PRICE-COST MARGINS AND TRADE LIBERALIZATION IN TURKISH MANUFACTURING INDUSTRY: A PANEL DATA ANALYSIS

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ABSTRACT

In the second half of 1980s, Turkey has experienced foreign trade liberalization within a broader framework of an overall liberalization program. In this study, the impacts of the market structure and the foreign trade reforms on the domestic market performance are discussed in the context of the structure-performance model. In this context, the import discipline hypothesis, the import penetration due to the foreign trade liberalization removes excess profits of domestic firms in oligopolistic markets and leads to relatively competitive market and improvement in allocative and production efficiency, is tested by using panel data of ISIC four-digit level of Turkish manufacturing industries for the period of 1983-1994.

The analysis is performed for the public and private sectors separately. Estimation procedure is carried out by using Fixed Effect and Random Effect Models in panel data analysis. In addition, Two Stage Least Square (TSLS) estimation procedure is carried out to avoid biased coefficients resulting from the endogenous explanatory variables. The price-cost margins are regressed on the variables that reflect foreign trade structure, market power, entry barriers and demand, cost and input availability conditions. The results of the analysis are substantially different for the private and public sectors. While import penetration leads to a decrease in the price-cost margins in the entire private sector, the price-cost margins in the highly concentrated private sector industries increase by the import penetration. Unlike the private sector, import penetration and export expansion result in a decline of excess profits in the concentrated public sector industries.

Keywords: Price-Cost Margins, Foreign Trade Liberalization, Concentration, Panel Data,

1. Introduction

Many developing countries have intended to exercise more liberal trade regimes as an alternative to protectionist trade policies during the last decade. The concept of global liberalization of trade in terms of goods and services has been legalized and adopted commonly in accordance with increasing of the trade volume and the degree of division of labour in the world economy. Parallel to these developments, the linkages between trade policy and industrial development has began to be emphasized by many researchers intensively.

Since the Turkish economy has been confronted with a serious balance of payment bottleneck together with social and economic crisis by the end of 1970s, the Turkish government has taken serious measures by introducing a more liberal trade regime at the beginning of 1980s. In January 1980, the Turkish government declared a "stabilization and economic liberalization program" that intended to adopt an "export-oriented industrialization" policy as a reaction to "import substitution industrialization" policy (ISI) in which Turkish import-competing industries were highly protected. The program also included

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some reform projects that stabilize macroeconomic balances. The main objectives of the reforms were to promote export, to liberalize foreign trade regime, to rationalize public expenditure and to encourage the activities of the private sector. The most important outcomes of these policy reforms were a substantial increase in the trade volume and the degree of openness of the economy. By these reforms, the structure of the manufacturing sector has changed drastically, that is, the share of manufacturing industry production of the private sector has increased drastically and the sectoral composition of exports and import have changed substantially in favour of manufacturing goods (Baysan and Blitzer (1990)).

In this study, the impact of foreign trade reforms on domestic market performance is discussed in the context of structure-performance framework. The main purpose of this paper is to measure the effects of trade liberalization on the structure and performance of the manufacturing industry. In this context, the contribution of trade liberalization to competitiveness of domestic industry will be analysed in the framework of the "import discipline hypothesis". This hypothesis states that import liberalization would discipline domestic prices and remove excess profits which reflect market power of domestic firms operating in oligopolistic markets. In short, in this paper, I intended to explain how the interaction among the variables which reflect industrial and foreign trade structure determine the price-cost margins as measure of market performance or competitiveness. The study consists of four parts. Second part is devoted to a short descriptive study on the manufacturing industry. In part three, the theoretical evidences on the determinants of the price-cost margins in the context of market structure-conduct-performance relationship is discussed and in this framework the import discipline hypothesis is tested econometrically by using a panel data of four-digit International Standard International Classification (ISIC) industries for the 1983-1994 period and the results are discussed. Some conclusions are reported in the last part.

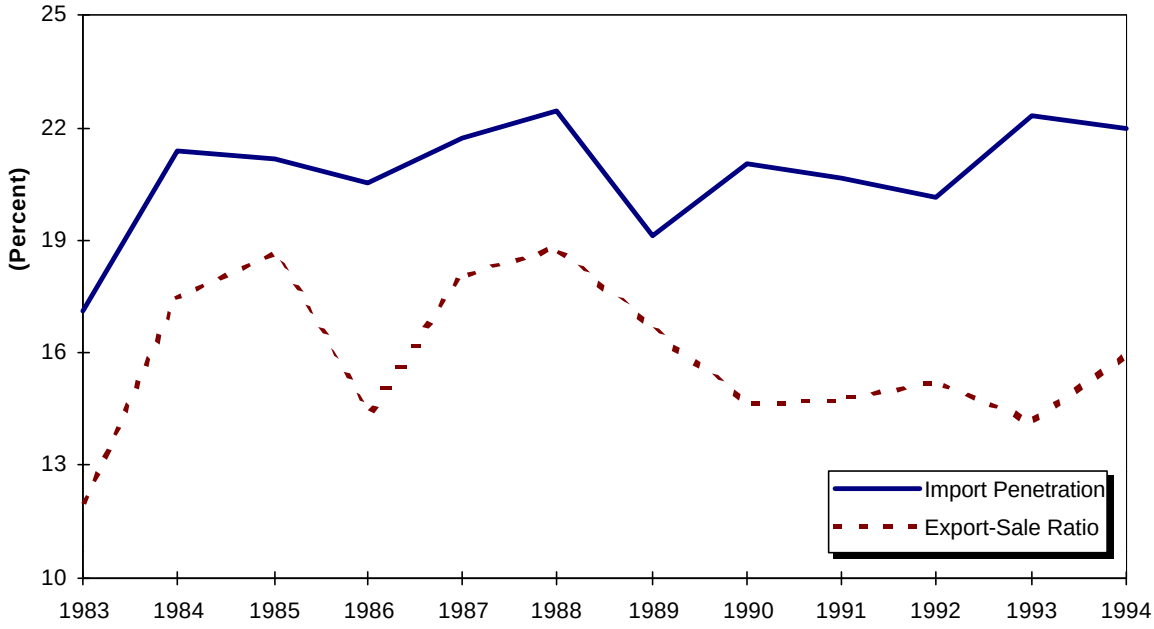
2. A Descriptive Analysis of the Data

The foreign trade program adopted during 1980s, has altered the main trends in the the foreign trade figures. The sectoral composition of import and export has changed considerably during the 1983-1993 period. The manufacturing trade figures imply the important shift in the foreign trade structure from primary to processed goods. The shares of manufacturing imports and exports in total imports and exports have increased considerably in all sectors except raw material-intensive industries. The dominant role of labour intensive products in total export has increased further during the period. In addition, the import share of consumption goods has increased sharply as the import restrictions have been removed overtime.

Import penetration and export-sale ratio figures confirm that the degree of openness of the manufacturing industry has arose considerably during the 1980s (Figure 1). It is generally expected that openness of the industry has intensified domestic competition and improved the efficiency of the manufacturing industry

in Turkey. In other words, import liberalization has disciplined the domestic market by lowering costs and price-cost margins of oligopolistic firms (Engin et. al., 1995 and Forouton, 1991). In addition, it is claimed that import liberalization has contributed to the disappearance of the illegal trade and the black market created by trade barriers and has led to an additional capital inflow and technology transfer.

Figure 1: Import Penetration and Export-Sale Ratio

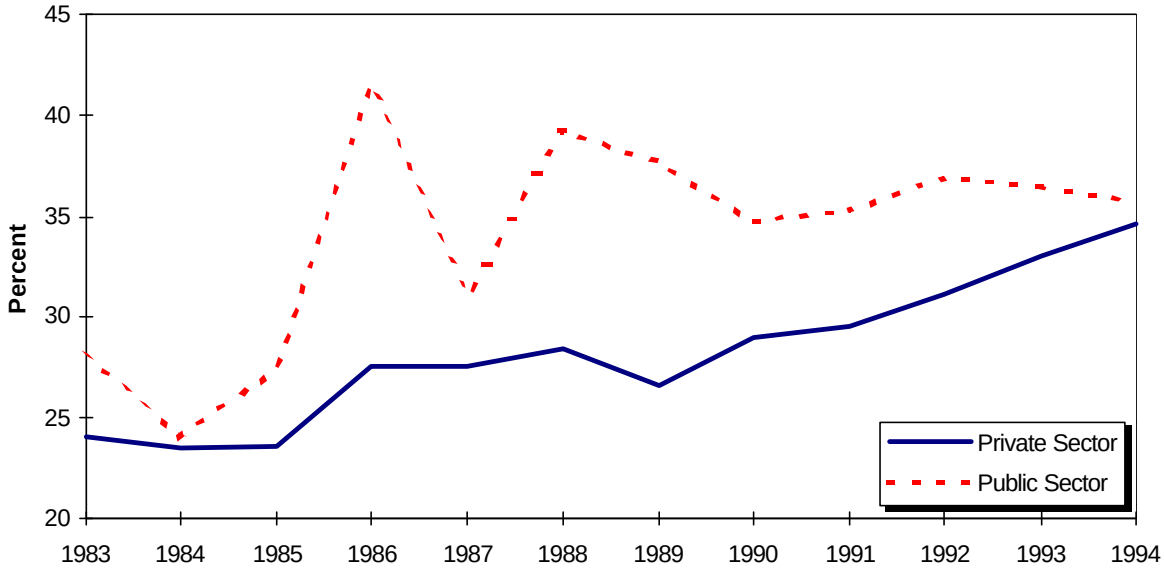


The price-cost margins are generally used as a measurement of performance and competitive level of the domestic industry. The data of the manufacturing industry indicate that price-cost margins have increased significantly both in the private and public sectors in the period of 1983-1994 (Figure 2). The price-cost margin of the manufacturing industry increased from 25.7 percent in 1983 to 34.9 percent in 1994. On the other hand, it has also increased from 24.0 percent in 1983 to 34.7 percent in 1994 in private sector. Price-cost margins in chemicals, chemical petroleum, coal, rubber and plastic industries increased fastest among the private sector industries, 76 percent during the period.

The price-cost margins in whole public sector increased from 28.2 percent to 35.7 during the period. They have decreased substantially in textile wearing apparel and leather industries; of manufacture of wood and wood products including furniture; of basic metal industries; of fabricated metal products, machinery and equipment, transportation vehicle, scientific and professional measuring and controlling equipment and of other manufacturing industries, whereas the price cost margins of chemical and petroleum industries that are highly capital intensive and accounted for more than half of the total sale of the public sector, of non-metal and basic metal products and other manufacturing industries have increased during the period. In fact, the increase in overall price-cost margin of public sector has resulted

from the large margins of chemical and petroleum industries. In short, while the price-cost margins in private sector increased steadily in all two-digit sectors, this was valid also for the public sector until 1988 but since then the performance of public firms worsened sharply.

Figure 2: Price-Cost Margins



Both import penetration rates and price-cost margins have increased to the some extend during the period. The increase in price-cost margins is not consistent with the import discipline hypothesis, since, it is considered that price-cost margins would decrease under the pressure of imports. There may be some explanations of this "unexpected" situation. First, import penetration is not the only factor that affects or determines price-cost margins in the industry, the variables such as, concentration rate, capital intensity, advertising expenditures, market size and growth, play important role in determining of price-cost margins. Changes in these variables might offset the negative impact of import penetration. In section 3.2, the impacts of all these variables will be tested by using an econometric model. Second, the increase in import penetration might result in mergers among the foreign and domestic firms in highly concentrated markets. Third, the imports might lead to lower cost and higher price-cost margins because of cheaper industrial inputs. Fourth, the legal capital depreciation rate which is also included in gross profit, increased from 6 percent in 1980 to 17 percent in 1989. Fifth, a steady decline in the share of the labour payment in value added might lead to increase in price-cost margins between the years of 1980 and 1988. In fact, the average share of labour payments in value added decreased from 24.8 percent in 1983 to 15.4 percent in 1988.

Another measure of industrial competition is the seller concentration rate. The sale weighted average of the four-firm concentration ratio has decreased gradually in six out of nine two-digit industries during the

period of 1983-1994. The most concentrated industries were mainly chemicals, chemical petroleum, coal rubber and plastic products whose concentration rate remained around 80 percent even though it has decreased gradually. On the other hand, textile, wearing apparel and leather industries had the lowest concentration rate, 17 percent on the average. At the four-digit industry level, the four-firm concentration rate of 42 industries has increased and the concentration ratio of 38 industries has decreased during the 1985-1994 period. The sale share of the former group increased from 40.0 percent in 1985 to 42.5 percent in 1994. That is, the market shares of industries whose concentration ratio has increased during the period, have expanded. Table 1 shows the import penetration, export-sale ratio, price-cost margins, labor share, sale share and number of industry at different concentration quintiles.

Table 1: Some Indicator Related to Turkish Manufacturing Industries

		Concentration Ratio					
Year	**Variables**	**0-20**	**21-40**	**41-60**	**61-80**	**81-100**	**Total**
1983	Import Penetration	2.4	28.9	18.8	8.2	11.3	16.2
	Export-Sale Ratio	16.4	12.9	16.9	10.7	5.3	12.0
	Price-Cost Margin	20.3	24.4	19.1	31.0	33.3	25.7
	Labor Share	11.4	10.3	11.8	10.9	3.1	9.0
	Sale Share	12.6	26.1	23.2	11.8	26.4	100.0
	Number of Sector	3	23	21	14	19	80.0
1987	Import Penetration	4.4	27.4	24.5	24.1	11.8	19.3
	Export-Sale Ratio	36.9	21.0	16.0	6.7	6.6	18.0
	Price-Cost Margin	25.3	26.5	28.8	36.8	29.9	28.6
	Labor Share	7.7	7.3	8.4	6.1	2.2	6.4
	Sale Share	16.4	33.0	18.0	12.2	20.4	100.0
	Number of Sector	6.0	23.0	21.0	17.0	13.0	80.0
1990	Import Penetration	4.1	21.6	32.9	23.5	15.0	19.8
	Export-Sale Ratio	36.0	14.1	10.4	9.6	5.1	14.7
	Price-Cost Margin	24.6	25.0	31.1	38.8	39.8	30.6
	Labor Share	9.9	11.2	10.4	9.6	3.4	9.1
	Sale Share	17.1	28.5	26.1	8.4	19.9	100.0
	Number of Sector	7	25	17	17	14	80.0
1994	Import Penetration	7.2	18.9	33.3	25.9	18.1	20.4
	Export-Sale Ratio	29.2	21.4	8.5	8.6	5.0	16.0
	Price-Cost Margin	30.2	30.9	35.9	36.9	47.0	34.9
	Labor Share	6.7	7.8	7.8	8.7	4.3	7.1
	Sale Share	16.8	35.1	24.4	8.4	15.3	100.0
	Number of Sector	4	25	23	15	13	80.0

Source: State Institute of Statistics

Another shift in the manufacturing industry is a substantial decline of the share of labour payments in value added (labour's share) during the period of 1983-1988 both in private and public sectors. After

1988, overall labour's share in manufacturing industry has increased for three years, but it decreased sharply in 1994 crisis. Labour's share in the public sector is substantially higher than in the private sector in all industries except chemicals, petroleum, rubber, plastics industry.

In addition, the weight of the private sector in manufacturing industry has increased substantially during the period. In other words, the share of private sector's sales in total manufacturing sales has increased from 60.6 percent in 1983 to 78.4 percent in 1994. The public sector is dominant only in the manufacture of chemicals, chemical-petroleum, rubber and plastics. While the manufacturing employment has increased 25 percent in the private sector, the employment of public sector has decreased 30 percent during the period. As a result, the share of private employment in total manufacturing employment has increased from 68 percent in 1983 to 79 percent in 1994. The privatization and export-oriented policies are the main reasons of declining in the share of public enterprises in manufacturing production and employment.

3. Specification of the Model and Estimation Results

3.1. A Brief Survey and Specification of the Model

Recent studies on the structure - performance relation have been intensively using foreign trade variables, import penetration rate, export share etc.. In these studies, the domestic economy is generally assumed to operate under imperfect competitive structure, in contrast to the traditional trade theory that assumes perfectly competitive markets. The structure-conduct-performance paradigm predicts that if there are only a few firms in a market and if there exist entry barriers, then these firms may collude to raise the product price and their profits. However, imports may create sometimes relatively competitive environment by preventing implicit collusion among domestic firms. An increase in the import penetration imposes a pressure on domestic price-cost margins that are accepted as indicator of monopoly power in oligopolistic markets. However, in some cases, the increase in the degree of openness of domestic economy may lead to implicit collusion between domestic and foreign firms and thus a relatively non-competitive market structure may also appear. Therefore, an overall impact of foreign trade liberalization on domestic competition depends on collusive behaviour of domestic and foreign firms.

The literature on the causes and effects of market structure and performance began with Joe S. Bain's study in (1941), "The Profit Rate as Measure of Monopoly Power". The literature on the structure-conduct-performance relation has developed considerably since that study. While cross-sectional industry data have employed in the earlier studies, the simultaneous equations and panel data have introduced intensively in recent analysis.

The profitability and concentration relation were discussed intensively in earlier studies. Bain has elaborated a theoretical framework in which various elements of market structure determines firm conduct and the interaction between structure and conduct determine market performance. In these studies, the main elements of market structure are the market size, product differentiation, entry conditions and economies of scale (See Bain (1951), Comanor and Wilson (1967), Collins and Preston (1969), Shephard (1974), Ornstein (1975), Domowitz et al. (1986), Coate (1989), Canyon and Machine (1991), Haskel and Martin (1992), Martin(1993)). In these studies, the market concentration may be considered as a measure of domestic competition, but it does not measure the actual competition that is affected by foreign trade. Therefore, the foreign trade variables have been incorporated into the studies that analyse the market structure-performance relationship intensively by the 1970s (see Esposito and Esposito (1971), Pagoulatos and Sorensen (1976), Urata (1979), Pugel (1980), Marvel (1980) Jacquemin et al., (1982), Urata (1984), Chou (1986), Karier (1988), Kalman and Reid (1991), Stalhammar (1991), Aiginger and Pfaffermayr (1995) and see Forouton (1991), Engin et.al. (1995) for the Turkish manufacturing data). A substantial increase in the share of total trade in total world output entailed to incorporate foreign trade variable into industry analysis.

The role of monopolistic and imperfect competitive market structure in terms of foreign trade has been recently discussed in the context of the theory of international trade. The increase in the share of the multinational firms in world trade and in the supply of the differentiated goods and services which are produced under the conditions of decreasing costs, externalities and the imperfect competitive structure, have altered the scope of the trade theory substantially. It is commonly claimed that foreign trade liberalization increases the welfare of a country further under the imperfect competitive domestic market because it reduces the distortions created in the imperfect competitive markets. Also it expands market size, lowers the average cost by constructing efficient-size firms and increases the division of labour in the context of the product differentiation and economies of scale (Helpman and Krugman, 1986: 1-7).

In this framework, Jacquemin (1982) has suggested an oligopoly model that assumes the homogeneous products and Cournot firm which does not change its output initially in response to an output change by a rival firm. In this case, the firm maximises its profit with respect to its output assuming the rival firm will not change its output level. Also, it is supposed that the import supply is perfectly inelastic, that is, the import supply does not respond to domestic prices. Under these conditions, the gross profit of oligopolistic firm i is formulated as follows;

$$\Pi_i = f(Q+M)\, Q_i - c_i Q_i - F_i \quad (1) \qquad (1)$$

where Q and M indicate the total output, and total import, F_i, Q_i and c_i indicate the fixed cost, output of firm and variable cost of firm i respectively and domestic price, p, is formulated as $p= f(Q+M)$.

By maximising the equation (1) with respect to Q_i, the equilibrium condition for firm i is obtained after some transformations in the following form,

$$L_i = (p-m_i)/p = (1/e_d).(Q_i/Q).(Q/(Q+M)) \quad (2)$$

and averaging over n firms both side of the equation (4), the industry level equation is obtained as follows;

$$L = (p-m)/p = (H_d/e_d).(1-t_m) \quad (3)$$

where L and L_i indicate the Lerner index of the monopoly power of the industry and of the firm i, m and m_i, indicate the marginal cost of the industry and of firm i, H_d, Herfindahl index of concentration, e_d domestic price elasticity of demand and t_m the import penetration rate (M/(Q+M). Assume that the average cost equals to the marginal cost, m, then Lerner index in the equation (3) transforms to the gross return on domestic sale that is the price-cost margin and the equation (3) indicates that there is a negative relationship among price-cost margins and domestic demand elasticity (an indicator of potential competition) and import penetration rate (an indicator of the actual import competition) , A positive relation between the price-cost margin and concentration rate, namely Herfindahl index is observed. In other words, the competitive effects of import on the domestic profitability is stronger in more concentrated domestic industries under the imperfect competition. However, in monopoly case, the domestic firms maximise their joint profits and H_d will be equal to one (Huveneers, 1981; Jacquemin, 1982).

However, suppose that the import supply is not perfectly inelastic and there exists still a Cournot behaviour among domestic firms. In this case, foreign firms that perceive domestic demand as being perfectly elastic, are the potential competitors of domestic oligopolistic firms. Then, equation (3) is transformed to the following form;

$$L = (p-m)/p = (H_d\,(1-t_m))/(e_d+g_s.t_m) \quad (4)$$

where g_s is the price elasticity of imports. In this case, import penetration interacts also with the price elasticity of imports in reducing the price-cost margin. In other words, high price elasticity of the imports enhances the impact of imports on price-cost margins. On the other hand, if the price of imports is perfectly elastic i.e. if the domestic industry is price-taker in the international markets, the price-cost margins will disappear completely. In this framework, the price elasticity of imports is also accepted as a measure of potential import competition (Jacquemin, 1982).

There are also some studies that find a positive and significant relationship between price-cost margins and import penetration rates in the framework of oligopoly models. In fact, this relationship would be

positive, if the degree of implicit collusion between domestic and foreign firms is greater than the degree of the collusion among domestic firms. Urata (1984) claimed that the relation between price-cost margins and import penetration rate is always negative, if each domestic firm believes that the foreign firm does not react to its output change (Cournot behaviour), but it is positive, if each domestic firm believes that only foreign firms react to maintain their market share (perfect collusion). On the other hand, import penetration does not affect price-cost margins, if all domestic and foreign firms react to maintain their market share.

Unlike imports, there is no general presumption about the impact of exports on domestic competition or price-cost margins. In fact, the theoretical analysis of the relationship between exports and profitability yields conflicting hypotheses and they are ambiguous (Caves, 1985). Suppose that exporting country is small in the world market (price-taker) and the demand for her exports is perfectly elastic so that the international price equals to the export price. Also assume that exporters can not discriminate price among domestic and foreign markets and there is non-decreasing marginal production cost. Then, it can be demonstrated that export activities lead to an increase in competitive power of the domestic industry by pressuring on the non-competitive sectors to behave in a competitive way. Alternatively, a domestic monopoly that is protected from the import competition and has relatively lower cost, may export at world prices and exploit market power in domestic market. If a domestic firm discriminates price among foreign and domestic markets, the theoretical link between the export share and price-cost margin is not clear and price-cost margin of the firm is determined by the weighted average of the margins on domestic and export sales.

The early models that were constructed in the context of structure-performance relation have emphasized more on profitability, seller concentration, capital requirements, advertising etc. However, by the second half of 1970s the foreign trade variables have also incorporated into the analysis as a result of increasing trade volume. In this study, an econometric structure-performance model of Turkish manufacturing industry is constructed to measure mainly the effects of foreign trade variables on price-cost margins.

A standard structure-performance model can be specified as follows;

$$PCM = f(C, E, X, B) \qquad (5)$$

where price-cost margin is a function of variables that reflect the competitiveness of the industry (C); industry elasticity of demand (E); input scarcity (X) and entry barriers (B). While C consists generally of the index of seller concentration, import penetration, export share, X is a vector of variables that reflect differences among industries in related with input availability of industries or firms, such as skilled labour, working capital, imported inputs etc., and B is a vector of variables that reflect the conjecture

made by firms about potential entrants, such as; advertising, cost advantage, etc. (Kaluwa and Reid, 1991: 689)

In this context, the following model is estimated by various pooling data specifications,

PCM = f(CR_4, $SQCR_4$, IMP, CRIMP, EXP, IIT, SCALE, OUTEMP, ELAB, GR, ADV, PRICE, WAGE, PRVS, FORL, ADML, TECHL, R&D) (6)

The model includes both industry, i and time, t dimensions. CR_4, CR_4^2, IMP, CRIMP and EXP are the variables that reflect and affect industry competitiveness. GR, PRICE reflects the industry demand conditions, ADML, TECHL, FORL indicate the demand of skilled labour and production technology and ADV, WAGE, IIT, OUTEMP, SCALE, ELAB are the variables that reflect entry conditions and remaining variables are specified as control variables. In addition, year dummies are also used to control for conjectural changes in price-cost margins. In this model, square of four-firm concentration ratio ($SQCR_4$) is also used to test whether there is a non-linear relationship between concentration rate and price-cost margin. Some researchers claim that the PCM and CR_4 exhibit an inverted U-form relation (Stalhammar, 1991:419).

3.2. Estimation and Results

The statistical models combining cross-section and time series data have become increasingly popular in the economic research. A panel data set includes information about individuals (firms, households, industries, etc.) at different points in time. Therefore, using panel data gives analysts additional information about the economic variables and enable him "to control individual specific unobservable effects" which may be correlated with other explanatory variables (Hausman and Taylor, 1981:1-2)

A standard model of panel data set is specified as follow;

$$y_{it} = X_{it}\beta_{it} + \varepsilon_{it} \quad (7)$$

where i= 1,2 .....,N refers to a cross-section unit (individual), t = 1,2 ...., T refers to time period. y_{it} and X_{it} are the dependent variable and the vector of non-stochastic explanatory variables for individual i at time t, respectively. ε_{it} is the error term β_{it} are unknown coefficients that vary with respect to individuals and time. The restrictive assumptions on these coefficients lead to various models.

The estimation results of the private sector industries indicate generally a large diversion among the estimated coefficients of the alternative model specifications. This problem may result from the nature of data and presence of correlation between variables. The most suitable specification seems to be the fixed effects model for the private sector data, since both the null hypotheses that assume the equality of the estimates of total and fixed effect specifications and the absence of correlation between the individual

specific effects and explanatory variables are rejected [1]. Therefore, the estimation results of the fixed effect (within estimates) are given for the private sector in the estimations (1) and (2) in Table 2. Unlike the differences in the results of various estimation methods for the private sector, the estimates of OLS, fixed effects and random effects are similar in the case of the public sector. Unlike the private sector where the individual effects are found to be correlated with the explanatory variables, the hypothesis that assumes no correlation between individual specific effects and explanatory variables is not rejected for the public sector. Therefore, we will discuss the results of random effects model for the public sector in Table 3 where estimation (1) includes year dummies and insignificant variables whereas estimation (2) does not.

On the other hand, in the literature there are quite a number of studies that discuss the direction of causality between the price-cost margins and concentration rate. In other words, it is not clear whether the concentration level explains price-cost margins or vice-versa. Therefore, two stage least square (TSLS) estimation is also carried out to remove the biases resulting from the endogenous explanatory variables, especially concentration rate. This estimation procedure involves the instrumental variables (IV)[2] that are independent of disturbance term and lead to unbiased coefficient. The estimation results of TSLS estimation is reported the estimations (3) and (4) in Table 2 and 3 for the private and public sectors, respectively.

An inverted U-form relation between the price-cost margins (PCM) and concentration rate (CR_4) can be observed from the estimation results. While the estimated coefficient of CR4 is positive, it is negative for SQCR4 in all estimations, but both are significant only in the estimation (3) where year dummies and insignificant explanatory variables are covered in the TSLS estimation in the private sector. On the contrary, while the random effect estimates of these variables are significant, TSLS estimates are not in public sector. One easily sees that the absolute value of t-ratios of CR4, SQCR4 increase as result of moving from fixed effects estimation to TSLS in private sector. However, moving from the random effect estimation to TSLS leads to a decrease in the absolute value of t-ratios of the same variables in public sector. In addition, the coefficient of the interaction term (CRIMP) is positive and significant in all estimation, whereas the coefficient of the import penetration is negative and significant in all estimations of private sector. In other words, when industry specific effects are allowed, the import penetration appears to affect price-cost margins negatively in overall industry even though it increases the price-cost margins of more concentrated industries through the interaction term.

Table 2. Results of Pooled Estimation of the Private Sector (1983-1994)

[1] F test implies the individual specific effects are statistically significant and the Hausman specification test implies the presence of a significant correlation between individual specific effects and explanatory variables. Therefore, fixed effect model is preferred.

[2] SCALE, TECHL, ADV, real value added per firm, share of industry firm number in total manufacturing industry firm number are used as instrumental variables in the TSLS estimation.

	Within Estimates (Fixed Effect)				TSLS Estimates			
	(1)		(2)		(3)		(4)	
Variable	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**
PCM is the dependent variable								
CR4	0.1042	1.411	0.0590	0.795	0.1541	1.847	0.1038	1.249
SQCR4	-0.1253	-1.953	-0.0998	-1.538	-0.1827	-2.451	-0.1414	-1.889
CRIMP	0.1283	3.378	0.1137	2.963	0.1838	4.117	0.1616	3.603
IMP	-0.0888	-2.846	-0.0558	-1.796	-0.1360	-3.662	-0.0973	-2.656
EXP	-0.0042	-0.586	-0.0108	-1.523	-0.0080	-0.947	-0.0139	-1.676
IIT	0.0039	0.404	-	-	0.0040	0.354	-	-
SCALE	0.0295	1.161	0.0477	1.885	0.0245	0.922	0.0396	1.504
OUTEMP	0.0015	9.092	0.0019	14.130	0.0016	8.886	0.0019	13.225
ELAB	-0.0001	-0.675	-	-	-0.0002	-0.847	-	-
GR	0.0005	9.528	0.0005	9.905	0.0005	7.430	0.0005	8.249
ADV	0.0047	2.075	0.0057	2.510	0.0047	2.043	0.0051	2.240
PRICE	0.0301	3.284	0.0500	8.212	0.0343	2.839	0.0636	8.253
WAGE	-0.2087	-2.475	-0.1835	-2.485	-0.1931	-1.923	-0.1387	-1.559
PRSHARE	-0.0253	-1.402	-0.0282	-1.552	-0.0223	-1.122	-0.0249	-1.253
FORL	-0.1890	-2.243	-0.2179	-2.597	-0.1917	-1.794	-0.2326	-2.241
ADML	0.0766	2.049	0.0950	2.528	0.0749	1.658	0.0944	2.097
TECHL	-0.1234	-1.011	-	-	-0.1370	-1.101	-	-
R&D	0.0002	0.211	-	-	0.0006	0.574	-	-
Y1	-0.0047	-0.574	-	-	-0.0107	-0.766	-	-
Y2	-0.0021	-0.253	-	-	-0.0046	-0.381	-	-
Y3	0.0108	1.276	-	-	0.0017	0.133	-	-
Y4	0.0207	2.377	-	-	0.0138	1.104	-	-
Y5	0.0204	2.114	-	-	0.0189	1.371	-	-
Y6	0.0182	2.069	-	-	0.0124	1.012	-	-
Y7	0.0262	3.062	-	-	0.0278	2.304	-	-
Y8	0.0331	3.736	-	-	0.0286	2.442	-	-
Y9	0.0340	3.644	-	-	0.0261	2.108	-	-
Y10	0.0373	3.910	-	-	0.0309	2.498	-	-
Y11	0.0462	3.607	-	-	0.0470	2.752	-	-
R2		0.786		0.774				
Adj. R2		0.758		0.750				
S.E. of Regr.		0.049		0.050				
Durbin-Watson		1.268		1.236				
Mean of PCM		0.293		0.293				
S.D.of PCM		0.100		0.100				
SSR		1.926		2.032				

Table 3. Results of Pooled Estimation of the Public Sector (1983-1994)

	Variance Comp.Estimates (Random effect)				TSLS Estimates			
	(1)		(2)		(3)		(4)	
Variables	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**
Dependent var.(PCM)								
Intercept	0.3015	3.982	0.2922	4.356	0.2310	2.715	0.2175	2.863
CR4	0.4735	2.360	0.5153	2.694	0.3695	1.433	0.3782	1.513
SQCR4	-0.4301	-2.477	-0.4666	-2.829	-0.3144	-1.395	-0.3217	-1.489
CRIMP	-0.1024	-0.669	-0.1088	-0.729	-0.1854	-0.971	-0.1827	-0.985
IMP	0.1707	1.674	0.1728	1.788	0.2960	1.908	0.3119	2.086
EXP	-0.1063	-3.955	-0.1085	-4.226	-0.1082	-2.797	-0.1191	-3.306
IIT	-0.0087	-0.410	-	-	0.0100	0.376	-	-
SCALE	0.0152	0.179	-	-	0.0203	0.214	-	-
OUTEMP	0.0013	6.020	0.0013	6.839	0.0016	5.970	0.0015	6.993
ELAB	-0.0005	-1.542	-0.0005	-1.620	-0.0004	-0.957	-0.0003	-0.738
GR	0.0111	3.035	0.0109	3.074	0.0125	2.465	0.0131	2.741
ADV	-0.0435	-1.450	-0.0420	-1.431	-0.0382	-1.224	-0.0378	-1.273
PRICE	0.0618	3.181	0.0633	4.453	0.0574	2.145	0.0642	3.513
WAGE	-0.5350	-15.235	-0.5375	-18.340	-0.5858	-13.261	-0.5610	-15.898
PRSHARE	-0.1440	-2.902	-0.1307	-2.922	-0.2271	-3.519	-0.2266	-3.931
FORL	-0.0032	-0.037	-	-	-0.0573	-0.546	-	-
ADML	-0.0580	-1.169	-0.0609	-1.294	-0.0626	-0.919	-0.0470	-0.749
TECHL	0.0015	0.015	-	-	-0.0117	-0.108	-	-
R&D	0.0016	0.777	-	-	-0.0009	-0.305	-	-
Y1	0.0059	0.263	-	-	-0.0081	-0.224	-	-
Y2	-0.0050	-0.221	-	-	-0.0209	-0.655	-	-
Y3	0.0144	0.638	-	-	-0.0325	-0.963	-	-
Y4	0.0180	0.791	-	-	0.0263	0.840	-	-
Y5	0.0088	0.356	-	-	-0.0148	-0.414	-	-
Y6	0.0063	0.264	-	-	0.0051	0.142	-	-
Y7	0.0206	0.880	-	-	0.0148	0.445	-	-
Y8	0.0138	0.576	-	-	0.0162	0.501	-	-
Y9	-0.0147	-0.600	-	-	-0.0228	-0.705	-	-
Y10	0.0092	0.371	-	-	0.0071	0.202	-	-
Y11	0.0128	0.438	-	-	0.0125	0.322	-	-
Unweighted Statistics including Random Effects								
R2		0.765		0.762				
Adj. R2		0.753		0.756				
S.E. of Regr.		0.106		0.106				
Durbin-Watson		1.666		1.660				
Mean of PCM		0.211		0.211				
S.D.of PCM		0.214		0.214				
SSR		6.442		6.530				

A proxy level of CR4 at which import penetration enhances PCM, may be found by the derivative of PCM with respect to IMP for the estimation (1) of the private sector,

$$dPCM/dIMP = -0.0888+0.1283\ CR_4 \qquad (8)$$

The coefficients of equation (8) may changes if the explanatory variables changes. But on the average the price-cost margins of the industries having over 70 percent concentration rates increase as the import penetrates, whereas they decline in industries whose concentration rate is small with the import penetration that is import penetration disciplines relatively small size producers in private sector, not the concentrated firms.

These results may be interpreted in the following theoretical framework. First, it is generally claimed that increasing of imports leads to more competitive domestic market by pressuring on prices, costs and excess profits of domestic firms, if there is no implicit collusion between domestic and foreign firms in an oligopolistic market (Jacquimin, 1982), Second, increasing imports may result in larger excess profits or price-cost margins, if the degree of implicit collusion between domestic and foreign firms is greater than that among domestic firms (Urata, 1984). Therefore, a positive coefficient of the interaction term may imply the presence of a possible implicit collusion between domestic and foreign firms in more concentrated industries in private sector. However, Forouton (1991) found different results for the Turkish manufacturing data of the private sector covering the 1977-1985 period. She concluded that import penetration in concentrated industries has led to reduction of the price-cost margins and has created relatively competitive domestic industry. Similarly, Engin et.al. (1995) noted that while import penetration in more concentrated industries creates a competitive pressure on price-cost margins, the relationship between import penetration and profit-cost margins is found to be positive, but insignificant in private sector, since imports of inputs which are larger than imports of final goods leads to cost advantage and high price-cost margins for domestic firms. The difference between our results and Forouton and Engin, Katýrcýoðlu and Akcay's findings could be explained by the period of analysis, explanatory variables and the estimation procedure used in the regression model. More variables are used in this study to capture different aspects of industrial structure and entry conditions.

On the other hand, substantial differences are observed among the estimation results of the private and public sectors. In public sector, while coefficient of interaction term is negative but insignificant, the coefficient of import penetration is positive and significant in all estimation even though it is more important in TSLS estimation. In other words, while import penetration imposes a pressure on the price-cost margins of more concentrated industries, it increases price-cost margins of the public sector industries generally probably because of cheap imports that are exploited as inputs in the domestic production and lead to lower domestic costs. Therefore it may be argued that import penetration leads to a reduction of market power of the public firms. This does not mean that import penetration leads to a more competitive and efficient public sector structure. However, the improvement in the competitiveness of public sector is ambiguous, since while import penetration may leave out more concentrated inefficient public firms or lead to a reduction in the price-cost margins of monopolistic public firms, the share of public sales has decreased gradually during the period of analysis. In other words, parallel to the

increase in the degree of openness of the manufacturing industry, the weight of the public sector has diminished significantly. Although this result is consistent with the result of Engin et.al. (1995) that was obtained for the whole industry, Forouton concluded that import penetration has not influenced price-cost margins of the public sector significantly during the 1977-1985 period.

The coefficient of export share (EXP) has negative sign and it is insignificant in all estimations of private sector even though it is rigorously significant in public sector. Negative and significant coefficient of EXP may imply the presence of relatively competitive exporters. That is, the domestic firm does not make probably price discrimination between domestic and foreign markets or not use domestic cost advantage in the international markets to increase its price-cost margin. It is generally expected that the domestic firms as price-taker confront with relatively more elastic demand in the open economy that leads to a reduction in margins of exporters. On the other hand, intra-industry trade index is not seem to be an explanatory variable for the PCM for all estimations. In other words, domestic firms are not able to increase intra-industry trade index by differentiation of products to lessen the impact of the import pressures on PCM.

The coefficients of advertising (ADV) , the growth rate of value added (GR) and rate of change in prices (PRICE) are all positive as expected and significant in all model specifications in private sector, but the impact of ADV on PCM is negative and insignificant in public sector. In other words, while advertising is a source of profit in forming product differentiation or entry barrier in private sector, it is important only as a source of cost in public sector. On the other hand, the coefficient of labour share (WAGE) is negative in all estimations of both sectors, but strongly significant in public sector as expected. This result may imply that payment to labour as a cost item is more important in public sector than private sector and the labour unions are more effective in sharing value added in public sector. In addition, this variable reflects not only labour cost but also industry specific labour characteristics.[3] Another interesting result is that the coefficient of the sales share of private sector (PRSHARE) is negative in both sectors, but significant only in the estimations of the public sector. In other words, the private firms operating in the industries dominated by the public firms earn higher profits[4] and as the share of public firms decrease their profits shrink. In short, increase in the activities of the private firms, probably by privatization lead to a pressure on PCM, that is privatization tendency may bring about more competitive market.

As expected the coefficient of the minimum efficient scale (SCALE) is positive in both sectors, but not significant. In addition, the coefficient of the labour productivity (OUTEMP) is positive and significant in all estimations as expected. However, although a positive relation between the electricity consumption-employment ratio (ELAB) and price cost margin is expected, the coefficient of ELAB is estimated as negative and insignificant in all estimations. On the other hand, the share of administrative (ADML),

[3] There is a trade off between profit and wage rate since they are the components of the prices in the macroeconomic sense.
[4] The higher profit rate in industries where public firms are dominated, might result from price leader behaviour of public firms.

technical (TECHL) and clerical labour (FORL) in total employment are used to control the differences in techniques of production. The impacts of these variables on PCM is not significant in public sector even though the coefficients of ADML and FORL are significant in private sector. In other words, while the increase in the share of administrative employees lead to higher profits, the clerical employees reduce it in private sector. The coefficient of R&D is insignificant in all estimations as expected, since the share of science-based production is very small in total manufacturing production[5]. Finally, unlike the private sector, the coefficients of year dummies in the public sector is not significant. PCM in private sector responses to the year dummies positively except a few year at the beginning of the estimation period. Especially after 1989, their coefficients become more significant in all specifications.

In short, the estimation results in the private sector are substantially different than those in the public sector. The fixed effects model which does not take into consideration whether the individual effects are correlated with explanatory variables or not, is useful for the private sector, whereas the random effects model is more suitable for the public sector. Unlike the private sector, the public sector has a strong inverted U-shape relationship between price-cost margins and concentration rate. In addition, the import penetration leads to a reduction in the price-cost margins of more concentrated industries in public sector, but it appears to decrease the price-cost margins of public sector in general. On the contrary, while the import penetration leads to an increase in the price-cost margins of more concentrated industries in private sector, it leads to a reduction in the price-cost margins of overall private sector. In other words, while import penetration has created a competitive pressure on the more concentrated public sector industries, same result is not true for concentrated private industries. This result implies a possibility of presence of an implicit collusion between domestic oligopolies and foreign firms or importers and domestic manufacturing firms may be parts of same firms in the private sector. On the other hand, while price-cost margins in the overall private sector has declined, they have increased in public sector. Moreover, exports have a negative and significant impact on price-cost margins in public sector. Surprisingly, ELAB that reflect capital intensity of industry affects the price-cost margins negatively in private and public sectors generally. While advertising is an important source of increasing price-cost margin in private sector, it is not important in public sector. Furthermore, the effect of the variation of time on price-cost margins is positive and significant in the private sector even though it is not significant in public sector.

5. Conclusion

[5] Research and developments expenditure (R&D) cover only 1991-94 period, the figures of the 1991 are used for the previous years.

Trade liberalization program has led to rise in the degree of openness of Turkish manufacturing industry substantially during the 1980s. Quantitative system of protection was abolished entirely. In accordance with decline in the manufacturing protection rates, especially the import penetration of consumption goods has increased substantially in 1980s. In addition, the export share of manufacturing has expanded sharply until 1988. However, the import penetration and export expansion have slowed down by the late 1980s, since some protective taxes have been imposed on imports and the export incentive system has abolished.

Price-cost margins of manufacturing industries have increased substantially during the 1983-1994 period. PCM of the private sector were found to be larger than that of the public sector. In addition, PCM of more concentrated industries are larger than that of less concentrated industries. While more than half of the public sales was performed by the most concentrated public industries, only about 15 percent of total private sales was originated from these industries. In addition, sale weighted four-firm concentration rate has decreased gradually in overall manufacturing industry during period. While the sale shares of industries whose concentration rate are in the range of 76-100 and 25-50 percent have declined sharply during the period, they have risen in industries having concentration rate in the range of 51-75 and 0-25 percent. This implies two results, first the firms residing in oligopolistic industries have become stronger; and second firms residing in less concentrated manufacturing industries have also become stronger on the average during the trade liberalization period.

The results of the empirical analysis of the private sector were found to be substantially different from the results of the public sector. Unlike the public sector, the results has changed substantially when industry-specific effects were taken into consideration in private sector. The impact of concentration rate on price-cost margins is significant in the private and public sectors, if the industry-specific effects are not taken into consideration. However, it is insignificant for the private sector when industry-specific effects are incorporated into the regression analysis. In addition, when the industry specific effects are allowed, import penetration appears to affect the price-cost margins in the private sector negatively even though it leads to an increase in the price-cost margins of more concentrated industries. When the industry specific effects are excluded, the effect of import penetration on price-cost margins disappears. In other words, while increase in the import penetration rate leads generally to a reduction in the price-cost margins in private sector industries, it leads to an increase in the price-cost margins of the more concentrated private sector industries in the fixed effects specification. In fact, this implies the presence of a possible implicit collusion among domestic and foreign firms in more concentrated industries or importers and domestic manufacturing firms may be parts of same firms[6] and the opening of the manufacturing industry to the world trade has not influenced effectively the competitiveness of these

[6] In most cases domestic firms in more concentrated industries hold the exclusive distribution and territorial rights to sale the imported goods along with their own goods owing to their established distribution and service networks. This case is less conceivable for the relatively smaller firms residing in low concentration and highly competitive industries.

industries where the import penetration is already low. On the contrary, although import penetration creates a disciplining pressure on the price-cost margins of more concentrated public sector industries whose capital intensities were already high, it appears to affect the price-cost margins of the whole public sector industries positively. In this context, trade liberalization is not sufficient for the competititve domestic market, some additional measures are needed to improve the competitiveness industry.

Moreover, while export expansion does not affect the price-cost margins of the private sector industries, it leads to a substantial decline in the price-cost margins of the public sector. In addition, advertising was found to be more important source of PCM in the private sector rather than public sector. Industry level growth and output price increases were found to increase the price-cost margins of both the private and public sector industries. When the industry-specific effects are allowed, a decrease in the share of the labour payments causes the price-cost margins to increase both in the private and public sectors. The price-cost margins of the public sector industries have not been influenced generally from the time, but time effects are important for the private sector and they have led to expansion in the price cost margins of the private sector industries.

In short, the increase in the degree of the openness of the Turkish economy during the 1980s has affected the private and public sectors in different ways. The excess profits resulted from oligopolistic market structure have been removed significantly in the public sector under the pressure of imports and export expansion, whereas they have increased to some extent in the private sector.

Data

Sale, value added, payments to labour, number of workers, electricity consumption, advertising and labour qualification- figures were obtained from Manufacturing Industry Surveys of the State Institute of Statistics (SIS). In addition, four-firm concentration rates, price indices, research and development expenditures also provided by the SIS. On the other hand, import and export figures were provided by the Under-secretary of the Foreign Trade. Total value of manufacturing imports and exports at the four-

digit ISIC industries were converted from US dollars to Turkish lira by using average exchange rates. Industry level data were provided at the four-digit ISIC level and included 87 manufacturing industries at this level. However, the number of industries used in the regression analysis reduced to 76 for the private and 49 for the public sectors because private and public firms do not operate in all industries without interruption. The industry data includes all public enterprises and those private firms that employ 10 or more persons in their economic activities. All variables defined in the following table, are calculated for both the public and private sectors except four-firm concentration rate, import penetration rate, export share, intra industry trade index and minimum efficient scale.

Variables Used in the Regression Analysis

Variable	Explanation
Price-Cost Margin (PCM)	PCM are accepted as a proxy for market power and defined in several ways in the literature. In this study, it is formulated as value added mines payment for the labour divided by output.

Concentration rate (CR4)	The share of the four largest firms in the total sales of an industry. The expected impact of CR4 on PCM is positive theoretically, since the collusive behaviour among firms is more likely in concentrated markets. But, there is large literature that disputes whether PCM determines concentration or vice-versa
Import Penetration (IMP)	IMP is the ratio of imports to domestic shipments (total sales minus exports plus imports). It is used to measure the degree of foreign competition in an industry and serves as a proxy for the threat of foreign potential competition.
Interaction Term (CRIMP)	Calculated by multiplying CR4 with IMP. This variable tests the effects of imports on PCM interacting with the concentration level. It is expected that the coefficient of the interactive term is negative, since it implies the disciplining impact of import penetration on PCM in more concentrated industries.
Export-Sale Ratio (EXP)[7]:	This tests whether the export-oriented industries have higher PCM.
Intra-Ind. Trade I. (IIT)[8]	This variable is used to measure the reactions of domestic producers against competitive imports. Higher value of IIT indicates competitiveness of the domestic firms.
Min Effic. Scale (SCALE):	The average size of the largest firms accounting for 50 percent of industry sales.
Labour Productivity (OUTEMP)	Real value added per employee.
Capital Requirement (ELAB)	It is assumed that PCM is closely related with the capital that employed in the production process. The ratio of electricity consumption in kWh to the employment (ELAB) is used as a proxy for the absolute capital requirement.
Value Added Growth (GR)	This variable is used in the estimation to cover the impact of expanding domestic markets on PCM. It is assumed that, other things remaining constant, the expansion of the market demand lead to an increase in PCM
Advertising rate (ADV)	The advertising expenditure-sales ratio is an indicator of product differentiation or kind of entry barrier. The sign of its coefficient is expected to be positive.
Price Change (PRICE)	This variable is calculated from price indices of four-digit industries.
Wage-Sale Ratio (WAGE)	This variable is employed to understand the effect of labour payments on profits. The expected effect of this variable is negative.
Private Sale Share (PRSHARE)	This variable reflects the effects of different pricing rules of these sectors and enable us to measure the competitive impact of the privatization in manufacturing .
Labour Skills	The shares of administrative (ADML), clerical (FORL) and technical (TECHL) employees in total employees are used to control for differences in production technologies and to measure the effect of labour on industrial performance.
Research and Dev. (R&D)	The share of R&D expenditure in sale.
Year Dummies (Y)	Dummies are used to capture the impact of conjectural changes on PCM over time

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[7] Although the import and export figures that were used in the analysis include total imports and exports of all private and public firms, sale figures used in the calculation of IMP and EXP include only the figures of firms that employ 10 or more persons in their economic activities. Therefore, the import penetration rate and export share variables may include some data errors and classification problem.

[8] This variable is formulated in the following form, IITi = [Xi+Mi - abs(Xi-Mi)] /Xi+Mi, where Xi and Mi are the sectoral exports and imports respectively and abs(Xi-Mi) is the absolute value of net export.

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