Customs Union with EU and the Impact of Foreign Competition on the Structure and Performance of Turkish Manufacturing Industry

Erzan, Refik; Filiztekin, Alpay and Zenginobuz, Unal

30. April 2003

Customs Union with EU and the Impact of Foreign Competition on the Structure and Performance of Turkish Manufacturing Industry

Refik Erzan[a], Alpay Filiztekin[b], Ünal Zenginobuz[c, *]

[a] *Department of Economics and Center for Economics and Econometrics, Boğaziçi University, 34342 Bebek, Istanbul, Turkey*

[b] *Faculty of Arts and Social Sciences, Sabanci University, Orhanli, 34956 Tuzla, Istanbul, Turkey*

[c] *Department of Economics and Center for Economic Design, Boğaziçi University, 34342 Bebek, Istanbul, Turkey*

Abstract

Using industry level panel data, we study how increasing openness to international markets, including the customs union with EU, have affected the structure and performance of Turkish manufacturing industries over the 1980-1999 period, with special emphasis on the market disciplining role of imports. We find that changes import penetration did not reduce (output-) concentration in concentrated industries, while for the less concentrated industries it had a mildly significant negative impact. It was also observed that changes in import penetration had a significant positive, rather than negative, effect on price-cost margins (PCM) with a one-year lag in high PCM industries; while for the low PCM industries current changes in import penetration had again a significant positive impact on profit margins. Thus, imports do not seem to provide discipline for either the low or high PCM industries.

JEL classification: L10, F10, L40, F13
Keywords: import-competition; market structure; customs union; Turkish manufacturing industry

* Corresponding author.
E-mail addresses: erzan@boun.edu.tr (E. Erzan), alpayf@sabanciuniv.edu (A. Filiztekin), zenginob@boun.edu.tr (Ü. Zenginobuz)

1 Introduction

Trade regime stood at the core of the reform process the Turkish economy has been undergoing since 1980. Vigorously followed export promotion policies, as well as more gradually introduced import liberalization policies, had a profound impact on the manufacturing industry. The State Institute of Statistics data reveal that the share of manufacturing in exports has gone up from 36% in 1980 to 79.1% in 1987 and stood at 91.4% in 2000.

Import penetration ratios in Turkish manufacturing, calculated as the ratio of imports to apparent consumption (domestic production plus imports minus exports), increased considerably since the 1980s. This has accelerated with the Customs Union (CU) with the Eropean Union (EU). In addition to import penetration ratios, nominal protection rates are also important in judging the competitive pressures that industries face.

In the 1970 Additional Protocol to the Association Treaty of 1963, Turkish imports from the European Community were divided into two lists. There was a 12-year list for industrial products that Turkey was likely to reach international competitiveness relatively faster, and the rest of the manufactured goods were placed on a 22-year list. With the CU that went into effect in 1996 Turkey has reduced the nominal protection rates in trade with EU for all of the commodities in the 12- and 22- year lists. For commodities that were not included in the 12- and 22-year lists but covered under the European Coal and Steel Community agreement, a separate Free Trade Agreement was signed in 1995 between Turkey and EU, which stipulated that trade of commodities covered under the agreement would be gradually liberalized over a period of three years. Thus, by 1999 the nominal protection rates for all industrial products when traded with EU have been reduced to zero. Moreover, the EU-Turkey customs union agreement requires Turkey to adopt the Customs Union Tariff of EU against third country imports by January 1, 1996, and all of the preferential agreements EU has concluded with third countries by the year 2001. Also, the enactment of Competition Law and the establishment of the Competition Authority have largely been due to Turkey's obligation under the Association Agreement. The Association Agreement required that the parties should apply the provisions of Rome Treaty for the harmonization of their laws, tax rules, and competition policies.

Systematic empirical studies on the impact or probable impact of the CU on Turkish manufacturing industry are very sparse. Harrison, Rutherford and Tarr, using a computable general equilibrium (CGS) model, addressed the issue in 1996, analyzing the potential overall impact of the CU on welfare. CGE estimations and simulations of Bayar *et al.* (2000) provided some indication of the direction and magnitude of changes in major sectors of the economy. Kucukahmetoglu (2000) conducted a study based on changes in revealed comparative (RCA) advantage indices. Erzan and Filiztekin (1997) analysed the probable impact of the CU on the structure of manufacturing industry in terms of small, medium and large firms, using panel data techniques.

The CU has both liberalization (trade creation) and trade diversion aspects. There are earlier studies on the impact of trade liberalization. Krueger and Tuncer (1982) reported that productivity growth was faster during the periods of liberalization. Similarly, Nishimizu and Robinson (1984) find that for most industries, productivity growth was increasing with export expansion. Both of these studies cover the1963-1976 highly protectionist period. The paper by Levinsohn (1993) was the first one that exploited the reforms in 1980. However, the major concern of Levinsohn was to test imports as a market discipline hypothesis. His results showed that for majority of industries, removing barriers to import decreases market power. Foroutan (1996) as a part of a World Bank funded project, examined total factor productivity between years 1976-1985. She concluded that industries that were classified as exportables grew faster after 1980. She also reported that there was small but significant disciplining effect of trade on market power.

Filiztekin (2000) explored the impact of trade reforms on the growth performance of Turkish manufacturing industry in the 1970-1996 period. He also addressed whether the observed growth in value added was due to accumulation of factors of production or rather improvement in productivity, whether the growth phenomenon was uniform across industries and whether there were certain industries that led the rest. The relation between trade and productivity growth, especially the effects of export growth and changes in imports on productivity were also tested.

Using industry level panel data, in this study we look at how increasing openness to international markets over the 1980-1999 period have affected the structure and performance

of Turkish manufacturing industries, with special emphasis on the market disciplining role of imports.

2 Overview and Description of Data

Table 1. gives the export-output and import penetration (imports/apparent consumption) ratios in manufacturing for the relevant sub-periods following the trade liberalization of 1980. The share of imports from and exports to the EU in, respectively, total imports and exports are also given. The CU led to a major increase in overall import penetration ratios, while the share of EU imports in imports from all sources increased only slightly after the CU. Table 1 also reveals that after the CU import penetration ratios doubled or nearly doubled in many sectors of manufacturing. The only striking change in the trade pattern following the CU was the major increase in overall import penetration ratios. This ratio increased from 19,8% in the early 1990s to nearly 29% in the post-CU period. However, the share of EU imports in imports from all sources increased only slightly from about 54% to about 56% in the two periods compared. What impact, if any, have these increases had on the structure and performance of Turkish manufacturing industries? In other words, how has the rising import competition affected market power in Turkish manufacturing industries, and have imports provided competition, actual or potential, to discipline domestic firms with market power?

Table 1 about here

According to the standart structure-conduct-performance paradigm in Industrial Organization theory, the more competitiors there are, the more competitive the firms' behavior or conduct will be, leading to lower costs, lower prices, and lower profits. Low profits associated with low prices will be the indicator of high output level and, hence, higher total welfare. This section looks at the relationship between import penetration and industry structure, as measured by a standard market concentration index, the share of four largest firms in total industry output (CR4); as well as at the relationship between import penetration and price-cost-margin (PCM), a standard indicator of industry performance.

The structure-conduct-performance paradigm provides a rationale for using CR4 data as a proxy for PCM data. CR4 figures are relatively easy to construct, while PCM data are rather difficult to obtain accurately. However, it is well known that in an open economy context standard indicators of market structure may be misleading about industry performance. For example, a highly concentrated industry (a high CR4 figure) will in all likelihood be indicative of significant market power and high PCM in an economy closed to foreign trade. With imports serving as actual or potential competition, however, even the price charged by a domestic monopolist may not diverge too much from marginal cost. Hence, both the examination of the interplay between imports and CR4, as well as between imports and PCM are warranted. The specifics of CR4 and PCM data used are further discussed below.

Import penetration is defined as the ratio of imports to apparent consumption (domestic production plus imports minus exports). The specific aspect of import penetration that is focused on here is whether imports respond fast enough in a given industry in response to changes in industry-specific and/or economy-wide factors. As such, imports, in addition to providing "actual" competition, will tame market power in industries through their "potential" competition aspect. Potential foreign competition will be measured by the estimated change in import penetration to changing economic conditions.

Trade figures used in this report are taken from the World Bank Trade and Production Database. The database contains imports and exports data at the industry level by blocs of countries over the period 1980-1999.[1]

Table 2 below provides a desciription of trends and fluctuations in import penetration in Turkish manufacturing industry over 1980-1999. Column (1) in Table 2 presents within-year average (across industries) import penetration in Turkish manufacturing industry, with shares in total manufacturing output of industries used as weights in calculating the average. Thus, the level of import penetration for the "representative" Turkish manufacturing industry increased from 13.9% in 1981 to 29.45% in 1999. On the other hand, Column (2) in Table 2 indicates considerable heterogeneity across industries. Examining Column (3) reveals that within-year heterogeneity across industries has exhibited a slow decline over the years a Turkish economy became more liberalized and open. Looking at short-run fluctuations in

[1] The data cover 28 3-digit ISIC (Rev. 2) manufacturing industries over 1981-1999, with Manufacture of Food Products not Elsewhere Classified (312) being merged with Food Manufacturing (311).

import penetration levels, Columns (4) - (6) of Table 2 reveal rather sharp short-run fluctuations and considerable heterogeneity across industries. Column (6) reveals that after the CU with the EU industries has become more different in terms of responsiveness of imports to changes in the economy.

Table 2: Trends and fluctuations in import penetration (IMPPEN)

Year	Level of IMPPEN			Changes in IMPPEN		
	(1) Mean	(2) S.D	(3) S.D./Mean	*(4)* Mean	(5) S.D	(6) S.D./Mean
1981	0,1386	0,1449	1,0456			
1982	0,1105	0,1265	1,1442	-0,0294	0,0265	-0,9019
1983	0,1137	0,1304	1,1467	0,0012	0,0251	20,4767
1984	0,1383	0,1320	0,9546	0,0214	0,0189	0,8799
1985	0,1871	0,1694	0,9054	0,0510	0,0539	1,0563
1986	0,1771	0,1706	0,9633	-0,0082	0,0333	-4,0421
1987	0,1871	0,1609	0,8603	0,0070	0,0329	4,7025
1988	0,1817	0,1532	0,8428	-0,0045	0,0308	-6,7957
1989	0,1687	0,1470	0,8713	-0,0031	0,0193	-6,1601
1990	0,1869	0,1471	0,7868	0,0125	0,0266	2,1220
1991	0,1835	0,1474	0,8030	-0,0078	0,0185	-2,3887
1992	0,1852	0,1442	0,7785	0,0030	0,0179	5,9052
1993	0,2066	0,1496	0,7240	0,0203	0,019	0,9337
1994	0,2156	0,1574	0,7303	0,0220	0,0321	1,4549
1995	0,2391	0,1587	0,6636	0,0192	0,0224	1,1620
1996	0,2791	0,1800	0,6450	0,0436	0,0305	0,6984
1997	0,2904	0,1749	0,6024	0,0029	0,0369	12,7294
1998	0,2926	0,1796	0,6137	-0,0021	0,0277	-12,9387
1999	0,2945	0,1932	0,6562	0,0072	0,0506	7,0005

The data cover 27 ISIC (Rev. 2) 3-digit Turkish manufacturing industries over 1981-1999. Import penetration IMPPEN = imports/ (domestic production + imports - exports).
For the level of IMPPEN, Column (1) presents the cross-industry mean value of the level of IMPPEN for each year, with shares in total manufacturing output of industries used as weights in calculating the mean; and Column (2) presents the cross-industry standard deviation (S.D.) of the level of IMPPEN for the corresponding year. Column (3) gives the coefficient of variation. The same definitions apply for the annual changes in each industry's IMPPEN given in Columns (4)-(6).

Reduction in trade barriers due to various policy changes and trade agreements are likely to be the determinants of a trend in import penetration, while changes in industry specific and economy wide aggregate factors will give rise to intertemporal fluctuations. Figures 1 and 2 display trend and fluctuations in import penetration levels. Following the periodization adopted throughout the study, the mean of (weighted-) average import penetration levels were 15.4%, 19.8%, and 28.9% in the 1981-1988, 1989-1995, and 1996-1999 periods, respectively. As to be expected, import penetration in Turkish manufacturing industries rose as the economy became more liberalized and more open to foreign trade. Average standard deviation figures were 14.8%, 15.1%, and 18.2%, respectively, in the 1981-1988, 1989-1995,

and 1996-1999 periods, pointing at increased heterogeneity in terms of import penetration across industries as imports surged after the CU with the EU.

Figures 1 and 2 about here

The data (Columns (2) and (4) of Table 2) show that there is considerable inter-industry variation in import penetration. Table 3 below displays information on intra-industry, rather than inter-industry, fluctuations in both level and change in import penetration. Summary statistics in Table 3 indicate considerable intra-industry fluctuations, especially for the change in import penetration. The large inter-industry and intra-industry fluctuations in import penetration over time are supportive of the claim that imports will respond to changes in industry specific and economy wide aggregate factors.

Table 3: Within-industry IMPPEN level and change across years

	Level of IMPPEN		Changes in IMPPEN	
	(1) Mean	(2) Standard Deviation	(3) Mean	(4) Standard Deviation
Mean	0.2062	0.0788	0,0101	0,0372
Standard Deviation	0.1849	0.0503	0,0087	0,0201
Minimum	0.0088	0.0056	-0,0061	0,0068
Maximum	0.7599	0.2558	0,0393	0,0903

The data cover 27 ISIC (Rev. 2) 3-digit Turkish manufacturing industries over 1981-1999. Import penetration IMPPEN = imports/ (domestic production + imports - exports).
For the level of IMPPEN, for each industry the mean level of IMPPEN over 1981-1999 is calculated, and Column (1) presents the summary statistics for these cross-industry means, while Column (2) presents the summary statistics for the cross-industry standard deviations over 1981-1999. The same definitions apply for the annual changes in each industry's IMPPEN given in Columns (3) and (4).

The four-firm output concentration ratio, i.e. CR4, is a commonly used proxy for industry structure and competitiveness. The CR4 data are obtained from the Annual Surveys of Manufacturing Industry conducted by the State Institute of Statistics (SIS).[2]

Table 4 below provides a description of trends and fluctuations in CR4 for Turkish manufacturing industry over 1980-1998. Column (1) in Table 4 presents within-year average (across industries) CR4 in Turkish manufacturing industry, with shares in total manufacturing output of industries used as weights in calculating the average. Thus, output concentration for the representative Turkish manufacturing industry has exhibited a modest downward trend

[2] The SIS publishes output concentration data at 4-digit level. The values for 29 3-digit ISIC (Rev. 2) industries used in this study are taken from Güneş (1995). We would like to thank Ms. Merih Güneş for providing us the source data used in her study and their updates.

over the years and decreased from 41.7% in 1981 to 30.5% in 1998. Figures 3 and 4 display trend and fluctuations in CR4 levels. The mean of (weighted-) average CR4 levels were 41.5%, 36.8%, and 32.4% in the 1981-1988, 1989-1995, and 1996-1998 periods, respectively. Average standard deviation figures were 30.4%, 27.3%, and 26.6%, respectively, in the 1981-1988, 1989-1995, and 1996-1998 periods, pointing at modestly decreasing within-year heterogeneity in output-concentration levels across industries over the periods studied. These observations are confirmed by the information in Columns (2) and (3) of Table 4, which indicate a certain amount heterogenity across industries that has remained relatively constant over the years. Looking at short-run fluctuations in output-concentration levels, Columns (4)-(6) reveal modest amounts of short-run fluctuations; however, changes in short-run fluctuations are rather sharp, indicating at considerable amount of heterogeneity across industries in that dimension. It is to be noted that average CR4 fell, albeit very modestly, in all of the years after the CU with the EU.

Figures 3 and 4 about here

Table 4: Trends and fluctuations in output concentration (CR4)

Year	Level of CR4			Changes in CR4		
	(1) Mean	(2) S.D	(3) S.D./Mean	(4) Mean	(5) S.D	(6) S.D./Mean
1980	0,4168	0,3066	0,7356			
1981	0,4302	0,3239	0,7530	-0,0081	0,0469	-5,7819
1982	0,4407	0,3295	0,7478	-0,0055	0,0291	-5,2756
1983	0,4229	0,3147	0,7441	0,0063	0,0396	6,2912
1984	0,4248	0,3061	0,7206	0,0054	0,0350	6,4980
1985	0,4172	0,3096	0,7422	-0,0047	0,0422	-8,9536
1986	0,4053	0,2999	0,7398	0,0067	0,0333	4,9459
1987	0,3821	0,2721	0,7121	0,0003	0,0297	115,5065
1988	0,3954	0,2742	0,6934	0,0131	0,0365	2,7790
1989	0,3843	0,2803	0,7293	-0,0088	0,0303	-3,4569
1990	0,3945	0,2859	0,7246	0,0037	0,0260	7,0840
1991	0,3851	0,2749	0,7138	0,0041	0,0270	6,5439
1992	0,3651	0,2751	0,7536	-0,0068	0,0265	-3,9096
1993	0,3594	0,2603	0,7243	-0,0010	0,0363	-35,6374
1994	0,3489	0,2691	0,7710	0,0050	0,0368	7,3245
1995	0,3354	0,2675	0,7975	-0,0102	0,0263	-2,5762
1996	0,3384	0,2696	0,7965	-0,0064	0,0329	-5,1389
1997	0,3274	0,2681	0,8187	-0,0047	0,0284	-6,0935
1998	0,3051	0,2601	0,8523	-0,0106	0,0344	-3,2367

The data cover 29 ISIC (Rev. 2) 3-digit Turkish manufacturing industries over 1980-1998. CR4 = $S_1 + S_2 + S_3 + S_4$, where S_i is the output share of the firm with the i^{th} highest output share.
For the level of CR4, Column (1) presents the cross-industry mean value of the level of CR4 for each year, and Column (2) the cross-industry standard deviation (S.D.) of the level of CR4 for the corresponding year. Column (3) gives the coefficient of variation. The same definitions apply for the annual changes in each industry's CR4 given in Columns (4)-(6).

Turning to within-industry fluctuations in both level and change in output-concentration, summary statistics in Table 5 indicate a certain amount of heterogeneity in level of concentration, and much more pronounced heterogenity in the change in output-concentration across industries.

Table 5: Within-industry CR4 level and change across years

	Level of CR4		Changes in CR4	
	(1) Mean	(2) Standard Deviation	(3) Mean	(4) Standard Deviation
Mean	0,3841	0,0602	-0,0026	0,0426
Standard Deviation	0,2091	0,0318	0,0075	0,0226
Minimum	0,0848	0,0120	-0,0175	0,0106
Maximum	0,9867	0,1160	0,0136	0,0906

The data cover 29 ISIC (Rev. 2) 3-digit Turkish manufacturing industries over 1980-1998. CR4 = $S_1 + S_2 + S_3 + S_4$, where S_i is the output share of the firm with the i^{th} highest output share.

The price-cost-margin variable PCM used as a measure of profits is defined as PCM = [(TR – TVC)/TR], where TR = total revenue (value of output plus change in stocks) and TVC = variable costs that include labor, materials and energy.[3] Hence this is a short-run profit measure that omits costs associated with depreciation, capital use, advertising, etc. Since the empirical model that is studied here involves time-series analysis in first differences (changes), problems associated with using this measure is not as pronounced as it would be in a cross-sectional analysis.[4] The data are obtained from the Annual Surveys of Manufacturing Industry conducted by the State Institute of Statistics (SIS).[5]

Table 6 below describs trends and fluctuations in PCM for Turkish manufacturing industry over 1980-1999. Column (1) in Table 6 presents within-year average (across industries) PCM in Turkish manufacturing industry, with shares in total manufacturing output of industries used as weights in calculating the average. Therefore, PCM for the representative Turkish manufacturing industry has remained almost constant over the 1980-1999 period, being 32.39% in 1980 and 32.29% in 1999. Figures 5 and 6 display trend and fluctuations in PCM levels. The mean of (weighted-) average PCM levels were 29.4%, 34.6%, and 33.6% in the 1981-1988, 1989-1995, and 1996-1998 periods, respectively. Average standard deviation figures were 6.5%, 6.6%, and 6.0%, respectively, in the 1981-1988, 1989-1995, and 1996-

[3] This is the so called Domowitz measure (see Domowitz et al., 1986).
[4] See Schmalensee (1989) for limitations of using PCM as an indicator of profits. See Katics and Petersen (1994) for a defense of PCM when first differences are used with time-series data. If variables omitted in PCM measure do not change very much in the short-run, then first-differencing the PCM data will partly control for these omitted variables.
[5] The data cover 28 ISIC (Rev. 2) 3-digit Turkish manufacturing industries over 1980-1999.

1999 periods, pointing at no change in within-year heterogeneity in PCM levels across industries over the periods studied. These observations are confirmed by the information in Columns (2) and (3) of Table 6, which indicate a relatively low level of heterogenity across industries that has remained so over the years. Looking at short-run fluctuations in output-concentration levels displayed in Columns (4)-(6), short-run fluctuations in PCM are relatively modest. There is, on the other hand, considerable heterogeneity across industries in the way PCM responds to industry specific and aggregate changes in the economy. Note also that after the CU with the EU, average PCM has exhibited a modest downward trend.

Figures 5 and 6 about here

Table 6: Trends and fluctuations in price-cost-margins (PCM)

Year	Level of PCM			Changes in PCM		
	(1) Mean	(2) S.D	(3) S.D./Mean	(4) Mean	(5) S.D	(6) S.D./Mean
1980	0,3239	0,0667	0,2059			
1981	0,2898	0,0678	0,2340	-0,0344	0,0499	-1,4516
1982	0,2795	0,0632	0,2261	-0,0106	0,0309	-2,9085
1983	0,2803	0,0576	0,2055	-0,0001	0,0301	-267,7546
1984	0,2720	0,0522	0,1920	-0,0045	0,0218	-4,8566
1985	0,2749	0,0628	0,2284	0,0025	0,0339	13,5080
1986	0,2882	0,0752	0,2610	0,0141	0,0399	2,8285
1987	0,3146	0,0725	0,2305	0,0249	0,0292	1,1741
1988	0,3263	0,0701	0,2148	0,0123	0,0320	2,6114
1989	0,3035	0,0672	0,2214	-0,0193	0,0293	-1,5150
1990	0,3281	0,0740	0,2255	0,0207	0,0286	1,3822
1991	0,3322	0,0624	0,1879	0,0020	0,0301	15,2310
1992	0,3480	0,0608	0,1748	0,0152	0,0200	1,3183
1993	0,3681	0,0676	0,1836	0,0186	0,0297	1,5921
1994	0,3886	0,0728	0,1872	0,0212	0,0279	1,3167
1995	0,3562	0,0588	0,1652	-0,0308	0,0406	-1,3184
1996	0,3446	0,0607	0,1761	-0,0137	0,0239	-1,7469
1997	0,3514	0,0552	0,1571	0,0096	0,0367	3,8265
1998	0,3236	0,0588	0,1818	-0,0295	0,0404	-1,3688
1999	0,3229	0,0658	0,2037	-0,0008	0,0499	-62,0574

The data cover 28 ISIC (Rev. 2) 3-digit Turkish manufacturing industries over 1980-1999. PCM = [(TR – TVC)/TR], where TR = total revenue (value of output plus change in stocks) and TVC = variable costs that include labor, materials and energy. For the level of PCM, Column (1) presents the cross-industry mean value of the level of PCM for each year, and Column (2) the cross-industry standard deviation (S.D.) of the level of PCM for the corresponding year. Column (3) gives the coefficient of variation. The same definitions apply for the annual changes in each industry's PCM given in Columns (4)-(6).

Summary statistics in Table 7 below provide insight regarding intra-industry fluctuations in PCM over the data period. There is some intra-industry heterogeneity in levels of PCM across industries; however, industries vary very significantly in terms of changes in PCM.

Table 7: Within-industry price-cost-margin (PCM) level and change across years

	Level of PCM		Changes in PCM	
	Mean	Standard Deviation	Mean	Standard Deviation
Mean	0,3453	0,0528	-0,0670	4,9197
Standard Deviation	0,0694	0,0216	0,4324	2,3827
Minimum	0,2423	0,0271	-0,9125	2,0875
Maximum	0,5316	0,1204	0,8205	12,4780

The data cover 27 ISIC (Rev. 2) 3-digit Turkish manufacturing industries over 1980-1999. PCM = [(TR – TVC)/TR], where TR = total revenue (value of output plus change in stocks) and TVC = variable costs that include labor, materials and energy.

In the estimations carried out, in addition to working with the full sample industries are grouped according to either the level of output concentration or the level of price-cost margins. Empirical studies for other countries show that concentrated industries exhibit greater intertemporal fluctuations in profit margins, and higher profit margins may induce larger inflows of imports to take advantage of these high margins.[6] In grouping industries by their CR4 values the median of the average CR4 values (ACR4) for industries calculated over the whole sample period was used as the critical CR4 to demarcate the competitive industries from the noncompetitive ones. ACR4 can be viewed as a long-run characteristic of an industry. The median of ACR4's was found to be 0.3988. There are 15 industries with ACR4 $\leq$ 0.3988 (a total of 195 observations), and 12 industries with ACR4 > 0.3988 (a total of 156 observations).[7] A similar procedure was followed to group industries according to their PCM levels. The median of the average PCM (APCM) values for industries was found to be 0.3333. There are 15 industries with APCM $\leq$ 0.3333 (a total of 210 observations), and 13 industries with APCM > 0.3333 (a total of 182 observations).[8] Table 8 below present summary statistics on ACR4 and APCM samples. Note that average change in CR4 (ΔCR4) is negative and small in both the low ACR4 and the low APCM industries, as well as in both the

[6] See Domowitz et al. (1986, 1987) and Ghosal (2000) on the link between profit margins and import response for US industries.

[7] As mentioned in Section 3.1, the Annual Surveys of Manufacturing Industry conducted by the State Institute of Statistics, from where the data used in this study is drawn, uses a classification system involving 29 3-digit industries in the period under consideration. For many of the variables used the food and beverage industries are collapsed, hence they are considered as one. Since the study concentrated on private firms, the petroleum refineries industry (ISIC Rev. 2 code: 353) was also dropped as it was heavily dominated by large public firms and contained very few private ones. This reduced the number of industries for IMPPEN and CR4 estimations to 27.

[8] Dropping the petroleum refineries industry (ISIC Rev. 2 code: 353) from the total sample of 29 industries left 28 3-digit industries in this case (see the previous footnote).

high ACR4 and the high APCM industries. Average import penetration levels are similar across ACR4 and APCM groups. As for changes in import penetration, imports on average increase faster in less concentrated industries compared to more concentrated industries. The same holds APCM groups, i.e. the increase in imports is on average higher in industries with low APCM levels compared to industries with high APCM. Average export/output ratio as well well as chnages in export/output ratio are higher for low ACR4 and APCM groups compared to high ACR4 and APCM groups.

Table 8: Summary statistics on ACR4 and APCM samples

		All	ACR4 ≤ 50th	ACR4 > 50th	APCM ≤ 50th	APCM > 50th
CR4	Mean	0.3841	0.2287	0.5505	0.3578	0.4164
	S.D.	0.2091	0.0936	0.1645	0.2327	0.1757
ΔCR4	Mean	-0.0026	-0.0029	-0.0022	-0.0035	-0.0014
	S.D.	0.0075	0.0066	0.0086	0.0064	0.0088
IMPPEN	Mean	0.2062	0.2008	0.2120	0,2080	0,2042
	S.D.	0.1849	0.1276	0.2374	0,1608	0,2146
ΔIMPPEN	Mean	0.0101	0.0128	0.0071	0,0113	0,0088
	S.D.	0.0087	0.0097	0.0067	0,0062	0,0109
EXPOUT	Mean	0.1591	0.1906	0.1252	0,1815	0,1350
	S.D.	0.1485	0.1904	0.0780	0,1866	0,0941
ΔEXPOUT	Mean	0.0095	0.0126	0.0062	0,0103	0,0086
	S.D.	0.0101	0.0095	0.0100	0,0059	0,0135
PCM	Mean	0.3453	0.3233	0.3690	0,2932	0,4014
	S.D.	0.0694	0.0515	0.0800	0,0316	0,0528
ΔPCM	Mean	-0,0007	0,0007	-0,0022	-0,0006	-0,0007
	S.D.	0,0043	0,0039	0,0044	0,0038	0,0049

The ACR4 and APCM groups are according to percentile figures.

2.1 Model Specification and Estimations

2.1.1 The Impact of Industry Structure and Performance on Import Penetration and Exports

This section will examine whether CR4 (a measure of industry structure) and PCM (a measure of industry performance) levels in an industry have explanatory power on how imports and exports change in that industry. To explain the responsiveness of imports and exports, one has to take into account both industry specific and economy wide aggregate factors. The four-firm output concentration ratio CR4 and price-cost margin PCM will serve as industry specific factors. In addition, to account for other industry specific factors, such as trade barriers specific to industries, an industry specific constant and an industry specific trend will be used as control variables. As economy wide factors affecting import penetration and exports, current and lagged gross domestic product (GDP), current and lagged trade weighted real exchange rates (RER), as well as lagged values of dependent variables (change in imports and change in exports) will be used as controls.

2.1.1.1 Impact of industry structure and industry performance on import penetration

White (1974) provided an early discussion on the link between industry structure, profit margins and import penetration. Landes and Posner (1981), who discuss the determinants of import penetration in specific industries, draw attention to the impact of profit-margins and prices on import penetration. The endogeneity of import penetration with respect to concentration and profitability in domestic industries is emphasized by Feenstra (1995) and Grossman (1986). The estimations in this section aim at uncovering the mutual impact of industry structure, industry performance, and import penetration to determine, on the one hand, whether and how industry structure and performance affects import penetration; and, on the other, whether and under what conditions imports serve as a market disciplining device to increase competition and reduce profit levels in a given industry.

Impact of output concentration (CR4) on import penetration

To test whether market structure, as measured by CR4, impedes or enhances import penetration (IMPPEN) the following equation is used:

$$\Delta IMPPEN_{i,t} = \alpha_i + \eta I_{i,t} + \beta_1 \Delta CR4_{i,t} + \beta_2 \Delta CR4_{i,t\text{-}1} + \gamma_1 \Delta GDP_t + \gamma_2 \Delta GDP_{t\text{-}1} + \delta_1 RER_t + \delta_2 RER_{t\text{-}1} + \theta \Delta \text{IMPPEN}_{i,t\text{-}1} + \varepsilon_{i,t} \quad (1)$$

Note that the dependent and independent variables are entered in first-differences, ecept for the industry dummies $I_{,i,t}$.[9] In this equation CR4 variable is an industry specific variable, while GDP and RER variables are included to control for economy-wide effects. As changes in CR4, GDP, and RER may not have instantaneous impact, their lagged values are included to account for dynamic effects of these variables. Lagged imports are included to account for persistence of imports.

As argued above, IMPPEN and CR4 are likely to be jointly determined in equilibrium. So, to account for the endogenity of CR4 levels and obtain consistent and unbiased estimates, the first-differenced version of Equation 1 is estimated using Generalized Method of Moments, treating $\Delta IMPPEN$ and $\Delta CR4$ as endogenous. The instrument set includes lagged CR4 values, lagged IMPPEN values, lagged GDP values, and lagged RER values. Since Equation 1 is in first-differences, α_i represents the industry-specific trend in IMPPEN.

Equation 1 above is first estimated for the whole panel (with 351 observation on a total of 27 industries), and then for two different groups of industries differentiated according to their ACR4 values (see discussion above on critical CR4 values to use in demarcating competitive and non-competitive industries). Table 9 below presents the estimates of the parameters in Equation 1 for the whole sample, as well as for groupings of industries according to output concentration.

[9] Using first-differences avoids the problems associated with time-series estimations using levels when variables used in the model involve possible non-stationarities. Most of the variables used in this study have trends, and non-stationarity is a typically a problem for trending data (see Ghosal, 2002, Footnotes 19 and 20, pp 1477-78, for a discussion of this point).

All industries:

When all industries are treated together, i.e. without grouping industries by CR4, it is observed that changes in CR4 have a significant impact on import penetration. An increase in CR4 leads to a decrease in IMPPEN with a 1-year lag and the estimate is significant at the 1% level, and the impact of current CR4 is also negative and significant at the 5% level. Note that the impact of CR4 on IMPPEN is significant after controlling for industry wide factors (GDP and RER) and allowing for industry specific trend and constant, which are used to control for unobserved systematic differences across industries (such as trade and entry barriers, and technology). Both the current and the lagged GDP growth lead to an increase in IMPPEN (significant at the 1% and 5% levels, respectively). Both the current and the lagged RER effects on IMPPEN are positive but insignificant.[10] In sum, estimates indicate that import penetration (or the extent of foreign competition, to put it differently) varies significantly depending on industry specific and economy wide factors. Moreover, it is significantly impeded when output concentration rises in manufacturing industries.

Table 9: Impact of output concentration (CR4) on import penetration (IMPPEN)

	All	**ACR4 ≤ 50th**	**ACR4 > 50th**
$CR4_{i,t}$	-0.3016***	-0.3419	-0.3151**
	(0.1114)	(0.2728)	(0.1256)
$CR4_{i,t-1}$	-0.1632**	-0.2523	-0.0939
	(0.0804)	(0.1684)	(0.0954)
GDP_t	0.1232*	0.0713	0.1704*
	(0.0666)	(0.1020)	(0.0931)
GDP_{t-1}	0.1583**	0.2035**	0.1086
	(0.0658)	(0.0994)	(0.0920)
RER_t	0.0243	0.0102	0.0356
	(0.0242)	(0.0364)	(0.0340)
RER_{t-1}	0.0404	0.0111	0.0664*
	(0.0246)	(0.0368)	(0.0346)
$IMPPEN_{i,t-1}$	-0.1072	-0.2665**	0.0862
	(0.0809)	(0.1179)	(0.1265)
Panel Obs.	351	156	195
(industries)	(27)	(12)	(15)

Note: *, **, and *** indicate significance at 90%, 95%, and 99% confidence levels, respectively.

CR4 groupings:

(i) For the higher ACR4 group, the current CR4 coefficient is negative and significant, while the lagged effect is also negative but insignificant. For the low ACR4 group, both the current

[10] The insignificance of RER on IMPPEN is puzzling, but it is a fact that has been observed in other studies for other countries as well (see Ghosal, 2002, for the case of US manufacturing industries).

and lagged CR4 coefficients are negative, but neither of them is significant. The degree of fall in import penetration seems to be distinctly higher in more concentrated industries.

(ii) For GDP, higher ACR4 group shows mildly significant positive current period effect, while the low ACR4 industries show significant positive lagged effect. Ignoring significance levels, sums of the GDP coefficients are 0.2790 and 0.2748 for the higher and lower ACR4 groups, respectively. Taking the sum of the current and lagged coefficients as indicator of short-run effect, the short-run impact of GDP growth on import penetration is similar across ACR4 groups, but the response of IMPPEN to GDP growth is faster for the high ACR4 groups. The RER coefficients are insignificant for the low ACR4 group, and only lagged RER changes have a positive and mildly significant impact for high ACR4 industries.

Impact of price-cost margin (PCM) on import penetration

Taking price-cost margin (PCM) as the indicator of profits, and hence industry performance, the following adoptation of Equation 1 is used to test the impact of profitability on import penetration:

$$\Delta IMPPEN_{i,t} = \alpha_i + \eta I_{i,t} + \beta_1 \Delta \mathrm{PCM}_{i,t} + \beta_2 \Delta PCM_{i,t\text{-}1} + \gamma_1 \Delta GDP_t + \gamma_2 \Delta GDP_{t\text{-}1} + \delta_1 RER_t + \delta_2 RER_{t\text{-}1} + \theta \Delta \mathrm{IMPPEN}_{i,t\text{-}1} + \varepsilon_{i,t} \quad (2)$$

Table 10 below presents the estimates of the parameters in Equation 2 for the whole sample, as well as for groupings of industries according to price-cost margin.

All industries:

When all industries are treated together, it is observed that changes in PCM have a mildly significant effect on import penetration. An increase in current PCM as well as the increase in the previous year leads to a decrease in IMPPEN. Coefficient of the current and the 1-year lagged PCM variables are both significant at the 10% level. Note that the impact of PCM variables survives after controlling for GDP and RER and allowing for industry specific trend and constant. The lagged GDP growth leads to an increase in IMPPEN (significant at the 5% level) for the whole sample. Both the current and the lagged RER effects on IMPPEN are again, as in the previous estimate above, positive but insignificant. Comparing the impact of

CR4 and PCM variables on import penetration for the whole sample, observe that they are qualitatively the same.

PCM groupings:

(i) For the higher APCM group, the current PCM coefficient is negative and significant, while the lagged effect is also negative but insignificant. For the low APCM group, both the current and lagged PCM coefficients are negative, but neither of them is significant. The degree of fall in import penetration seems to be distinctly higher in more concentrated industries. Observe again that the impact of CR4 and PCM variables on import penetration when the sample is segmented according to high and low CR4 and PCM, respectively, are qualitatively the same. This indicates that CR4 as a measure of industry structure is a rather good proxy for industry performance and profitability.

(ii) For GDP, higher APCM group shows significant positive current period effect, while the low APCM industries show mildly significant positive lagged effect. Ignoring significance levels, sums of the GDP coefficients are 0.2662 and 0.1738 for the higher and lower APCM groups, respectively. Taking the sum of the current and lagged coefficients as indicator of short-run effect, the short-run impact of GDP growth on import penetration is higher for the high APCM as well as working faster than for the low APCM group. The RER coefficients are insignificant for the low APCM group, and only lagged RER changes have a positive and significant impact for high APCM industries.

Table 10: Impact of price-cost margin (PCM) on import penetration (IMPPEN)

	All	**APCM ≤ 50th**	**APCM > 50th**
$PCM_{i,t}$	-0.1214*	-0.0022	-0.2046**
	(0.0731)	(0.1239)	(0.0946)
$PCM_{i,t-1}$	-0.0992*	-0.1174	-0.0222
	(0.0555)	(0.0994)	(0.0730)
GDP_t	0.0944	0.0280	0.1748**
	(0.0581)	(0.0821)	(0.0839)
GDP_{t-1}	0.1307**	0.1458*	0.0914
	(0.0596)	(0.0834)	(0.0870)
RER_t	0.0278	0.0092	0.0329
	(0.0232)	(0.0321)	(0.0341)
RER_{t-1}	0.0438	0.0189	0.0736**
	(0.0236)	(0.0326)	(0.0352)
$IMPPEN_{i,t-1}$	-0.1429*	-0.3204***	0.1350
	(0.0748)	(0.1040)	(0.1250)
Panel Obs.	392	182	210
(industries)	(28)	(13)	(15)

Note: *, **, and *** indicate significance at 90%, 95%, and 99% confidence levels, respectively.

2.1.1.2 Impact of industry structure and industry performance on exports

As in the case of import pentration, there is theoretical ground for expecting a relationship between industry structure and performance, and share of exports in total output in a particular industry. Tense competition in domestic markets will force producers to look for more profitable markets abroad, or, conversely, if an industry is highly concentrated and enjoys high level of profits then incentives to search for export markets will be diminished. Export opportunities will also be expected to have an impact on domestic industry structure and performance through, for example, exploitation of scale economies when the size of export markets allow large scale operations. Cost advantage acquired in this fashion may allow a large firm to dominate a domestic industry and force its competitors out of the industry. This scetion looks at the impact of output concentration and profitability on the share of exports in total output of Turkish manufacturing industries.

Impact of output concentration (CR4) on exports

To test the impact of market concentration (CR4) on share of exports in total output (EXPOUT), the following equation equation is used:

$$\Delta \text{EXPOUT}_{i,t} = \alpha_i + \eta I_{i,t} + \beta_1 \Delta CR4_{i,t} + \beta_2 \Delta CR4_{i,t\text{-}1} + \gamma_1 \Delta GDP_t + \gamma_2 \Delta GDP_{t\text{-}1} + \delta_1 RER_t + \delta_2 RER_{t\text{-}1} + \theta \Delta \text{EXPOUT}_{i,t\text{-}1} + \varepsilon_{i,t} \quad (3)$$

As in the case of imports, in Equation 3 CR4 is an industry specific variable, while GDP and RER variables are included to control for economy-wide aggregate effects. Lagged exports are included to account for persistence of export. Estimation techniques used are as in the case of estimating the import equations.

Table 11 below presents the estimates of the parameters in Equation 3 for the whole sample, as well as for groupings of industries according to output concentration.

All industries:

When all industries are treated together, it is observed that changes in CR4 have a highly significant impact on changes in share of exports in total output (EXPOUT). An increase in CR4 leads to a decrease in EXPOUT with a 1-year lag and the estimate is significant at the 1% level, and the impact of current CR4 is also negative and significant at the 1% level. Note

that the impact of CR4 on EXPOUT is significant after controlling for industry wide factors (GDP and RER) and allowing for industry specific factors. The current GDP growth leads to an immediate decrease in exports (significant at the 1% level). The current RER has a positive and the lagged RER has a negative effect on EXPOUT, but both of these are insignificant. In sum, estimates indicate that increases in industry concentration leads to reduction in exports, as, presumably, higher concentration goes together with higher profit margins in domestic markets, which in turn reduce incentives for exports.

Table 3.10: Impact of output concentration (CR4) on exports (EXPOUT)

	All	ACR4 ≤ 50th	ACR4 > 50th
$CR4_{i,t}$	-0.7334***	-3.0197***	-0.0797
	(0.2223)	(0.7213)	(0.2204)
$CR4_{i,t-1}$	-0.4695***	-1.9143***	0.0335
	(0.1602)	(0.4498)	(0.1671)
GDP_t	-0.5510***	-0.8445***	-0.4128**
	(0.1330)	(0.2742)	(0.1641)
GDP_{t-1}	0.0396	-0.1334	0.1886
	(0.1398)	(0.2794)	(0.1735)
RER_t	0.0634	0.1594*	0.0350
	(0.0476)	(0.0956)	(0.0594)
RER_{t-1}	-0.0019	0.0437	-0.0056
	(0.0496)	(0.0999)	(0.0611)
$EXPOUT_{i,t-1}$	-0.4044***	-0.5273***	-0.3057***
	(0.0562)	(0.0926)	(0.0804)
Panel Obs.	351	156	195
(industries)	(27)	(12)	(15)

Note: *, **, and *** indicate significance at 90%, 95%, and 99% confidence levels, respectively.

CR4 groupings:

(i) The impact of CR4 on EXPOUT identified for above for the whole group continues to hold exactly for less concentrated industries (low ACR4 group). Both the current and lagged CR4 effects are negative and highly significant at the 1% level. For the higher ACR4 group, however, both the current and lagged CR4 effects disappear. In highly concentrated industries there is no relationship between changes in output concentration and changes in export behavior. This is presumably due to high profit margins in concentrated industries which allow a slack in terms of need to search for export market when faced with a decline in profits (as a result of increased competition due to a decrease in output concentration).

(ii) For GDP, effect of current GDP growth is negative and highly significant at the 1% level for both the low and high ACR4 groups. The impact of GDP growth is more pronounced on

exports in less concentrated industries (low ACR4 group) than in highly concentrated industries (high ACR4 group). As for RER, there is mildly significant impact of current RER on low ACR4 industries (but with a positive sign).

Impact of price-cost margin (PCM) on exports

Turning to testing the impact of profit-cost margins (PCM) on share of exports in total industry output, the following equation is estimated:

$$\Delta \text{EXPOUT}_{i,t} = \alpha_i + \eta I_{i,t} + \beta_1 \Delta \text{PCM}_{i,t} + \beta_2 \Delta PCM_{i,t\text{-}1} + \gamma_1 \Delta GDP_t + \gamma_2 \Delta GDP_{t\text{-}1} + \delta_1 RER_t + \delta_2 RER_{t\text{-}1} + \theta \Delta \text{EXPOUT}_{i,t\text{-}1} + \varepsilon_{i,t} \quad (4)$$

Table 12 below presents the estimates of the parameters in Equation 3.4 for the whole sample, as well as for groupings of industries according to price-cost margin.

Table 12: Impact of profit-cost margin (PCM) on exports (EXPOUT)

	All	APCM ≤ 50th	APCM > 50th
$PCM_{i,t}$	-0.1600	-0.4185	-0.0164
	(0.1356)	(0.2549)	(0.1592)
$PCM_{i,t\text{-}1}$	-0.1390	-0.4316***	0.0642
	(0.1040)	(0.1926)	(0.1244)
GDP_t	-0.4718***	-0.4670**	-0.4192***
	(0.1102)	(0.1739)	(0.1455)
$GDP_{t\text{-}1}$	0.1143	0.0244	0.1687
	(0.1200)	(0.1866)	(0.1593)
RER_t	0.0662	0.0929	0.0389
	(0.0436)	(0.0671)	(0.0586)
$RER_{t\text{-}1}$	-0.0050	0.0228	0.0040
	(0.0453)	(0.0704)	(0.0609)
$EXPOUT_{i,t\text{-}1}$	-0.3506***	-0.4008***	-0.2972***
	(0.0748)	(0.0764)	(0.0784)
Panel Obs.	392	182	210
(industries)	(28)	(13)	(15)

Note: *, **, and *** indicate significance at 90%, 95%, and 99% confidence levels, respectively.

All industries:

Although both coefficients are negative, and therefore in conformity with a priori theoretical expectations, neither the current nor the lagged PCM variable has a significant effect on export behavior when all industries are considered together. The effect of current GDP growth on exports is negative and highly significant at the 1% level. The contrast between impacts of

changes in industry concentration (CR4) on exports, highly significant negative current and lagged effects, and that of profit-cost margin (PCM) is striking, but it can be explained. Separate estimations for different PCM groupings shed light on this discrepancy.

PCM groupings:

(i) For the higher APCM group, the current PCM coefficient is negative but insignificant, while the lagged effect is positive but also insignificant. For the low APCM group, on the other hand, both the current and lagged PCM coefficients are negative, with the lagged effect highly significant at the 1% level and the current effect borderline insignificant. Low and high APCM industries seem to exhibit different response to changes in profit margins. Low APCM industries have less room to maneuver when faced with decreasing profits in domestic markets, and hence they search more for export markets. On the other hand, as already mentioned above, high APCM industries have slack in their profit margins before they have to search for more profitable export opportunities.

(ii) For GDP, effect of current GDP growth is negative and highly significant at the 1% level for both the low and high APCM groups. The impact of GDP growth is similar in magnitude for the low and high APCM industries. Neither the current nor the lagged RER values have significant impact on export behavior in either of the groups.

2.1.2 The Impact of Foreign Trade on Market Structure and Performance

After considering whether changes in industry output concentration and profitability induces import and export response in the last section, this section looks at whether the resulting change, if any, in import penetration and exports affects industry structure and profitability. Several earlier studies show that imports have a disciplining effect on market power and profitability (e.g., see Levinsohn, 1993, for evidence on Turkish manufacturing industry). Results by Ghosal (2000) and Katics and Petersen (1994) show that greater import competition leads to lower profits primarily in more concentrated industries.

2.1.2.1 Impact of import penetration (IMPPEN) and exports (EXPOUT) on market structure (CR4)

Equation 5 below is used to test whether import penetration affects market structure as measured by CR4:

$$\Delta CR4_{i,t} = \alpha_i + \eta I_{i,t} + \beta_1 \Delta IMPPEN_{i,t} + \beta_2 \Delta IMPPEN_{i,t-1}, + \gamma_1 \Delta GDP_t + \gamma_2 \Delta GDP_{t-1} + \theta \Delta CR4_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

In this equation IMPPEN variable is an industry specific variable, while GDP variables are included to control for economy-wide effects. Lagged CR4 variable is included to account for persistence of output concentration ratios. As in the previous estimations, to account for the endogenity of CR4 levels Generalized Method of Moments estimator is used to obtain consistent and unbiased estimates. The instrument set includes lagged IMPPEN values, lagged CR4 values, and lagged GDP values. Since Equation 5 is in first-differences, α_i represents the industry-specific trend in CR4. Equation 5 is first estimated for the whole panel, and then separately for industries with high ACR4 and low ACR4. Columns (1)-(3) of Table 13 below presents the estimates of the parameters in Equation 13 for the whole sample, as well as for groupings of industries according to output concentration.

Table 13 about here

All industries:

When all industries are taken together, it is observed that changes in import penetration did not have a significant impact on market concentration as measured by CR4. The coefficients of IMPPEN variables are both negative, but they are close to zero and insignificant.

CR4 groupings:

When industries are grouped according to their ACR4 values, import penetration does not have an impact on the higher CR4 group, while for the low CR4 group changes in import penetration seems to have a mildly significant (at 10% significance level) negative impact on market concentration with one period lag.

To test the impact of exports on market structure, Equation 5 above was reestimated with IMPPEN variables replaced with their EXPOUT counterparts. Columns (4)-(6) of Table 13 reveal that share of exports in total output (EXPOUT) does not have any significant effect on industry concentration either when all industries are taken together or grouped according to their ACR4 levels. Similarly, IMPPEN and EXPOUT variables do not exhibit any significant effect when entered jointly in the equation for CR4 (see Columns (7)-(9) of Table 13).

Including trade with EU as separate variables:

When imports and exports from EU countries are included separately as additional variables in Equation 5, the results reported above without including EU imports and exports continue to hold for all cases considered.

2.1.2.2 Impact of import penetration (IMPPEN) and exports (EXPOUT) on price-cost-margins (PCM)

To test whether and how import penetration (IMPPEN) affects price-cost margins (PCM), the following equation is used:

$$\Delta PCM_{i,t} = \alpha_i + \eta I_{i,t} + \beta_1 \Delta IMPPEN_{i,t} + \beta_2 \Delta IMPPEN_{i,t-1}, + \gamma_1 \Delta GDP_t + \gamma_2 \Delta GDP_{t-1} + \theta \Delta PCM_{i,t-1} + \varepsilon_{i,t} \quad (6)$$

Equation 6 is first estimated for the whole panel, and then separately for industries with high APCM and low APCM. Columns (1)-(3) of Table 14 below presents the estimates of the parameters in Equation 6 for the whole sample, as well as for groupings of industries according to output concentration.

Table 14 about here

All industries:

When all industries are taken together, it is observed that changes in import penetration did not have a significant impact on price-cost margins. The coefficients of IMPPEN variables are

both positive, but they insignificant. Changes in profit margins in the previous period (i.e. $\Delta PCM_{i,t-1}$) have a highly significant (at the 1% level) negative impact on profit margins.

PCM groupings:

For the high APCM group changes in import penetration has a significant positive, rather than negative, impact on price-cost margins with a one year lag; while for the low APCM group current changes in import penetration has again a significant positive impact on profit margins. Imports do not seem to provide discipline for either the low or high profit industries. The positive current IMPPEN effect on profits in low APCM industries is more pronounced than the positive lagged IMPPEN effect observed in high APCM industries. Lagged PCM changes have mildly significant negative impact on market concentration in the case of low APCM industries only.

To test the impact of exports on industry profits, Equation 6 above was reestimated with IMPPEN variables replaced with their EXPOUT counterparts. Columns (4)-(6) of Table 14 reveals that share of exports in total output (EXPOUT) does not have any significant effect on industry profits either when all industries are taken together or grouped according to their APCM levels.

When IMPPEN and EXPOUT variables entered jointly in the equation for PCM, the significant positive IMPPEN effects survive for both the low and the high APCM groups (see Columns (7)-(9) of Table 14).. For the high APCM group, the positive lagged IMMPEN effect continues to hold, while for the low APCM group both the current and laged IMPPEN effects are positive and significant.

Including trade with EU as separate variables:

When imports and exports from EU countries are included separately as additional variables in Equation 5, the results reported above without including EU imports and exports continue to hold for all cases considered.

2.2 Discussion and Conclusions

Turkey's CU with the EU that started in 1996 increased considerably import penetration in manufacturing while not significantly affecting the share of EU in Turkey's trade. Following the CU, import penetration ratios doubled or nearly doubled in many sectors of manufacturing. It can be expected that such an impetus would have an important impact on the manufacturing industry in Turkey, and on its competitive behavior.

In testing the relationship between industry structure and trade variables, separate estimations have been carried out for industries with high and low levels of output-concentration. This was done to account for structural differences between these two groups of industries. The same procedure was followed in estimating the relationship between profit margins and foreign trade.

When all industries are treated together, i.e. without grouping them according to CR4, it was observed that increases in output concentration significantly hampered import penetration. When separate estimations were carried out for high and low concentration industries, the negative impact of concentration on import penetration persisted for high concentration industries, while for low concentration industries it disappeared. So, while further increases in concentration already concentrated industries limits foreign entry, in low concentration industries increases in concentration do not constitute higher barrier to foreign entry. To put it differently, when concentration is reduced in concentrated industries through new domestic entry, the share of imports in total (apparent) consumption will increase. On the other hand, decreasing output concentration in competitive industries will not lead to increased flow of imports. These observations have implications regarding how to take into account the role of foreign competition in applying competition policy to, for example, mergers and acquisitions in low and high concentration industries.

As for the impact of industry structure on exports, it was observed that when all industries were treated together increases in industry concentration very significantly reduced exports. Presumably, increases in industry concentration leads to reduction in exports, as higher concentration goes together with higher profit margins in domestic markets, which in turn reduce incentives for exports. However, the negative impact on exports of increases in industry concentration holds only for less concentrated industries, while for high

concentration industries there is no relationship between changes in output concentration and changes in export behavior. This is presumably due to high profit margins in concentrated industries that allow a slack in terms of need to search for export market when faced with a decline in profits (as a result of increased competition due to a decrease in output concentration), whereas in low concentration industries decreases in competition leads to sufficient increase in profits to stop firms from having to search for export markets. In terms of policies to promote exports, increasing competition in concentrated industries will fail to increase exports unless an industry becomes very un-concentrated and hence competitive.

Turning to the impact of price-cost margin (PCM) on foreign trade variables, it was observed that the impact PCM on import penetration was qualitatively the same as the impact of CR4 on import penetration, both when the sample was treated as a whole and when it was segmented according to level of PCM. This indicates that, as a measure of industry structure, CR4 is a rather good proxy for industry performance and profitability as far as impact on import penetration is concerned.

As for the impact of PCM on export response, no significant impact was observed when the whole sample was treated as a whole. For the high PCM industries increases in PCM had no significant impact on export response, while for the low PCM industries there was a significant negative (one-year lagged) effect of PCM on exports. Thus, low and high PCM industries exhibit different response to changes in profit margins. While low PCM industries have less room to maneuver when faced with decreasing profits in domestic markets and, hence, they search more for export markets, high PCM industries have slack in their profit margins before they have to search for more profitable export opportunities.

To treat the question of whether imports provided market discipline in the sense of reducing industry concentration and profits, a number of different specifications were tried. When all industries were taken together, it was observed that changes in import penetration did not have any impact on market concentration. When industries were grouped according to their concentration levels, import penetration did not reduce concentration in concentrated industries, while for the less concentrated industries changes in import penetration had a mildly significant negative impact on market concentration. So, imports do not seem to serve a disciplining role on concentrated industries, but may give way to further competition in

already competitive industries.[11] As for exports, no significant impact of changes in exports on industry structure was observed for either low or high concentration industries. Moreover, when the impact of import penetration and share of exports in total output were entered jointly in the equation for industry structure, no significant effect was observed for either grouping of the industries. None of the results just reported changed when imports and exports from EU countries were included separately as additional variables. Overall, foreign trade does not seem to have statistically significant effect on the evolution of industry structure.

When all industries are taken together, it was observed that changes in import penetration did not have a significant impact on price-cost margins (PCM), while changes in profit margins in the previous period had a highly significant negative impact on profit margins. On the other hand, looking at high PCM industries separately showed that changes in import penetration had a significant positive, rather than negative, effect on price-cost margins with a one-year lag; while for the low PCM industries current changes in import penetration had again a significant positive impact on profit margins. The positive impact on profits of changes in current import penetration profits in low PCM industries was more pronounced than the positive lagged effect observed in high PCM industries.[12] Share of exports in total output did not have any significant effect on industry profits either when all industries are taken together or grouped according to their PCM levels. When imports penetration and export variables were entered jointly in the equation for PCM, the significant positive import penetration effects survived for both the low and the high PCM groups. These results continue to hold when imports and exports from EU countries are included separately as additional variables. Thus, imports do not seem to provide discipline for either the low or high PCM industries.

[11] When the same equation was estimated using level values of variables, rather than first-differenced values, same qualitative results were obtained: for the high concentration industries changes in import penetration led to no significant change in industry structure, while for the low concentration industries there was a highly significant negative lagged effect. For the whole group, the effect was insignificant.

[12] When the same equation was estimated using level values of variables, rather than first-differenced values, following qualitative results were obtained: for the high PCM industries changes in import penetration led to a highly significant increase in PCM level with a one-year lag, while for the low concentration industries there was a negative lagged effect that was significant at the 6% level. For the whole group, the effect was insignificant.

References

Bayar, A., H. Nuray and S. Reçberoğlu (2000), "The Effects of the Customs Union on the Turkish Economy: An Econometric Analysis of the Four Years' Implementation," *Economic Development Foundation*, No. 160, Istanbul.

Domowitz, I., G. Hubbard, and B. Petersen (1986), "Business Cycles and the Relationship Between Concentration and Price-Cost Margins", *RAND Journal of Economics 17*, pp. 1-17.

Erzan, R., and A. Filiztekin (1997), "Competitiveness of Turkish SMSEs in the Customs Union," *European Economic Review,* Vol. 41, pp. 881-892.

Feenstra, R. (1995), "Estimating the Effects of Trade Policy", in: Grossman, G., K. Rogoff (Eds.), *Handbook of International Economics*, Vol. 3, North-Holland, Amsterdam, pp. 1553-1595.

Filiztekin, A. (2000), "Openness and Productivity Growth in Turkish Manufacturing," *mimeo.*

Foroutan, F. (1996), "Turkey 1976-85: Foreign Trade, Industrial Productivity and Competition," in *Industrial Evolution in Developing Countrie*s, eds. M. J. Roberts and J. R. Tybout, A World Bank Book, Washington.

Ghosal, V. (2002), "Potential Competition in US Manufacturing", *International Journal of Industrial Organization 20*, pp. 1461-1489.

Ghosal, V. (2000), "Product Market Competition and the Industry Price-Cost Margin Fluctuations: Role of Energy Prices and Monetary Changes", *International Journal of Industrial Organization 18*, pp. 415-444.

Grossman, G. (1986), "Imports as a Cause of Injury: The Case of US Steel Industry", *Journal of International Economics 20*, pp. 201-223.,

Güneş, M. (1998), *Türk İmalat Sanayinde Yoğunlaşmayı Belirleyen Faktörler (Panel Veri Çalışması, 1980-1994)*, Devlet İstatistik Enstitüsü Uzmanlık Tezi, Ankara. (*The Determinants of Output Concentration in Turkish Manufacturing Industry (A Panel Study: 1980-1994)*, Expert Thesis prepared for State Institute of Statistics, Ankara)

Harrison G. W., T .F. Rutherford, and D. G. Tarr (1996), "Economic Implications for Turkey of a Customs Union with the European Union," *Policy Research Working Paper*, No. 1599, World Bank.

Katics, M., and B. Petersen (1994), "The Effect of Rising Import-Competition on Market Power: A Panel Data Study of US Manufacturing", *Journal of Industrial Economics 42*, pp. 2277-286.

Krueger, A., and B. Tuncer (1982), "Growth of Factor Productivity in Turkish Mnufacturing Industry," *Journal of Development Economic*s, Vol. 11 pp. 307-25.

Küçükahmetoğlu, O., (2000), "Türkiye-AB Gümrük Birliği'nin İktisadi Etkileri," *Iktisat Dergisi*, No. 408.

Landes, W., R. Posner (1981), "Market Power in Antitrust Cases, *Harvard Law Review 94*, 937-996.

Levinsohn, J. (1993), "Testing the Imports-as-Market-Discipline Hypothesis," *Journal of International Economics 35*, pp. 1-22.

Nishimizu, M, and S. Robinson (1984), "Trade Policies and Productivity Change in Semi-industrialized Countries," *Journal of Development Economics*, Vol. 16 pp. 177-206.

White, L. (1974), Industrial Organization and International Trade: Some Theoretical Considerations", *American Economic Review 64*, 1013-1020.

Table 1. Trade Ratios and Trade Shares, 1981-1999 (%)

		Export-Output Ratio			*Import Penetration*			*Sh. Of Imp. from EU in Tot Imp*			*Sh. Of Exp. to EU in Tot Exp*		
		1981-1988	*1989-1995*	*1996-1999*	*1981-1988*	*1989-1995*	*1996-1999*	*1981-1988*	*1989-1995*	*1996-1999*	*1981-1988*	*1989-1995*	*1996-1999*
311	*Food*	14,62	18,57	20,88	6,18	9,90	12,16	37,73	56,32	31,94	37,78	51,49	48,28
313	*Beverage*	1,49	2,52	3,45	0,80	0,75	1,23	79,03	58,69	86,97	19,82	27,09	28,47
314	*Tobacco*	19,21	2,12	4,99	5,27	10,88	13,29	3,36	15,79	4,83	18,04	13,51	20,58
321	*Textiles*	27,26	32,62	44,38	4,39	11,81	23,47	45,06	46,09	31,84	70,01	69,77	60,52
322	*Clothing*	83,30	67,56	79,43	0,67	1,43	18,50	69,32	61,22	73,30	81,67	76,93	66,81
323	*Leather*	6,12	17,42	19,59	9,80	37,47	38,73	53,19	81,32	68,76	60,93	65,34	45,85
324	*Footwear*	9,97	28,22	31,21	2,72	13,83	25,83	70,93	67,26	30,51	36,22	25,01	16,32
331	*Wood*	10,05	7,22	10,12	4,05	5,73	14,67	40,17	59,61	53,17	18,79	27,07	22,84
332	*Furniture*	24,08	10,51	14,20	6,20	10,23	20,89	81,85	83,77	87,15	10,20	30,52	43,96
341	*Paper*	4,13	4,78	10,59	11,58	22,71	42,03	59,67	45,59	59,22	2,67	16,96	15,25
342	*Printing*	1,81	0,94	1,88	2,87	5,02	5,38	80,55	79,56	81,27	48,84	45,44	30,44
351	*Chemicals*	13,73	19,14	20,27	40,05	49,17	66,19	54,29	52,81	55,02	24,07	42,34	39,20
352	*Other Chemicals*	3,84	6,97	11,39	12,96	18,53	28,93	69,03	61,90	72,04	31,55	18,22	12,06
354	*Misc. Products of Petroleum*	0,37	0,46	0,78	1,67	3,42	7,91	46,63	61,84	64,03	39,51	59,41	28,45
355	*Rubber*	6,54	21,37	30,43	6,28	14,26	25,64	62,49	59,21	63,81	24,89	35,51	59,02
356	*Plastics*	5,30	5,48	11,64	3,34	11,07	18,36	66,34	71,93	77,86	11,03	27,04	19,41
361	*Pottery*	4,78	5,80	17,39	1,56	3,28	9,65	57,57	62,61	59,17	55,27	78,23	75,30
362	*Glass and Products*	20,98	25,14	32,64	4,60	11,11	21,37	62,45	73,24	70,84	38,94	52,73	45,05
369	*Other non-metallic*	2,69	8,75	13,40	5,12	5,65	6,24	70,76	73,72	79,61	24,91	47,39	40,42
371	*Iron & steel*	13,72	24,15	27,50	18,54	22,60	27,98	34,53	61,34	48,85	20,12	12,43	25,11
372	*Non-ferr. Metals*	7,77	14,12	23,50	20,34	28,01	44,89	26,82	57,42	40,27	13,34	41,89	43,67
381	*Fabricated Metal*	9,96	11,05	18,53	24,87	37,94	42,32	49,46	43,38	62,72	20,39	42,70	41,60
382	*Machinery*	11,80	7,33	17,77	50,10	52,12	67,28	61,00	60,29	68,64	36,98	42,15	43,60
383	*Electrical Machinery*	6,67	16,07	30,62	32,85	36,19	53,17	72,26	40,17	58,75	23,31	64,26	64,03
384	*Motor Vehicles*	4,33	7,24	19,17	29,53	30,27	45,02	64,28	69,94	53,20	32,44	45,44	45,28
385	*Prof&scientific equip.*	28,68	10,28	13,02	84,39	69,66	70,25	56,37	57,98	58,93	51,08	38,59	46,19
390	*Others*	18,74	33,81	70,74	18,19	48,32	74,96	44,58	62,42	53,69	24,37	52,97	30,30
	Total	14,60	19,06	26,40	15,43	19,80	28,91	57,01	53,97	56,12	37,41	47,29	44,41

Table 13: Impact of foreign trade on market concentration (CR4)

	All (1)	ACR4 ≤ 50th (2)	ACR4 > 50th (3)	All (4)	ACR4 ≤ 50th (5)	ACR4 > 50th (6)	All (7)	ACR4 ≤ 50th (8)	ACR4 > 50th (9)
$CR4_{i,t-1}$	-0.0493	-0.0601	-0.0192	-0.0783	-0.1638	-0.0394	-0.0892	-0.1974*	-0.0199
	(0.0910)	(0.1186)	(0.1301)	(0.0873)	(0.1438)	(0.1250)	(0.0877)	(0.1143)	(0.1322)
GDP_t	-0.0182	-0.0552	0.0159	-0.0681	-0.0555	-0.0590	-0.0634	-0.1054	-0.0408
	(0.0648)	(0.0636)	(0.1053)	(0.0689)	(0.0706)	(0.1140)	(0.0720)	(0.0680)	(0.1186)
GDP_{t-1}	0.0581	0.0307	0.0581	0.0156	0.0169	0.0296	0.0189	-0.0216	-0.0077
	(0.0698)	(0.0706)	(0.1103)	(0.0654)	(0.0681)	(0.1076)	(0.0708)	(0.0723)	(0.1135)
$IMPPEN_{i,t}$	-0.0774	0.0547	-0.1429				-0.0342	0.1659	-0.1034
	(0.1392)	(0.1509)	(0.2039)				(0.1411)	(0.1527)	(0.2085)
$IMPPEN_{i,t-1}$	-0.0500	-0.2017*	0.1384				0.0007	-0.1160	0.2569
	(0.1005)	(0.1157)	(0.1519)				(0.0998)	(0.1139)	(0.1613)
$EXPOUT_{i,t}$				-0.0853	0.0417	-0.0871	-0.0843	-0.0880	-0.0946
				(0.0694)	(0.0715)	(0.1216)	(0.0701)	(0.0608)	(0.1229)
$EXPOUT_{i,t-1}$				-0.0761	-0.0169	-0.0513	-0.0804	-0.0623	-0.1333
				(0.0526)	(0.0681)	(0.0894)	(0.0541)	(0.0463)	(0.0997)
Panel Obs.	351	156	195	351	156	195	351	156	195
(industries)	(27)	(12)	(15)	(27)	(12)	(15)	(27)	(12)	(15)

Note: *, **, and *** indicate significance at 90%, 95%, and 99% confidence levels, respectively.

Table 14: Impact of foreign trade on profit-cost margins (PCM)

	All (1)	APCM ≤ 50th (2)	APCM > 50th (3)	All (4)	APCM ≤ 50th (5)	APCM > 50th (6)	All (7)	APCM ≤ 50th (8)	APCM > 50th (9)
$PCM_{i,\,t\text{-}1}$	-0.1816***	-0.1721*	-0.1526	-0.1979***	-0.2173**	-0.1932**	-0.1974***	-0.2026**	-0.1720*
	(0.0673)	(0.1038)	(0.0932)	(0.0649)	(0.0915)	(0.0901)	(0.0663)	(0.0986)	(0.0930)
GDP_t	0.0644	0.0651	0.0895	0.0259	0.0511	0.0333	0.0222	0.0266	0.0488
	(0.0700)	(0.0907)	(0.1045)	(0.0764)	(0.0934)	(0.1161)	(0.0780)	(0.0965)	(0.1182)
$GDP_{t\text{-}1}$	0.0675	-0.0581	0.1318	0.0748	-0.0114	0.1840	0.0408	-0.0984	0.1304
	(0.0782)	(0.1019)	(0.1138)	(0.0736)	(0.0934)	(0.1106)	(0.0791)	(0.1018)	(0.1152)
$IMPPEN_{i,t}$	0.0769	0.6106**	-0.1670				0.0877	0.6317**	-0.1777
	(0.1731)	(0.2561)	(0.2231)				(0.1754)	(0.2510)	(0.2234)
$IMPPEN_{i,t\text{-}1}$	0.1914	0.2826	0.3471**				0.2285*	0.3422*	0.3453**
	(0.1274)	(0.2040)	(0.1662)				(0.1258)	(0.1959)	(0.1664)
$EXPOUT_{i,t}$				-0.0895	-0.0682	-0.0681	-0.1059	-0.1176	-0.1014
				(0.0872)	(0.1020)	(0.1346)	(0.0879)	(0.1051)	(0.1333)
$EXPOUT_{i,t\text{-}1}$				-0.0567	-0.0114	0.1840	-0.0962	-0.1258	-0.0616
				(0.0653)	(0.0933)	(0.1106)	(0.0673)	(0.0798)	(0.1056)
Panel Obs.	392	182	210	392	182	210	392	182	210
(industries)	(28)	(13)	(15)	(28)	(13)	(15)	(28)	(13)	(15)

Note: *, **, and *** indicate significance at 90%, 95%, and 99% confidence levels, respectively.

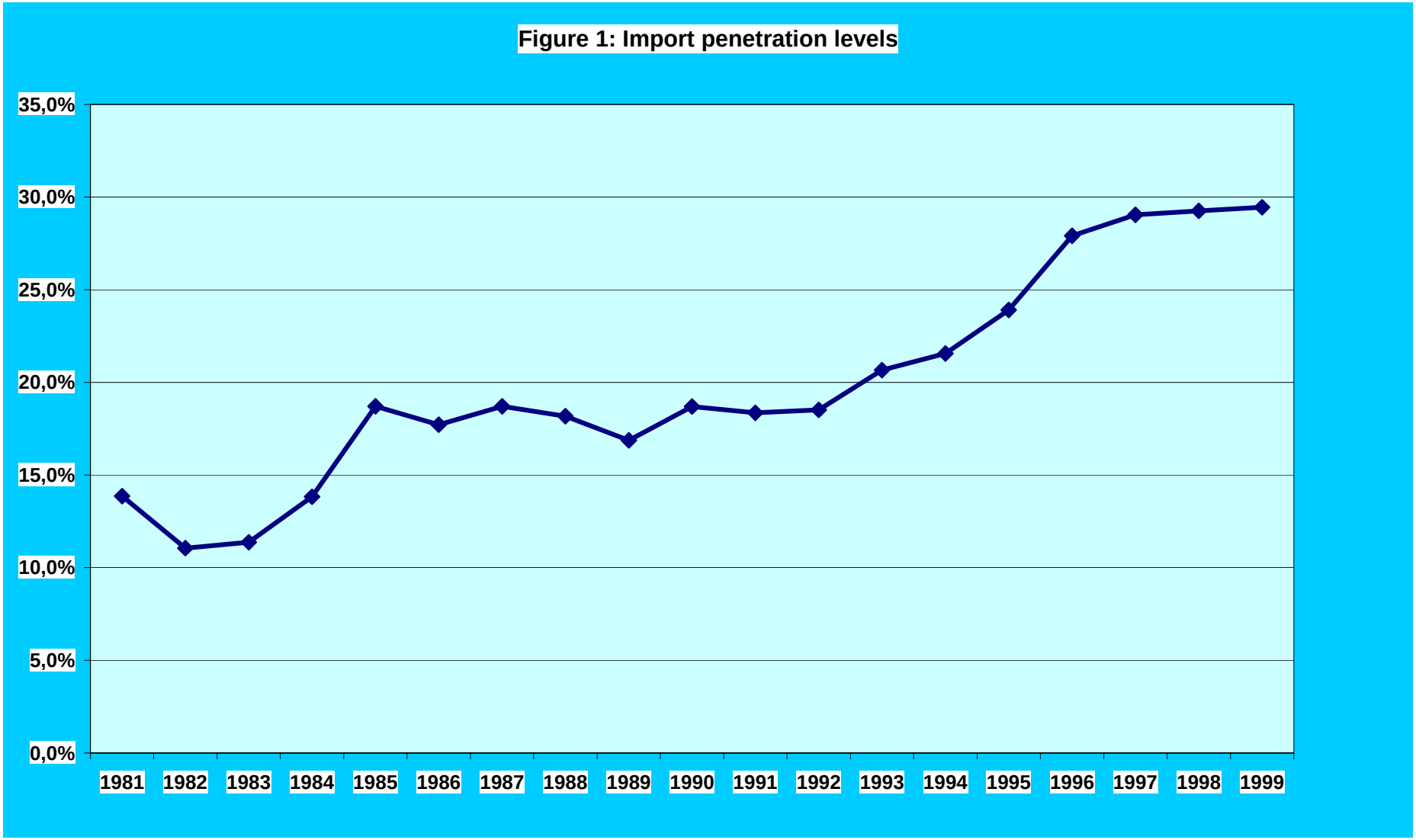
Figure 1: Import penetration levels
35,0%
30,0%
25,0%
20,0%
15,0%
10,0%
5,0%
0,0%
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999

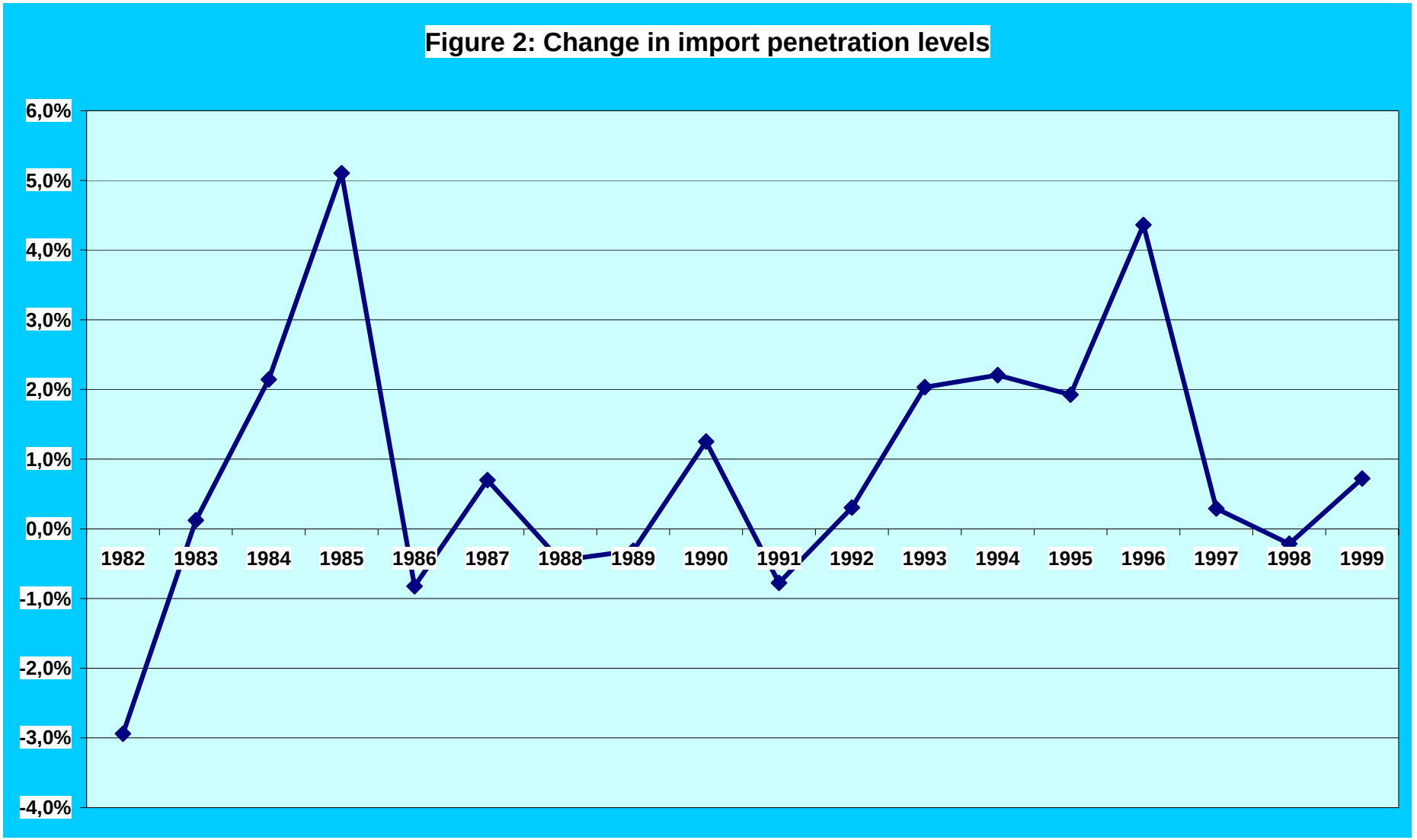
Figure 2: Change in import penetration levels
6,0%
5,0%
4,0%
3,0%
2,0%
1,0%
0,0%
-1,0%
-2,0%
-3,0%
-4,0%
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999

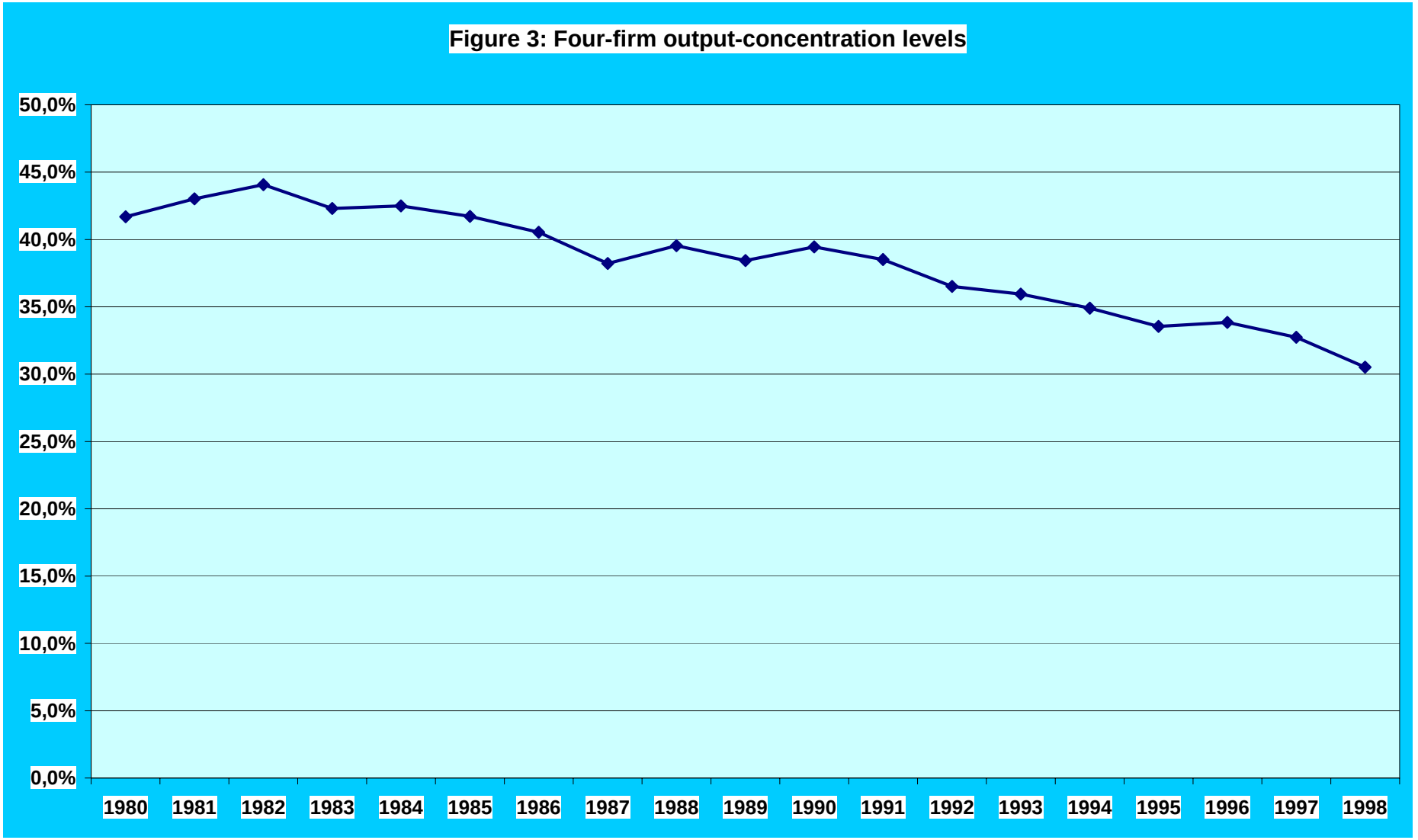
Figure 3: Four-firm output-concentration levels
50,0%
45,0%
40,0%
35,0%
30,0%
25,0%
20,0%
15,0%
10,0%
5,0%
0,0%
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998

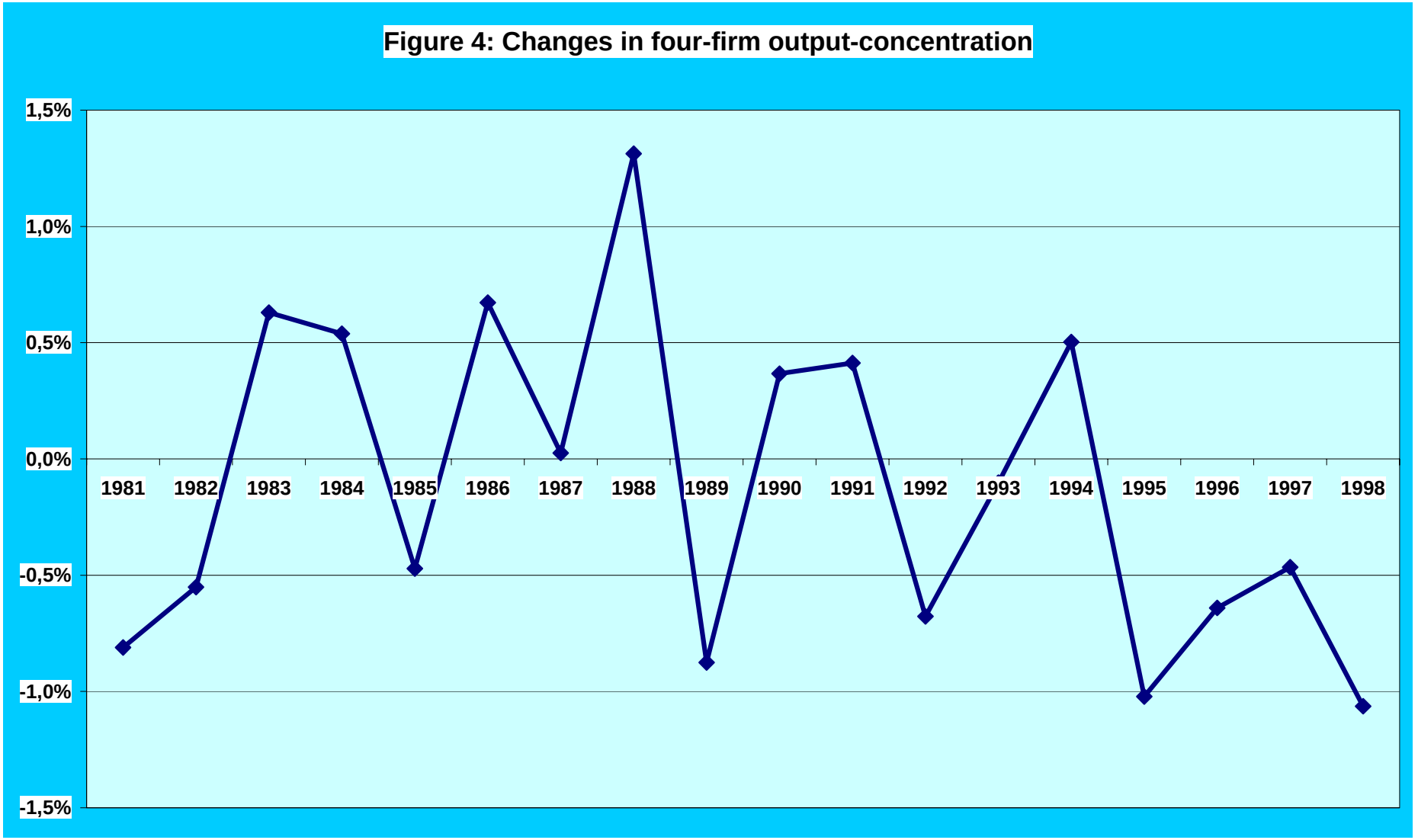
Figure 4: Changes in four-firm output-concentration
1,5%
1,0%
0,5%
0,0%
-0,5%
-1,0%
-1,5%
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998

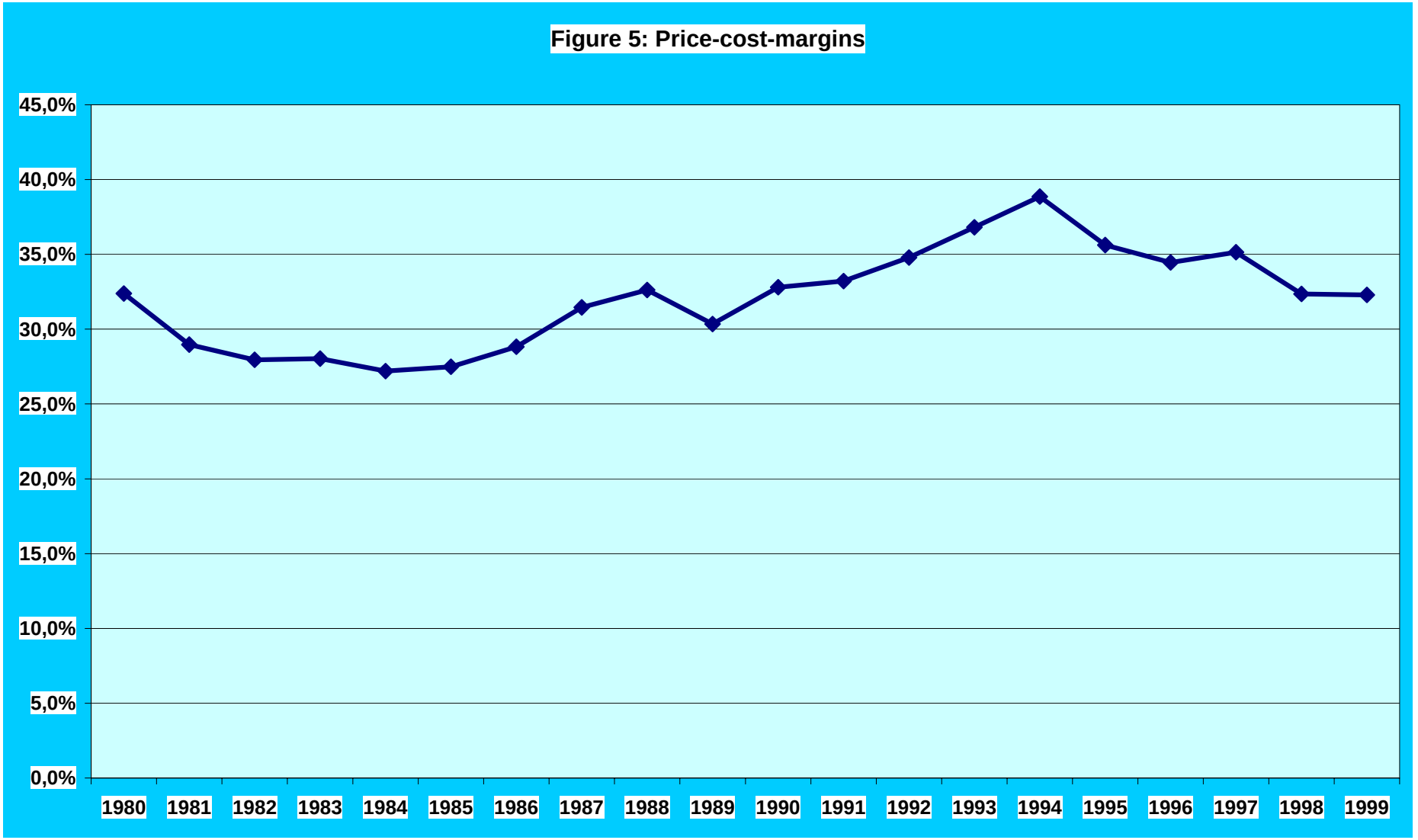
Figure 5: Price-cost-margins
45,0%
40,0%
35,0%
30,0%
25,0%
20,0%
15,0%
10,0%
5,0%
0,0%
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999

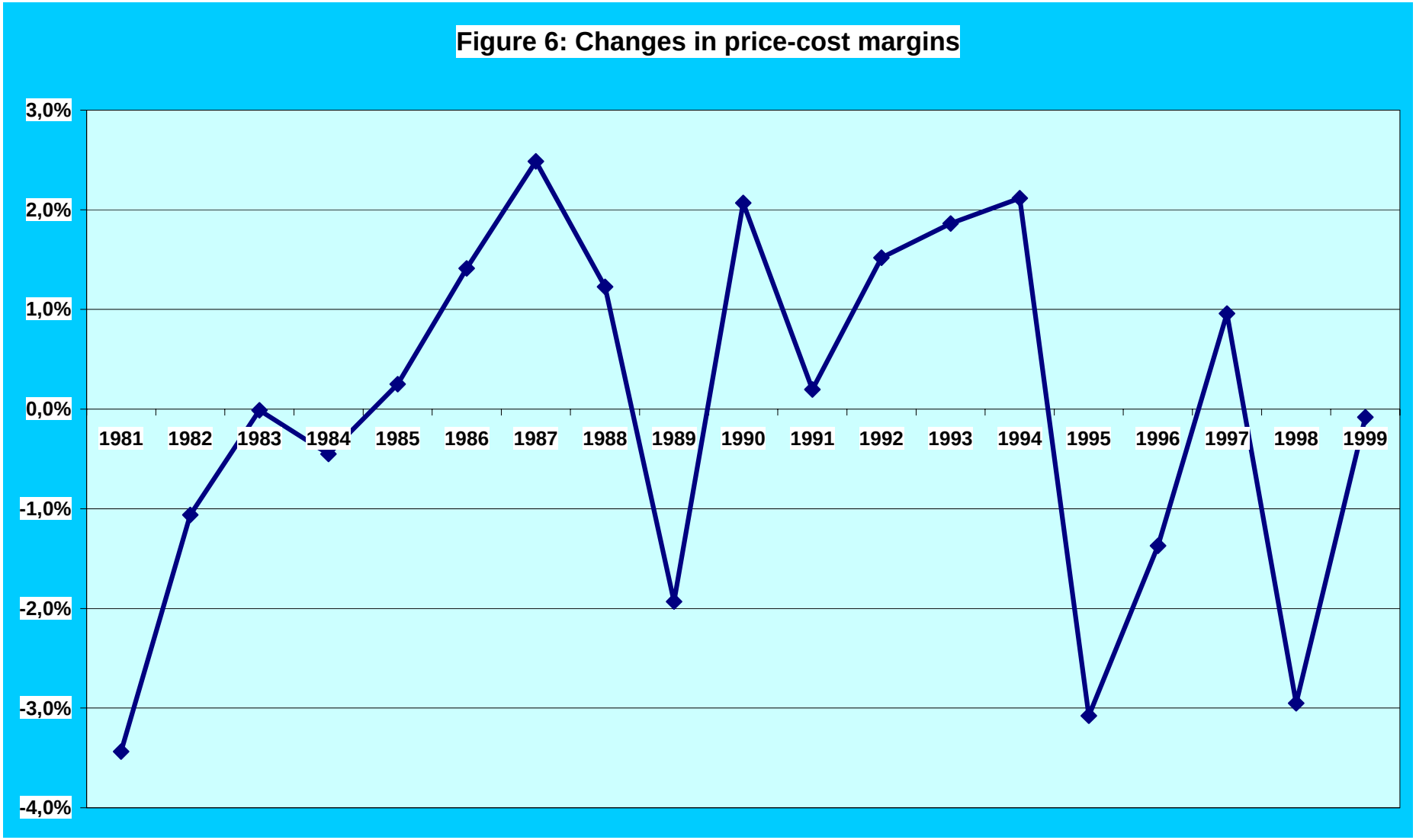
Figure 6: Changes in price-cost margins
3,0%
2,0%
1,0%
0,0%
-1,0%
-2,0%
-3,0%
-4,0%
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999