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THE CYCLICALITY OF MARK-UP RATIOS:
THE CASE OF TURKISH INDUSTRY
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# THE CYCLICALITY OF MARK-UP RATIOS: THE CASE OF TURKISH INDUSTRY*

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## Abstract

The estimation of mark-up ratios for Turkish industry sector and its sub-sectors are realized in this paper. Mark-up ratios are estimated to be significant and thus, estimation results reveal that market structure is characterized by imperfect competition. Moreover, it is observed that mark-up ratios increase during recession periods, since especially private firms diminish their production costs in order to increase the share of gross profits in total value added of the industry sector. Thus, the share of wages in total value added decline and mark-up ratios rise. Consequently, it is also concluded that mark-up ratios demonstrate counter-cyclical behavior in Turkish industry.

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* The views expressed here do not represent the official view of CBRT.

## I. INTRODUCTION

The aim of this paper is to analyze pricing behavior of firms that operate in manufacturing industry. In this respect, I will try to estimate mark-up ratios for Turkish industry sector and its sub-sectors. The estimation of mark-up ratios will enable the researcher to observe the pricing behavior of firms during boom and recession periods.

The paper of Hall (1988) reveals that some U.S. industries have marginal costs below price. The conclusion of the paper also rests on the finding that cyclical variations in labor input are small compared with variations in output. It is observed that firms produce more output in boom periods and sell it for a price that exceeds marginal cost of production. Moreover, Hall acknowledges that substantial degree of price-cost margin stems from the fact that the degree of competition is low. With other words, it is accepted as a convincing fact against perfect competition hypothesis.

The conclusions of Hall (1988) are appealing, since he claims that price-cost margins are widened during boom periods. We can derive the conclusion from his study that mark-up ratios are pro-cyclical. However, this empirical conclusion is challenged in literature by other empirical studies.

The paper of Small (1997) also concludes that mark-up ratios are pro-cyclical in U.K. manufacturing and services sectors. This paper suggests that price pressures move in line with the cycle such that it increases during the recovery period and decreases during the recession period. Moreover, Small's paper reveals that imperfect competition prevails in manufacturing and services sectors of U.K., too.

On the other hand, the study by Martins et al. (1996) carried out for 14 OECD countries finds out that the tests for the cyclicality suggest that of mark-up ratios are counter-cyclical if analyzed at disaggregated sector level. Moreover, another study by Martins and Scarpetta (1999) reached to the contradictory conclusion with Hall (1988) that mark-up ratios are counter-cyclical for U.S. industry. In addition to this, the extension of their analysis to G-5 countries (Japan, U.K., France, Germany and U.S.) reaffirmed their conclusions concerning the counter-cyclical behavior of mark-up ratios.

A panel data analysis for Turkish manufacturing industry by Yalçın (2000) reaches to the conclusion that trade liberalization and thus, import penetration leads to a decrease in price-cost margins of private manufacturing industry. However, this conclusion is reversed for highly concentrated sectors of private manufacturing industry, since price-cost margins showed increases in these sectors by import penetration. Yalçın (2000) reveals a significant issue in pricing behavior of private firms that mark-up ratios are directly and positively related with concentration ratios for sub-sectors of Turkish industry.

Moreover, Metin-Özcan (2000) reaffirmed the conclusions of Yalçın (2000) that trade liberalization had small impact on profit margins (mark-up ratios) and profit margins are positively and significantly related to concentration power and real wage cost increases. It is also observed that real investments in the sector display positive relationship with profit margins.

A brief analysis of the industry sector and its sub-sectors is performed in this paper. Moreover, the estimation of mark-up ratios for the industry sector and its sub-sectors is realized for the period of 1991-1997. The restraint on the research period stems from the limitation of annual data. Although, the research period covers the 1994 crisis, it is accepted that not to be able to discuss the developments in the economy during the 2000-2001 is the main deficiency of the paper.

## II. THEORETICAL BACKGROUND

I think it is appropriate to say that the fundamental assumption of firm theory is that a firm aims to maximize profits. Moreover, economic theory argues that a firm equates the sales price of a final good to its production cost in a perfectly competitive market structure. The presence of perfect competition forces firms to decrease their sales price to the level of marginal cost. Consumers will switch from one firm to another if they observe that sales price is higher for the same commodity. Another critical assumption is put forth at this point that the final good produced by each firm is in fact homogeneous, which is a characteristic feature of perfect competition. With other words, demand for final good is perfectly elastic in price in a perfectly competitive market structure.

However, if the market structure is characterized by imperfect competition, then firms may be able to charge a mark up over their marginal costs in order to gain monopoly profits. Prices will be higher than they ought to be and output will be lower than it could be under imperfect competition. Consequently, social welfare will decline if market structure is imperfectly competitive.

The economic profit is the difference between total revenue and total cost. Therefore, the profit-maximizing condition for a perfectly competitive firm is MR=MC. On the other hand, the basic indicator of mark-up pricing and imperfect competition in goods market is the so-called Lerner index (B), which is defined as (P-MC)/P[1]. Under perfect competition, price equals to marginal cost and the Lerner index will be equal to zero. However, if price exceeds marginal cost, then the Lerner index will become positive and vary between zero and unity. A positive number of Lerner index will signify that the structure of the market is not perfectly competitive. Moreover, the closer the value of the index to unity, the greater the market of power for firms those operate in that market.

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1 See Martins et al., 1996.

Mark-up ratio is defined as (P/MC) in this approach and designated by: $\mu$ .

$$(1) \rightarrow B = \frac{P - MC}{P} = 1 - \frac{1}{\mu} \quad or \quad \mu = \frac{1}{1 - B}$$

In Hall's approach, the estimation of mark-up ratios is based on ideas contained in Solow's seminal paper (1957) on productivity measurement[2]. The most common method of calculation total factor productivity (TFP) is the Solow residual, which is the difference between the growth rate of output and a weighted average of the growth rate of factor inputs.

Moreover, Roeger's approach (1995) improved Hall's methodology for the estimation of mark-up ratios. Martins et al. (1996) performed the estimation of mark-up ratios of manufacturing industry and non-manufacturing industry sectors for 14 OECD countries utilizing this methodology. Moreover, another paper by Martins and Scarpetta (1999) realized the estimation of mark-up ratios for US manufacturing industry and extended the estimation of mark-up ratios to the manufacturing industries in the other G-5 countries.

According to Hall, Solow residual (SR) can be related to the mark-up of prices over marginal costs $\left(\mu = P/MC\right)$ as follows:

$$(2) \rightarrow SR = \Delta q - \alpha \cdot \Delta l - \left(1 - \alpha\right) \cdot \Delta k = \left(\mu - 1\right) \cdot \alpha \left(\Delta l - \Delta k\right) + \theta$$

Production function is assumed to exhibit constant returns to scale property in this model. Lower case letters denote natural logs and $\Delta$ stands for first difference. q, l and k correspond to real value added, labor and capital inputs, respectively, $\alpha$ is the labor share in value added and $\theta$ is the Hichs-neutral rate of technical progress. If the mark-up ratio is assumed constant for the estimation period, then the dual of equation (2) can be derived for the price-based productivity measure (Roeger, 1995), a dual Solow residual:

$$(3) \rightarrow DSR = \alpha \cdot \Delta\omega - \left(1 - \alpha\right) \cdot \Delta r - \Delta p = \left(\mu - 1\right) \cdot \alpha \cdot \left(\Delta\omega - \Delta r\right) + \theta$$

$\omega$ and r are natural logarithms of the wage rate and the rental price of capital, respectively. Equation (2) and (3), state that under perfect competition, ($\mu$=1), the primal and the dual Solow residuals can be considered as a correct measure of for the (unobservable) rate of technical progress. The econometric estimation of these equations is complicated by the fact that the explanatory variables are correlated with the random productivity shocks ($\theta$), thus OLS estimates

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2 See Hall, 1988 for detailed discussion of this estimation procedure.

become inconsistent. Instrumental variable estimation technique is utilized to overcome this issue, however, the choice of instrumental variables is also a problematic issue and this methodology leads to high mark-up estimates.

Roeger (1995) recommended subtracting the dual SR, equation (3), from the primal SR, equation (2), since the productivity term cancels out and leaving an equation with only observable variables. The resulting equation is expressed as a Solow residual in nominal terms (NSR). The NSR is a function of the mark-up, the labor share and the growth rate of the ratio of labor to capital costs:

$$(4) \rightarrow NSR = \Delta(p+q) - \alpha \cdot \Delta(\omega+l) - (1-\alpha) \cdot \Delta(r+k) = (\mu-1) \cdot \alpha \cdot [\Delta(w+l) - \Delta(r+k)]$$

The mark-up can be estimated by standard OLS techniques by simply adding an error term to equation (4).

The difficulty in the estimation of mark-up ratios utilizing Hall's approach improved by Roeger (1995) is that it requires reliable data for capital stock, which is not available for Turkish manufacturing industry and its sub-sectors.

However, mark-up ratio is also defined as the ratio of total profits to total costs of wages and intermediate inputs in previous studies that mainly aim to estimate mark-up ratios for Turkish Economy[3]. Total costs for each year is considered as marginal costs accruing to the sector for chosen year.

(5) mark-up = gross profits / (wages + material inputs)

= [output – (wages + material inputs)] / [wages + material inputs]

(6) sales profitability = gross profits / total value of output

(7) share of profits = gross profits / value added

I think that this definition of mark- up ratio is more appropriate for Turkish Economy. This methodology enables the researcher to analyze the changes in mark-up ratios annually. Thus, the behavior of mark-up ratios during boom and recession periods can be observed. This observation will also enable the researcher to figure out whether mark-up ratios are pro-cyclical or counter-cyclical within the context of Turkish Economy. Moreover, it is possible to estimate mark-up ratios for sub-sectors of industry sector. Therefore, in this paper mark-up ratio is estimated by utilizing the definition in equation (7), which is in fact a simple procedure.

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3 See Kıvılcım et al., (2000), Özmucur (1992) and Şahinkaya (1991).

### III. DEVELOPMENTS IN THE INDUSTRY SECTOR

In this paper, mark-up ratios are estimated for manufacturing industry and its sub-sectors for 1991-1997 periods annually. The estimation is carried out for two and three digit manufacturing industries according to the ISIC2 classification. All the data examined in this paper is gathered from SIS Statistical Yearbook of Turkey 2000. The data covers all public and private firms that operate in the industry sector, which employ more than 10 workers. The major drawback of the study is that the coverage of the data is short and only accounts for the 1991-1997 period.

It is observed that in the industry sector the share of public sector in total value added and employment declined steadily during the research period. Contrary to public opinion, the decline of the share of public sector in employment was deeper compared to the decline of public sector value added. The share of public sector in industry sector value added decreased from 32 % in 1991 to 23 % in 1997, whereas its share in industry sector employment fell from 26 % in 1991 to 13 % in 1997.

Moreover, the share of wages in total value added of industry sector declined gradually during the research period. The share of wages in value added decreased to 16,9 % in 1997 from 21,8 % in 1990. The decline of the share of wages in value added mainly stemmed from the private sector. However, it is observed that contrary to developments in the private sector, the share of wages increased in the public sector during the period of 1991-1994. However, the share of wages also decreased substantially after 1994, probably due to the devastating effects of the financial crisis on the public sector budget.
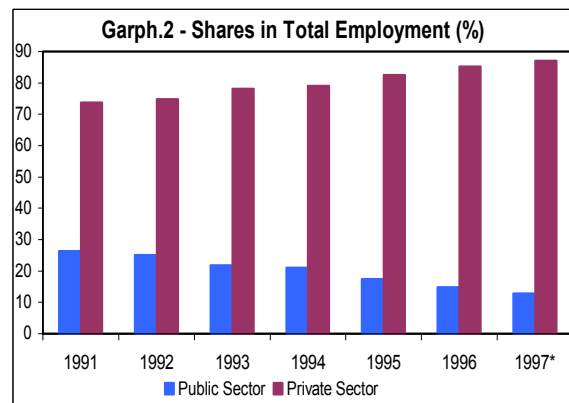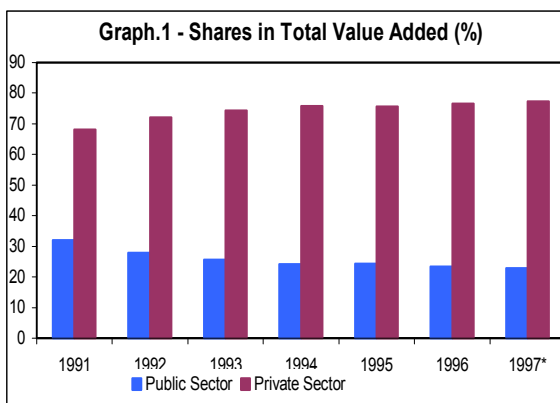


On the other hand, the share of wages in value added continued to decline during the research period. In private sector, the share of wages in total value added was 21,8 % in 1991, but it is observed that it declined to 17,3 % level in 1997. The share of wages in value added reached its lowest level in 1994 with 13,6 %. The gradual decline of the share that workers accrue from total

value added is a good indicator of the worsening of income distribution in Turkish Economy during the research period.

Table.1 - The Share of Sub-sectors in Total Value Added of the Industry Sector (%)

| | 1991 | 1992** | 1993 | 1994 | 1995 | 1996 | 1997* |
|---|---|---|---|---|---|---|---|
| Food, beverage and tobacco | 18.9 | 16.1 | 16.9 | 14.8 | 15.6 | 16.2 | 12.0 |
| Weaving, wearing appeal and leather | 14.3 | 14.2 | 14.6 | 17.3 | 16.7 | 17.1 | 17.2 |
| Wood products and furniture | 0.9 | 1.0 | 1.2 | 0.9 | 1.1 | 1.2 | 1.2 |
| Paper, paper products and printing | 3.2 | 2.8 | 3.7 | 3.9 | 3.3 | 3.5 | 3.0 |
| Chemical-petrol., coal, rubber and plastic products | 27.9 | 26.4 | 25.7 | 26.8 | 30.0 | 28.2 | 28.6 |
| Stone and soil products | 7.0 | 6.8 | 7.7 | 7.6 | 6.8 | 6.9 | 6.8 |
| Basic metal products | 7.1 | 5.9 | 7.4 | 9.3 | 6.6 | 6.1 | 8.8 |
| Metal products, mach.-equip., transportation vehicles | 20.5 | 19.7 | 22.4 | 19.2 | 19.7 | 20.5 | 22.2 |
| Other manufacturing industry | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.4 |

Source: SIS

* Provisionary

** The shares of sub-sectors do not sum up to 100 for 1992.

Large-scale firms that employ more than 1.000 workers constitute only around 1 % of total number of firms, which operate in the industry sector, during the research period. However, these firms provided employment opportunities for 30,9 % of workers within the industry sector in 1991, which decreased to 18,9 % level in 1997. Moreover, the contribution of large-scale firms to total value added of the industry sector declined to 34,7 % in 1997, which was 40,6 % in 1991.

Table.2 - The Share of Sub-sectors in Total Employment of the Industry Sector (%)

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997* |
|---|---|---|---|---|---|---|---|
| Food, beverage and tobacco | 19.0 | 18.6 | 18.1 | 18.0 | 17.3 | 16.6 | 15.6 |
| Weaving, wearing appeal and leather | 27.9 | 29.4 | 29.8 | 30.9 | 32.8 | 34.3 | 34.9 |
| Wood products and furniture | 1.8 | 2.1 | 2.3 | 2.2 | 2.1 | 2.3 | 2.2 |
| Paper, paper products and printing | 3.7 | 3.6 | 3.5 | 3.6 | 3.6 | 3.5 | 2.9 |
| Chemical-petrol., coal, rubber and plastic products | 10.0 | 9.8 | 9.6 | 9.6 | 9.5 | 9.5 | 9.4 |
| Stone and soil products | 7.4 | 7.2 | 6.7 | 6.9 | 6.8 | 6.6 | 6.5 |
| Basic metal products | 8.2 | 7.6 | 7.1 | 6.8 | 6.6 | 5.6 | 5.6 |
| Metal products, mach.-equip., transportation vehicles | 21.6 | 21.4 | 22.3 | 21.3 | 20.8 | 21.1 | 22.2 |
| Other manufacturing industry | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 |

Source: SIS

* Provisionary

Medium-sized firms, defined as firms that employ 25 to 999 numbers of workers, constitute 63,5 % of all firms in the industry sector in 1997 by increasing from 60,2 % in 1991. Moreover, their share in total employment in the industry sector increased to 74,7 % in 1997 from 64,4 % in 1991. The share of medium-sized firms in total value added increased from 57,5 % in 1991 to 63,2 % in 1997.

The contribution of small-sized firms, which employ 10 to 24 numbers of workers, to total vale added of the industry sector stood steady around 2 % level during the research period. On the other hand, the ratio of small-sized firms to total number of firms decreased to 35,4 % in 1997 from 38 % in 1991. The employment provided by these firms increased from 4,8 % in 1991 to 5,5 % in 1997 within the industry sector.

It is observed that among the sub-sectors of the industry sector the share of food sector declined steadily during the research period. On the other hand, weaving, chemical-petroleum products and metal products, machinery-equipment, transportation vehicles increased their share in the total value added of the industry sector during the 1991-1997 period.

Table.3 - The Share of Private Sector in Total Value Added of the Industry Sector (%)

|  | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997* |
|---|---|---|---|---|---|---|---|
| Food, beverage and tobacco | 50.8 | 55.3 | 62.4 | 73.1 | 77.3 | 78.3 | 85.2 |
| Weaving, wearing appeal and leather | 93.2 | 94.3 | 94.6 | 96.5 | 97.0 | 97.9 | 97.3 |
| Wood products and furniture | 87.3 | 78.5 | 84.3 | 89.0 | 94.2 | 95.0 | 96.6 |
| Paper, paper products and printing | 71.5 | 84.5 | 89.1 | 86.0 | 82.2 | 88.1 | 90.7 |
| Chemical-petrol., coal, rubber and plastic products | 42.2 | 42.5 | 46.9 | 47.8 | 44.7 | 45.9 | 44.8 |
| Stone and soil products | 88.4 | 86.9 | 94.0 | 94.9 | 96.1 | 97.0 | 98.3 |
| Basic metal products | 62.7 | 64.9 | 64.4 | 61.3 | 70.8 | 56.0 | 60.8 |
| Metal products, mach.-equip., transportation vehicles | 94.7 | 94.3 | 95.1 | 94.7 | 95.5 | 95.6 | 95.9 |
| Other manufacturing industry | 95.7 | 90.4 | 89.8 | 92.0 | 94.8 | 93.9 | 94.8 |

Source: SIS

* Provisionary

In line with the developments in the value added of the industry sector, the employment ratio of weaving sector to total employment of the industry sector increased substantially during this period. However, employment in the food sector declined gradually compared to other sub-sectors of the industry sector.

It is observed that the share of private sector in total value added of the industry sector and its sub-sector are excessively high compared to the public sector. Moreover, the share of private sector continued to increase gradually during the research period. Only in chemical-petroleum products and basic metal products sectors demonstrate significant existence of public sector. Moreover, the share of private sector in value added of the basic metal products declined slightly during the 1991-1997 period, but its share is still above 60 % of the value added of the sector.

| Table.4 - The Share of Private Sector in Total Employment of the Industry Sector (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **1991** | **1992** | **1993** | **1994** | **1995** | **1996** | **1997*** |
| **Food, beverage and tobacco** | 54.4 | 53.7 | 58.4 | 60.1 | 64.4 | 68.0 | 69.3 |
| **Weaving, wearing appeal and leather** | 87.7 | 89.2 | 90.9 | 91.5 | 93.9 | 95.6 | 96.6 |
| **Wood products and furniture** | 65.5 | 71.2 | 78.3 | 78.7 | 84.9 | 90.3 | 93.9 |
| **Paper, paper products and printing** | 58.6 | 61.4 | 66.0 | 68.4 | 71.5 | 73.7 | 72.5 |
| **Chemical-petrol., coal, rubber and plastic products** | 72.2 | 72.2 | 74.1 | 74.2 | 76.6 | 79.2 | 81.6 |
| **Stone and soil products** | 83.2 | 83.8 | 88.7 | 90.1 | 90.7 | 92.7 | 94.2 |
| **Basic metal products** | 40.2 | 39.3 | 43.1 | 43.4 | 56.6 | 56.3 | 61.7 |
| **Metal products, mach.-equip., transportation vehicles** | 85.6 | 86.8 | 88.7 | 88.3 | 89.5 | 91.1 | 92.6 |
| **Other manufacturing industry** | 89.3 | 84.5 | 88.9 | 89.5 | 90.2 | 91.9 | 97.0 |

Source: SIS

* Provisionary

On the other hand, it is observed that the share of private sector in total employment of the industry sector is less compared to its share in total value added of the industry sector. This clearly indicates that productivity per worker is substantially higher in the private sector compared to the public sector during the research period. Only, in chemical-petroleum products sectors, the employment level is higher as a ratio compared to value added level.

It is thought that the decline of the share of public sector in total value added and employment of the industry sector results from privatization attempts and macroeconomic policies that target to decrease public employment.
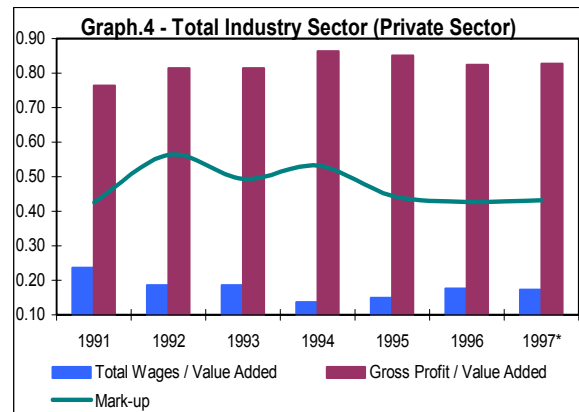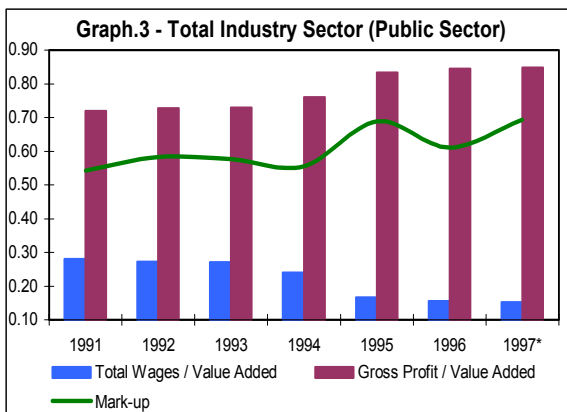




## IV. MARK-UP RATIOS

In line with the decline of the share of wages in total value added, mark-up ratios increased considerably in the public sector during the research period. In private sector, on the other hand, mark-up ratios rose to a high level during the 1994 crisis due to the decline of the share of wages

in total value added, but decreased slightly afterwards. Throughout the research period, the ratio of gross profits to total value added were substantially high in both public and private sectors.

The estimation results for private industry sector reveal that mark-up ratios reached to their highest level in 1994 except for the wood products and furniture sector and other manufacturing industry sector. However, mark-up ratios of wood products and furniture industry reached its highest level in 1995. Boratav et al. (1999) also found out that mark-up ratios were highest in 1994 in their study for the period of 1980-1995, which is consistent with the findings of this paper.

<div align="center">Table.5 - Mark-up Ratios in Private Industry Sector</div>

|  | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997* |
|---|---|---|---|---|---|---|---|
| **Food, beverage and tobacco** | 0.37 | 0.40 | 0.42 | 0.43 | 0.42 | 0.41 | 0.33 |
| **Weaving, wearing appeal and leather** | 0.39 | 0.43 | 0.42 | 0.45 | 0.38 | 0.36 | 0.36 |
| **Wood products and furniture** | 0.47 | 0.43 | 0.43 | 0.38 | 0.49 | 0.39 | 0.46 |
| **Paper, paper products and printing** | 0.48 | 0.54 | 0.60 | 0.67 | 0.40 | 0.48 | 0.44 |
| **Chemical-petrol., coal, rubber and plastic products** | 0.45 | 0.53 | 0.64 | 0.67 | 0.57 | 0.54 | 0.57 |
| **Stone and soil products** | 0.31 | 0.33 | 0.33 | 0.39 | 0.26 | 0.22 | 0.33 |
| **Basic metal products** | 0.31 | 0.33 | 0.33 | 0.39 | 0.26 | 0.22 | 0.33 |
| **Metal products, mach.-equip., transportation vehicles** | 0.44 | 0.47 | 0.48 | 0.57 | 0.47 | 0.44 | 0.47 |
| **Other manufacturing industry** | 0.54 | 0.71 | 0.47 | 0.66 | 0.61 | 0.33 | 0.57 |

Source: SIS

* Provisionary

Mark-up ratio for each sector is defined as the ratio of gross profits of firms to expenses made by firms for wages and material inputs. Thus, the rise of mark-up ratios stems from the fact that firms diminish their production costs, while gross profits, which is total value of output (total revenue) less of production costs, increase at the same time. It is thought that firms primarily decrease expenditures for wages during recession periods and since, the share of wages in value added decline, mark-up ratios demonstrate significant rises during recession periods[4].

Moreover, from another perspective, it is possible that private firms increase price of their output to boost their total revenue and thus gross profits rise even tough costs production remains constant. However, this strategy seems more appropriate for boom periods rather than recession periods, even if market structure is characterized by imperfect competition (Hall, 1988).

The capability of firms to increase price to boost their total revenue primarily depends on the price elasticity of demand for their products and obviously, degree of competitiveness in the market. Price of output will increase more than the decline of quantity sold only if demand is

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4 See Şahinkaya (1991) as he also reached the same conclusions by a simple regression of the share of wages in value added on mark-up ratios for the period of 1963-1988.

inelastic for output of the firm. With other words, consumers have fewer alternatives to substitute the final goods produced by the existing firms in the market.

Table.6 - Mark-up Ratios in Public Industry Sector

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997* |
|---|---|---|---|---|---|---|---|
| Food, beverage and tobacco | 0.64 | 0.49 | 0.45 | 0.26 | 0.33 | 0.31 | 0.09 |
| Weaving, wearing appeal and leather | 0.02 | 0.10 | 0.12 | 0.05 | 0.09 | 0.08 | 0.27 |
| Wood products and furniture | -0.08 | 0.18 | 0.13 | -0.05 | -0.01 | 0.17 | 0.14 |
| Paper, paper products and printing | 0.33 | 0.03 | 0.03 | 0.21 | 0.27 | 0.20 | 0.07 |
| Chemical-petrol., coal, rubber and plastic products | 0.88 | 1.10 | 1.01 | 0.91 | 1.16 | 0.88 | 1.11 |
| Stone and soil products | 0.39 | 0.55 | 0.40 | 0.48 | 0.30 | 0.28 | 0.28 |
| Basic metal products | 0.010 | 0.004 | 0.169 | 0.433 | 0.234 | 0.445 | 0.801 |
| Metal products, mach.-equip., transportation vehicles | 0.05 | 0.21 | 0.18 | 0.20 | 0.30 | 0.32 | 0.42 |
| Other manufacturing industry | 0.11 | 0.32 | 0.39 | 0.52 | 0.24 | 0.20 | 1.73 |

Source: SIS

* Provisionary

The increase of mark-up ratios in almost all sub-sectors of private industry sector in 1994 indicates that private firms cut costs of production including wages during crisis periods. It is observed that the ratio of wages to value added declined substantially in 1994.



Graph.5 - Developments in Private Manufacturing Industry
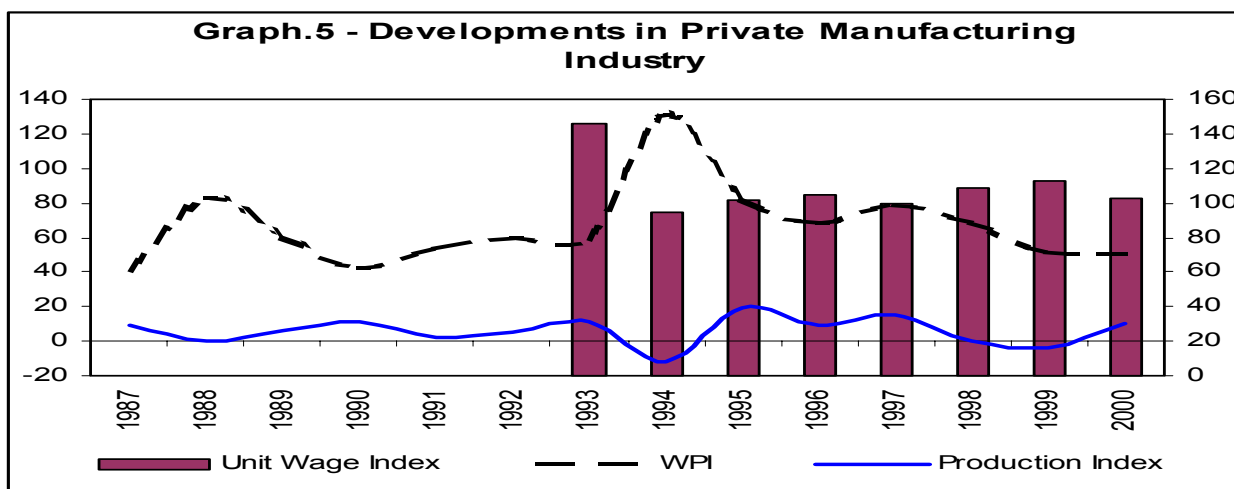
Moreover, the rise of mark-up ratios to high levels in private industry sector in 1994, although it was a crisis year, is regarded as a reliable indicator of imperfect competition in goods market in Turkish Economy.

On the other hand, it is observed that mark-up ratios for private manufacturing industry are counter-cyclical, since mark-up ratios increased in 1994 although it was a crisis year, but decreased slowly afterwards with entrance of the economy to growth period between 1995-1997.

Mark-up ratios of sub-sectors of public manufacturing industry demonstrate different behaviors during the research period, which makes to assess their economic meaning difficult. The mark-up ratios of wood products and furniture industry were negative in specific years, whereas the mark-up ratio for other manufacturing industry increased above 1 as a ratio in 1997.

## V. CONCLUSION

Mark-up ratios for industry sector and its sub-sectors are significantly high and considered as convincing evidence for the existence of imperfect competition in the goods market.

It is observed that mark-up ratios increase mainly in recession periods of the economy. Mark-up ratios reach its highest level in 1994 during the research period in almost all sub-sectors of private manufacturing industry. Thus, mark-up ratios are evaluated as exhibiting counter-cyclical behavior in Turkish Economy.

Private firms diminish production costs during recession periods, and primarily expenses for workers are cut. Consequently, the share of wages in total value added of the industry sector decline. Therefore, the share of gross profits in total value added grows and mark-up ratios increase extensively during recession periods.

The results of the study are also in line with the pro-cyclical behavior of wages, since it is observed that real wages declined during recession periods. The decline of real wages during recession periods is in line with the finding of this paper that private firms decrease employment costs in times of economic contraction. Therefore, it is argued that the pro-cyclical behavior of wages should be the underlying reason of the counter-cyclical behavior of mark-up ratios in Turkish industry sector.

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# APPENDIX

**Food, beverage and drink (Public Sector)**



**Food, beverage and drink (Private Sector)**



**Weaving, wearing appeal and leather (Public Sector)**



**Weaving, wearing appeal and leather (Private Sector)**



**Wood products and furniture (Public Sector)**



**Wood products and furniture (Private Sector)**



**Paper, paper products and printing (Public Sector)**



**Paper, paper products and printing (Private Sector)**



**Chemical-petrol., coal, rubber and plastic (Public Sector)**



**Chemical-petrol., coal, rubber and plastic (Private Sector)**



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## Stone and soil products (Public Sector)



Legend: Total Wages / Value Added — Gross Profit / Value Added — Mark-up

## Stone and soil products (Private Sector)



Legend: Total Wages / Value Added — Gross Profit / Value Added — Mark-up

## Basic metal products (Public Sector)



Legend: Total Wages / Value Added — Gross Profit / Value Added — Mark-up

## Basic metal products (Private Sector)



Legend: Total Wages / Value Added — Gross Profit / Value Added — Mark-up

## Metal products, mach.-equip., transp. vehicles (Public Sector)



Legend: Total Wages / Value Added — Gross Profit / Value Added — Mark-up

## Metal products, mach.-equip., transp. vehicles (Private Sector)



Legend: Total Wages / Value Added — Gross Profit / Value Added — Mark-up

## Other manufacturing industry (Public Sector)



Legend: Total Wages / Value Added — Gross Profit / Value Added — Mark-up

## Other manufacturing industry (Private Sector)



Legend: Total Wages / Value Added — Gross Profit / Value Added — Mark-up

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