Protection and the Dynamics of Productivity Growth: The Case of Automotive Industries in Indonesia

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Working Paper Series in Economics and Finance No. 324
June 1999

Abstract

Indonesia, like many other countries in South East Asia, has actively promoted the automotive industry. The governmental interventions have ranged from tariffs and non-tariff barriers to various local content programs. As a result, imports of ready made cars and motorcycles have been expensive, which led to an inflow of foreign producers. This paper examines the productivity performance in the Indonesian automotive industries. More specifically, we try to answer two questions. Firstly, has the government intervention been successful in lifting the industry from its "infant industry" status? Secondly, what roles have multinational enterprises played in the development of the automotive industry in Indonesia? In examining the issues at hand, we use establishment data for the Indonesian automotive industries between 1990-1995. Our choice of methodology enables us to examine the dynamics of the different industries' productivity performance: which establishments account for most of the productivity growth, and how important entry and exit of establishments are to the overall performance.

JEL classifications: O3; F2; L62
Keywords: Productivity; Growth; Automotive industry; Indonesia; Protection.

1. Introduction

There is a long tradition of government intervention in Indonesia's industrialization and economic development. A state-led development has been the chosen strategy since independence, both as a result of a general mistrust of market forces and from the examples of the East Asian success stories. As in most countries within the region, the automotive industry was identified as a target industry for government support at an early stage of Indonesia's industrialization.[1] Consequently, the automotive industry has been heavily protected and supported for more than 30 years. This paper will try to evaluate the performance of the automotive industry, and hence, the government interventions.

Following the launching of the "New Order" in 1967, the automotive industry received special treatment through local content rules, entry barriers and foreign ownership restrictions (Hill 1996). Initially, the owners of the automotive industry were often Indonesians from the military ranks or senior officials, but as the "New Order" proceeded the industry went in to the hands of the Soeharto family and of the large Chinese conglomerates (Robison 1997). The close link between the owners of the automotive industry and the political leadership made the industry a powerful lobbyist. As a result, a ban on imports of motor vehicles remained until 1993, when the ban was replaced by tariffs in the range of 175-275 per cent.

The high protection against imports of ready made motor vehicles resulted in an inflow of foreign assemblers who imported most of their parts and components. However, the Indonesian government was not satisfied with hosting only the assembling part of the automotive production, and launched various programs to increase the local content. Most programs were explicitly specifying parts and components which had to be manufactured locally (Thee 1990). The foreign firms responded by starting up new automotive component companies in Indonesia, often as joint ventures with local firms.

The protective regime in the automotive industry persisted despite extensive liberalization in the rest of the manufacturing sector since the mid 1980s. Tariffs have been high, local content requirements frequent, and the industry even received an exemption from the ASEAN free trade agreement. The protective regime has been motivated by for instance the automotive industry in Japan which, it is argued, needed thirty years of protection to achieve international competitiveness. Furthermore, conditions on local content aim at establishing various linkages and to enhance the technology transfer from foreign assemblers to local suppliers.

Our study has a twofold purpose. Firstly, we try to answer whether the rigorous protection and state interventions have been successful in lifting the industry from its "infant industry" status to a more competitive industry. We would expect to see stable growth in output and productivity, if the interventions have been successful. Secondly, we examine the roles of foreign multinational enterprises (MNEs) in the development of the automotive sector in Indonesia.

To analyze the issues at hand, we will begin with descriptive statistics on the development of the Indonesian automotive industry. Next we examine various measures on the economic performance of the sector, and discuss possible explanations to variations between different sub-sectors. We continue by examining the role of foreign firms, and sum up with a discussion of the results.

2. Industrial Widening and Deepening of the Automotive Industry

As previously mentioned, the automotive industry was targeted to receive active government support already in the 1960s, but the industry's growth did not accelerate until the 1980's. Table 1 shows the number of establishment, and the shares of employment and gross output of the automotive industry in the total manufacturing industry for 1986, 1990 and 1995. The relative share of the automotive industry was small in the mid 1980s, but since then increased rapidly both in the automobile and the motorcycle industries. The two industries came to reach almost one tenth of the gross output of the entire manufacturing industry by 1995. However, the automotive industry's share of employment is still below two per cent.

Table 1 around here.

In addition, the automotive industry experienced a deepening of the industrial structure between 1990-95: an increase of the relative shares of parts and component suppliers. Tables 2(a) and 2(b) show the shares of assemblers (ISIC 38431, 38441) and parts and components suppliers (38432, 38433 and 38442) in the auto- and motorcycle industries. As seen in the tables, the assemblers' shares have declined and that of parts and components suppliers, except car body makers, have increased. The magnitude of the change differs between the automobile and the motorcycle industries; the assemblers' share of gross output declined by more than 15 percentage points in the motorcycle industry, compared to only four percentage points in the automobile industry. This suggests that the motorcycle industry succeeded in developing backward linkages over the 1990-95 period to a greater extent than the automobile industry.

Table 2(a) around here

Table 2(b) around here

3. Economic Performance of the Automotive Industry

General Economic Performance

The relative size of parts and suppliers has, hence, increased at the expense of the assemblers. We continue by examining the economic performance of different sub-sectors in the automotive industry in tables 3(a) and 3(b).[2] More specifically, the two tables show simple averages of employment, labor productivity (both in terms of gross output and value added), the level of total factor productivity (TFP), the share of non-production workers, wage rates, export shares, and import ratios.[3] T-tests were conducted to examine the statistical difference between the two years.

Table 3(a) around here.

Table 3(b) around here.

The result for the automobile industry is rather remarkable; all of the sub-sectors (assemblers, car body makers and parts suppliers) experienced a decline in labor productivity and total TFP, even though the decline is statistically significant only for car body makers. Furthermore, although labor productivity declined between 1990 and 1995, real wage rates of both production and non-production workers increased for the assemblers and the parts suppliers. This indicates that the price competitiveness of the automobile sector was eroded, which is confirmed by export figures near zero in two of the sectors. Moreover, the import ratios declined substantially among the car assemblers, in return those ratios increased among the parts suppliers. As pointed out by Sato (1998: 119), when the mandatory deletion program proceeded, imports changed from ready made car parts to smaller components. Raw materials for prime components such as special steel and alloy are still fully imported.

The motorcycle industry shows a slightly better performance with stable or increasing productivity, which presumably allowed for increasing wages without deteriorating the competitiveness. However, the export ratios are still low both for the assemblers and the suppliers. Moreover, although the local content of the motor cycle assemblers increased substantially between 1990 and 1995, the local content of the suppliers declined.

Productivity Dynamics or Stagnation?

A productivity growth analysis will further examine the validity of the above findings. In the past decade there has been an increased interest in improving the microeconomics of productivity analysis. One branch of studies aims at exploring the heterogeneity among plants to see how individual establishments move within an industry, which establishments account for most of the productivity growth, and how important entry and exit are to the overall performance.

Following Baily, Hulten and Campbell (1992), we examine TFP growth of the automobile and motorcycle industries using the following equation:

$$\Delta \ln TFP_t = \Sigma(\theta_{it} \ln TFP_{it} - \theta_{it-\mu} \ln TFP_{it-\mu}) + (\Sigma\theta_{jt} \ln TFP_{jt} - \Sigma\theta_{kt-\mu} \ln TFP_{kt-\mu}), \quad (1)$$

where $i \in S$, $j \in N$, and $k \in E$.

In equation (1), industry TFP growth between t and t-μ is decomposed into contributions of the plants which continued to operate in the same business line for the observed period (stayers), those which entered (entrants), and those which exited (exits) during the period. S, N and E are the stayers, entrants, and the exits respectively. θ_{it} is the share of the ith plant in total gross output in year t.

The productivity growth among the stayers can be further broken down in two ways, improvement in each plant separately holding output shares constant, and changes in output shares, as follows:

$$\Sigma(\theta_{it} \ln TFP_{it} - \theta_{it-\mu} \ln TFP_{it-\mu}) = \Sigma\theta_{it-\mu}\ \Delta \ln TFP_{it} + \Sigma\ [(\theta_{it} - \theta_{it-\mu}) \ln TFP_{it}], \quad (2)$$

where $i \in S$.

The former is called fixed effect, and the latter is share effect.

Industry labor productivity growth (gross output per employee and value added per employee) was calculated along the same line. The results are presented in Table 4.[4]

Table 4 around here.

The results in Table 4 are consistent with the previous findings. The productivity growth performance of the automobile industry has been poor, regardless of the different measures used. All of the sub-sectors: the assemblers, car body makers and the parts suppliers showed negative growth rates during the 1990-95 period, with the exception of output and TFP growth rates for the parts suppliers. Establishments that left the industry have mainly driven the poor performance of the industry whereas entrants have shown positive productivity growth. In addition, the negative figures of almost all of the fixed effects show that there was little improvement or even deterioration among the stayers in the automobile industry.

The productivity performance of the motorcycle parts suppliers shows a slightly better performance than the automobile industry. One of the productivity measures declined: gross output per employee. However, that was caused by one big-scale plant that exited over this period. If that observation is excluded, output per employee shows a 128 per cent increase over the same period. Therefore, it seems that the previously shown expansion of the motorcycle parts suppliers has been accompanied by a productivity improvement. Moreover, contrary to the automobile industry, there was some improvement in productivity among the surviving plants as shown by their positive fixed effects. However, the positive productivity growth was mainly driven by the entrants of new highly productive establishments.

Why are the Automobile and Motorcycle Industries Different?

The protective regime and the various requirements of local contents have been present and rather similar within the automotive industry. In fact, most policies have been implemented simultaneously in the automobile and the motorcycle industries. Yet, their productivity performance turned out to be different; the motorcycle industry has performed better than the automobile industry.

There are some possible explanations to the difference in industry performance. Firstly, the size of the market. An automobile is beyond reach for most Indonesians whereas the market for motorcycles is much larger. Motorcycles constitute the bulk of motor vehicle sales in Indonesia. For instance, 69 per cent of the 12.8 million motor vehicles registered in Indonesia in 1995 were motorcycles (Thee 1997: 95). Table 5 shows the number of cars (including commercial vehicles) and motorcycles produced in Indonesia since 1990; the production volume of cars is still small and did not increase as rapidly as the volume of motorcycles.

A second explanation could be the high fragmentation of the automobile industry, with a large number of assemblers, producing a large number of brands and models for a relatively small domestic market (Thee 1997: 117). Besides a larger market for motorcycles, the number of actors is fewer. There has been a deliberate policy from the government in minimizing the number of firms and models in the sector. For instance, in 1981 it was decided that each motorcycle assembler was not allowed to produce more than five different models. Limited assemblers and models together with the large market made it possible to operate at a relatively larger scale in the motorcycle industry. Table 6 shows the number of assembling establishment by employment size in 1990 and 1995. The number of assemblers in the automobile industry is two to three times more than in the motorcycle industry, and the size of each assembler is far smaller in the former than in the latter.

The fragmented industry may also be an obstacle for the development of an automobile body and parts industry, since it prevents the utilization of scale economies. Different cars use different bodies and parts, and few attempts have been made to standardize different brands. Again, the situation for the motorcycle parts supplier is different, with a less fragmented market due to fewer producers and a larger market.

Finally, the technology in the motorcycle industries may be less sophisticated or more suited to local conditions in comparison to the technologies in the automobile industries.

Hence there are several possible economic and technological explanations to the relative superior performance of the motorcycle industries. However, it should be stressed that although all factors above can explain why the automobile industries perform worse than the motorcycle industries, they can not explain a negative productivity growth in the automobile industries. The performance of the automobile industry has been poor not only in relative, but also in absolute terms.

4. The Roles of Foreign Firms in the Development of the Automotive Industry

Despite a reasonable development of the motorcycle parts suppliers, the figures above reveal an overall poor development of the Indonesian automotive industry. There are at least two possible reasons. Firstly, the technology may be too difficult to master for domestic establishments without prior experience of automotive production. If this is the case, the foreign establishments may do well, but poor domestic establishments decrease the overall performance of the industry. Secondly, the protective regime may foster inefficiency; low competition does not require the establishments to improve upon their production since it does not affect the sales. If this were the case we would expect domestic as well as foreign establishments to show a poor performance.

Hence, there are reasons for us to examine the role of foreign firms in the development of the Indonesian automotive industry. Table 7 shows the foreign establishments' shares of gross output, value added, employment, investment, export and imports of intermediate inputs in the automotive industries. We define foreign establishments as having any (above zero per cent) foreign ownership. As shown by the table, the deregulation of the ownership restrictions in 1993 has increased the overall importance of foreign establishments between 1990 and 1995. The one exception is automobile parts suppliers where the foreign share has decreased. Foreign establishments totally dominate the automobile assembling industry and account for more than 50 per cent of most other industries.

Table 7 around here.

Then, what role has foreign firms played in Indonesia's automotive industry? We put a focus on the productivity performance of the sector. There are two mechanisms through which the entry of foreign firms contributes to the productivity of the recipient industry. The first effect is when more productive foreign firms vis-à-vis local firms enter the market and the second is through the spillover effects from foreign to local firms.[5]

Table 8 around here.

Table 8 compares the economic performance between local and foreign establishments in the automotive industries.[6] As expected, foreign establishments tend to be bigger in size and more productive than local counterparts in all industries. This shows that, as the conventional FDI theory implies, foreign establishments possess a firm-specific advantage over local ones (Caves 1996: 4). The entry of foreign firms may therefore have contributed to the introduction of modern technology and management methods in Indonesia and upgraded the quality of products both in the assembly and component industries. The superior performance of foreign establishments was also revealed in TFP growth figures (not shown). Foreign establishments have positive TFP growth rates in all industries except automobile assemblers, and they show a TFP growth performance which is greater than that of domestic establishments.

Hence, foreign establishments are generally showing a better performance than domestic establishments. However, foreign firms have not fully become an engine of growth in the automotive industry for two reasons. First, although some foreign firms (both assemblers and parts suppliers) entered the Indonesian market through FDI, their number is still quite small especially among the parts suppliers of both automobile and motorcycle industries. For instance, according to Auto Trade Journal Co., Inc. (1996), 45 subsidiaries of Japanese automobile parts suppliers were established in Indonesia by 1996. The number is considerably lower than that of Thailand where as many as 111 Japanese subsidiaries were set up during the same period.[7]

Second, the foreign establishments do not seem to have generated any substantial spillovers on domestic establishments, as seen for instance by the latter group's negative or low productivity performance.[8] This indicates that a reasonable productivity performance of the motorcycle parts suppliers between 1990 and 1995 arose mostly from the entry of relatively productive foreign establishments rather than from a significant improvement among local suppliers.

Again, two possible reasons for a poor performance of the Indonesian automotive industry, could be that the domestic establishments have not been able to achieve the qualifications for automotive production, and that the lack of competition does not require the establishments (domestic and foreign) to produce efficiently. It is likely that both these factors attribute to the industry's poor performance. However, since the foreign establishments at least have shown a positive productivity performance, we are inclined to believe that the most important factor is the former: the failure among domestic producers to upgrade their knowledge and qualifications of automotive production.

5. Conclusion and Policy Implication

It is hard to describe the government intervention in the Indonesian automotive sector as anything else than a failure. Based on many negative experiences of infant-industry protection in other parts of the world, one may have expected that the industry would not be able to achieve international competitiveness. Moreover, state interventions in other Indonesian industries such as aerospace have failed to generate international competitiveness (Fong and Hill 1988; McKendrick 1992). However, the automotive industry not only failed to achieve international competitiveness and positive productivity growth, even after 30 years of protection and government support is it showing a negative productivity growth. Hence, the state of the industry is not only poor, but even deteriorating.

Despite the failure to lift the automotive industry out of its infant-industry status, there are sub-sectors where the performance has been at least acceptable. The performance of the motorcycle industry was found to be somewhat better than that of the automobile industry. A larger and less fragmented market and a higher degree of standardization may be two factors to account for the difference.

The high protection against imports of motor vehicles resulted in an inflow of FDI to Indonesia. The positive contribution of foreign firms to the automotive industry cannot be neglected in terms of bringing in new technology, management, and market information to Indonesia. However, their impact does not seem to be strong enough, partly because Indonesia has not succeeded in attracting a large number of foreign firms, and partly because spillover effects to local firms seem to be limited.

NOTES

We are grateful for comments and suggestions from participants at the international symposium "Foreign Direct Investment in Asia", arranged by the Economic Planning Agency in Tokyo, October 1998. Yumiko Okamoto gratefully acknowledges a grant for scientific research from the Ministry of Education in Japan. Fredrik Sjöholm gratefully acknowledges financial support from the Tore Browaldhs fond.

[1] See Fujita and Hill (1997) on comparative industrial strategies in the automobile sector in Southeast Asia.

[2] The economic performance of the automotive industry is examined only over the period of 1990 and 1995 due to lack of detailed industrial statistics prior to 1990.

[3] Following, Baily, Hulten and Campbell (1992: 191), TFP of the *i*th plant in each industry for year *t* is defined as follows: In TFP_{it} = In Q_{it} - α_L ln L_{it} - α_K ln K_{it} - α_M ln M_{it}, where Q_{it} is the real gross output of the *i*th plant in year *t*, and L_{it}, K_{it}, and M_{it}, are labor, capital and intermediate inputs. α_L , α_K , α_M are factor income shares of labor, capital and intermediate inputs, averaged over industries and the beginning and ending years of the period. As a proxy variable for real capital stocks, we used book value of real assets deflated by investment price indexes (1993=100). Gross output of each plant was deflated by the relevant wholesale price index (1993=100). Intermediate inputs were deflated by price indexes constructed with the wholesale price indexes and input-output tables of 1990.

[4] We are not able to conduct the above calculations for the motorcycle assemblers due to a small number of observations.

[5] See Blomström and Kokko (1998) and Okamoto (1994, 1999) for how the entry of foreign firms may influence the productivity of the recipient industry. Blomström and Sjöholm (1999), and Sjöholm (1999a, 1999b) examine spillovers from FDI in Indonesia.

[6] The number of foreign establishments are very few in some industries in some years. There is, hence, a risk that specific foreign establishments could be identified. For secrecy reasons, we have therefore not included Automobile assemblers (1990), Automobile body suppliers (1990, 1995), Motorcycle assemblers (1990, 1995), and Motorcycle parts suppliers (1990).

[7] It is important to note that the number of Japanese parts suppliers in Indonesia (45) is larger than that of establishment shown in Table 8(a). The latter includes the parts suppliers, which belong only to ISIC 38433, while the former includes the suppliers which belong to any industrial category.

[8] Local establishments TFP growth (%) over the 1990-95 period for automobile assemblers, automobile body suppliers, automobile parts suppliers, and motorcycle parts suppliers are -57.5, -34.1, 14.5 and 6.4 respectively.

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