.15)*
Dummy variable for ISIC 33 (Wood products, incl. furniture)	0.004 (0.09)	0.005 (0.10)	0.002 (0.05)
Dummy variable for ISIC 34 (Paper and paper products)	-0.032 (0.63)	-0.031 (0.62)	-0.034 (0.67)
Dummy variable for ISIC 35 (Chemical, rubber and plastics)	-0.062 (1.84)+	-0.062 (1.83)+	-0.064 (1.90)+
Dummy variable for ISIC 36 (Non-metallic mineral products)	0.038 (0.75)	0.038 (0.76)	0.035 (0.70)
Dummy variable for ISIC 37 (Basic metal industry)	-0.030 (0.79)	-0.029 (0.78)	-0.030 (0.80)
Dummy variable for ISIC 38 (Machinery and equipment)	-0.054 (1.25)	-0.053 (1.24)	-0.052 (1.22)

Notes: 1. Absolute value of z statistics in parentheses.

2. + significant at 10%; * significant at 5%; ** significant at 1%.

3. The ISIC used in the regression, or reported in the table, is ISIC Rev. 2.

4. The results refers to the regression reported in Table 4.7.

The picture changes quite significantly if we turn to the results in Table 4.12 for the post-crisis period. First, there were only two industries, namely tobacco-products and motor vehicle industry, which are suggested to have lower exporting cost than the exporting cost in food-and-beverage industry (ISIC 15). The coefficients of the dummy variables for these two industries are negatively large and statistically very significant. While quite many of the coefficients of the dummy variable for the other industries are also negative, such as those of the electronics, basic metal and iron, paper and paper products, many of these coefficients are often statistically

¹⁹ Rubber and rubber-based products are included in ISIC 35 of basic chemical industry.

insignificant. This indicates, to some extent, a high variation in the cost of exporting across firms in these industries.

Second, and perhaps more importantly, the results in Table 4.12 now suggest the cost of exporting in industries where Indonesia has its comparative advantage (i.e., labour- and resource-intensive industries) apparently was higher after the crisis – or during the recovery period – than during the deep crisis. This inference is derived from many positive and very statistically significant coefficients of the dummy variables for these industries. In particular, the industries included in this group are textiles products (ISIC 17), garment (ISIC 18), leather products and footwear (ISIC 19), wood products (ISIC 20), and basic chemicals (ISIC 24). While further investigation is clearly needed, this finding is consistent with the general situation of deteriorating business climate after the crisis. As reviewed, in terms of business climate, Indonesia starting from the early 2000s was characterised with a deteriorating infrastructure and a rigid labour policy (see Section 2.4).

Table 4.12 The coefficients of dummy variable for industry (at two-digit level of ISIC) from the determinants of export participation, the period 2002-04

Independent variable	Dependent variable		
	EP _{t-1}	EP _{t-1}	EP _{t-1}
Dummy variable for ISIC 16 (Tobacco products)	-0.362 (2.35)*	-0.361 (2.32)*	-0.364 (2.44)*
Dummy variable for ISIC 17 (Spinning, weaving and finishing of textiles)	0.459 (5.79)**	0.462 (5.78)**	0.454 (5.82)**
Dummy variable for ISIC 18 (Wearing apparel, except fur apparel)	0.564 (7.70)**	0.576 (7.92)**	0.598 (8.11)**
Dummy variable for ISIC 19 (Leather products and footwear)	0.329 (2.39)*	0.345 (2.51)*	0.389 (2.83)**
Dummy variable for ISIC 20 (Wood products)	0.351 (1.73)+	0.387 (1.86)+	0.495 (2.32)*
Dummy variable for ISIC 21 (Paper and paper products)	-0.073 (0.44)	-0.073 (0.44)	-0.102 (0.62)
Dummy variable for ISIC 22 (Publishing and printing)	-0.150 (0.98)	-0.160 (1.05)	-0.197 (1.29)
Dummy variable for ISIC 23 (Non-metallic mineral products)	-0.074 (0.18)	-0.054 (0.13)	-0.009 (0.02)
Dummy variable for ISIC 24 (Basic chemicals)	0.248 (2.61)**	0.237 (2.51)*	0.200 (2.10)*
Dummy variable for ISIC 25 (Rubber and plastic products)	0.094 (1.07)	0.085 (0.97)	0.084 (0.97)
Dummy variable for ISIC 26 (Glass and glass products)	0.123 (1.56)	0.130 (1.66)+	0.148 (1.89)+
Dummy variable for ISIC 27 (Basic iron and steel)	-0.048 (0.24)	-0.045 (0.22)	-0.100 (0.51)
Dummy variable for ISIC 28 (Metal products)	-0.102 (0.89)	-0.100 (0.88)	-0.114 (1.01)
Dummy variable for ISIC 29 (General purpose machinery)	-0.220 (1.27)	-0.216 (1.26)	-0.219 (1.29)
Dummy variable for ISIC 31 (Electric motors, generators and transformers)	0.233 (1.14)	0.234 (1.15)	0.204 (1.01)
Dummy variable for ISIC 32 (Electronic and other electronic components)	-0.562 (1.81)+	-0.533 (1.75)+	-0.531 (1.77)+
Dummy variable for ISIC 33 (Medical appliances and instruments)	0.527	0.513	0.450

Dummy variable for ISIC 34 (Motor vehicles)	(1.23) -0.619 (2.39)*	(1.21) -0.623 (2.42)*	(1.07) -0.693 (2.66)**
Dummy variable for ISIC 35 (Other transport machinery)	-0.345 (1.63)	-0.335 (1.60)	-0.361 (1.72)+
Dummy variable for ISIC 36 (Furniture)	0.404 (1.72)+	0.448 (1.85)+	0.577 (2.31)*

Notes: 1. Absolute value of z statistics in parentheses.

2. + significant at 10%; * significant at 5%; ** significant at 1%.

3. The ISIC used in the regression, or reported in the table, is ISIC Rev. 3.

4. The results refers to the regression reported in Table 4.8.

5. The dummy variable for industry ISIC 30 and 37 were dropped by the regressions.

V. Summary, conclusion and some possible policy recommendations

This study was motivated by an observation that while there was an improvement in terms of trade after the 1997/98 economic crisis, Indonesia does not seem to have been able to improve its export performance. This study addresses this issue and attempts to answer the question of why there was only sluggish export response. In answering the question, this study details the picture of plant-level export supply response of the Indonesian manufacturing and investigates which factors explained the sluggish export response.

Among the other findings, the descriptive analysis shows the extent of export participation of plants in the industry tends to have weakened over the period 2002-04, or recovery period. This is albeit the rapid recovery immediately after the crisis over the period 1999-2000. The other important finding is the strong persistency of firms in either state of their exporting status ('exporting' or 'non-exporting'). This suggests the lack of export response to the improved terms of trade could be caused by the inability of firms in immediately engaging in export activities.

The major findings from the econometric analysis can be summarised as follows. First, being an exporter in the previous year significantly increases the probability to stay as 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 higher chance to participate in export compared to their domestic counterparts. However, the importance of this effect is shown to have been much weaker during the period 2002-04.

In general, the econometric analysis confirms much of the picture from the descriptive analysis, and being able to provide a more robust quantitative method. Thus, it is important highlighting the main points derived from the estimations. First, the improved terms of trade from the exchange rate depreciation is likely to have been captured only by plants which had been exporting prior to crisis. This suggests it is likely to observe a success response from firms that have had some exporting

experience, but not necessarily so for firms that sell their entire output to the domestic market. The redirection is likely to happen with a lag.

Second, the support for the self-selection hypothesis provides another reason for the observed unsuccessful response during and after the crisis. Firms may have been not ready or not prepared to enter export markets. This is consistent with other studies which found that new exporters tend to improve their performance in the few years leading up to exporting.

Third, this study supports Blomstrom and Lipsey's (1993) proposition that it is easier for foreign firms to increase their exported output or redirect sales in the event of positive economic shock. In Indonesian and the crisis context, this may have been due to some supports, particularly financial and market access support.

Finally, the estimations indicated that the cost for exporting was quite differently between during and post-crisis. In particular, after the crisis, sectors which Indonesia has some comparative advantage, i.e., labour- and resource-intensive, seem to have had much higher cost for exporting, compared to the indication of the cost during the crisis. As highlighted, this might be due to the increasing supply-constraints in Indonesian economy in the post-crisis period, in the form of a deteriorating infrastructure and a rigid labour policy.

The in-depth interviews, meanwhile, provide more insights and confirm the some of the major findings from statistical analysis. Three main findings were derived from the interviews. First, the availability of networks, namely trade, production, technology and ownership network, determines the success of firms in responding to the improved terms of trade. The interviews suggest companies that engage in industrial networks performed relatively better in terms of exports during and after crisis, than those that did not. Second, limited access to capital and deteriorated infrastructure were often mentioned as the main constraints for firms in benefiting the sharp exchange rate depreciation. Third, unlike what is commonly believed, the role of trade facilitators does not appear to have given significant positive impact to firm export supply response. What was learnt from the interview is that the role of trade facilitators could be industry specific. In this study, textile-and-garment industry relies much on the facilitators while it is not the case with electronic industry.

a. Some possible policy recommendations

Presuming that the trend of the improved terms of trade would continue, or maybe there would be another big jump in terms of trade in the future, the findings are clearly relevant for policy-making practice in Indonesia. The immediate implication is that, the policy should be focused on encouraging firms to start exporting, even if a firm is domestically oriented. The reason is obvious. The empirical analysis in this study indicates and confirms that exporting is costly and could be very slow business activity to be initiated.

Encouraging firms to start exporting could be done in many ways. One, which also indicated by the empirical findings, is by attracting much higher flow of foreign direct investment (FDI). Again, the reason is obvious, foreign ownership is shown to have been important for shaping a successful export supply response after the crisis. One important policy action would be streamlining the procedure and process for

establishing business or exporting from Indonesia. As noted in the many reports, Indonesia currently stays at the bottom of the global ranking for this particular area.

Related to effort to attract more FDI, the study also provides a clear signal on which direction the policy should go. In the last few years following the economic crisis of 1997/98, some attempts made by the government to attract FDI does not seem to have been very successful. Although it is still subject to further research, casual observation indicates the lack of knowledge from the policy makers on the real situation could be one of the important factors contributing to the policy failure.

The importance of increasing FDI inflow is also very crucial in the context of relaxing the liquidity constraint faced by exporters. The finding from firm-level interview suggests the access to foreign source of fund , which often comes along a flow of FDI, serves as an alternative option in the light of minimum functioning of the domestic financial sector. This does not only apply in the context of deep crisis, or even during the recovery period. Currently, and despite the successful effort of the central bank and the government in maintaining macroeconomic stability, the contribution of domestic financial sector to private real sector is still considerably low.

The other important policy suggestion is that the government should immediately remove the supply-constraints characterising the Indonesian economy post-crisis. This is clearly derived from the indication on the extent of the cost for exporting. In addition, the in-depth interviews revealed, for example, that weak infrastructure, particularly that enables firms to install energy-efficient machinery, significantly undermined the boost in competitiveness.

References

- Aguiar, M. (2005), 'Investment, Devaluation, and Foreign Currency Exposure: The Case of Mexico', *Journal of Development Economics*, 78(1), pp.95-113.
- ADB (2002), 'Did East-Asian Developing Economies Lose Export Competitiveness in the Pre-Crisis 1990s?', *ADB Institute research Paper*, No. 34, Tokyo: ADB Institute.
- Aitken, B., G. Hanson and A. Harrison (1997), 'Spillover, Foreign Investment and Export Behaviour.', *Journal of International Economics*, 43(1-2), pp.103-132.
- Aswicahyono, H.H. and H. Hill (1995), 'Determinants of Foreign Ownership in LDC Manufacturing: An Indonesian Case Study', *Journal of International Business Studies*, 26 (1), pp.139-158.
- Aswicahyono, H. and I. Maidir (2003), 'Indonesia's Textiles and Apparels Industry: Taking a Stand in the New International Competition', *CSIS Economics Working Paper Series*, No. 64, Jakarta: CSIS.
- Aswicahyono, H. and H. Hill (2004), 'Survey of Recent Developments', *Bulletin of Indonesian Economic Studies*, 40(3), pp.227-305.
- Aswicahyono, H., K. Bird and H. Hill (2004), 'How Do 'Twin Crises' Affect LDC Industrialization? An Indonesian Case Study', paper prepared for the 9th Convention of the East Asian Economic Association. Hong Kong, 13-14 November.
- Aw, Bee Y. and A.R. Hwang (1995), 'Productivity and Export Market: A Firm-level Analysis', *Journal of Development Economics*, 47(2), pp.313-32.
- Berry, R.A. (1992), 'Firm (or plant) Size in the Analysis of Trade and Development', in G.K. Helleiner (ed.), *Trade Policy, Industrialization, and Development: New Perspectives*. Oxford: Clarendon Press, pp. 46-88.
- Bernard, A.B., J.B. Jensen and R.Z. Lawrence (1995), 'Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987', *Brookings Papers on Economic Activity, Microeconomics*, 1995, pp.67-119.
- Bernard, A.B. and J. Wagner (1998), 'Export Entry and Exit by German Firms', *NBER Working Paper Series*, No. 6538, Cambridge, MA: NBER.
- Bernard, A.B. and J.B. Jensen (1999), 'Exceptional Exporter Performance: Cause, Effect, or both?', *Journal of International Economics*, 47(1), pp.1-25.
- Bernard, Andrew., and J.B. Jensen (2004), 'Why Some Firms Export', *Review of Economics and Statistics*, 86(2), pp.561-69.

Blomstrom, M. and R.E. Lipsey (1993), 'Foreign Firms and Structural Adjustment in Latin America: Lesson from the Debt Crisis', in G. Hansson (ed.), *Trade, Growth and Development*. New York: Routledge, pp.109-32.

BPS (2000), *Table Kesesuaian Lapangan Usaha/Kegiatan Ekonomi: KBLI 2000 – KLUI 1990*. Jakarta: BPS.

Campa, J.M. (2004), 'Exchange rates and Trade: How Important is Hysteresis in Trade?', *European Economic Review*, 48(3), pp.527-48.

Desai, M., C.F. Foley and K.J. Forbes (2004), 'Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Crisis', *NBER Working Paper Series*, No. 10545, Cambridge, MA: NBER.

Duttagupta, R. and A. Spilimbergo (2004), 'What Happened to Asian Exports during the Crisis?', *IMF Staff Papers*, 51(1), pp.72-95.

Dwor-Frecaut, D., F. Colaco and M. Hallward-Driemeier (eds.) (2000), *Asian Corporate Recovery: Findings from Firm-level Surveys in Five Countries*, Washington DC: The World Bank.

Forbes, K.J. (2000a), 'Cheap Labor Meets Costly Capital: the Impact of Devaluations on Commodity Firms', *Journal of Development Economics*, 69(1), pp.335-65.

Forbes, K.J. (2002b). 'How do Large Depreciations Affect Firm Performance?', *IMF Staff Papers*, 49, pp. 214-238.

Geroski, P.A. (1998), 'An Applied Econometrician's View of Large Company Performance', *Review of Industrial Organization*, 13(6), pp.271-93.

Greenaway, D., N. Sousa and K. Wakelin (2004), 'Do Domestic Firms Learn to Export from Multinationals?', *European Journal of Political Economy*, 20(4), pp. 1027-43.

Ghei, N. and L. Pritchett (1999), 'The Three Pessimisms: Real Exchange Rate and Trade Flows in Developing Countries', in L.E. Hinkle and P.J. Montiel (eds.), *Exchange Rate Misalignment: Concepts and Measurements for Developing Countries*. Oxford: Oxford University Press, pp.467-96.

Gosh, S.R. and A.R. Gosh (1999), 'East Asia in the Aftermath: Was there a Crunch?', *IMF Working Paper*, No. 38, Washington DC: IMF.

Gupta, P., D. Mishra and R. Sahay (2003), 'Output Response to Currency Crisis', *IMF Working Paper*, No. 230, Washington, DC: IMF.

Hill, H. (1996), *Southeast Asia's Emerging Giant: Indonesian Economic Policy and Development since 1966*. Cambridge: Cambridge University Press.

James, W.E., D.J. Ray and P.J. Minor, 'Indonesia's Textiles and Apparel: The Challenges Ahead', *Bulletin of Indonesian Economic Studies*, 39(1), pp.93-103.

Johnson, C. (1998), 'Survey of Recent Developments', *Bulletin of Indonesian Economic Studies*, 34(2), pp.3-57.

Kawai, M., H.J. Hahm and G. Iarossi (2000), 'Corporate Foreign Debt in East Asia: Too Much or too Little?' in D. Dwor-Frecaut, F. Colaco and M. Hallward-Driemeier (eds), *Asian Corporate Recovery: Findings from Firm-level Surveys in Five Countries*, Washington DC: The World Bank, pp.111-21.

Krueger, A. and A. Tornell (1999), 'The Role of Bank Restructuring in Recovering From Crises: Mexico 1995-98', *NBER Working Paper Series*, No. 7042, Cambridge, MA: NBER.

Lipsey, R.E. (2001), 'Foreign Direct Investors in Three Financial Crises', *NBER Working Paper Series*, No. 8084, Cambridge, MA: NBER.

Narjoko, Dionisius A. (2006), 'Indonesian Manufacturing and the Economic Crisis of 1997/98', unpublished PhD thesis, Australian National University, Canberra.

Ramstetter, E.D. (1999), 'Trade Propensities and Foreign Ownership Shares in Indonesian Manufacturing', *Bulletin of Indonesian Economic Studies*, 36(2), pp.61-95.

Ray, D. (2003), 'Survey of Recent Developments', *Bulletin of Indonesian Economic Studies*, 39(3), pp.245-70.

Roberts, M.J. and J.R. Tybout (1997), 'An Empirical Model of Sunk Costs and Decision to Export', *American Economic Review*, 87(4), pp.545-64.

Rosner, L.P. (2000), 'Indonesia's Non-oil Export Performance during the Economic Crisis: Distinguishing Price Trends from Quantity Trends,' *Bulletin of Indonesian Economic Studies*, 36(2), pp.61-95.

Sjoholm, F. and S. Takii (2003), 'Foreign Networks and Exports: Results from Indonesian Panel Data', *ICSEAD Working Paper Series*, Vol. 2003-33, Kitakyushu: ICSEAD.

Thee, K.W. (1994), *Industrialisasi di Indonesia: Beberapa Kajian*. Jakarta: LP3ES.

Thee, K.W. (2003), 'The Indonesian Economic Crisis of 1997-98 and the Long Road to Recovery', *Australian Economic History Review*, 43(2), pp.183-96.

Wooldridge, Jeffrey M. (2002), *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

World Bank (2000), *East Asia: Recovery and Beyond*. Washington D.C.: World Bank

Yin, Robert K. (1984), *Case Study Research: Design and Methods*. London: Sage Publication.

Appendix 1: The measurement of variable used in the regressions

Size (SIZE)

As commonly adopted in other studies, SIZE is proxied by number of employees. The other proxies commonly used in the literature, such as output or profit, are not adopted since they are more sensitive to changes in business cycle.

Age (AGE)

AGE is proxied by the number of years the plant has been in commercial production.

Foreign ownership (FOR)

FOR is proxied by the percentage share of foreign ownership in a plant.

Plant-level labour productivity (LP)

LP is constructed by taking the ratio between real value added to employment. Price ratio at the three-digit ISIC level is used as the price deflator to compute the real value added. It is important to note here that LP tends to overstate the true real labour productivity, since the ideal denominator is hours of work – instead of number of working labour. The data on hours of work, however, are not available in the *SI* data, and therefore, this study proceeds with employment as the denominator.

Factor intensity (PCI or PSI)

In the absence of reliable data on capital stock, *PCI* is measured as follows

$$\begin{aligned} \text{PCI} &= \frac{(\text{non - wage value added})}{(\text{total number of employee})} \\ &= \frac{(\text{value of output}) - (\text{inputs}) - (\text{wages and salary})}{(\text{total number of employee})} \end{aligned}$$

PSI is computed as the following

$$\text{PSI} = \frac{(\text{total expenditure on wages and salary})}{(\text{total number of employee})}$$

Financial leverage (LEV)

While data on firms' balance sheet is incomplete in the *SI* data, this study employs 'interest coverage ratio' to construct the variable for financial leverage (*LEV*), defined as follows

$$\text{LEV} = \frac{1}{(\text{Interest Coverage})}$$

where

$$\text{(Interest Coverage)} = \frac{\text{(EBIT)}}{\text{(interest payment)}}$$

and *EBIT* is equal to sales (or earnings) before deduction of interest payments and income taxes.

Interest coverage ratio measures the number of times a firm's earnings exceed debt payments. It indicates how well a firm's earnings can cover interest payments. In general, a low interest coverage ratio implies that a firm is highly leveraged (i.e. higher LEV) and has low capability to take on additional debt (i.e. more financially constrained). It is important bearing in mind that the ratio – as with the other leverage ratios – is very approximate. This is because the ratio tends to understate the true extent of a firm's financial leverage, since it focuses only on servicing the interest liability and does not take into account debt repayment. Usually, repayment of debt principal is higher than the interest payment.

Import dependency (*IMDEP*)

Import dependence (*IMDEP_i*) is proxied by the intensity of imported input in total input, defined as

$$\text{IMDEP} = \frac{\text{(value of imported input)}}{\text{(value of imported + domestic input)}}$$

The domestic input here is defined as the domestically produced input, which is different to the concept of domestic input in Input-Output Table sense.