EXPORT BEHAVIOUR OF MANUFACTURING FIRMS IN INDONESIA, 1990-2000

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Abstract

This paper examines export behaviour of manufacturing firms in Indonesia. We use firm-level data from survey of medium and large Indonesian manufacturing industries over the period 1990-2000. Using panel data regression technique, we find the following regularities. First, there is a persistency in the firm's decision to export as well as proportion of exported output. Second, higher wage, larger number of production employment, higher productivity and higher share of foreign ownership lead to higher probability of a firm to export. Third, higher wage leads to higher proportion of exported output. However, higher productivity or higher share of foreign ownership leads to lower proportion of exported output. Fourth, while real exchange rate does not significantly affect the probability of firms to export, it significantly affects the proportion of exported output. Fifth, both probability to export and proportion of exported output was significantly much lower during the 1997/1998's Asian crisis. Finally, looking at the export behaviour across industries, the estimation results show that there is a variation of export behaviour across industries.

I. INTRODUCTION

Promoting exports is one of the main agendas of Indonesia's economic policy, as it is also one of the main agendas of other developing countries. Over the period of 1990-2007 share of manufacturing in Indonesia's exports had increased from 37 percent to 46 percent. Nevertheless, compared with other countries in the region, share of manufacturing industry in Indonesia's exports is still far behind. Share of manufacturing industry in Malaysia's and Thailand's exports in 2007, for example, reached 72 percent and 77 percent, respectively.

There are a number of reasons why manufacturing exports are highly prized in developing countries (Das, Roberts, and Tybout, 2001). First, industrial exports helps generate gains from trade through comparative advantage effects and intra-industry resource allocation. Second, industrial product markets are diversified, and they are well-positioned to sustain their production and employment in the face of domestic recession. Third, exporting firms may facilitate the absorption of technology.

Given the benefits gained from manufacturing exports, many countries have attempted to stimuli exports through factors considered positively affects manufacturing exports. Therefore, it is important to pin down main factors contributing to manufacturing exports. While theoretically there are a number of factors that can explain factors that potentially increase exports, there is still a lack of understanding on why some firm exports while others do not. So far, most of the studies on Indonesia's export are at country or industry level, that is, studies on the determinants of Indonesia's exports and imports are mostly in aggregate level.

The purpose of this paper is to provide empirical evidence on factors determining export decisions by manufacturing firms in Indonesia. In addition, this paper also provides empirical evidence on factors determining the increase or decrease in the proportion of exported output of manufacturing firms in Indonesia. This paper is expected to shed light on various factors that may contribute to the decision of manufacturing firms to export. The results of the paper will give a better understanding on the causes of exports of manufacturing sector in Indonesia that in turn can be used as a ground for policy to promote Indonesian exports.

The paper will proceed as follows. Section II reviews related literature. Section III discusses theoretical model of firms' decision to export. Section IV presents empirical methodology. Section V presents description of manufacturing firms in Indonesia. Section VI presents estimation results. Finally this paper will be concluded with Section VII.

II. RELATED LITERATURE

A number of papers have conducted empirical studies on factors driving firms to exports. Álvarez and López (2008) examine determinants of export entry and exit of Chilean manufacturing firms. They find that within industry heterogeneity-such as productivity and other firms characteristics-significantly affects plant turnover in international markets. On the other hand, trade costs, factor intensities and fluctuations in real exchange rate only play a minor role. Bernard and Jensen (2001) examine determinants of export decision by the US manufacturing firms. They find that plant characteristics-especially past export activity of the firm-and favourable exchange rate shocks strongly increase the probability of firms to export. Meanwhile, spill-over from export activities of other plants and government expenditure on export promotion have no significant effects for the probability of exports.

Castellani et al (2007) examines the relationship between exports and productivity in 14 countries. Their evidence supports the hypothesis that exporting firms tend to be more productive than non-exporting firms, and there is strong evidence of self-selection of more productive firms into export markets. But, the hypothesis that spill-over of knowledge from international buyers and competitors help to improve performance of exporters is not supported by their study. This study apparently confirms the result of a survey literature by Wagner (2007), in which he also finds that exporters are more productive firms and self-select into export markets while the opposite direction-export activities improve productivity-is not necessarily the case.

Aitken, Hanson, and Harrsion (1997) investigate whether other exporters increase the probability of a non-exporter to turn into an exporting firm. In other words, they examine the spill-over effects of exporting firms on other firms. Using data of manufacturing firms in Mexico, they find that the probability of a manufacturing firm to export increases when it locates near multinational firms. On the other hand, the activities of domestic exporters do not have a significant effect on the probability of other firms to export. They argue that the reason for this finding is that foreign multinational firms provide a channel through which domestic firms can obtain information on foreign markets and technology. In addition, information and distribution services provided by foreign investors may increase exports prospect of local firms.

Arnold and Hussinger (2005) analyses the causal relationship between productivity and exports of German manufacturing firms. Their findings show that higher productivity leads to presence in foreign markets, and no evidence that the presence in international markets result in productivity improvement. Thus, this study shows that German manufacturing firms with high productivity tend to self-select themselves entering into export markets.

III. THEORETICAL FRAMEWORK

Following Bernard and Jensen (2004), the theoretical base of the decision to export by manufacturing firms can be modelled using a rational, profit-maximizing firm. For each period t, each firm i is assumed to produce the optimal amount of exports q_{it}* at price p_t with profit function:

$$\pi_{it}(X_{it}, Z_t) = p_t q_{it}^* - c_{it}(X_{it}, Z_t \mid q_{it}^*) \tag{V.1}$$

where $c_{it}(.)$ is the variable cost of producing the amount of export, q_{it}, X_{it} is a vector of firm-specific factors and Z_t is a vector of exogenous factors affecting profitability of firms.

Let Y_{it} be the export status of firm i in period t determined by the expected profit of the firm, that is:

$$Y_{it} = \begin{cases} 1 & if \quad \pi_{it}(X_{it}, Z_t) \geq c_{it} \\ 0 & if \quad \pi_{it}(X_{it}, Z_t) < 0 \end{cases} \tag{V.2}$$

Equation (V.2) says that a firm will export if expected profit from exporting is greater than or equal to zero. In the presence of entry cost in order to export, the profit function can be formulated as:

$$\tilde{\pi}_{it}(X_{it}, Z_t) = p_t q_{it}^* - c_{it}(X_{it}, Z_t \mid q_{it}^*) - \eta(1 - Y_{it-1}) \tag{V.3}$$

where η is entry cost to export.

Extending equation for the decision problem in a one-period model into a multiple-period model, the decision to export can be formulated as follows. In a multi-period model, the expected profit of the firm is given by equation:

$$\Pi_{it}(X_t, Z_{it}) = E_t\left(\sum_{s=t}^{\infty} \delta^{s-t} [\tilde{\pi}.Y_{is}] \right) \tag{V.4}$$

If the amount of export today affects the cost of export tomorrow, that is, if $\dfrac{\partial c_{it}(.)}{\partial q_{it-1}^*} \neq 0$, then export status tomorrow is affected by export status today. Thus, the problem of the firm is a dynamic programming problem with a value function given by:

$$V_{it}(\cdot) = \max_{\{q_{it}\}}\left(\pi_{it} \cdot [q_{it}^* > 0] + \delta E_t[V_{it+1}(\cdot) \mid q_{it}^*] \right) \tag{V.5}$$

A firm will choose to export in period

t if the value function of export is larger than the value function of not to export, that is,

$$V_{it}(q^*_{it} > 0) > V_{it}(q^*_{it} = 0) \tag{V.6}$$

$$\tilde{\pi}_{it} + \delta E_t[V_{it+1}(\cdot) \,|\, q^*_{it} > 0] > \delta E_t[V_{it+1}(\cdot) \,|\, q^*_{it} = 0] \tag{V.7}$$

$$p_t q^*_{it} + \delta E_t[V_{it+1}(\cdot) \,|\, q^*_{it} > 0] - \delta E_t[V_{it+1}(\cdot) \,|\, q^*_{it} = 0] > c_{it} + \eta.(1 - Y_{it-1}) \tag{V.8}$$

In this multi-period model, entry cost is captured by the link between exports activity in two consecutive years. Here the presence of inter-temporal spill-over is assumed due to the presence of entry costs.

IV. METHODOLOGY

IV.1 Empirical Models

Based on the multi-period model, as given by equation (V.7), the empirical model to capture the decision of firms to export can be formulated as:

$$Y_{it} = \begin{cases} 1 & if \quad \bar{\pi}_{it} > c_{it} - \eta\,(1 - Y_{it-1}) \\ 0 & otherwise \end{cases} \tag{V.9}$$

where

$$\bar{\pi}_{it} = p_t q^*_{it} + \delta\left(E_t[V_{it+1}(\cdot) \,|\, q^*_{it} > 0] - E_t[V_{it+1}(\cdot) \,|\, q^*_{it} = 0]\right) \tag{V.10}$$

To estimate the decision to export by a firm, we approach equation (8) with a binary non-structural empirical model:

$$Y_{it} = \begin{cases} 1 & if \quad \beta X_{it} + \gamma Z_t + \varepsilon_{it} > 0 \\ 0 & otherwise \end{cases} \tag{V.11}$$

where is a vector of firm's characteristics, and Z_t is a vector of exogenous factors.

Equation (10) can be estimated by using dynamic binary choice framework with unobserved heterogeneity, such as linear probability models, probit models, or conditional logit models.

One of the main issues in estimating this model is determining whether the unobserved firm heterogeneity is better modelled as random or fixed effects. When the firm effects are uncorrelated with the regressors then the random effect model is more appropriate. On the other hand, in this type of models, most fixed effects models results in biased and inconsistent estimates, particularly the estimates of lagged dependent variables (Bernard and Jensen, 2004). To deal with endogeneity problem we use lagged explanatory variables.

As mentioned at the outset, other than examining factors determining decision of firms to export, we also examine factors determining proportion of firms' exported output. To do that we estimate panel linear regression models formulated as follows:

$$EX_{it} = \alpha_0 + \beta X_{it} + \gamma Z_t \qquad \text{(V.12)}$$

where EX_{it} is proportion of firm i's exported output at year t, EX_{it} is a vector of firm's characteristics, and Z_t is a vector of exogenous factors.

IV.2. Variables

To capture the sources of variation in export status we use the following firm's specific variables. Lag of export activity is used to capture the persistence in export activity of a firm. Exporting firm in a certain period is expected to be affected by its previous export activity. While this variable cannot distinguish between the entry cost and export experience, it can be used as a proxy for sunk cost born by a firm to enter export market.

Wage can be used to capture labor quality, which is expected to positively related to entering export markets under the condition that exported goods are higher quality (Bernard & Jensen 2001). Wage can also be used to capture variation in the product prices of the firms, as better labor quality tends to produce better quality and more expensive products. Thus, we expect that higher wage leads to a higher probability of a firm to export.

Number of production labor is used to capture the size of the firm. In manufacturing industry, the size of the firm generally refers to the number of production labor rather than the value of total output. We expect that a firm with larger number of production labor tends to have higher probability to export. As a measure for labor productivity we use value added per employee.[3] We expect that a firm with higher productivity has a higher tendency to export.

The share of foreign ownership is used to capture the role of foreign ownership in firms' export activities. A firm with higher foreign ownership tend to export if the presence of foreign

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3 Following Bernard and Wagner (1998).

investors is intended to obtain lower input costs. On the other hand, if the presence of foreigners is rather to penetrate domestic market, then higher foreign ownership tends to lower probability to export.

Other than the aforementioned firm-specific variables, we also capture the effect exogenous factors on firms export status. Here, to control for exogenous factors and the effect of 1997/98 Asian crisis, we use real effective exchange rate and dummy for the crisis, respectively. An appreciation in real effective exchange rate is expected to lower probability of firms to export due to lower competitiveness. On the other hand, a depreciation of real effective exchange rate is expected to increase the probability of a firm to export due to improvement in firm competitiveness. Due to various constraints facing firms during the crisis, we expect that probability of a firm to export and proportion of its exported output is lower during the crisis.

V. RESULT AND ANALYSIS

Firm-level data used in this study is obtained from survey of medium and large manufacturing firms in Indonesia.[4] The data cover the period from 1990 to 2000 with yearly frequency. Every year Indonesia's Central Bureau of Statistics (BPS) conducted a survey on medium and large manufacturing firms. BPS sends questionnaire to all medium and large manufacturing firms recorded in BPS Firm Directory updated annually. Based on their main products, each firm are classified into International Standard Industrial Classification of All Economic Activities (ISIC). In these data, a manufacturing firm refers to a production unit located in a building or a certain premises under a management unit.

Table V.1 Distribution of Firms by Export Activities, 1990-2000			
Year	**Number of Firms**	**Non Exporter (%)**	**Exporter (%)**
1990	16,536	88.3	11.7
1991	16,494	84.9	15.1
1992	17,648	82.4	17.6
1993	18,163	82.3	17.7
1994	19,017	82.2	17.8
1995	21,551	83.2	16.8
1996	22,997	81.1	18.9
1997	22,386	86.3	13.7
1998	21,423	97.7	2.3
1999	22,070	86.3	13.7
2000	22,174	83.4	16.6

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4 Medium and large manufacturing firms are defined as manufacturing firms employing 20 workers or more.
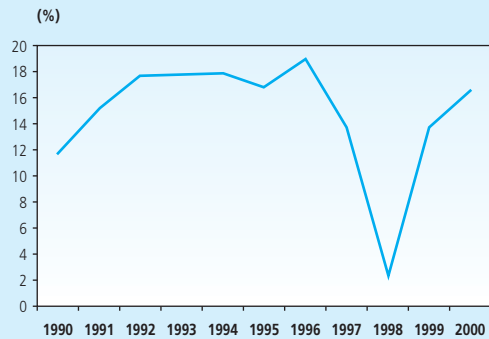
Figure V.1
Distribution of Firms by Export Activities
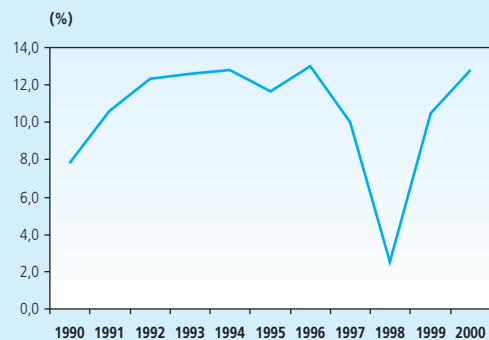
Figure V.2
Proportion of Exported output

Over the period of 1990-2000, in average, 15 percent of medium and large manufacturing firms in Indonesia exported (Table V.1 and Figure V.1). During the crisis, number of exporting firms dropped substantially, and recorded the lowest number in 1998 in which only 2.3 percent of the firms that exported. Similarly, proportion of exported output also dropped significantly from about 12 percent to 2 percent (Figure V.2).

If we look at the status of the firms, 45 percent of the PMA firms exported while only 28 percent of the PMDN firms that exported (Table V.2). And number of exporting firms that import also larger than the number of non-exporting firms that import (Table V.3).

Table V.2
Distribution of Firms by Export Activities and Firm Status

Year	PMDN		PMA		Others	
	Non Exporter	Exporter	Non Exporter	Exporter	Non Exporter	Exporter
1990	78.2	21.8	68.2	31.8	91.9	8.1
1991	72.6	27.4	57.8	42.2	89.7	10.3
1992	64.3	35.7	46.9	53.1	87.5	12.5
1993	67.5	32.5	44.4	55.6	87.2	12.8
1994	67.5	32.5	42.6	57.4	87.3	12.7
1995	71.4	28.6	40.6	59.4	88.3	11.7
1996	67.1	32.9	33.8	66.2	86.9	13.1
1997	77.6	22.4	56.3	43.7	90.6	9.4
1998	85.6	14.4	91.2	8.8	98.7	1.3
1999	69.1	30.9	62.1	37.9	90.1	9.9
2000	66.8	33.2	53.5	46.5	87.9	12.1

Table V.3
Distribution of Firms by Industry and Export Activities in 2000

Industry	Non Exporter	Exporter
Food, beverage and tobacco	90.4	9.6
Textile, garment and leather	82.8	17.2
Wood, bamboo, rattan, willow including furniture	62.4	37.6
Paper and paper products, printing and publishing	94.7	5.3
Chemical, petroleum, coal, rubber and plastic products	83.7	16.3
Non-metalic, non-petroleum, non-coal mineral products	93.6	6.4
Basic metal	81.7	18.3
Fabricated metal products, machinery and equipments	86.0	14.0
Other manufacturing industries	71.3	28.7

Based on industry classification, wood, bamboo, rattan, and furniture industry has the largest number of firms that export (Table V.4). Around 38 percent of firms producing processed wood, bamboo, rattan, and furniture export some of their products. This shows that manufacturing firms in Indonesia that export concentrate in natural resource based industry.

Over 60 percent of exporting firms at a particular year were also exporting in the previous year. And over 70 percent of exporting firms at a particular year were already exporting at least once in the previous years (Table V.5).

Year	Non Exporter		Exporter	
	Non Importer	**Importer**	**Non Importer**	**Importer**
1990	79.1	20.9	66.0	34.0
1991	79.6	20.4	63.9	36.1
1992	81.2	18.8	63.9	36.1
1993	81.7	18.3	65.5	34.5
1994	83.2	16.8	65.5	34.5
1995	85.7	14.3	64.4	35.6
1996	87.4	12.6	64.4	35.6
1997	84.1	15.9	63.7	36.3
1998	81.9	18.1	50.8	49.2
1999	83.2	16.8	66.1	33.9
2000	84.9	15.1	65.8	34.2

Table V.4
Distribution of Firms by Export and Import Activities

Table V.5
Distribution of Exporting Firms by Export Experience

Year	Exporter (t,t-1)	
	(Number of Firms)	**(%)**
1991	1289	51.7
1992	1755	56.4
1993	2183	67.8
1994	2211	65.2
1995	2460	67.9
1996	2828	64.9
1997	2100	68.6
1998	500	100.0
1999	63	2.1
2000	2421	65.9

V.1 Decision to Export

Estimation results show that all firm-specific variables significantly affect firms' decision to export (Table V.6). First, the probability of a firm to export at certain year is significantly affected by its export status in the previous year. A firm that export at certain year has a higher probability to export in the following year by 0.303. This persistency level is larger than export persistence of the US manufacturing industries found by Bernard and Jensen (2001), which is 0.203.

Second, firms with higher wage, larger number of production employment, higher productivity, and higher share of foreign ownership significantly tend to have higher probability to export, although the magnitude of the effect of wage is very small, that is, less than 1

percent. Marginal effects of number of production employment, productivity, and share of foreign ownership on the probability to export are 0.028, 0.012, and 0.083, respectively.

Finally, although the sign is correct, real exchange rate does not significantly affect firms' decision to export. Meanwhile, During 1997/1998's Asian crisis, the probability of firms to export had fallen significantly. In 1998, the probability of a firm to export fell by 6.7 percent.

If we look at the export behaviour across industries at two-digit ISIC, the estimation results reveal a number of regularities (Table V.6 & V.7). First, all industries show significant persistence in the decision to exports, in which wood, bamboo, rattan, and furniture industry has the highest persistence while textile, garment and leader industry has the lowest persistence.

Second, all industries show that higher share of foreign ownership lead to higher probability of export. Third, except for basic metal and other industry, higher productivity significantly affects the probability of a firm to export, in which the effect is positive as expected. Fourth, while the effect of wage is positive in most industries, the effect is significantly negative for wood, bamboo, rattan and furniture industry. Fifth, number of production employment only significantly affects the probability to export of metal and machinery and equipment industries, in which the effect is positive.

		ISIC								
Table V.6 Marginal Effects of Explanatory Variables on Decision to Export										
	ALL	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**
Exported last year	0.3027***	0.1271***	0.0352***	0.4944***	0.0743***	0.2447***	0.0990***	0.3536***	0.3792***	0.4357***
	0.0078	0.0143	0.0144	0.0117	0.0269	0.0195	0.0259	0.0498	0.0226	0.0389
Wage	0.0002***	0.0016***	0.0039***	-0.0177***	0.0005	0.0077***	0.0013***	0.0143	0.0044***	-0.0074
	0.0005	0.0040	0.0014	0.0034	0.0006	0.0017	0.0004	0.0104	0.0017	0.0071
Production Employment	0.0286***	-0.0039*	-0.0010	0.2258	0.0063	-0.0013	-0.0050*	0.1700**	0.0348***	0.0900
	0.0041	0.0022	0.0156	0.0347	0.0047	0.0099	0.0032	0.0738	0.0136	0.0719
Productivity	0.0119***	0.0041***	0.0219***	0.0347***	0.0017***	0.0083***	0.0034***	0.0067	0.0071***	0.0039
	0.0005	0.0005	0.0016	0.0041	0.0007	0.0015	0.0008	0.0075	0.0015	0.0078
Share of Foreign Ownership	0.0833***	0.0293***	0.1167***	0.2353***	0.0213***	0.0865***	0.0149***	0.1659***	0.1022***	0.2134***
	0.0031	0.0036	0.0077	0.0294	0.0066	0.0086	0.0040	0.0373	0.0065	0.0333
Real Exchange Rate	-0.0001	0.0002***	-0.0014***	-0.0017*	-0.0002	0.0002	0.0001	-0.0033	0.0001	-0.0021
	0.0001	0.0001	0.0004	0.0010	0.0002	0.0004	0.0001	0.0025	0.0004	0.0020
Dummy for Crisis	-0.0674***	-0.0154***	-0.1041***	-0.3188***	-0.0100***	-0.0648***	-0.0085***	-0.1893***	-0.0641***	-0.2216***
	0.0019	0.0018	0.0045	0.0102	0.0033	0.0053	0.0021	0.0299	0.0055	0.0243
N	31734	7812	7585	4744	1381	3790	2888	272	3618	820
Log likelihood	-44314	-7914	-11210	8862	-1135	-5738	-1876	-530	-4401	-1150

Note:
Numbers in italic are standard errors of the estimates
***, **, * is significant at 1%, 5% and 10% level, respectively.
ISIC:
 (31) Food, beverage and tobacco; (32) Textile, garment and leather; (33) Wood, bamboo, rattan, willow including furniture;
(34) Paper and paper products, printing and publishing; (35) Chemical, petroleum, coal, rubber and plastic products;
(36) Non-metallic, non-petroleum, non-coal mineral products; (37) Basic metal;
(38) Fabricated metal products, machinery and equipments; (39) Other manufacturing industries

Sixth, real exchange rate only has significant effect in the probability to exports of firms in food and textile industries. However, while the effect of real exchange rate on textile industry is negative, as expected, the effect of real exchange rate on the decision to export in food industry is positive, meaning that appreciation of real exchange rate leads to higher exports although the magnitude is very small. Finally, the probability of firms to export in all industries is significantly lower during the 1997/1998's Asian crisis.

V.2 Proportion of Exported output

The way firm's characteristics affect its decision to export does not necessarily the same with the way they affect the amount of exported production (Table V.7). The estimation results show that firms with higher productivity significantly tend to have lower proportion of exported output. Similarly, firms with larger share of foreign ownership significantly tend to have lower proportion of exported output.

Similar to the effects on decision to export, there is also a persistency in the amount of export. A one percent higher in the proportion of exported output in a certain year significantly increases the proportion of exported output in the next year by 0.19 percent. The effect of wage on the proportion of exported output is also positive. A one percent increase in wage leads to 0.34 percent increase in the proportion of exported output.

Looking at the effect of real exchange rate, the result show that, change in real exchange rate significantly affects the proportion of exported output. A one percent real exchange rate appreciation significantly lowers the proportion of exported output by 0.12 percent. Similar to the effect of the 1997/98's Asian crisis on the decision to export, the crisis also lowered the proportion of exported output significantly, in which the proportion exported output was lower by 17.5 percent.

Looking at the proportion of exported output across industries, the estimation results show that, except for basic metal industry, there is a persistency in the proportion of exported output. In almost all industries, product price also positively affect proportion of exported output. While product price does not significantly affect the proportion of exported output in other industry, the effect is negative in wood and furniture industry.

The effect of foreign ownership is significantly negative for most industries, while the effect is significantly positive in paper and paper product industries. On the other hand, foreign ownership does not have a significant effect on the proportion of exported output of chemical, basic metal and other industries.

	ALL	ISIC								
		31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**
Exported last year	0.193***	0.126***	0.228***	0.164***	0.084***	0.162***	0.129***	0.17	0.254***	0.135
	0.004	0.008	0.009	0.0126	0.016	0.012	0.0127	0.042	0.013	0.032
Wage	0.345***	0.513***	0.595***	-0.945***	0.406*	0.643***	0.276**	0.657***	1,043***	-0.595
	0.08	0.143	0.176	0.322	0.223	0.212	0.125	0.825	0.22	0.7
Production Employment	1,178	2,917**	6,242**	-1,652	3,932**	-4,498***	0.596	16,854***	-0.541	0.713
	0.826	1,243	2,584	3,903	1,963	1,699	1,491	6,776	2,371	8,137
Productivity	-0.433***	0.067	-0.667***	-1,433***	0.023	-0.011	-0.222	-0.155	-0.329	-3,476
	0.102	0.18	0.239	0.437	0.243	0.23	0.221	0.695	0.246	0.88
Share of Foreign Ownership	-4,032***	-4,259*	-5,277***	-8,543***	10,577***	-0,257	-5,151**	5.98	-6,157***	5,064
	0.966	2,446	1,852	4,307	3,184	2,136	2,478	8,003	1,909	5,294
Real Exchange Rate	-0.116***	0.041	-0.157***	-0.238***	-0.166***	-0.135***	-0.053	-0.199	-0.054	0.291
	0.02	0.036	0.044	0.082	0.051	0.048	0.037	0.186	0.052	0.173
Dummy for Crisis	-17,521***	-5,899***	-19,487***	-39,212***	-12,188***	-16,726***	-6,358***	-21,136**	-11,379***	-32,333
	1,023	1,854	2.25	4,185	0.051	2,488	1.9	9,65	2,674	8,844
N	27209	6818	6456	3833	1233	3297	2480	229	3121	673
Wald Chi^2	6541.27	789.47	1635.88	1825.52	117.62	658.25	218.24	64.56	673.49	199.6

Table V.7
The effects of Explanatory Variables on Proportion of Exported Output

Note:
Numbers in italic are standard errors of the estimates
***, **, * is significant at 1%, 5% and 10% level, respectively.
ISIC:
 (31) Food, beverage and tobacco; (32) Textile, garment and leather; (33) Wood, bamboo, rattan, willow including furniture;
(34) Paper and paper products, printing and publishing; (35) Chemical, petroleum, coal, rubber and plastic products;
(36) Non-metalic, non-petroleum, non-coal mineral products; (37) Basic metal;
(38) Fabricated metal products, machinery and equipments; (39) Other manufacturing industries

The effect of production employment on the proportion of exported is quite mixed, in which some industries has significant positive effect while other industries have negative effects. If we look at the effect of productivity, productivity does not have significant effect in most of the industries. The effect of productivity is significantly negative only in textile, wood, and other industries.

An appreciation of real exchange rate tends to lower proportion of exported output in natural resource intensive industries. An exception is that proportion of exported output of food industries is significantly affected by the change in real exchange rate. On the other hand, the estimation results show that real exchange rate does not have a significant effect on the proportion of exports of industries with more capital intensive.

VI. CONCLUSIONS

This paper provides empirical evidence on export behaviour of manufacturing firms in Indonesia. For that purpose we use firm-level data from survey of medium and large Indonesian manufacturing industries over the period 1990-2000. First, we examine factors determining

firms' decision to export. The estimation results show that there is a persistency in the firms' decision to export. Moreover, higher wage, larger number of production employment, higher productivity and higher share of foreign ownership leads to higher probability of a firm to export. On the other hand, real exchange rate does not significantly affect the probability to export.

Second, other than examining factors determining decision to export by firms, we examine factors determining proportion of their exported output. Similar to the decision to export, proportion of exported output also shows a persistency. In addition, while higher wage leads to higher proportion of exported output, higher productivity and higher share of foreign ownership leads to lower proportion of exported output. Moreover, real exchange rate appreciation leads to higher proportion of exported output with very small magnitude.

Finally, we also look at export behaviour across industries, and the estimation results show that there is a similarity and differences of export behaviour across industries, both their decision to export as well as the proportion of their exported output. Except basic metal industry in which there is no persistency in the proportion of exported output, all industry show a persistency in the decision to export as well as proportion of exported output. In addition, higher share of foreign ownership also significantly increases probability of firms to export. On the other hand, the effect of real exchange rate varies across industries, only certain industries that are significantly affected.

The fact that there is persistence in export status gives an indication that to enter export market, firms need to bear certain sunk cost. This implies that, in promoting manufacturing exports, the authority has a room to intervene through, for example, providing certain fiscal incentive or helping firms in penetrating foreign markets. On the other hand, while a policy on real exchange rate contribute in supporting the amount of firms' exports, it does not seem help in increasing the probability of firm to export.

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