THE IMPACT OF SECTORAL COMPETITION ON INFLATION IN TURKEY

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ABSTRACT

THE IMPACT OF SECTORAL COMPETITION
ON INFLATION IN TURKEY

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This thesis explores the impact of sectoral competition on inflation in Turkey. To this end, panel data analyses investigating the determinants of deviation of sectoral price inflation from the consumer price inflation, and the resulting effect of the changes in the level of sectoral competition on this deviation measure are conducted in both static and dynamic frameworks. The empirical analyses covers the 1995-2001 period and 62 manufacturing sectors classified according to International Standard of Industrial Classification (ISIC) Rev. 2 at 4-digit level. The findings of the empirical analyses are particularly important for the assessment of the theoretical foundations and empirical basis of the recent proposals favoring enhancement of competition with disinflationary motives. The static analyses suggest that sectoral concentration is insignificant in explaining deviations of sectoral inflation from consumer inflation, while dynamic analyses suggest enhancing competition may lead to higher levels of sectoral inflation. The interpretation of the results indicates that enhancing competition may not be a viable tool for disinflationary purposes in Turkey.

Keywords: Industrial Economics, Inflation, Competition, Panel Data, Dynamic Panel Data

ÖZ

TÜRKİYE'DE SEKTÖREL REKABETİN ENFLASYONA ETKİSİ

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Bu tezde, Türkiye'de sektörel rekabetin enflasyon üzerindeki etkisi incelenmektedir. Bu amaçla, statik ve dinamik çerçevede sektörel enflasyonun tüketici enflasyonundan sapmasında belirleyici olan öğeler kapsamında sektörel rekabet düzeyinde meydana gelen değişikliklerin etkisinin incelendiği panel veri analizleri gerçekleştirilmiştir. Çalışma, 1995-2001 yılları arasında Uluslararası Sanayi Sınıflandırma Standartları sistemine göre Rev. 2, 4-hane düzeyinde sınıflandırılmış imalat sanayiindeki 62 sektörü kapsamaktadır. Tezin bulguları özellikle yakın zamanlarda gündemde olan dezenflasyonist saiklerle sektörel rekabetin arttırılmasını telkin eden politika önermelerinin teorik ve ampirik temellerinin değerlendirilmesi bakımından önem taşımaktadır. Statik analiz, sektörel rekabetteki değişimin sektörel enflasyonun tüketici enflasyonundan sapmasında açıklayıcı olmadığını, dinamik analiz ise sektörel rekabetin arttırılmasının sektörel enflasyonu arttırıcı bir etki doğurduğunu göstermektedir. Çalışmanın sonuçları, Türkiye ekonomisinde enflasyonla mücadele kapsamında rekabet arttırıcı politikaların kullanılmasının beklenen sonuçlara yol açmayabileceği vurgusu yapmaktadır.

Anahtar Kelimeler: Sanayi İktisadı, Enflasyon, Rekabet, Panel Veri Analizi, Dinamik Panel Veri Analizi

To my familyé

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CHAPTER 1

INTRODUCTION

Enhancing competition in real sectors has been a significant part of the macroeconomic policy recommendations of the international economic institutions as well as domestic policy makers. To serve as an example in the Turkish context, the importance of enhancing competition as well as coordinated regulation has been one of the major advices in the *Organization for Economic Co-operation and Development (OECD) Survey: Turkey 2006* as a facilitating mean for the reduction of inflation:

> *Co-operation between the sectoral regulators and the competition authority should be strengthened and further steps taken to accelerate competition in the network industries. Fostering competition in all tradable and non-tradable activities should be a prime objective for reducing inflation and strengthening the competitiveness of the economy (OECD, 2006, 16).*

Similarly, regarding domestic policy makers, one can speak of a consensus in Turkey, on achieving lower rates of inflation, by attaining more competitive markets. Turkish Competition Authority (TCA), in a similar tone with the OECD, stresses the importance of microeconomic reforms, particularly the enhancement of competition in order to attain lower levels of inflation (TCA, 2008, pp. 3-8). Likewise, Central Bank of

Republic of Turkey (CBRT) seems to support the views of TCA and OECD as well[1].

Evidently, prior to the adaptation of competition enhancing policies within the context of disinflationary programs, exploring theoretical foundations of propositions that are suggesting disinflationary benefits for the enhancement of competition, and making an actual empirical assessment for Turkey are of particular importance.

A fragmentation in the academic environment can be noticed in assessing the prospects of attaining permanent reductions in inflation, rather than temporary reductions in price level[2], by making markets more competitive. Dynamic Inconsistency Theory (DIT) developed by Kydland & Prescott (1977) and Barro and Gordon (1983), provides the main theoretical framework for the studies proposing competition enhancement. On the other hand, Qualls (1981), and Benabou (1988) and (1992), describe alternative settings where assertions of the DIT should be questioned. Same divergence is also demonstrated in empirical research. Former works, particularly, Gisser and Johnson (1978), Qualls (1981) and Eckard (1981) seem to be skeptical about, while more recent ones Neiss (2001) Cavelaars (2003), and Przybyla

[1] Durmus Yilmaz, Governor of CBRT, emphasizes the strong relationship between the primary objective of Central Bank, namely, price stability and competition policies.

> *In the circumstances where competition conditions prevail, firms will not have the opportunity to act monopolistically. ...Additionally, the need of the firms, due to either domestic or foreign competitive pressures, to adopt strategies enhancing productivity, is one of the primary factors that triggers innovation and technological progress and that contributes to the growth of potential output.é The fact that firms, will take precautions to increase profitability via reducing costs instead of increasing prices, will make it possible to enjoy higher growth, at lower rates of inflation (quoted in TCA, 2008, pp. 9-13).*

[2] Motta (2005) emphasizes this difference in the following fashion:

> *Fighting inflation, for instance has been indicated as one reason for introducing control over cartels in Germany. However, it seems doubtful that competition law might efficiently be used to attain such purposes. If firms are colluding then breaking a cartel would give a one time reduction of prices, rather then contributing to a permanent decr ease in inflation (Motta, 2005, 24).*

and Roma (2005) are supportive for the idea of pursuing competition enhancement with disinflationary motives.

In the light of the discussions above, this thesis is oriented to explore the impact of sectoral competition on inflation in Turkey. To this end, panel data analyses investigating the determinants of deviation of sectoral price inflation from the consumer price inflation, and the resulting effect of the level of sectoral competition on this deviation measure are conducted in both static and dynamic frameworks. The analyses cover the period of 1995-2001 and 62 manufacturing sectors that are classified according to International Standard of Industrial Classification (ISIC) Rev. 2. The findings of this thesis are particularly important for the assessment of theoretical foundations and empirical basis of the recent proposals favoring enhancement of competition with disinflationary motives.

Empirical analysis is conducted in two-steps. In the first step, static panel data methods are employed to identify the sources of deviation of sectoral inflation from consumer inflation. In this setting, both fixed effects and random effects estimations are used. Both techniques offer similar results with the implication that level of sectoral competition is insignificant in explaining deviations of sectoral inflation from consumer inflation.

As a second step, the analysis is expanded into a dynamic setting. Estimations are conducted in a Generalized Method of Moments (GMM) framework using instrumental variable techniques following Arellano and Bond (1991), and Arellano and Bover (1995). In contrast to the static setting, the results imply that level of competition is significant in explaining deviations of sectoral inflation from consumer inflation. However, it turns out that sectoral competition and inflation is related in a fashion contrary to the expectations shaping most policy

recommendations. The results suggest that deviation of sectoral inflation from consumer increases as sectoral competition increases. In this sense, one can argue that the findings in this thesis indicate policies designed to reduce inflation via enhancing sectoral competition may not have the desired effect.

This thesis is organized as follows: Chapter 2 reviews the literature regarding the *theoretical framework* on the relation between inflation and market structure, the *findings of previous empirical research*, and *the pricing behavior of Turkish manufacturing firms*, Chapter 3 introduces static panel data framework, Chapter 4 outlines dynamic panel data techniques, Chapter 5 presents the empirical findings. Last chapter concludes.

CHAPTER 2

LITERATURE REVIEW

This chapter presents a summary of literature centering around mainly on three issues. First, studies suggesting possible theoretical links on the nature of the interaction between sectoral competition and inflation are reviewed. Next, in order to assess the real experiences, the findings of preceding empirical studies are summarized. Lastly, previous research giving insights on price setting behavior of the Turkish firms is outlined.

2.1. Theories on the Nature of the Relationship between Inflation and Competition

Regarding the discussions on the nature of the interaction between inflation and sectoral competition, it is possible to find out arguments suggesting that enhancement of competition might have disinflationary effects, as well as, arguments implying that enhanced competition may not be necessarily accompanied by lower inflation[3].

One of the theories relating changes competition level with the changes in inflation is *Dynamic Inconsistency Theory*. The theory basing on the studies of Barro and Gordon (1983), and Kydland & Prescott (1977) and being revived in Neiss (2001), Cavelaars (2003), and Przybyla and Roma (2005), operates through monetary policy channel.

[3] See Table A.1. for a summary.

It is suggested that under discretion, inflation is sub-optimally high and central banks have an inflation bias, measured by the gap between potential and actual output growth. This output gap forces central banks to pursue inflationary policies. In the existence of product market imperfections and rigidities, the gap between potential and actual output increases, which puts more pressure on central banks to inflate (Cavelaars, 2003, p.72 and Przybyla and Roma, 2005, p.9).

Theoretically a loss function of the form,

$$L = \frac{1}{2}\left[\pi^{2} + \lambda(y - \theta y^{*})^{2}\right] \qquad [2.1.1]$$

would hold, where, ´ is the rate of inflation in the economy, y and y* are actual and potential output growth, ə is the parameter defining central bankŝs priorities, while ***d*** measures the level of distortions in the economy[4]. Central bank would make an optimization by the central bank yielding the fastest growth and the lowest inflation.

In this setting there may be many sources of distortion. Discretionary taxation, imperfect competition in the goods market, rigidities stemming from factor markets may all be influential. Optimization by the central bank will give following condition

$$\pi = \lambda y^{*}(\theta - 1) \qquad [2.1.2]$$

The evident conclusion from the optimization condition above is $d\pi/d\theta > 0$ which means lower rate of inflation is possible with less rigidity. Since poor competition structure is a form of rigidity, increased competition is expected to contribute fighting inflation (Cavelaars, 2003, pp.72-3 and, Przybyla and Roma, 2005, p.9). Generally, DIT constitutes

[4] The assumptions regarding the parameters are: ə > 0, d > 1.

the central pillar of the theories proposing possibility of attaining lower inflation via enhancement of competition.

Following the premises of DIT, a second theoretical explanation suggested for why reduced competition in the form of increased concentration would lead to higher inflation, centers on the *political economy of concentration and central bank independency*.

The framework suggests that, if central bank is less independent, the tendency to inflate via placing an emphasis on output gap becomes more severe. Less independent central bank is more prone to the interest of politicians, and politicians are lobbied by powerful groups. Therefore, if concentration increases, powerful groups may manipulate politicians more effectively, who in turn may manipulate the central bank. The central bank willingly or unwillingly may give a greater priority to output gaps. If priority of central bank changes in favor of output gaps, then rigidities in product markets may be more influential on the level of inflation. It is, therefore in the interest of both central banks and politicians to pursue policies enhancing product market competition (Cavelaars, 2003, pp.70-1).

On the other hand, alternative theories implying enhanced competition in the markets may not necessarily be accompanied by lower inflation levels, have been devised as well. One theory in this fashion relates *market structure, wage inflation and coordination problems in product markets.*

Following this framework, Qualls (1981) tries to test the assertion that concentrated industries contribute to the wage inflation in the economy. In his theory, he assumes two types of sectors in the economy: *competitive* and *oligopolistic*. The wages earned in these sectors be w_c and w_o respectively. Since prices of the factors used in the competitive sectors would follow business cycle fluctuations, w_c will also fluctuate

such that it will increase in expansionary periods, and contract in recessionary periods. Conversely, oligopolistic firms will be operating under conditions of *oligopolistic dependence*. While shaping their strategies, they will take possible reactions that will be received from other firms operating in the market into consideration as well. Therefore, with the fear of initiating price wars, they will be reluctant to make changes in prices. In this setting, they will be trying to smooth the expenses and make the production process and costs involved as predictable as possible. What follows is that to avoid price changes triggered by altered factor prices, these firms will be eager to pay a premium to labor over the competitive wage level. Therefore, immediate conclusion will be that $w_o > w_c$. However, similar to Keynes (1936)[5] who posit the argument that workers compare their wages to the wages of workers in other sectors, it is assumed that workers in concentrated industries will react to the convergence of wages earned in two sectors and will demand an increase. Under the assumption of equal bargaining power, this is expected to initiate a wage-inflation spiral, suggesting a link between concentration and not only inflation but also stagflation (pp.345-6)[6].

Nevertheless, Qualls (1981) also emphasizes that; *the fragility of pricing coordination* should be more relevant for industries of medium to low concentration rather than those of high concentration. This follows from the basic idea that coordination problems become more visible as the number of actors in the market increases. More actors in the market will mean more information need to be harvested, and more parties to be

[5] *..In other words, the struggle about money-wages primarily affects the* distribution *of the aggregate real wage between different labour-groups, and not its average amount per unit of employment, which depends, as we shall see, on a different set of forces. The effect of combination on the part of a group of workers is to protect their* relative *real wage. The* general *level of real wages depends on the other forces of the economic system. (Chapter 2, part III).*

[6] This theory is known as *concentrated industry-wage stability hypothesis* (Qualls, 1981, 345).

monitored and trusted. On the other hand, uncertainties and informational problems will not be characteristic of highly concentrated industries with few competitors. In more concentrated industries policies such as expenditure smoothing to facilitate coordination is of secondary importance, as coordination is maintained automatically.

Therefore, the idea that it is the low concentration industries seeking price stability rather than high concentration industries, presents a contrast with the general prediction that sectors with high concentration are the sources of rigidities in the economy.

Similarly, Coricelli (2007) suggests that enhancement of competition would bring out intensified coordination problems. The idea is that atomistic firms exhibit hoarding behavior in identifying their pricing strategies. Following a shock, primary reaction of the firms in competitive markets is to base their strategies on the prices of their rivals. Therefore, in more competitive markets, once disturbed, as in the case of a change in the monetary policy or a supply shock, steady state is difficult to attain back. On the other hand, free of coordination problems, following a shock, oligopolistic markets return to steady state faster and easier (Coricelli, 2007, pp.258-61). If the assertion is true, then it is not oligopolistic markets but rather competitive markets that create rigidities. Thus, there is no reason to have an expectation that as markets become more competitive, the inflationary pressures decline[7].

[7] Evaluation of the assertion presented by Qualls (1981) and Coricelli (2007) is particularly important for the evaluation of the DIT. It should be recalled that DIT is one of the most profound theories for establishing a permanent and possible relation between competiveness and inflation. As mentioned earlier, the primary notion of the DIT is the idea that when there are rigidities in the market, the potential and the actual output deviates from each other. In such a setting, monetary authorities have a tendency to inflate. Thus, as markets become more competitive, the gap between potential and actual output narrows, and inflationary tendencies are reduced. Hence, as competitiveness increases, permanent reductions in inflation become possible. Conversely, the claim here is; it is the competitive markets that create rigidities steaming from information problems.

Another theoretical explanation for the nature of the relationship between competition and inflation provided by Eckard (1981) is based on the merits of competition. The competition in concentrated industries may take the form of cost reductions through increases in productivity. If innovative firms are within the group of firms that have the market power, concentration ratio will rise, while inflation falls. However if innovative firms are those lacking market power, a decline in concentration together with a decrease in inflation will be observed, as innovative firms that lack market power will cause erosion on the market shares of the bigger firms. Eckard suggests that when firms compete on the merits of productivity, the level of competition in the market is simply irrelevant in the determination of inflation:

> *The evidence suggests that a policy of increasing concentration would be effective in easing inflation as a policy of decreasing concentration, which is to say not very effective as all (p.1050).*

An alternative setting is provided by Benabou (1988, 1992), which is also reviewed in Jones and Laudadio (1990) and Caglayan et.al., (2008), with the implication that, contrary to the general understanding, it may be sectors with a lesser level of competition in which inflation level may be lower.

Jones and Laudadio (1990), divides the markets into two according to the continuum of the relation between the buyer and the seller. First type of markets is *the auction markets*, in which the price is the primary criterion, there is no product differentiation, and since there are many buyers and sellers each seller and each buyer probably meet once. The second type of markets is *the customer markets* in which, product differentiation exists up to a point, and there is a continuum of buyer-seller relationship. It is suggested that in customer markets it is in the benefit of both parties to continue an existing interaction instead of

searching for alternatives. As long as buyer is confident that a fair price has been suggested, the costs involved in the search process will not be endured. Similarly, as long as buyer continues its relation with the seller, the seller will also be better off, as a predictable stream of transactions will make planning easier, and reduce costs of holding inventories (Jones and Laudadio, 1990, 1626).

Caglayan et. al. (2008) proposes that under the assumption of a positive inflation, all firms competitive or monopolistic will have to review and change their prices at some point of time. However, changing prices will mean bearing some costs such as the costs endured during the decision of what would be the optimal price, or costs that will be endured after the optimum price is determined such as; informing the staff, re-printing price lists etcé On the other hand, firms, as their real prices are eroded due to the positive and persisting inflation, will be suffering a loss due to divergence from the profit maximizing condition.

A rational firm will have to optimize such that it will change prices, when the cost of not doing so, exceeds doing so. In other words, when loss incurred by erosion due to inflation exceeds the menu costs, firm will change the price (Caglayan et.al., 2008, pp.1189-90).

Nevertheless, when setting a new price, a firm operating in a customer market will not only consider costs. If price alterations are perceived by its customer as *unfair*, then the customer may decide to search for other providers. Therefore, although it may be rational at the short run to change the price, by taking possible future sales which the seller face the risk of loosing into consideration, the seller may be tempted to keep the low price for a while and make a sacrifice from its short-run profits. This reluctance to increase price is particularly important when the seller believes that the endured shock is temporary. Therefore, at the end, the shocks that may create inflationary pressures in auction markets may be

mitigated by the profit sacrifices of the sellers. Given that it is the customer markets in which product differentiation exists up to a certain level, it may be the case that, sectoral inflation in more competitive markets instead of less competitive markets is higher (Jones and Laudadio, 1990, pp. 1626-7)[8].

Another argument on the interaction between competition and inflation is brought by Cavelaars (2003) and is related to the economies suffering from high inflation and high interest rates. It is suggested that the direction of causality between competitiveness of the markets and inflation may be decisive in these cases.

The reasoning of Cavelaars (2003) is that in the instances where high inflation is associated with high interest rates, owners of capital may be demanding a better return for their investments and accordingly to offset incentives to shift between financial sector instruments and real sector, share of capital in production would increase in disfavor of labor's share. Therefore, since mark-up is a proxy for the level of competition, it is possible that causality may be running from inflation to competition at the sectoral level[9].

To sum up the arguments, on the one side; *dynamic inconsistency theory*, and *concentrated industry/ wage stability hypothesis* back up the proponents of the enhancement of competition for disinflationary purposes. On the other side, theories related to *the fragility of pricing*

[8] Nevertheless, Jones and Laudadio (1990) provide an exception for the functioning of this mechanism. It is suggested that if the shocks are anticipated by every agent in the economy, become permanent or repeated, and the seller is certain that price increases that will be passed on to the customer will not be perceived as "*unfair*" by the buyer, the seller will be tempted to make the price increase. As the risk of being condemned as unfair decreases, sellers may begin to ignore the perceptions of their customers (p.1626-7).

[9] Cavelaars, warns that may be an outcome only under asymmetric bargaining power between firms and workers. If the bargaining power is symmetric then, labor unions would press for obtaining an acceptable share from income, which would offset the demands of the holders of capital.

coordination in competitive markets, *merits of competition,* and *the nature of the markets; customer markets vs. auction markets* suggest that enhanced competition may not be necessarily imply lower inflation. As discussions related to the theoretical framework on the relation between competition and inflation points out, it is possible to find out arguments suggesting both enhancing competition may or may not mean lower inflation.

2.2. Empirics of the Relationship between Inflation and Competition

The policies basing on the assertion that competition policy can be utilized in the pursuit of enhancement of competition in the markets thereby it can be a tool with in the context of disinflationary programs, began to be seen in the government agendas in the late 70ûs and early 80ûs. Therefore, empirical works centering on the issue also date back to more or less the same period. Nevertheless, the skepticism of the academic environment in earlier years is particularly visible.

Gisser and Johnson (1978) covers US private sector for the period of 1967-1978. A two-good general equilibrium model with a Cournot competition is constructed under the assumptions of a single exhaustible factor of production and existence of identical firms. Demand for each product is found to be a function of price elasticity and number of firms operating in the market. Here, it is claimed that:

> *the act of reducing concentration, if successful is likely to have little impact on the consumer price indexé é [O]nly as the oligopolistic sectors become completely monopolized will there be significant increases in the consumer price index (Gisser and Johnson, 1978, pp.1377-81).*

In another study skeptical about disinflationary benefits of competition enhancement, Eckard (1981) constructs an index of inflation computed as a weighted summation of changes in value added by all sectors of the economy. Inflation index is constructed for 4-digit Standard Industrial Classification[10] (SIC) industries in US manufacturing sector according to three distinct periods, 1958-63, 1963-67, and 1967-72. Then, oligopolistic sectors, defined as having a four-firm concentration ratio (CR4) ratio beyond 50, at least in one of the boundary years are specified.

Considering the correlation between changes in the index and changes in the concentration levels, Eckard (1981) interprets that the results indicate that it is *the magnitude* of the concentration change rather than *the direction of the change* that is correlated with the price index.

Qualls (1981) links industrial structure to inflation with a focus on labor markets. In the study the assertion that concentrated industries contribute to the wage inflation in the economy is tested versus the alternative that ñ*the fragility of pricing coordination*ò should be more relevant for industries of medium to low concentration as, coordination problems increase with the number of actors in the market.

With an orientation to test both arguments, Qualls (1981) conducts an econometric analysis covering the period of 1958 ï 1972 and 79 SIC 4-digit US Manufacturing Industries. If wages in less concentrated sectors are more flexible, then in these sectors wages are expected to be lower in recessionary and higher in expansionary periods compared to more concentrated sectors. The deviation of the sectoral wage from the trend, is expressed as a function of CR4, quality of the entry barriers (high vs. low), nature of the goods in question (durable vs. consumption), and income elasticity.

[10] A classification used by US Census Bureau, and replaced with North American Industrial Classification system in 1997.

The findings indicate only in 1967-72, the assertion that less concentrated industries have more flexible wage relations is confirmed. Even then, the suggested relationship is not significant. For 1958-63 and 1966-67 periods, the coefficients have the opposite sign with the prediction and are statistically significant.

As previously mentioned, there is merely a contrast in the implications of earlier studies compared with the implications of more recent ones. Contemporary work seems to support the assertion that reductions in inflation can be achieved via enhancement of competition.

One recent study in this fashion is Neiss (2001) which is oriented to test DIT empirically for OECD countries for the 1973-1988 period. In the analysis, unanticipated inflation is related to openness, mark-up, growth of GDP, and growth of per capita GDP. Neiss uses the mark-up[11] as the proxy for the level of competition in the market. The findings indicate that mark-up is particularly significant in explaining unanticipated inflation. This relation seems to last as openness, country size and, total imports are included in the model (pp.579-85).

Following Neiss, Cavelaars (2003) also tests the assertions of the *DIT*, via a cross country estimation covering 21 OECD countries for 1988 ï 2000 period. Inflation is expressed as a function of GDP per capita, and an indicator of central bank independence, fiscal balance, and mark-up which is used as an indicator for the level of competition. Cavelaarsô findings, similar to Neissô seem to confirm the predictions of *DIT* that permanent reductions in inflation are possible via more competitive markets. Accordingly, for a country like Holland, reduction of mark-ups from 1.92 to 1.75 pulls inflation trend from 2.8 to 1.7 (Cavelaars, 2003, 79).

[11] Mark-up is computed as the inverse of labor income share.

In a similar vein, Przybyla and Roma (2005) investigate the relationship between inflation and competition in three different models for a sample of 15 EU countries, for the period 1980-2001. The first model relates inflation to mark-up, money supply growth, growth of personal income, openness and output growth. The second model relates inflation to profit margins instead of mark-ups, and the third model, acting as an unrestricted model includes mark-ups, personal income growth, central bank independence, economic regulation, regulation of competition, barriers to competition and state control.

Findings of this study suggest that an increase in competition in a particular sector that will reduce mark-ups by 10 percent will cut down long-term sectoral inflation on average by 0.1 percent. However, an economy-wide equal reduction in mark-ups would reduce long-term inflation by 0.6 percent. It is suggested that competition may be influential in inflation as sectors closed to the competition are advocated to be the essential cause of the inflation differentials within the EU.

2.3. Insights of Pricing Behavior of the Turkish Manufacturing Firms

Covering the theoretical framework and the empirical analysis conducted, within this framework, next challenge is to get insights about price setting behavior for the Turkish manufacturing firms. To conduct an empirical analysis related to their pricing strategies, there is a need for defining the variables that is taken into account while taking pricing decisions.

In this regard, there are two possible sources to work through. In 1990ôs one of the ongoing debates related to international macroeconomics was whether globalization or increased openness is contributing to the fulfillment of disinflationary goals. As an extension of this debate, some

research has been conducted in Turkey as well. These studies constitute a valuable source in understanding the dynamics of the pricing behavior in Turkey. The variables that have been set out in these studies will also be helpful in the construction of empirical framework for this thesis. Kivilcim et.al. (2000) Yalcin (2000), and Culha and Yalcin (2005) are the primary sources utilized in this manner.

The second source that will expose price setting patterns is the survey conducted by CBRT in 2005. Although the primary motivation of this survey is exploring the phenomenon of price rigidity in Turkish manufacturing industry, since it also uncovers the pricing strategies and variables governing these strategies, the survey provides a sound ground for empirical analysis that will be conducted in the following chapters of this thesis.

Kivilcim et. al., (2000), investigates the relation between price cost margins (PCM) and concentration, although the primary intention is to analyze the effects of import liberalization on PCM. The study covers the period 1980 ï 1996, and 29 Turkish Manufacturing Sectors at the 3-digit level classified in ISIC Rev. 2. A simultaneous equations model is utilized in the study. The results suggest that openness[12], CR4, and real wages are effective in the determination of mark-ups by manufacturing firms. The findings also indicate that, concentration ratio seems to be explanatory in the pricing decisions. One percent increase in the concentration is expected to lead a 0.18 percent increase in prices[13].

[12] Ratio of imports and exports to sectoral value added.

[13] Kivilcim et.al. (2000) also suggests that Turkish manufacturing sector exhibits Sraffian dynamics. Increases in the wages do not induce firms to make sacrifices from PCM. Instead, via immediate fine-tuning in prices, increases in wages are passed on to consumers. The evidence suggests that firms use wage increases as an excuse to increase PCM. The amount of increase in prices tends to *overshoot* the increase in wages.

Yalcin (2000) focuses on Turkish Manufacturing Sector at the ISIC 4-digit level for the period of 1983-1994, aiming to find out why increased imports, which can also be regarded as increased competition on domestic markets, are not accompanied by narrower profit margins in practice. PCM is expressed as a function of CR4, imports, exports, intra-industry trade, minimum efficient scale, productivity, capital requirement, value added growth, advertisement, sectoral inflation, wage sale ratio, labor skills, research and development. The findings indicate that level of sectoral exports, advertisement, scale, and labor productivity seem to be insignificant in explaining profit margins.

One particularly important finding of Yalcin (2000) is, for sectors with low initial level of concentration, the level of sectoral imports has negative influence on PCM, while for sectors with high level of concentration sectoral imports seems to *increase* PCM.

Similarly, Culha and Yalcin (2005) relates PCM to output gap, market share at the firm level, import penetration, interest income, export share, productivity, indebtedness, and exchange rates, In their study covering the period of 1993 ï 2003 for Turkish Manufacturing Industry at ISIC 4-digit level, it is claimed that trade liberalization in Turkey has failed to reduce the influence of mark-up pricing. Firms with foreign partners and firms with high market shares seem to be operating with highest PCM[14].

One implication of the studies focusing on the impact of openness in Turkey is that process of import liberalization had a limited, and in some cases unpredictable effect on the economy. Increased exposure to imports, in some sectors had no effect on the mark-ups, while in some sectors it raised mark-ups. The firms over which imports had a

[14] Two explanations are suggested for the emergence of this phenomenon. First, foreign firms may be choosing to engage in partnership with establishments having a considerable influence in the market, second, they may be choosing to establish exclusive networks. Both strategies may alleviate competitive pressures on the new entrants.

constraining effect are suggested to be smaller ones. It is claimed that in many cases, openness fail to generate expected erosion in profits.

This phenomenon is also explicitly expressed by Durmus Yilmaz, governor of the CBRT:

> ***é*** *the studies conducted by central bank indicate that competitive pressures exerted by imports are not sufficient in the reduction of the PCM in Turkish manufacturing industry. This phenomenon is especially visible for sectors in which there are firms holding high market shares or concentration ratios are high (quoted in TCA, 2008, 11).*

As mentioned earlier at the beginning of this section, the secondary source that should be taken into consideration is the survey conducted by CBRT, which is explanatory for the issue of how the pricing strategies are constructed in manufacturing sector. Some implications of the survey may be summarized as follows:

- ï Firms claim that the primary factor in pricing decisions is the costs involved in the production. Similarly, exchange rate shocks, changes in demand, are taken into consideration as well. The increases in the prices of the imported inputs seem to be transmitted to product prices to a greater extend, compared to the price increases in domestic inputs. Similarly, changes in the energy prices seem to be explanatory in price strategies as well.
- ï Initial reaction of the firms to increases in demand is to expand production[15], secondly, firms chose to shrink their inventories, only after then prices are increased.

[15] First method in expanding production is overtime employment, second is extra shifts, and third is increasing employment. The same initial reaction is seen in UK firms as well. See Hall et.al. (2000).

- Firms have a threshold level for exchange rate appreciation. Before passing the appreciation to prices, firms want to see that the change in the exchange rate is greater then that threshold. 7.5 percent appreciation is required to increase prices around 5 percent. Similarly, when exchange rate depreciates 7 percent prices are reduced 4 percent. 66 percent of the increase in exchange rate and 57 percent of the decrease in exchange rate is passed on to the prices.
- In manufacturing, primary costs are imported raw materials and inputs, with a weight of 36 percent, followed by domestic raw materials and inputs with 32 percent, labor with 12 percent, electricity, gas and water with 6.6 percent. Other costs constitute 13 percent of the total.
- 46 percent of operating expenses of the firms is denominated in foreign currencies, while 54 percent is denominated in domestic currency. The correlation coefficient between foreign currency denominated expenses and imported inputs and raw materials is 0.76.
- The findings of the study indicate that 36 percent of the firms in Turkey adopt some sort of indexation in pricing decisions. Following a dominant firm also have a considerable weight. Moreover, 68.2 percent of manufacturing firms adopts state dependent pricing[16],
- In Turkey, coordination problems[17] seem to be increasing as competition increases (p.64). Moreover, the impact of exchange

[16] The pricing behavior of firms may be divided into two categories. First one is time dependent pricing, in which firms review prices on a predetermined regular basis, and change prices if it is necessary. In state dependent pricing, firms review prices immediately after some important change in the market occurred and make price changes if required. According to the responses from the survey, 31.8 percent of the firms review prices only periodically.

[17] Coordination problems stem from reluctance of firms to adopt the best pricing strategies, due to information problems, particularly about rivals or consumers. For instance, firms with the fears of loosing customers, or initiating a price war may be

rate or inflation expectations decline as the market becomes more competitive.

restrained from increasing prices when price increase is needed due to lack of coordination. This phenomenon is elaborated in the Section 2.1. in detail.

CHAPTER 3

STATIC FRAMEWORK

In this chapter, the aim is to lay down the theoretical framework for a static panel data analysis. In Section 3.1 and 3.2, an outline of the panel data methodology, and fixed and random effect estimation methods are presented.

3.1. Panel Data Methods

Panel data applications, dating back to 1960ôs[18], bring new features to the econometric analysis. The advantages of panel data methodology are summarized by Baltagi.

According to Baltagi (2002, pp. 5-7) main benefits that arise from utilization of panel data econometrics are the following;

1. *Individual heterogeneity is easily controlled:* In estimation process an investigator may be facing a pool of heterogeneous observations in the sense that, states, sectors, firms, or individuals may be differing from each other according to many factors, such as religion, custom, production technology, quality of management, education etc... These characteristics exhibit little or no propensity to change in time. Similarly, policies, affecting not only some cross sections but entire population such as nation wide legislations may be influential across every cross section exogenously and significantly. These so-called

[18] Gujarati (2003), 637.

ñ*state and time invariant characteristics*ò are exploited better via panel data methods.

2. ñ*Panel data provides more information, more variability, more degrees of freedom and more efficiency.*ò The likelihood of suffering multicollinearity is significantly lower in panel data, compared to time series. Additional variability provided by cross section dimension makes the data more informative, thus more reliable estimations become possible.
3. ñ*Panel data are better able to study the dynamics of adjustment.*ò Phenomena such as phases of unemployment and poverty or effects of the changes in the economic policy may be reflected better via panel data tools.
4. ñ*Panel data are better able to identify and measure effects that are not simply detectable in pure cross section or pure time series data.*ò Utilization of panel data may reveal qualitative dimensions of a quantitative change. It becomes possible to identify whether, say an increase in private investment is a result of every firm or some certain firms investing more.
5. Since, many variables are measured better in micro level compared to macro level, ñ*biases resulting from aggregation over firms or individuals are eliminated*ò.
6. As an interaction of all these, panel data models ñ*allow* [the investigator] *to construct and test more complicated behavioral models than purely cross-section or time-series data*ò.

On the other hand, there are limitations of the panel data as well. As Baltagi suggests, *problems in design and data collections* especially in the construction of panel surveys, *measurement errors* committed and *selectivity problems* encountered in the process of information gathering and particularly *short time series dimension* seem to be the main limitations (2002, 7-9). However, panel data methods remain to be valuable tools in econometric estimation.

Nevertheless identifying the proper methodology is of particular importance in order to exploit benefits of panel data. In the next section, alternative estimation techniques will be discussed.

3.2. Evaluation of the Data Structure in Panel Data Applications

As in time series analysis, it is now common practice to apply unit root tests in panel data analysis, as long as the time dimension of the data is long enough (Verbeek, 2003, 389). Levin and Lin (1992), Im, Paseran and Shin (1997), Maddala and Wu (1999), Choi (1999) and Hadri (1999) represent some major works for the application of unit root tests in panel applications[19].

Panel data unit root tests employ the following auto-regressive model:

$$y_{it} = \alpha_i + \gamma_i y_{it-1} + \mu_{it} \qquad [3.1]$$

where i represents the cross-section and t represents time period. After subtracting y_{it-1} from both sides, same equation can be formulized as:

$$\Delta y_{it} = \alpha_i + \pi_i y_{i,t-1} + \mu_{it} \qquad [3.2]$$

where, $\pi_i = \gamma_i - 1$. The null hypothesis is that series exhibit unit root, which is formulated by $H_o : \pi_i = 0$.

According to the framework set by Maddala and Wu (1999), the alternative hypothesis is that $H_A : \pi_i < 0$. The test methodology bases on

[19] In this study, following the approach of Maddala and Wu (1999) Fisher ADF and Fisher PP unit root tests are conducted. For a detailed discussion related to alternative panel data unit root tests, See Baltagi, (2002, pp. 235-243).

the cummulation of the p-values of the unit root tests related to N cross-sections, which can be formulized as;

$$P = -2\sum_{i=1}^{N} \log p_i \qquad [3.3]$$

and is expected to have chi-square distribution, with *2N* degrees of freedom. Evidently benchmark statistic for each cross-section is set as; ADF, for Fisher ADF test and PP, for Fisher PP test. A large value is interpreted as; a rejection of the null hypothesis that series exhibit unit root[20] (Verbeek, 2008, pp. 390-392).

3.3. Static Linear Panel Data Models

As discussed earlier, panel data is essentially cross-sectional data that is pooled together for a certain period of time with equal intervals.

A simple model for such a set of data would be:

$$y_{it} = \alpha_0 + x_{it}^{'}\beta + \mu_{it} \qquad [3.4]$$

where i refers to any of *N* cross sections, t denotes any of *T* time periods, and x_{it} is a vector of K dimensions, composed of explanatory variables.

The model suggests that neither intercepts nor slope coefficients vary over time or cross sections. Holding them constant on both dimensions,

[20] Choi (1999) also devises a similar test statistic. Known as Choi Z statistic, it is calculated by cumulation of p-values for of the unit root tests related to N cross-sections. The method of testing proposed by Choi (1999) and Maddala and Wu (1999) is called *combining p-value tests* in general.

the error term μ_{it}, is supposed to capture all unobservable factors that are not included in the model[21] (Verbeek, 2008, 356).

In the next section, two of more preferred alternatives, namely fixed effect and random effect models will be presented. In both cases, the attempt to enrich the model with variation will be fulfilled via introducing variability to intercepts. The models that are providing variability in slope coefficients are kept out of the scope of this thesis.

3.3.1. Fixed Effects Estimation

In a setting described above, fixed effects estimation is ñ*simply a linear regression model in which the intercept terms vary over the individual units (Verbeek, 2008, 359).***ò** The model can be formulized as follows,

$$y_{it} = \alpha_i + x_{it}^{'} B + \mu_{it} \qquad [3.5]$$

where $\mu_{it} \sim IID\left(0, \sigma_{\mu}^{2}\right)$.

The attempt of differentiating every cross section can be fulfilled, via introducing a dummy variable for each cross section, as in the following equation:

$$y_{it} = \sum_{j=1}^{N} \alpha_i d_{ij} + x_{it}^{'} \beta + \mu_{it} \qquad [3.6]$$

where, $d_{ij} = 1$ if *i* = *j* and zero elsewhere. Therefore, the model ends up having N dummy variables (Verbeek, 2008, pp.359-60). Estimation of

[21] Although these assumptions are simplistic, their restrictive nature may distort the nature of the relationship between dependent and independent variables (Gujarati 2003, 641).

this model by Ordinary Least Squares is therefore called Least Square Dummy Variable (LSDV) estimation.

Notice that another way to eliminate individual effects is to use *time-demeaned variables* in the model. By taking means with respect to time,

$$\bar{y}_i = \alpha_i + \bar{x}_i + \mu_i \qquad [3.7]$$

where $\bar{y}_i = T^{-1}\sum_{t=1}^{N} y_{it}$, and the same holds for μ_{it} and x_{it} as well. Time-demeaned version of y_{it} would give the following;

$$\left(y_{it} - \bar{y}_i\right) = \left(x_{it} - \bar{x}_i\right)'\beta + \left(\mu_{it} - \bar{\mu}_i\right) \qquad [3.8]$$

The estimation performed by *de-meaning transformation* is called as; *within transformation* or *fixed effects estimation*[22] and estimators obtained are exactly the same as the estimators in LSDV Estimation (Verbeek, 2008, 360).

Fixed Effects Estimation is preferred when the focus is on a set of cross-sections and the desire is to make inferences about that set of cross-sections. In contrast, it may not be preferred if the aim is generalizing for the entire population based on a sample (Verbeek, 2008, 367).

The fixed effects estimation operates in a setting where the explanatory variables are strictly exogenous and under the assumption that error terms are uncorrelated with explanatory variables in entire period of analysis. Nevertheless, in fixed effects estimation, for individual time periods the assumption of strict exogenity is relaxed, as correlation between α_i and explanatory variables is allowed.

[22] Also known as *covariance model* (Gujarati, 2003, 643).

This basically stems from the nature of α_i and the estimation process. All time-invariant variables allowing variations in qualitative dimensions such as; ethnicity, the level of education, demographics, gender etcé are swept away in time-demeaning process. This constrains the utilization of these variables in fixed effects estimations. In this setting, α_i does not represent an exception as well. As mentioned earlier, α_i corresponds to the cross-section specific factors that do not change over time[23].

Therefore, during transformation, similar to other qualitative factors that are constant over time, α_i is also swept away. Actually, this is the desired outcome of the estimation process, as in many cases there is a suspicion that these historical features are correlated with explanatory variables (Wooldridge, 2003, 462).

On the other hand, if this is not a justified suspicion, meaning, in reality, α_i is not correlated with explanatory variables, then acting as it is, would be undesirable as well. Since this would be imposing an unrequired restriction, the estimators of the model would be inefficient.

The suspicion of possible correlation between α_i and explanatory variables, and the concern of producing inefficient estimators comprise the border between fixed effects and random effects estimation, which is discussed in the next section.

[23] To illustrate, in an effort of explaining the role of unemployment in city crime rates, α_i would represent factors such as geographical or demographic features, the differences in the methods of crime reporting, different attitudes against crime, all of which does not change in time or change sluggishly (Wooldridge, 2003, 439).

3.3.2. Random Effects Estimation

Instead of trying to capture unique characteristics of the sectors, random effects model initiates from the idea that, factors affecting the dependent variable may be caught by random error term (Verbeek, 2003, 364).

The corresponding model is as follows:

$$y_{it} = \beta_o + x_{it}^{'}\beta + \alpha_i + \mu_{it} \qquad [3.9]$$

In random effects models, the error term is comprised of two parts. First part is specific to each cross section and is time invariant, while, the second part *does* vary over time, yet it is assumed to be uncorrelated. This is the reason why this model is also known as *error component model* (Gujurati, 2003, 648). Originating from the idea that α_i is independent of explanatory variables in entire time periods, random effects model includes all the assumptions of fixed effects model with the extra requirement that $Cov(x_{it}, \alpha_i) = 0$ (Wooldridge, 2003, 469).

In fixed effects model, the basic notion is recognizing the possibility of correlation between α_i and explanatory variables, and eliminating α_i. On the other hand, in random effects approach, the aim is to integrate unique characteristics of each cross-section to the error terms. The primary concern in this estimation is not particular values of some certain cross-sections. Therefore, when the aim is to make inferences about population characteristics based on the sample values, random effects estimation is suggested as a better tool (Verbeek, 2003, 367).

3.3.3. Choosing between Random Effects and Fixed Effects Estimations

As previously mentioned, the correlation between independent variables and the α_i represent the border between fixed effects and random effects approaches. Although fixed effects approach may allow for correlation, employment of too many dummies may cause serious losses in degrees of freedom especially for panels with short duration. Additionally, if the suspicion of correlation is not justified, by being overly restrictive inefficient estimators may be produced. Test proposed by Hausman (1978) provides a formal framework for choosing between fixed effect and random effect estimations.

Hausman test is constructed to find out whether α_i is correlated with explanatory variables which would imply testing existence of appreciable differences between fixed effects and random effects estimators. Test operates by testing whether the difference between fixed effects and random effects estimators, $\hat{\beta}_{FE}$ and $\hat{\beta}_{RE}$ is significant, which is formulated by the null hypothesis that:

$$H_o : p\lim\left(\hat{\beta}_{FE} - \hat{\beta}_{RE}\right) = 0 \qquad [3.10]$$

Under the null hypothesis test statistic follows an asymptotic chi-square distribution with K degrees of freedom, K being number of explanatory variables (Verbeek, 2003, pp.368-9). A large value of test statistic is interpreted as an indicator for the rejection of null hypothesis, and as a finding in favor of choosing fixed effects estimation[24].

[24] For an extension elaboration of how to conduct Hausman test, see Baltagi (2001) pp. 65-72.

CHAPTER 4

DYNAMIC FRAMEWORK

In this chapter the aim is extending the static framework that is presented in the previous chapter into a dynamic one. For this purpose theoretical foundations of dynamic panel data models will be outlined.

As expressed before, panel data models provide a better ground for studying the dynamics of adjustment. Moreover, panel data tools make it easier to construct more complex models with more complicated patterns of behavior. Since many economic relations are naturally dynamic in nature, dynamic panel data models are particularly important to exploit the benefits of panel data.

In a dynamic model, it is suggested that behavior in any time period depends on the behavior in previous periods (Verbeek, 2003, p.377). A simple dynamic panel model may be constructed as follows:

$$y_{it} = \delta y_{it-1} + x_{it}'\beta + \varepsilon_{it} \qquad [4.1]$$

In a static setting, the independent variables would correspond to the entire available information that is used in explaining y_{it}. Nevertheless, under dynamic modeling, inclusion of y_{it-1} would imply integration of *ñentire history of right hand side variables.*ò Thus, explanatory variables for the current period would *ñrepresent the effect of new information*ò (Greene, 2003, 307).

Even tough it may be fairly beneficial to include a lagged variable to the model, in this process some problems arise as well. Considering the dynamic model:

$$y_{it} = \delta y_{it-1} + x_{it}' \beta + \alpha_i + \mu_{it} \quad [4.2]$$

$$y_{it-1} = \delta y_{it-2} + x_{it}' \beta + \alpha_i + \mu_{it-1} \quad [4.3]$$

it immediately follows that time invariant variable α_i is present in every time period, forming a dependency between error terms and the lagged value of the dependent variable, and causing inconsistency in estimators.

In realization of this, first reaction would be sweeping α_i away. There are two alternative methods that can be employed for this purpose. First one is *time-demeaning:*

Let $\bar{y}_i = T^{-1} \sum_{t=1}^{N} y_{it}$, $\bar{x}_i = T^{-1} \sum_{t=1}^{N} x_{it}$ and $\bar{\mu}_i = T^{-1} \sum_{t=1}^{N} y_{it}$. This would imply:

$$y_{it} - \bar{y}_i = \delta (y_{it-1} - \bar{y}_i) + (x_{it} - \bar{x}_i)' \beta + (\mu_{it} - \bar{\mu}_i) \quad [4.4]$$

A second method is *first differencing* in the following sense:

$$y_{it-1} - y_{it-2} = \delta (y_{it-1} - y_{it-2}) + (x'_{it} - x'_{it-1})\beta + (\mu_{it} - \mu_{it-1}) \quad [4.5]$$

Even tough time-invariant variable has been swept out in both cases efficiently; there are other problems as well. Notice that regarding the time-demeaned equation, the mean of error terms $\bar{\mu}_i$ includes error terms from each period. Thus, unless, *T*, time period under consideration approaches to infinity, this creates a correlation between regressors and error terms. Similarly, in first differencing $(y_{it-1} - y_{it-2})$ is expected to be

correlated with $(\mu_{it} - \mu_{it-1})$. Therefore, in both cases the estimators are inconsistent with fixed and finite T values.

Nevertheless, alternative methods to overcome this problem have been devised as well. Finding an instrumental variable (IV) replacing $(y_{it-1} - y_{it-2})$ would be favorable (Baltagi, 2001, pp.129-131). The IV that will be used should be uncorrelated with the error term structure, $(\mu_{it} - \mu_{it-1})$ yet, should be correlated with $(y_{it-1} - y_{it-2})$.

Fortunately,

> *...in many cases panel data will provide internal instruments for regressors that are endogenous or subject to measurement error. That is transformations of the original variables can often be argued to be uncorrelated with the model's error term and correlated with the explanatory variables themselves and no external instruments are needed (Verbeek, 2008, 359).*

Various models have been suggested by previous research in deriving internal instruments in panel data applications. Arellano and Bond (1991), Arellano and Bover (1995), Ahn and Schmidt (1995), Blundell and Bond (1998) represent only some of the works in the field[25]. In this study, the analysis will be restricted to the studies of Arellano and Bond (1991), and Arrelano and Bover (1995).

In their study, Arellano and Bond (1991), attempt to devise new IVs. Consider the following model including lagged dependent variable as the sole regressor:

$$y_{it} = \delta y_{it-1} + \varepsilon_{it} \qquad [4.6]$$

where $\mu_{it} = \alpha_i + \mu_{it}$ holds. In difference form, the model transforms into:

[25] For an extensive discussion on studies in this field, see Baltagi (2003) pp.131-146.

$$y_{it} - y_{it-1} = \delta\left(y_{it-1} - y_{it-2}\right) + \left(\mu_{it} - \mu_{it-1}\right) \qquad [4.7]$$

For the period $t = 3$, the model implies that:

$$y_{i3} - y_{i2} = \delta\left(y_{i2} - y_{i1}\right) + \left(\mu_{i3} - \mu_{i2}\right) \qquad [4.8]$$

The problem for the above expression is the correlation between $\left(y_{i2} - y_{i1}\right)$ and $\left(\mu_{i3} - \mu_{i2}\right)$. Therefore, the challenge is finding an instrument variable that will be correlated with the former expression, and uncorrelated with the latter one. A variable in this fashion may be y_{i1}.

For the period $t = 4$ the expression will be:

$$y_{i4} - y_{i3} = \delta\left(y_{i3} - y_{i2}\right) + \left(\mu_{i4} - \mu_{i2}\right) \qquad [4.9]$$

In this case, in addition to y_{i1}, y_{i2} may also serve as an IV. Adding an extra variable in this fashion, in period t, the list of possible IVs extends to include $\left(y_{i1}, y_{i2}, ...y_{it-2}\right)$.

To express the same argument in more formal terms what Arellano and Bond (1991) suggests is introducing an extra moment condition, and extending the list of available regressors for every time period. As mentioned above, for $t = 3$ one possible IV is y_{i1}. This will require the fulfillment of the moment condition $E\left[\left(\mu_{i3} - \mu_{i2}\right)y_{i1}\right] = 0$. Similarly, for the proceeding time period $t = 4$, the set of possible IVs extend to include y_{i2}. Thus, for this period in addition to $E\left[\left(\mu_{i4} - \mu_{i3}\right)y_{i1}\right] = 0$, $E\left[\left(\mu_{i4} - \mu_{i3}\right)y_{i2}\right] = 0$ should be satisfied as well. In general terms, for a sample of t periods, the moment conditions may be expressed as $E\left[\left(Z_i'\right)\Delta\mu_i\right] = 0$, or, $E\left[\left(Z_i'\right)\left(\Delta y_i - \delta\Delta y_{i-1}\right)\right] = 0$, where Z_i is a diagonal

matrix of $(T-2)x(T-2)$ dimensions, composed of valid instruments for each period in respective row (Verbeek, 2003, 380).

The inclusion of exogenous variables does not make a significant change. If all explanatory variables are *strictly exogenous*; in the sense that $E(x_{it}, \mu_{is}) = 0$ for all *t*, and $s = 1,2...,T$, then all variables serve as valid instruments. On the other hand, if explanatory variables are *predetermined* rather then strictly exogenous, implying that the condition $E(x_{it}, \mu_{is}) \neq 0$ for all $s < t$, and zero otherwise holds, then only $(x_{i1}, x_{i2}, ..., x_{it-1})$ constitute the set of possible IVs for exogenous variables. This can be demonstrated as follows:

For the period $t = 3$,

$$y_{i3} - y_{i2} = \delta(y_{i2} - y_{i1}) + (x_{i3} - x_{i2}) + (\mu_{i3} - \mu_{i2}) \qquad [4.10]$$

while for $t = 4$

$$y_{i4} - y_{i3} = \delta(y_{i3} - y_{i2}) + (x_{i4} - x_{i3}) + (\mu_{i4} - \mu_{i3}) \qquad [4.11]$$

will hold. Therefore, for $t = 3$, x_{i1}, x_{i2} and for $t = 4$ x_{i1}, x_{i2}, and x_{i3} will be alternative IVs. Proceeding in this fashion, by adding an extra variable for each period, $t-1$ variables can be identified (Baltagi, 2001, pp.134-5).

Arellano and Bover (1995), attempt to extend the list of possible IVs. Also known as *forward orthogonal deviations* method,[26] and similar to Arellano and Bond (1991); method is devised to overcome the difficulties accompanying the utilization of a lagged endogenous variable, it focuses on panels where a linear relationship is suggested, the time period is moderate but number of observations is large, it is formulated to allow

[26] Alternatively, simply *orthogonal deviations.*

inclusion of independent variables that may not be strictly exogenous (Roodman, 2006, 1).

The starting point is the idea that there may be additional information available, that has not been employed, but can be integrated into the analysis. Arrelano and Bover (1995) try to exploit that information by imposing additional moment conditions (Greene, 2003, 308). Since algebra involved in the estimation and derivation is fairly complex, the estimation process is not reproduced here mathematically. Nevertheless, it is worth noticing that main difference between Arellano and Bond (1991) and Arellano and Bover (1995) is related to the method of transformation used. As outlined above, Arellano and Bond (1991) use first differencing as the method of transformation, while Arellano and Bover (1995) use ñ*forward orthogonal deviations.*ò In the latter one, the transformation is maintained by subtracting the mean of all available future observations instead of subtracting earlier periods from each observation (Roodman, 2006, 19).

CHAPTER 5

EMPIRICAL FINDINIGS

In this chapter the aim is making an empirical assessment of the Turkish manufacturing sector, building on the theoretical and empirical framework that have been outlined in the previous chapters. Section 5.1. introduces the data used, Section 5.2 presents the findings of both static and dynamic estimations, Section 5.3 interprets the results.

5.1. Presentation of the Data

Data used in the empirical analysis is mainly obtained from Turkish Statistical Institute (TURKSTAT). The data covers 62 manufacturing sectors classified according to ISIC Rev 2, and includes sectoral prices, output index, real wage index, CR4, sectoral export and import revenues at 4-digit level, capacity utilization index at 3-digit level, and import prices at 2-digit level. The sectors covered by the data are provided in the Table A.2.

Two main difficulties appeared in handling the data set. The first difficulty was the classification mismatch at the 4-digit level between CR4 and rest of the data.

One practical problem encountered when dealing with sectoral competition is the fact that it is difficult to find a proper index measuring the level and/or nature of the competition in product markets (Frederic

J[27], quoted in TCA, 2008, 35). Therefore the researcher is confined to use some proxies. Inspired from earlier studies[28], and from the simple logic of construction, CR4 has been specified as the proxy for sectoral competition. Nevertheless, there was a mismatch between classification systems that had been used by TURKSTAT in the construction of the data sets. CR4 was constructed according to the *ISIC Rev. 2*, while, all other sectoral indices was constructed according to *ISIC Rev. 3*.

Since *ISIC Rev. 2* is the narrower classification, and there are some sectors in *ISIC Rev. 3* that has no counterpart in the former one, the narrower index is chosen as the basis for the study. For harmonization of two different classification systems ñ*conversion tables*ò provided by TURKSTAT are utilized[29].

The second difficulty is related to the time-span. The data provided by TURKSTAT ends in year 2001. It should be kept in mind that, especially after 2001 crisis, Turkish economy has experienced a particular transformation. Many economic indicators some of which may be advocated to affect pricing decisions, have significantly improved and began to follow a more stable pattern compared to 1990ôs[30]. Unfortunately, ceasing in 2001, the data acts as a constraint for the

[27] The Chairman of the OECD Competition Commity.

[28] Particularly, see Qualls (1981), Eckard (1981), Kivilcim et.al. (2000), Jones and Laudadio (1991).

[29] See Table A.3. Although, in many cases there is a single correspondence for a sector in both classification systems, there may also be multiple correspondences in *ISIC Rev. 3* for a sector classified under *ISIC Rev. 2.* In cases where there are various correspondences, there is a need for a general method of collapsing multiple classes into one class. In this study, the method used to overcome this difficulty is to take arithmetic averages of the relevant classes. The classes that are grouped together in this fashion are provided in Table A.4.

[30] For a comparison of pre-2001 and post 2001 economic indicators, see the remarks of Sureyya Serdengecti, the former governor of CBRT. Governorôs presentations for the council of ministers for years 2004 and 2005 are particularly informative and available at http://www.cbrt.gov.tr/yeni/eng.

purposes of including recent transformation in the economy to the analysis.

The data regarding pricing, capacity utilization, concentration spans the period of 1988-2001[31], while output index and import prices are available after 1992 and 1995 respectively. Thus the analysis covers the overlapping period of 1995-2001. All 62 sectors, for which both price and CR4 data exist at 4-digit, are included in the analysis.

In identifying the variables that will be used, previous empirical studies are used as a starting point. Since, Sections 2.2 and 2.3 extensively discuss the earlier literature, Table 5.1 suffices to present an outline only.

Table 5.1: A Synopsis on the Explanatory Variables Used in Previous Research

Previous Work	Extend	Variables
Qualls (1981)	1958-1972 period, 79 US 4-digit sectors.	- Wage (Dependent) - CR4 - Level of entry barriers - Type of the good (durable goods vs. consumption goods) produced - Income elasticity.
Kivilcim (2000)	1980-1996 period, 29 Turkish manufacturing sectors at three-digit level, simultaneous equations.	- PCM - Concentration - Real wage - Openness - Real investment
Yalcin (2000)	1983-1994 period, Turkish manufacturing sectors at the 4-digit level.	- PCM (Dependent) - Imports, - Exports, - Intra-industry trade, - Minimum efficient scale - Productivity - Capital requirement - Value added growth - Advertisement - Inflation - Wage sale ratio - Labor skills - Research and development

[31] Actually, data regarding concentration is available as early as 1980, yet pricing data is available only after 1987, and capacity utilization data is available only after 1988 at 3-digit level.

Table 5.1: (Continued)

Culha and Yalcin (2005)	Firm level study covering 1993-2003 period Turkish manufacturing sectors at 4-digit.	- PCM (Dependent) - Output gap[32] - Market share - Import penetration - Interest income - Export share - Productivity - Indebtedness - Exchange rates
Neiss (2001)	Cross-country study covering OECD countries and 1973-1988 period.	- Inflation (Dependent) - Openness - Mark-up - GDP growth - Growth of per capita GDP - Central bank independence
Cavelaars (2003)	Cross-country study covering OECD countries and 1988-2000 period.	- Inflation (Dependent) - Mark-up - Openness - Size of the economy - GDP per capita - Fiscal balance - Central bank independence
Przybyla and Roma (2005)	Cross-country study covering 15 EU countries and 1980-2000 period.	- Inflation (Dependent) - Mark-up, - Openness - Money supply growth - Growth of personal income - Output growth
CBRT Survey (2005)	Survey results regarding pricing behavior of Turkish manufacturing firms.	- Imported raw materials - Domestic raw materials - Labor - Energy prices - Exchange rate shocks - Changes in demand.

Table 5.2 presents the variables that are used in this study inspired from previous work and taking the primary goal of this thesis into consideration.

[32] Output gap and import penetration are measured at sectoral level, while all other variables (except exchange rate) are measured at firm level.

Table 5.2: The Variables Used in the Study

Variable[33]	Abbreviation	Content
PRICE	PRICE	Sectoral prices at 4-digit level
CONCENTRATION RATIO	CR4	Sectoral concentration at 4-digit level. Computed by summation of market shares of the top four firms in the market.
ENERGY PRICE	P_ENERGY	Energy prices.
IMPORT PRICE	P_IMPORT	Price index for imported goods at 2-digit level.
IMPORT VOLUME	IMPORT	Total revenue of sectoral imports at the 4-digit level measured in TL
EXPORT VOLUME	EXPORT	Total revenue of sectoral exports at the 4-digit level measured in TL
OUTPUT LEVEL	OUTPUT	Sectoral production index at the 4-digit level.
CAPACITY UTILIZATION	CAPUT	Sectoral capacity utilization index at the 3-digit level.
REAL WAGE	WAGE	Sectoral hourly real wage index at the 4-digit level.
NOMINAL WAGE	N_WAGE	Nominal wage, computed by inflating sectoral hourly real wage index at the 4-digit level by consumer inflation,
REAL PRICE	R_PRICE	Deviation of sectoral prices from CPI or WSPI at the 4-digit level
REAL IMPORT PRICE	RP_PRICE	Price index for imported goods at two-digit level deflated by real effective exchange rate[34].
REAL ENERGY PRICE	RP_ENERGY	Deviation of energy prices from changes in CPI or WSPI at the 4-digit level.
REAL EXPORT[35]	R_EXPORT	Sectoral real exports at 4-digit level[36].
REAL IMPORT	R_IMPORT	Sectoral real imports at 4-digit level.

After deciding the variables that will be used, these variables have been tested for stationarity. To this end, Fisher ADF, and Fisher PP statistics have been used. Table 5.3 and 5.4 summarizes the results of panel unit

[33] All variables, are used in log deviation form. All sectoral variables are constructed in ISIC Rev. 2. *ñ(-1)ò* representation implies one period lagged values of relevant variables.

[34] Provided by CBRT, Electronical Data Dissemination System.

[35] Export and import figures are presented in national currency, thus CPI is chosen as the tool for transformation to real values.

[36] Both CPI and WSPI are used in the transformation of nominal export and import values into real ones.

root tests. According to test results, series do not exhibit unit root and are stationary.

Table 5.3: ADF Unit Root Test Results

ADF		CR4	PRICE	RP_ENERGY	WAGE	R_EXPORT	R_IMPORT	RP_IMPORT	REER	OUTPUT	CAPUT
Int.	St.	261.169**	527.049***	283.880***	467.477***	537.728**	674.292**	282.862**	620.836***	360.467***	646.258***
	P-val	0,0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Int. & tr	St.	248.529	387.270	160.645	422.639	444.286	468.512	127.316	428.267	271.142	502.215
	P-val	0,0000	0,0000	0,0149	0.0000	0.0000	0.0000	0.4009[37]	0.0000	0.0000	0.0000

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. A low p-value or a high test statistic implies rejection of the null hypothesis that series exhibit unit root. Lag lengths are determined automatically by Eviews 5.1.

Table 5.4: PP Unit Root Test Results

PP		CR4	PRICE	RP_ENERGY	WAGE	R_EXPORT	R_IMPORT	P_IMPORT	REER	OUTPUT	CAPUT
Int.	St.	267.228**	667.862**	264.400**	616.988**	766.722**	971.889**	383.816**	653.558**	462.114**	934.150**
	P-val	0,0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Int.& tr.	St.	323.749**	640.370**	141.691	536.203**	821.316**	907.576**	227.676**	448.408**	427.624**	880.095**
	P-val	0.0000	0,0000	0,1322[38]	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. A low p-value or a high test statistic implies rejection of the null hypothesis that series exhibit unit root. Lag lengths are determined automatically by Eviews 5.1.

[37] Choi Z statistic has a p-value of 0.1130, which is slightly above 10 % threshold. Nevertheless, note that three other tests suggest stationarity.

[38] Choi Z statistic has a p-value of 0.0001.

5.2. Estimations

5.2.1. Findings of the Static Models

In this section a primary model basing on the idea of explaining divergence of annual price changes in any sector from changes in consumer price index is employed. The aim is identifying the variables that should be accounted for in explaining price increases in one sector in excess or short of increases in consumer price index (CPI), and finding out whether changes in competition as represented by concentration is significant in elucidating sectoral price deviations. In addition to CR4; exports, imports, real wages, capacity utilization rate, output, import prices at the sectoral level, and energy prices and a crisis-dummy for the year 2001 are used as explanatory variables. The model may be represented by the following expression in the unrestricted form:

$$U(r\_price) = (cr4, rp\_energy, wage, output, caput, r\_export, r\_import, rp\_import)$$

Nevertheless, in addition to the primary model two alternative models have also been estimated. In the first of two alternatives a similar logic is used, yet in this case transformation of nominal values into real ones is done by Wholesale Price Index (WSPI). In this setting, the sources of deviations of sectoral prices from WSPI instead of CPI, and the impact of concentration changes are analyzed.

As a second alternative, another model in which nominal variables are not transformed into real ones is constructed. In this case, no state invariant variables such as real effective exchange rate or energy prices are used. The effects of these variables are captured by period dummies.

In all three models, estimations have been conducted by both fixed effects and random effects techniques.

The results of the primary model are presented in Table 5.5, and of alternative models are presented in Table B.1 and Table B.2 in the unrestricted form.

Table 5.5: Primary Static Model in Unrestricted Form

	Fixed Effects			Random Effects		
Variable	**Coef.**	**Std. Error**	**p ï val.**	**Coef.**	**Std. Error**	**p ï val**
C	-0.0028	0.0117	0.8132	0.0018	0.0119	0.8767
CR4	-0.0488	0.0797	0.5408	-0.0197	0.0688	0.7750
CR4(-1)	-0.0302	0.0756	0.6900	0.0094	0.0646	0.8846
RP_ENERGY	0.9181**	0.0475	0.0000	0.9285**	0.0393	0.0000
WAGE	-0.0869	0.0653	0.1837	-0.0677	0.0552	0.2207
WAGE(-1)	-0.1655**	0.0612	0.0072	-0.1490**	0.0516	0.0041
R_EXPORT	0.1033**	0.0279	0.0002	0.0927**	0.0241	0.0001
R_EXPORT(-1)	-0.0433**	0.0193	0.0256	-0.0467**	0.0174	0.0076
R_IMPORT	0.0353**	0.0145	0.0155	0.0291**	0.0123	0.0182
R_IMPORT(-1)	-0.0396**	0.0143	0.0058	-0.0445**	0.0126	0.0005
RP_IMPORT	0.2684**	0.0991	0.0071	0.2953**	0.0853	0.0006
OUTPUT	0.0118	0.0452	0.7941	0.0156	0.0359	0.6639
CAPUT	0.0622	0.1361	0.6480	0.0706	0.1146	0.5383
OUTPUT(-1)	-0.0681	0.0538	0.2061	-0.0581	0.0416	0.1640
CAPUT(-1)	-0.0786	0.1423	0.5814	-0.0658	0.1180	0.5774
D2001	-0.1943**	0.0424	0.0000	-0.1984**	0.0379	0.0000

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2. Sectoral prices, energy prices, export and import revenues are deflated by CPI.

It is worthy of note that although there are some small differences in size and signs of the coefficients corresponding to fixed and random effects models, these seem to be negligible. Nevertheless, both fixed and random effects estimations clearly include variables that should be omitted, as evident from high p-values.

Various models have been estimated in all three different forms, the findings indicate that primary model outperforms the alternative models. After dropping the insignificant variables, the results presented in Table 6 are obtained.

Table 5.6: Primary Static Model in the Restricted Form

	Fixed Effects			Random Effects		
Variable	**Coef.**	**Std. Error**	**p ï val.**	**Coef.**	**Std. Error**	**P ï val**
C	0.0020	0.0100	0.8460	0.0033	0.0105	0.7512
CR4	-0.0364	0.0801	0.6501	-0.0232	0.0706	0.7421
RP_ENERGY	1.0103**	0.0274	0.0000	1.0084**	0.0249	0.0000
WAGE(-1)	-0.1948*	0.0591	0.0011	-0.1807*	0.0516	0.0005
R_EXPORT(-1)	-0.0199**	0.0118	0.0920	-0.0188*	0.0100	0.0607
R_IMPORT	0.0287**	0.0133	0.0319	0.0254**	0.0116	0.0283
R_IMPORT(-1)	-0.0459**	0.0150	0.0023	-0.0492**	0.0132	0.0002
RP_IMPORT	0.2666**	0.0925	0.0042	0.2737**	0.0815	0.0009
D2001	-0.1854**	0.0389	0.0000	-0.1884**	0.0350	0.0000

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2. Sectoral prices, energy prices, export and import revenues are deflated by CPI.

5.2.2. Findings of Dynamic Models

In the dynamic setting, structure of the analysis remained the same. Similar to the static setting, a primary model basing on the idea of explaining divergence of annual price changes in any sector from changes in consumer price index is used with the aim of identifying the variables that should be accounted for in explaining price increases in one sector in excess or short of increases in CPI. In addition to CR4, exports, imports, real wages, capacity utilization rate, output, import prices and energy prices, and one lagged value of the dependent variable is also included to the model.

In dynamic setting, in addition to the primary model, two alternative models have been estimated. In the first of two alternatives, transformation of nominal values into real ones is maintained by WSPI meaning that, the sources of deviation of sectoral price changes from changes in WSPI instead of CPI is analyzed. In the second alternative, nominal variables are not transformed into real ones, and no state invariant variables are used. In all three cases, estimations have been

carried on by both Arellano and Bond (1991) ï first difference and Arellano and Bover (1995) - orthogonal deviation variable transformation techniques.

Table 5.6 summarizes the results of the primary model in unrestricted form, while respective results for alternative models are presented in Table B.3 and Table B.4. Findings indicate that models include variables that should have been omitted, however, in contrast to the static case, the performances of the primary model and the alternative models are comparable.

Table 5.7: Primary Dynamic Model in Unrestricted Form

	First Differences			Orthogonal Deviations		
Variable	**Coef.**	**Std. Err.**	**p-val**	**Coef.**	**Std. Err**	**p-val**
PRICE(-1)	-0.2016**	0.0227	0.0000	-0.1988**	0.0223	0.0000
CR4	-0.0891**	0.0346	0.0105	-0.0224	0.0323	0.4884
CR4(-1)	-0.0905*	0.0502	0.0723	-0.0646	0.0500	0.1979
RP_ENERGY	0.8911**	0.2118	0.0000	0.4925**	0.2251	0.0294
WAGE	-0.1174**	0.0542	0.0309	-0.0373	0.0553	0.4998
WAGE(-1)	-0.1120**	0.0428	0.0093	-0.0772*	0.0450	0.0874
EXPORT	0.0392*	0.0211	0.0637	0.0188	0.0176	0.2872
EXPORT(-1)	-0.0074	0.0175	0.6710	-0.0093	0.0159	0.5605
IMPORT	0.0048	0.0094	0.6106	0.0074	0.0096	0.4416
IMPORT(-1)	0.0144*	0.0073	0.0508	0.0100	0.0062	0.1091
RP_IMPORT	0.1137**	0.0450	0.0119	0.1433**	0.0412	0.0006
OUTPUT	0.0039	0.0246	0.8742	-0.0044	0.0222	0.8434
OUTPUT(-1)	-0.0049	0.0368	0.8934	-0.0305	0.0386	0.4294
CAPUT	0.1100	0.0749	0.1430	0.0141	0.0685	0.8375
CAPUT(-1)	0.1257**	0.0591	0.0340	0.1468**	0.0514	0.0046
1996	-0.4749**	0.0465	0.0000	-0.5561**	0.0516	0.0000
1997	-0.1531**	0.0420	0.0003	-0.0583	0.0448	0.1941
1998	-0.1756	0.1537	0.2541	0.1385	0.1715	0.4199
1999	-0.0869*	0.0510	0.0890	0.0167	0.0633	0.7915
2000	-0.1393**	0.0404	0.0006	-0.0435	0.0503	0.3875
2001	-0.2016**	0.0227	0.0000	-0.1988**	0.0223	0.0000

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2. Sectoral prices, energy prices, export and import revenues are deflated by CPI.

Table 5.7 represents the restricted version of the primary model, while, corresponding forms of alternative models are presented in Table B.5, B.6, B.7, and B.8.

Table 5.8: Primary Dynamic Model in Restricted Form

	Orthogonal Deviations			First Difference			
Variable	**Coef.**	**Std. Err**	**p - val**	**Variable**	**Coef.**	**Std. Err.**	**p - val**
PRICE(-1)	-0.1853**	0.0241	0.0000	**PRICE(-1)**	-0.2089**	0.0150	0.0000
CR4	***-0.0783***	***0.0232***	***0.0008***	***CR4(-1)***	***-0.0376****	***0.0210***	***0.0747***
CR4(-1)	***-0.0792***	***0.0320***	***0.0137***	**RP_ENERGY**	0.3199**	0.0948	0.0008
RP_ENERGY	0.9164**	0.1948	0.0000	**WAGE(-1)**	-0.0623**	0.0160	0.0001
WAGE	-0.1033**	0.0442	0.0199	**IMPORT(-1)**	0.0075**	0.0035	0.0316
WAGE(-1)	-0.1062**	0.0313	0.0008	**RP_IMPORT**	0.1233**	0.0233	0.0000
IMPORT(-1)	0.0120**	0.0058	0.0387	**CAPUT(-1)**	0.1170**	0.0295	0.0001
RP_IMPORT	0.0861**	0.0308	0.0055	**1996**	-0.6149**	0.0235	0.0000
CAPUT(-1)	0.1225**	0.0396	0.0021	**1997**	-0.0398*	0.0209	0.0574
CAPUT	0.1013**	0.0492	0.0403	**1998**	0.2721**	0.0748	0.0003
1996	-0.5001**	0.0450	0.0000	**1999**	0.0501	0.0337	0.1381
1997	-0.1453**	0.0358	0.0001	**2000**	-0.0138	0.0263	0.5994
1998	-0.1809	0.1438	0.2094	**2001**	-0.0010	0.0496	0.9845
1999	-0.1264**	0.0464	0.0068				
2000	-0.1506**	0.0355	0.0000				
2001	-0.3146**	0.1034	0.0025				

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2. Sectoral prices, energy prices, export and import revenues are deflated by CPI.

5.2.3. Assessment of Empirical Findings

In this section, the empirical findings obtained in the preceding sections will be assessed. However, it should be warned that although the results make theoretical sense as outlined below, the short time dimension of the data set, and relatively unstable nature of the period should be taken into consideration when interpreting the results. It is possible that in a more stable period or in an analysis with a longer time dimension, the results may differ significantly.

An increase in import prices or energy prices is expected to contribute to the deviation of sectoral prices from both CPI, and WSPI, thus to the inflationary pressures. As CBRT survey suggests, energy and imported inputs are important cost elements in Turkish manufacturing industry. For firms, facing cost increases it may be reasonable to increase prices faster then CPI. The results of the estimations confirm that increases in energy prices and/or import prices contribute to inflationary tendencies in manufacturing sectors.

Regarding sectoral exports, it is possible to find a relation in both directions. Sectoral exports may be contributing to disinflationary process by the transmission of cost efficiencies, a possible result of competing at the international level. More efficient production should imply lower sectoral inflation. On the other hand, it is also possible that foreign demand may be diverting the resources away from domestic markets, which may be reflected as greater deviations of sectoral prices from CPI, and may contribute to the inflationary pressures. Static analysis suggests that sectoral exports reduce inflationary pressures, while dynamic analysis suggest changes in sectoral exports is insignificant.

The situation is similarly vague for sectoral imports and inflation as well. One possible impact of sectoral imports on inflation is the so-called ñimport disciplining effectò, which suggests that domestic producers, facing foreign competition as a result of new entries to the market may be tempted to curb mark-ups and/or may be forced to operate more efficiently. In both cases, inflationary pressures may be expected to decrease; nevertheless, the nature of the imported goods is particularly important for this outcome. If major part of imports is composed of investment goods, inputs, and intermediary goods, which are more complementary in nature, then increases in imports may contribute to the

inflationary pressures[39]. Moreover, it should be kept in mind that empirical studies focusing on the impact of trade liberalization in Turkey[40] suggest that, constraining impact of imports on sectoral mark-ups have been limited and in many cases unpredictable. Therefore, finding both a negative or positive relation between sectoral imports and inflationary pressures can be advocated to have theoretical validity. Findings of the study, suggest a positive relation between sectoral imports and inflationary pressures.

Sectoral capacity utilization is expected to be positively related to the deviation of sectoral prices from inflation indices. An increase in capacity utilization may be interpreted as an increase in demand faced by the producer thus as an increased willingness of the consumers to pay more. Similarly, as more costly inputs and factors of production began to be utilized in the production process increased capacity utilization may lead to increased unit costs. The static analysis suggests that capacity utilization has been insignificant in explaining inflationary tendencies; however, in all three settings dynamic findings indicate that sectoral capacity utilization is contributing to the deviation of sectoral prices from inflation indices, and to the inflationary pressures.

Regarding the lagged value of the dependent variable, results suggest that in explaining deviation of changes in sectoral price indices from CPI, the deviation in the previous period is explanatory. This result seems to confirm the findings of the CBRT Survey that a considerable amount of the manufacturing firms is exhibiting some sort of indexation behavior in their pricing strategies. Sectoral deviations from CPI in one direction are matched by an opposing deviation in the next period, a phenomenon that may be interpreted as CPI might have served as an anchor in this period.

[39] For Turkey this does not seem to be a remote possibility, as, imported final goods make up only 6-12 percent of the total imports in 1995-2001. See www.turkstat.gov.tr.

[40] In particular, see, Culha and Yalcin (2005), Kivilcim et. al., (2000), and Yalcin (2000). For a summary of these studies, see pp.17-19.

Firms, realizing that they are increasing prices faster than CPI, may be tempted to make price increases in short of the CPI increases, while, firms increasing prices slower then CPI may be compelled to make price increases in excess of increases in CPI in the subsequent period. In all three dynamic settings the relation between lagged value and actual value persists.

Finally and most importantly for the purposes of this thesis, static findings indicate that changes in CR4 is insignificant in explaining deviation of sectoral prices from consumer price index. No significant relation has been found in static framework under both fixed and random effects estimations. On the other hand, in dynamic framework, a significant relation between changes in sectoral concentration and inflation is found. Results imply that sectoral prices tend to deviate from CPI increasingly as concentration decreases. This finding does not change in all three different settings and in both methods of variable transformations; first difference and orthogonal deviations. Since CR4 is the concentration index chosen in this study, results suggest that increases in competition are accompanied by greater deviations from CPI. The findings imply that in Turkish manufacturing industry, enhancing competition contributes to the inflationary pressures. This outcome presents a contrast with the predictions of the DIT, which suggests that enhancing competition may be a viable tool in fighting inflation.

CHAPTER 6

CONCLUSION

Inspired from the policy recommendations and the apparent consensus of the domestic policy makers on the possibility of attaining lower levels of inflation by enhancing competition, this thesis is oriented to explore the impact of sectoral competition on inflation in Turkey.

To this end, first the theoretical framework and previous empirical research is explored. Later, basing on the preceding studies focusing both on the nature of the relation between inflation and competition and on the determinants of the pricing behavior in Turkey, a static panel data analysis is conducted. Both fixed effects and random effects estimations give similar results with the implication that the changes in the level of sectoral competition is insignificant in explaining differences in deviations of sectoral prices from CPI. Next, empirical analysis has been expanded into a dynamic setting. It turns out that sectoral competition level and inflation is related in a fashion contrary to the expectations behind the policy recommendations. The results suggest that as sectoral competition increases, the deviation of sectoral inflation from CPI increases.

Nevertheless, it should be recalled that the empirical analysis covers a relatively short period of 1995 ï 2001, a period characterized by economic instability and stop-go cycles. Therefore, in a more stable economic period, as currently being experienced, or in an analysis with a longer time dimension, the results may differ significantly. Conducting a similar research when more contemporary data is available, might be particularly insightful.

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APPENDICES

APPENDIX A

Table A.1: Theories on the Nature of the Relation Between Inflation and Competition

Theories implying that enhanced competition in the markets will be accompanied by lower inflation.		**Theories implying that enhanced competition in the markets may not be accompanied by lower inflation.**	
Theory	**Study**	**Theory**	**Study**
Dynamic inconsistency theory ï Monetary policy channel	Kydland and Prescott (1977) Barro and Gordon (1983)	Customer market theory	Benabou (1988), (1992) Jones and Laudadio (2000)
Political economy of concentration	Cavelaars (2003)	Eckard (1981)	Competition via innovation
Anticipated and repeated shocks in customer markets	Jones and Laudadio (2000)	Qualls (1981) Coricelli (2007)	Market structure, wage inflation and coordination problems
Concentrated industry wage stability hypothesis	Qualls (1981)	Cavelaars (2003)	High interest rates, high inflation and the direction of causality.

Table A.2: Manufacturing Sectors at the 4-digit Level for ISIC Rev.2 Classification[41]

3111	Slaughtering, preparing and preserving meat
3112	Manufacture of dairy products
3113	Canning and preserving of fruits and vegetables
3115	Manufacture of vegetable and animal oils and fats
3116	Grain mill products
3117	Manufacture of bakery products
3118	Sugar factories and refineries
3119	Manufacture of cocoa, chocolate and sugar confectionery
3121	Manufacture of food products not elsewhere classified
3122	Manufacture of prepared animal feeds
3131	Distilling, rectifying and blending spirits
3132	Wine industries
3133	Malt liquors and malt
3134	Soft drinks and carbonated waters industries
3140	Tobacco manufactures
3211	Spinning, weaving and finishing textiles
3212	Manufacture of made up textile goods except wearing apparel
3213	Knitting mills
3219	Manufacture of textiles not elsewhere classified
3231	Tanneries and leather finishing
3233	Manufacture of products of leather and leather substitutes, except footwear and wearing apparel
3240	Manufacture of footwear, except vulcanized or moulded rubber or plastic footwear
3311	Sawmills, planing and other wood mills
3320	Manufacture of furniture and fixtures, except primarily of metal
3411	Manufacture of pulp, paper and paperboard
3412	Manufacture of containers and boxes of paper and paperboard
3419	Manufacture of pulp, paper and paperboard articles not elsewhere classified
3420	Printing, publishing and allied industries
3511	Manufacture of basic industrial chemicals except fertilizers
3512	Manufacture of fertilizers and pesticides
3513	Manufacture of synthetic resins, plastic materials and man made fibres except glass
3522	Manufacture of drugs and medicines
3523	Manufacture of soap and cleaning preparations, perfumes, cosmetics and other toilet preparations
3529	Manufacture of chemical products not elsewhere classified
3530	Petroleum refineries
3551	Tyre and tube industries
3559	Manufacture of rubber products not elsewhere classified
3610	Manufacture of pottery, china and earthenware
3620	Manufacture of glass and glass products
3691	Manufacture of structural clay products
3692	Manufacture of cement, lime and plaster
3710	Iron and steel basic industries

[41] Source: United Nations Statistics Division, available at: http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=8&Lg=1.

Table A.2 (Continued)

3720	Non ferrous metal basic industries
3811	Manufacture of cutlery, hand tools and general hardware
3812	Manufacture of furniture and fixtures primarily of metal
3813	Manufacture of structural metal products
3819	Manufacture of fabricated metal products except machinery and equipment not elsewhere classified
3821	Manufacture of engines and turbines
3822	Manufacture of agricultural machinery and equipment
3823	Manufacture of metal and wood working machinery
3824	Manufacture of special industrial machinery and equipment except metal and wood working machinery
3825	Manufacture of office, computing and accounting machinery
3829	Machinery and equipment except electrical not elsewhere classified
3831	Manufacture of electrical industrial machinery and apparatus
3832	Manufacture of radio, television and communication equipment and apparatus
3833	Manufacture of electrical appliances and housewares
3839	Manufacture of electrical apparatus and supplies not elsewhere classified
3843	Manufacture of motor vehicles
3844	Manufacture of motorcycles and bicycles
3851	Manufacture of professional and scientific, and measuring and controlling equipment not elsewhere classified
3852	Manufacture of photographic and optical goods
3909	Manufacturing industries not elsewhere classified

Table A.3: The Correspondence of the Manufacturing Sectors Classified within ISIC Rev. 2 in ISIC Rev. 3[42]

Rev.2	*Rev. 3*	*Rev.2*	*Rev. 3*	*Rev.2*	*Rev. 3*	*Rev.2*	*Rev. 3*
3111	1511	3411	2101	3699	2699	3839	3190
3114	1512	3419	2101	3710	2710	3832	3210
3113	1513	3412	2102	3720	2720	3832	3220
3115	1514	3419	2109	3710	2731	3832	3230
3112	1520	3420	2211	3720	2732	3851	3311
3116	1531	3420	2212	3813	2811	3851	3312
3121	1532	3420	2213	3819	2812	3831	3313
3122	1533	3420	2219	3819	2813	3851	3313
3117	1541	3420	2221	3819	2891	3852	3320
3118	1542	3420	2222	3819	2892	3853	3330
3119	1543	9414	2230	3811	2893	3843	3410
3117	1544	3540	2310	3812	2899	3843	3420
3121	1549	3530	2320	3819	2899	3843	3430
3131	1551	3511	2330	3821	2911	3841	3511
3132	1552	3511	2411	3829	2912	3841	3512
3133	1553	3512	2412	3829	2913	3842	3520
3134	1554	3513	2413	3819	2914	3845	3530
3140	1600	3512	2421	3829	2914	3844	3591
3211	1711	3521	2422	3824	2915	3844	3592
3211	1712	3529	2422	3829	2919	3849	3592
3212	1721	3522	2423	3822	2921	3849	3599
3214	1722	3523	2424	3823	2922	3320	3610
3215	1723	3529	2429	3823	2923	3812	3610
3219	1729	3513	2430	3824	2924	3901	3691
3213	1730	3551	2511	3824	2925	3902	3692
3220	1810	3559	2519	3824	2926	3903	3693
3232	1820	3320	2520	3829	2927	3909	3694
3231	1911	3560	2520	3824	2929	3909	3699
3233	1912	3620	2610	3829	2929	3319	2029
3240	1920	3610	2691	3833	2930	3320	2029
3311	2010	3610	2692	3825	3000	3699	2695
3311	2021	3691	2692	3831	3110	3699	2696

[42] The conversion table is provided by TURKSTAT, www.turkstat.gov.tr.

Table A.3. (Continued)

3311	2022	3691	2693	3831	3120	3839	3140
3312	2023	3692	2694	3839	3130	3839	3150

Table A.4: Sectors in ISIC Rev. 2 with Multiple Correspondences in ISIC Rev. 3

Rev.2	***Rev. 3***	***Rev.2***	***Rev. 3***	***Rev.2***	***Rev. 3***	***Rev.2***	***Rev. 3***
3117	1541	3513	2413	3823	2922		3230
	1544		2430		2923	3839	3130
3121	1532	3529	2422	3824	2915		3140
	1549		2429		2924		3150
3211	1711	3610	2691		2925		3190
	1712		2692		2926	3843	3410
3311	2010	3691	2692		2929		3420
	2021		2693	3829	2912		3430
	2022	3710	2710		2913	3844	3591
3320	2029		2731		2914		3592
	2520	3812	2899		2919	3851	3311
	3610		3610		2927		3312
3419	2101	3819	2812		2929		3313
	2109		2813	3831	3110	3909	3694
3511	2330		2891		3120		3699
	2411		2892		3313		3230
3512	2412		2899	3832	3210		
	2421		2914		3220		

APPENDIX B

Table B.1: Results of the Static Estimations Done by WSPI Transformation: Unrestricted Models

	Fixed Effects			Random Effects		
Variable	**Coef.**	**Std. Err.**	**p ï val.**	**Coef.**	**Std. Err.**	**p ï val.**
C	-0.0094	0.0102	0.3588	-0.0045	0.0101	0.6572
CR4	-0.0092	0.0640	0.8860	0.0121	0.0555	0.8268
CR4(-1)	-0.0305	0.0675	0.6515	-0.0017	0.0571	0.9757
RP_ENERGY	-0.0077	0.0622	0.9011	-0.0028	0.0569	0.9601
WAGE	0.0167	0.0530	0.7537	0.0166	0.0467	0.7232
WAGE(-1)	-0.0299	0.0492	0.5432	-0.0236	0.0415	0.5701
R_EXPORT	0.0032	0.0232	0.8899	-0.0046	0.0204	0.8207
R_EXPORT(-1)	-0.0135	0.0202	0.5032	-0.0172	0.0182	0.3464
R_IMPORT	0.0042	0.0117	0.7220	-0.0021	0.0096	0.8266
R_IMPORT(-1)	-0.0019	0.0119	0.8759	-0.0069	0.0103	0.5035
OUTPUT	-0.0293	0.0379	0.4404	-0.0144	0.0305	0.6371
RP_IMPORT	0.0156	0.0783	0.8424	0.0405	0.0671	0.5462
CAPUT	-0.0345	0.1027	0.7368	-0.0148	0.0874	0.8655
OUTPUT(-1)	-0.0721	0.0440	0.1024	-0.0506	0.0334	0.1309
CAPUT(-1)	-0.0286	0.1105	0.7962	-0.0006	0.0914	0.9945
D2001	0.0435	0.0359	0.2269	0.0369	0.0323	0.2549

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2. Sectoral prices, energy prices, export and import revenues are deflated by WSPI.

Table B.2: Results of the Static Estimations Done by Nominal Variables: Unrestricted Models

	Fixed Effects			Random Effects		
Variable	**Coef.**	**Std. Err.**	**p ï val.**	**Coef.**	**Std. Err.**	**p ï val.**
C	0.5800	0.0661	0.0000	0.5778	0.0536	0.0000
CR4	-0.0481	0.0599	0.4228	-0.0214	0.0522	0.6818
CR4(-1)	-0.0619	0.0649	0.3410	-0.0272	0.0554	0.6234
OUTPUT	0.0037	0.0362	0.9191	-0.0020	0.0288	0.9456
OUTPUT(-1)	-0.0121	0.0427	0.7774	-0.0146	0.0319	0.6479
CAPUT	0.0393	0.1034	0.7044	0.0298	0.0872	0.7327
CAPUT(-1)	0.1614	0.1117	0.1495	0.1675	0.0913	0.0673
N_WAGE	-0.0649	0.0530	0.2212	-0.0444	0.0450	0.3252
N_WAGE(-1)	-0.0785	0.0525	0.1360	-0.0576	0.0441	0.1921
IMPORT	0.0095	0.0114	0.4088	0.0036	0.0094	0.7039
IMPORT(-1)	0.0031	0.0115	0.7899	-0.0026	0.0100	0.7917
EXPORT	0.0067	0.0223	0.7643	0.0009	0.0196	0.9646
EXPORT(-1)	-0.0146	0.0200	0.4659	-0.0191	0.0180	0.2907
P_IMPORT	0.0595	0.0924	0.5201	0.0641	0.0798	0.4222
1996	0.0474	0.0560	0.3978	0.0329	0.0504	0.5135
1997	0.1713	0.0539	0.0016	0.1540	0.0483	0.0015
1998	-0.0969	0.0432	0.0256	-0.0942	0.0378	0.0130
1999	-0.0470	0.0527	0.3736	-0.0484	0.0460	0.2937
2000	-0.2102	0.0401	0.0000	-0.2202	0.0351	0.0000
2001	0.1107	0.0478	0.0213	0.1099	0.0424	0.0098

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2.

Table B.3: Results of the Dynamic Estimations Done by Nominal Variables: Unrestricted Models

	First Differences			Orthogonal Deviations		
Variable	**Coef.**	**Std. Err.**	**p ï val.**	**Coef.**	**Std. Err.**	**p ï val.**
PRICE(-1)	-0.2194**	0.0262	0.0000	-0.2243**	0.0211	0.0000
CR4	-0.1128**	0.0391	0.0042	-0.0625	0.0418	0.1358
CR4(-1)	-0.1450**	0.0555	0.0094	-0.0722	0.0499	0.1493
OUTPUT	-0.0067	0.0321	0.8342	-0.0105	0.0240	0.6617
OUTPUT(-1)	-0.0002	0.0387	0.9952	-0.0569	0.0447	0.2040
CAPUT	0.2327**	0.0986	0.0188	0.0416	0.0884	0.6384
CAPUT(-1)	0.1908**	0.0713	0.0079	0.1594**	0.0731	0.0299
N_WAGE	-0.1543**	0.0407	0.0002	-0.0487	0.0539	0.3671
N_WAGE(-1)	-0.0899**	0.0312	0.0042	-0.0655**	0.0234	0.0055
IMPORT	-0.0053	0.0133	0.6883	0.0102	0.0107	0.3424
IMPORT(-1)	-0.0080	0.0089	0.3691	0.0097	0.0120	0.4174
EXPORT	0.0661**	0.0240	0.0061	0.0441*	0.0264	0.0959
EXPORT(-1)	-0.0853**	0.0227	0.0002	-0.0096	0.0274	0.7270
P_IMPORT	0.1892**	0.0647	0.0037	0.1704**	0.0611	0.0056
1996	-0.0087	0.0266	0.7434	-0.0201	0.0301	0.5056
1997	0.0737**	0.0250	0.0034	0.1087**	0.0264	0.0000
1998	-0.2118**	0.0303	0.0000	-0.1246**	0.0462	0.0073
1999	-0.1753**	0.0254	0.0000	-0.1162**	0.0329	0.0005
2000	-0.3487**	0.0270	0.0000	-0.2612**	0.0421	0.0000
2001	-0.1028**	0.0286	0.0004	-0.0002	0.0462	0.9972

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2.

Table B.4: Results of the Dynamic Estimations Done by WSPI Transformation: Unrestricted Models

	First Difference			Orthogonal Deviation		
Variable	**Coef.**	**Std. Err.**	**p ï val.**	**Coef.**	**Std. Err.**	**p ï val.**
PRICE(-1)	-0.2086**	0.0265	0.0000	-0.2101	0.0290**	0.0000
CR4	-0.0797**	0.0431	0.0654	-0.0247	0.0331	0.4571
CR4(-1)	-0.1021	0.0626	0.1040	-0.0755	0.0653	0.2486
RP_ENERGY	1.1713**	0.4528	0.0101	0.9974	0.3467**	0.0043
WAGE	-0.1754**	0.0515	0.0007	-0.1021	0.0623	0.1024
WAGE(-1)	-0.1153**	0.0404	0.0046	-0.1000	0.0411**	0.0155
R_EXPORT	0.0398	0.0282	0.1587	0.0258	0.0207	0.2133
R_EXPORT(-1)	-0.0197	0.0223	0.3756	-0.0144	0.0204	0.4789
R_IMPORT	-0.0026	0.0105	0.8048	0.0038	0.0099	0.7008
R_IMPORT(-1)	0.0101	0.0097	0.2990	0.0076	0.0074	0.3015
RP_IMPORT	0.1305**	0.0627	0.0381	0.1300	0.0529**	0.0144
CAPUT(-1)	0.1548**	0.0596	0.0098	0.1276	0.0662**	0.0546
CAPUT	0.1599*	0.0955	0.0949	0.0300	0.0881	0.7337
OUTPUT	-0.0113	0.0320	0.7253	-0.0156	0.0307	0.6125
OUTPUT(-1)	-0.0209	0.0469	0.6566	-0.0388	0.0406	0.3396
1996	-0.5060**	0.1772	0.0046	-0.4286	0.1392**	0.0022
1997	-0.0090	0.0215	0.6744	-0.0020	0.0223	0.9271
1998	-0.2738**	0.1031	0.0083	-0.2477	0.0867**	0.0046
1999	-0.2397**	0.1440	0.0970	-0.1979	0.1201	0.1003
2000	-0.1388**	0.0788	0.0792	-0.1180	0.0753	0.1180
2001	-0.4006**	0.1474	0.0069	-0.3396	0.1250**	0.0069

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2. Sectoral prices, energy prices, export and import revenues are deflated by WSPI.

Table B.5: Results of the Dynamic Estimations Done by Nominal Variables: Arellano and Bond (1991) ï Difference Transformation

Variables	Coef.	Std. Err.	t-stat.	p ï val.
PRICE(-1)	-0.218633	0.019920	-10.97561	0.0000
CR4	-0.076295	0.030183	-2.527759	0.0119
CR4(-1)	-0.070151	0.035785	-1.960342	0.0508
P_IMPORT	0.109547	0.027430	3.993635	0.0001
IMPORT(-1)	0.011880	0.005916	2.008170	0.0454
N_WAGE	-0.104111	0.021407	-4.863432	0.0000
N_WAGE(-1)	-0.068103	0.012636	-5.389651	0.0000
CAPUT	0.375174	0.056608	6.627550	0.0000
CAPUT(-1)	0.299171	0.044144	6.777173	0.0000
1996	-0.007011	0.014213	-0.493299	0.6221
1997	0.086234	0.015402	5.598730	0.0000
1998	-0.137774	0.016402	-8.399775	0.0000
1999	-0.119799	0.013571	-8.827435	0.0000
2000	-0.288872	0.011629	-24.84061	0.0000
2001	0.003880	0.019290	0.201120	0.8407

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2

Table B.6: Results of the Dynamic Estimations Done by Nominal Variables: Arellano and Bover (1995) ï Orthogonal Deviations Transformation

Variable	Coef.	Std. Err.	t-stat.	p ï val.
PRICE(-1)	-0.206219	0.019306	-10.68175	0.0000
CR4	-0.019659	0.021440	-0.916921	0.3598
CR4(-1)	-0.071938	0.032794	-2.193652	0.0289
CAPUT(-1)	0.130290	0.031274	4.166129	0.0000
N_WAGE	-0.087776	0.020299	-4.324076	0.0000
N_WAGE(-1)	-0.081028	0.011359	-7.133690	0.0000
IMPORT(-1)	0.007787	0.004412	1.764821	0.0785
P_IMPORT	0.145242	0.029800	4.873812	0.0000
1996	0.001712	0.015089	0.113492	0.9097
1997	0.109460	0.017051	6.419430	0.0000
1998	-0.163410	0.015724	-10.39245	0.0000
1999	-0.140243	0.012280	-11.42020	0.0000
2000	-0.278940	0.012226	-22.81548	0.0000
2001	-0.016147	0.017129	-0.942705	0.3465

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2

Table B.7: Results of the Dynamic Estimations Done by WSPI Transformation: Arellano and Bond (1991) ï Difference Transformation

Variables	Coef.	Std. Err.	t-stat.	p ï val.
R_PRICE(-1)	-0.202677	0.025221	-8.035995	0.0000
CR4	-0.065565	0.029247	-2.241756	0.0256
CR4(-1)	-0.076575	0.037109	-2.063533	0.0398
RP_ENERGY	0.963162	0.246059	3.914360	0.0001
WAGE	-0.142350	0.035055	-4.060779	0.0001
WAGE(-1)	-0.112686	0.025235	-4.465551	0.0000
R_IMPORT(-1)	0.011617	0.005678	2.046010	0.0415
P_IMPORT	0.105106	0.042517	2.472081	0.0139
CAPUT(-1)	0.136413	0.038326	3.559291	0.0004
CAPUT	0.105531	0.045732	2.307611	0.0216
1996	-0.431523	0.104615	-4.124873	0.0000
1997	-0.021332	0.017024	-1.253084	0.2110
1998	-0.234499	0.057027	-4.112038	0.0000
1999	-0.189860	0.076907	-2.468708	0.0140
2000	-0.113955	0.046661	-2.442213	0.0151
2001	-0.333232	0.083982	-3.967925	0.0001

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Corrected standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2. Sectoral prices, energy prices, export and import revenues are deflated by WSPI.

Table B.8: Results of the Dynamic Estimations Done by WSPI Transformation: Arellano and Bover (1995) ï Orthogonal Deviations Transformation

Variables	Coef.	Std. Err.	t-stat.	p ï val.
R_PRICE(-1)	-0.208483	0.018423	-11.31617	0.0000
CR4(-1)	-0.049380	0.026684	-1.850567	0.0651
RP_ENERGY	0.753743	0.189318	3.981361	0.0001
WAGE	-0.087060	0.032277	-2.697290	0.0073
WAGE(-1)	-0.097580	0.015852	-6.155509	0.0000
R_IMPORT(-1)	0.007913	0.004415	1.792227	0.0740
P_IMPORT	0.117244	0.036084	3.249179	0.0013
CAPUT(-1)	0.119148	0.027324	4.360584	0.0000
1996	-0.347019	0.079555	-4.361992	0.0000
1997	-0.017363	0.017187	-1.010276	0.3131
1998	-0.199156	0.046829	-4.252821	0.0000
1999	-0.128774	0.064849	-1.985735	0.0478
2000	-0.078116	0.043358	-1.801669	0.0725
2001	-0.260827	0.064948	-4.015941	0.0001

Notes: * and ** indicates level of significance at 10 % level, and 5 % level respectively. Robust standard errors are used. Both estimations cover 1995-2001 period and 62 Manufacturing Sectors classified according to ISIC Rev.2. Sectoral prices, energy prices, export and import revenues are deflated by WSPI.