

**Markup Pricing and Import Competition:
Has Import Disciplined Tunisian
Manufacturing Firms?**

Riadh Ben Jelili

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Abstract

Two approaches have been taken to examine the effect of increased import competition on markups in industries. In one approach, the gross price-average cost margins – defined as the ratio of sales net of expenditure on labor and intermediate inputs over sales – is used as an indicator of the markup, and regressed on a set of explanatory variables including variables representing the level of import competition. In the other approach, the methodology developed by Hall (1988) is used. It involves regression of output growth rate on a share-weighted growth rate of inputs, the regression yielding the markup as the slope coefficient. This paper extends Hall's approach to examine whether intensified international competition forces industries to price more competitively by examining six manufacturing sectors in Tunisia between 1972 and 1999. Results show significant but plausible and moderate markups to be present in the Tunisian manufacturing industry. The econometric evidence tends also to support the hypothesis that increased exposure to import competition serves to lower the markup. In other words, import competition disciplines domestic firms in imperfectly competitive industries. However, the regression results obtained here suggest that the direct effect of competition law on industry markup is not significant.

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Introduction

Many international trade models have now been developed that account for imperfect competition. While some of these models provide insight into situations where trade protection may be welfare-improving, most indicate that imperfect competition provides additional sources of gains from trade. These gains result generally from the “pro-competitive” effect of trade, given that import competition increases the perceived elasticity of demand for domestic firms, consequently leading them to reduce their markups of price over marginal cost. Applied general equilibrium models suggest that these effects may be important quantitatively.

Early econometric studies analyzing the impact of trade on market power employ the markup of price over average variable cost – defined as revenues-variable costs/revenues – as a measure of non-competitive behavior. These studies generally find that import competition reduces average cost markups, particularly in domestically concentrated industries. Economic theory, however, predicts that import competition reduces the markup of price over marginal cost, which is not directly observable.

More recent studies draw on the work of Roberts (1984) and Hall (1988) to estimate price-marginal cost markups from equations derived from profit maximizing conditions and to analyze the impact of trade reform on competition. A number of studies for developing countries have found that increased exposure to import competition causes markups or profit margins in industries to fall, with the largest effect being in the highly concentrated industries and in large plants. These include studies undertaken for Chile, Columbia, Mexico, Morocco, and Turkey (Roberts and Tybout, 1996; Krishna and Mitra, 1998; Currie and Harrison, 1997)⁽¹⁾. That import competition reduces markups has been found also in two recent cross-country studies, covering both developed and developing countries (Hoekman *et al.*, 2001; Kee and Hoekman, 2003).

This paper empirically examines whether intensified international competition forces industries to price more competitively by examining six manufacturing sectors in Tunisia between 1972 and 1999.

The empirical method used in this paper to examine the response of the profitability of domestic industries to increasing competition from abroad is based on a modified version of the technique developed by Hall (1990) and Roeger (1995), which imposes no restrictions on returns to scale or the degree of competition in industries. The effects of economic integration on profits are then captured by relating the markups to trade penetration ratios to test whether import competition has been regarded as a disciplinary device to constrain market power of domestic manufacturing firms in Tunisia.

A Theoretical Background

Foreign Competition, Productivity Gains and Investment

The prospect of substantial firm-level productivity gains has been a driving force behind recent trade liberalization efforts in the developing world. A myriad of empirical studies seems to support the notion that trade liberalization induces productivity gains at the firm level (Krishna and Mitra, 1998; Harrison, 1994; Nishimizu and Page, 1991; Tybout and Westbrook, 1995; Corbo and

⁽¹⁾ For a review of literature, see Tybout (2000) and Epifani (2003)

De Melo, 1985; Roberts and Tybout, 1995), providing a framework for interpreting the conventional wisdom that “in creating competition for domestic products in home markets, imports provide incentives for firms [to invest] to improve their [productivity]” (Balassa, 1988).

Nevertheless, the question of how opening to foreign competition may affect domestic firms' decisions has been a comparatively unexplored one in the middle-income countries context. Goh (2000) examines the relationship between trade policies and technological effort, arguing that a firm investing in new technology bears an opportunity cost of not getting their product to the market as quickly. Lopez (2003) introduces a model where domestic firms may choose to respond to foreign tariff liberalizations by investing in the technology of a higher-quality export good.

Traca (1997, 2001) provides a theoretical model of the effects of protection on a domestic firm's output, isolating what he calls the direct effect, corresponding to the decreased market share, and the pro-competitive effect, corresponding to a lower markups result in more sales, of import competition on a domestic firm's output. If the domestic market is not perfectly competitive, a decline in import prices has two conflicting effects on the incentives to expand productivity and efficiency – the direct effect and the pro-competitive effect. The direct effect hampers productivity growth, implying the contraction of output from the decline in demand for the domestic good. Conversely, the pro-competitive effect fosters investment in productivity, reflecting the expansion of output due to the decline in domestic markups, from the loss of market power.

Until now, the theory has said very little on the outcome of the interplay of these two conflicting forces. Roberts and Tybout (1991) argue that simulation models have shown that the pro-competitive effect usually dominates, in particular, for the most efficient firms in the industry.

In a dynamic, infinite-horizon framework, the domestic firm has to continuously invest in productivity growth. This is to make up for the expansion of its foreign competitors and avoid exit. Implicitly, the growth of foreign productivity promotes domestic growth, as the decline of the price of imports expands domestic output and fosters investment in productivity. Thus, the pro-competitive effect dominates the direct effect in the steady state of the productivity growth path if the firm survives import competition.

However, when the initial productivity gap to foreign competitors is too large, the direct effect dominates, since the firm's market power is too small for the pro-competitive effect to be of first-order. In this case, the pressure of imports may prove too intense, leading the domestic firm to concede and exit the market in the long run. The imposition of a temporary tariff in this infant stage persuades the firm to fight and catch up, thus ensuring its long term competitiveness.

Moreover, given that the direct effect prevails, the temporary protection of an infant industry to ensure survival is welfare-increasing, thus suggesting that the firm's incentives to concede and exit are higher than the social optimal. Firstly, protection improves welfare, when it increases the output of a domestic firm with market power, i.e. when the direct effect dominates. Secondly, protection increases welfare by expanding productivity, since market power implies that investment is socially sub-optimal.

However, if the pro-competitive effect prevails, free trade is the best policy, as protection decreases output and productivity, thus adding to the distortion created by domestic market power. Given the predominance of the pro-competitive effect in the vicinity of the steady state, this implies that the optimal, time-consistent tariff path entails free trade in the long run (steady state).

The removal of existing tariffs has non-monotone effects. Starting from the steady state, small trade liberalization yields an increase in the productivity growth of the domestic firm. This increase is temporary, and allows the firm to compensate for the loss of protection by expanding its intrinsic competitiveness to catch up with its foreign competitors. In the long run, the domestic firm's profitability and market power return to their initial (steady state) level.

However, when the tariff is high, a radical cut leads the firm to concede, cutting down productivity growth and eventually exiting the market⁽²⁾. Since a small liberalization induces the firm to catch up, a gradual approach to tariff reform increases the chances of survival for domestic firms, even if the reform schedule is fully anticipated.

Foreign Competition and Market Power Reduction

Greater exposure to foreign competition may come through three principal channels:

- The first channel is that of foreign firms locating in the domestic economy.
- The second channel looks at the effect of greater competition through the opening of a country to more imports. As quantitative restrictions and tariffs continue to fall, import penetration has increased dramatically in the formerly protected economies.
- A third channel is to look at the expansion of exports and of domestic firms as they enter foreign markets.

N.B. For the purposes of this paper, only the second channel is considered.

Barriers to entry, including explicit restrictions on foreign ownership or trade barriers, can foster conditions where domestic firms retain monopoly power. The opening of the domestic market to imports can thus help to break local abuses of market power. This may have three related effects. Firstly, the market structure can change, with greater numbers of firms producing goods. Secondly, if barriers to entry are lower, it facilitates the adjustment of resources to the most productive areas and encourages greater innovation. Thirdly, prices will likely come down as competition increases. This is of considerable benefit to consumers and to buyers of intermediate goods.

Market Structure and Barriers to Entry. As tariffs and investment restrictions fall, previously protected firms will face greater competition and loss of market power. With reduced barriers to entry, new innovative firms face fewer hurdles in starting up operations.

Numerous studies link greater competition to increased incentives to innovate. Pavcnik (2000) makes a direct link between greater trade competition and innovation. Using panel data on Chilean firms, she finds the import competing firms to be significantly more likely to adopt skill-intensive technology in the face of liberalization relative to both exporters and non-traded goods producers. Other authors look at the issue of incentives to innovate indirectly, trying to capture concentration ratios of industries pre- and post-reforms. In the short run, the concentration might rise temporarily as exits increase. But new entrants and the inclusion of imported goods should soon lower them.

However, other researchers find that if one controls for other sector characteristics, the relationship is not significant. Blomstrom and Kokko (1996) in their survey, conclude that the

⁽²⁾ Empirically, the exit of the firm creates a selection bias, since firms where productivity growth is hurt by the liberalization, will vanish from the sample. This will bias upwards the estimates of the average effect of trade liberalization on the firms' productivity growth.

balance of the evidence indicates Multinational Companies (MNCs) are more likely to crowd out local firms in Less Developed Countries (LDCs), leading to higher concentration ratios. But they continue to point out that some increase in concentration ratios may not be a bad thing – particularly if it means there is better exploitation of scale economies. Provided a significant number of competitors remains, a decrease in the total number may not be detrimental.

There are three sources for this outcome. The first is that if imports are produced more cost effectively than the domestic producers, some domestic producers will be driven out of that range of goods. Thus, it is possible that domestic production concentration increases, while the range of goods increases and the price of goods declines. In this case, greater concentration is consistent with greater productivity and lower prices.

Secondly, foreign presence and market structure can be endogenous, making it difficult to separate the effects of foreign entry on competition. A correlation between high concentration and a foreign presence may be due to MNCs being attracted to concentrated industries rather than MNCs serving to lower concentration ratios.

Thirdly, there is also a real danger that market power has been strengthened, particularly if the foreign competition takes the form of foreign direct investment. A foreign multinational could succeed in out-competing enough domestic rivals that it wields market power in the domestic market. Particularly, given MNCs' possession of intangible assets, the effect of MNCs on domestic competition should receive close scrutiny.

Such a danger is greatest if protectionist trade policies are in place. Tariffs give MNCs an incentive to 'jump' the tariffs and produce locally. However, once behind the protective barriers, they can then use them to shore up their own monopoly position. Thus, the best means of ensuring that such an MNC faces competition is the same as if it were a domestic monopoly – expose it to pressures from rivals abroad. Liberalized trade can be one of the most effective means of insuring against market power. Such a solution is most effective for traded goods. But even in areas such as non-traded services, openness to foreign bids can be a disciplining force. The effectiveness of the approach will also be determined by the strength of the domestic regulatory framework and international cooperation in addressing antitrust concerns.

Price Changes and Openness. Many authors find that greater openness to trade leads to lower markups. Some studies look at the relationship of price markup and import penetration or tariff levels, looking across industries at a point in time. More convincing studies have tested the "imports as discipline" hypothesis by looking at changes in markups as countries liberalize trade (Levinsohn, 1993; Roberts and Tybout, 1996). Both types of studies find a negative relationship between openness and markups.

Hoekman *et al.* (2001) examine 41 countries during the 1980s and 1990s. They estimate a single average markup for each country based on 29 sectors over the two decades. Even at this level of aggregation, they find a significant negative relationship between average markups and import penetration, controlling for market size, financial depth, intellectual property and barriers to entry.

Data from Mexico show that with the liberalization of the late 1980s, markups fell dramatically, particularly in industries with greater market concentration and a high proportion of large firms. Grether (1996) finds that a reduction in tariffs of 1% would lower markups up to 1.5% for large firms in more concentrated industries.

Levinsohn (1993) examines five industries in Turkey in the period immediately after trade was liberalized. In all five of the industries he examines, markups changed in the expected way, four of them, significantly so. In contrast, in more open countries such as Chile and Morocco, there is less correlation between markups and import penetration. However, De Melo and Urata (1986) do find a fall in industry markups in the pre- and post- 1976 reform in Chile.

In Cote d'Ivoire, trade was liberalized in 1985. Harrison (1994) uses firm level data to estimate the effects on markups and on productivity. She estimates that a 10% fall in tariffs lowered markups of domestic firms by 6%, although they had no significant impact on foreign firms' markups. However, a 10% increase in import penetration lowered markups about 2% for both domestic and foreign firms. She also makes a strong case for the importance of controlling for changes in the market structure when assessing the impact of trade reform. Ignoring this may lead to the underestimation of productivity gains.

Econometric Analysis of Markups of Price over Marginal Cost

In theory, the degree of monopoly power of a given producer may be viewed as the markup of product price (P_t) over marginal cost (MC_t). It may be defined as $(P_t - MC_t)/P_t$ which corresponds to the so-called *Lerner Index*. The greater the index, the greater is the degree of monopoly power.

The main problem associated to the empirical measurement of the *Lerner Index* and related measures, arises from the fact that while prices can be measured, marginal costs are not directly observable. Therefore, indirect measures have to be developed.

Hall (1988) has suggested markup rate estimation based on a model for the Solow residual which has been extensively applied in the empirical literature. Hall's approach has also been criticized and the results deemed somewhat dubious mostly because the estimation procedure requires use of instrumental variables which are difficult to find in the context of imperfect competition.

The Roeger-Approach

Roeger (1995) proposes an alternative method of computing markups founded on both the Solow residuals and the dual Solow residuals. For a firm enjoying technical progress in the use of labor and capital, a reasonable approximation of its marginal cost may be given by the following expression:

$$MC_{it} = \frac{w_{it} \Delta L_{it} + c_{it} \Delta K_{it}}{\Delta Q_{it} - \theta_{it} Q_{it}},$$

where θ_{it} corresponds to the rate of technical progress for each time period t and sector i .

Under the assumption of constant returns to scale and constant markup, Equation 1 may be rephrased as follows:

$$\underbrace{\Delta q_{it} - \alpha \Delta l_{it} - (1 - \alpha) \Delta k_{it}}_{\text{Solow Residual (SR}_t)} = (\mu - 1) \alpha (\Delta l_{it} - \Delta k_{it}) + \theta_{it}$$

where the markup of price over marginal cost is : $\mu = P/MC$, with Δ denoting the first difference, lower case denotes the natural log transform, q , l , and k denote real value added, labor, and capital inputs, α is the labor share in value added, and $\theta \equiv \dot{A}/A$ denotes exogenous (Hicks-neutral) technological progress. Under perfect competition $\mu = 1$, while imperfectly competitive markets allow $\mu > 1$.

Estimation of Equation 2 faces the difficulty that the explanatory variables ($\Delta l - \Delta k$) will themselves be correlated with the productivity shocks θ , and hence results in bias and inconsistency in the estimates of μ . One solution is to instrument, which in turn raises the requirement that the instruments are correlated with the factor inputs, but not technological change and hence, the error term.

An alternative approach to avoid the endogeneity bias and instrumentation problems has been suggested by Roeger (1995). By computing the dual of the Solow residual (DSR), a relation of the price-based productivity measure to the mark-up may again be obtained:

$$DSR_{it} \equiv \alpha \Delta w_{it} + (1 - \alpha) \Delta r_{it} - \Delta p_{it} = (\mu - 1) \alpha (\Delta w_{it} - \Delta r_{it}) + \theta_{it}$$

with w , r denoting the natural logs of the wage rate and rental price of capital respectively.

While Equation 3 is subject to the same endogeneity problems, and hence instrumentation problems as Equation 2, Roeger's insight is that subtraction of Equation 3 from Equation 2 would give us the nominal Solow residual (NSR), given by:

$$NSR_{it} \equiv \Delta(p_{it} + q_{it}) - \alpha \Delta(l_{it} + w_{it}) - (1 - \alpha) \Delta(k_{it} + r_{it}) = (\mu - 1) \alpha (\Delta(l_{it} + w_{it}) - \Delta(k_{it} + r_{it}))$$

in which the productivity shocks θ have cancelled out, removing the endogeneity problem, and hence the need for instrumentation.

Equation 4 is a rather tractable expression for the estimation of the markup ratio. Adding an error term, the markup may be estimated by standard OLS techniques. Alternatively, a markup coefficient could even be calculated algebraically for each year and each sector and a simple average computed over a given period:

$$\mu - 1 = \frac{\Delta(p_{it} + q_{it}) - \alpha \Delta(l_{it} + w_{it}) - (1 - \alpha) \Delta(k_{it} + r_{it})}{\alpha (\Delta(l_{it} + w_{it}) - \Delta(k_{it} + r_{it}))}$$

Oliveira Martins and Scarpetta (1999) demonstrate that where the assumption of constant returns to scale is dropped, Equation 4 is actually:

$$NSR_{it} = \left(\frac{\mu}{\lambda} - 1 \right) \alpha (\Delta(l_{it} + w_{it}) - \Delta(k_{it} + r_{it}))$$

where $\lambda > 1$ denotes increasing returns to scale. From Equation 6, it may be seen that with increasing returns to scale, the Roeger's method produces a downward bias in the estimation of the markup. Thus, any estimate of mark-up that follows from Solow residuals should be interpreted as lower-bound values if increasing returns to scale are present.

Equation 4 may be easily extended to incorporate intermediate inputs and express the mark-up ratio over gross output (*GO*) instead of value added. This correction is important, insofar as the mark-up over value added induces a clear upward bias in the estimation. Indeed, Basu and Fernald (1994) show that the measurement of real value added assumes that the elasticity of output with respect to intermediate inputs equals its revenue share, which is only true if there were perfect competition. In the presence of market power, shifts in the intermediate inputs will be incorrectly attributed to shifts in value added and estimates of the markups will be biased.

Taking into account intermediate inputs, Equation 4 becomes:

$$\begin{aligned} NSRGO_{it} &\equiv \Delta(\tilde{p}_{it} + \tilde{q}_{it}) - \tilde{\alpha}\Delta(l_{it} + w_{it}) - \tilde{\beta}\Delta(m_{it} + p_{it}^m) - (1 - \tilde{\alpha} - \tilde{\beta})\Delta(k_{it} + r_{it}) \\ &= (\mu - 1)(\tilde{\alpha}\Delta(l_{it} + w_{it}) + \tilde{\beta}\Delta(m_{it} + p_{it}^m) - (\tilde{\alpha} + \tilde{\beta})\Delta(k_{it} + r_{it})) \end{aligned}$$

where \tilde{p} and \tilde{q} correspond to logarithms of gross output and its respective price, m and p^m to intermediate inputs and their prices, and $\tilde{\alpha}$ and $\tilde{\beta}$ to the share of labor and intermediate inputs in gross output value, respectively.

The appealing feature of Roeger's approach is that it helps to overcome some availability problems associated with price data. As Equation 7 only requires nominal variables, there is no need to gather price indexes for intermediate inputs, an information that is not readily available. However, the treatment of capital costs still requires a separate computation for the growth rate of the rental price of capital, r .

The Open Economy Context

The discussion thus far, has ignored the impact of the open economy context. Yet tariff and other restrictions clearly carry implications for the degree of international competition to which domestic industry is exposed, and hence the magnitude of the feasible markup that domestic industry can maintain. By implication, the suggestion is that trade liberalization is a means by which inefficiency in production can be remedied.

Hakura (1998) offers one means of incorporating the open economy context into the estimation of markups over marginal cost. The starting point of analysis is the suggestion that tariff and other trade restrictions shield domestic industry from international competition. Hence, reduction in trade barriers should decrease the market power of domestic producers, through increased import penetration, decreasing mark-ups of price over marginal cost. The suggestion is thus that trade liberalization will reduce the pricing power of industry.

In order to see how changes in import (or export) penetration affect the price marginal cost markup, the weighted growth rates of inputs is interacted with the import (export) penetration ratios *IPR* (*EPR*) and the relationship tested by Hakura (1998) is given by:

$$dq_{it} = \beta_{it} d\tilde{x}_{it} + \gamma(IPR_{it} - \overline{IPR}_i) d\tilde{x}_{it}$$

where $dq_{it} = dy_{it} + \frac{s_m}{1-s_m} dm$ and $d\tilde{x}_{it} = s_l dl_{it} + s_k dk_{it} + \frac{s_m}{1-s_m} dm_{it}$

where dy denotes the log change in value added, s_j the share of factor J in value added (labor, capital and intermediate inputs) and i denotes the i 'th industry⁽³⁾. While β provides a measure of the mark-up, γ captures the impact of deviations of import penetration from the sectoral mean value of import penetration on the mark-up. Where $\gamma < 0$, rising import penetration lowers the mark-up, where $\gamma > 0$, rising import penetration raises the mark-up.

The specification given by Equation 8 is again subject to endogeneity problems, since production and input change decisions are likely to be simultaneous. Yet, it is again possible to subject the specification of Equation 8 to the transformations suggested by Roeger (1995).

A final extension proves necessary due to the use of panel data in the present study. Estimation of the mark-up on an industry-by-industry basis requires a control only for within-industry variation of import penetration to capture trade effects. In a panel data context, this is not sufficient since variation in import penetration between industries is not captured, thereby omitting an important source of heterogeneity between industries. For this reason, the following specification will be adopted to test for the impact of import penetration on the mark-up:

$$\begin{aligned} NSRGO_i = & (\mu - 1) \left(\tilde{\alpha} \Delta(l_{it} + w_{it}) + \tilde{\beta} \Delta(m_{it} + p_{it}^m) - (\tilde{\alpha} + \tilde{\beta}) \Delta(k_{it} + r_{it}) \right) \\ & + \theta_2 \left(IPR_{it} - \overline{IPR}_i \right) \left(\tilde{\alpha} \Delta(l_{it} + w_{it}) + \tilde{\beta} \Delta(m_{it} + p_{it}^m) - (\tilde{\alpha} + \tilde{\beta}) \Delta(k_{it} + r_{it}) \right) \\ & + \theta_3 \left(IPR_{it} - \overline{IPR} \right) \left(\tilde{\alpha} \Delta(l_{it} + w_{it}) + \tilde{\beta} \Delta(m_{it} + p_{it}^m) - (\tilde{\alpha} + \tilde{\beta}) \Delta(k_{it} + r_{it}) \right) \end{aligned}$$

where \overline{IPR}_i denotes the mean import penetration for the i 'th industry, and \overline{IPR} denotes the mean import penetration across all industries⁽⁴⁾. Thus, θ_2 captures the impact of within-industry variation of import penetration, and θ_3 the between-industry variation in import penetration on the markup.

The Impact of Market Structure

Differences in market power across manufacturing industries must be in part, due to differences in entry conditions into each industry. Traditionally, entry conditions and the resulting market structures have been related to technological conditions, such as economies of scale and scope. Another possibility is the existence of product differentiation. For example, under a regime of Chamberlinian monopolistic competition, a limited market power may arise from the combination of returns to scale and horizontal product differentiation. However, the entry of new firms may be expected to bring prices down to average costs over the long run. More recent research has focused on so-called "vertical" product differentiation where firms are able to influence the perceived quality of their products. In industries where firms engage in such product differentiation, product strategies may be able to influence entry conditions in the market; this influence could generate endogenous sunk costs, e.g. large advertising or R&D expenditures. These industries could not simply exist under a regime of perfect competition.

⁽³⁾ The panel employed in Hakura study employs both cross-country and cross-industry elements. The reported equation (8) has adapted this to the cross-industry panel context employed in the paper.

⁽⁴⁾ It is probably better to relate the estimates of markups to direct measures of trade barriers such as quotas and tariffs. However, these data are not available in time series from each sector

Along these lines, the rationale for persistent markups is likely to differ according to the type of industry and form of competition. Following Sutton (1991) and a subsequent discussion by Schmalensee (1992), two major types of industries or types of competition may be identified:

- Industries with typical small average establishment size (Type I) are termed "fragmented" industries. In these industries, the number of firms typically grows in line with the size of the market.
- Sectors characterized by the existence of large establishments, covering a large proportion of employment and output, are termed "segmented" industries (Type II). In these sectors, concentration remains relatively stable or converges towards a finite lower bound.

This market structure taxonomy may also be related to more direct indicators of sunk costs and product innovation and to qualitative information about the different industries. Hence, market concentration may determine the pricing power of firms and the mark up of price over marginal cost. Of course, contestability of markets may limit the ability of domestic producers to exercise market power even in the presence of high degrees of industry concentration. Remove an ability to control for the contestability of markets, the effect of industry concentration on mark-ups is therefore ambiguous, and must remain a matter for empirical determination.

Unfortunately, in the absence of any industry concentration ratio covering all the sample period, only the impact of changes in the competition law and policy that took place in Tunisia since 1991, and more particularly from 1995, on the level of price markups will be investigated. For this purpose, a dummy variable (*CLAW*) which takes the value of 1 for the period 1995-1999 is introduced in Equation 7.

$$NSRGO_{it} = (\mu - 1) \left(\tilde{\alpha} \Delta(l_{it} + w_{it}) + \tilde{\beta} \Delta(m_{it} + p_{it}^m) - (\tilde{\alpha} + \tilde{\beta}) \Delta(k_{it} + r_{it}) \right) + \lambda CLAW_t \left(\tilde{\alpha} \Delta(l_{it} + w_{it}) + \tilde{\beta} \Delta(m_{it} + p_{it}^m) - (\tilde{\alpha} + \tilde{\beta}) \Delta(k_{it} + r_{it}) \right)$$

A significantly negative coefficient λ would indicate the success of the competition law and policy in reducing the level of price markups.

The Tunisian Background

Significant structural changes in the Tunisian economy have taken place since the early 1960s. Between 1960 and 1999, the Tunisian economy grew at an average rate of 5%, quite a reasonable rate by lower middle-income country and regional standards. Agriculture's share of the GDP declined steadily from about 28% in 1960 to 9% in 1999. At the same time, the manufacturing sector expanded very rapidly, increasing its portion of the gross domestic product (at factor cost) from less than 8% in 1960 to 20% in 1999.

The manufacturing sector has been comparatively dynamic, growing at an average (real) rate of 6.1% since 1980. In 1999, manufacturing employed about 21% of the entire labor force and

accounted for 69% of total merchandise export earnings, making it the second nation's largest sector. However, this sector remains fairly small, particularly when compared to countries that have achieved fast economic growth. Furthermore, the Directory of Enterprises of the *Institut National de la Statistique* provides evidence about the prevalence of small enterprises in Tunisian manufacturing sectors. The size distribution varies by sector: firms in Chemical and Rubber, Woodwork, Paper and Diverse, and Food Processing sectors tend to be smaller. Firms in the Textile sectors are larger⁽⁵⁾.

The limited size of firms is due to two main factors: (a) family ownership, and (b) the highly protectionist policy that lasted over more than three decades. Tunisian entrepreneurs have so far, been very reticent to opening ownership outside family ties. Given limited financial resources, this attitude has restricted their choice of investment to small projects. The existence of high barriers to entry of imports has made many of such projects artificially profitable.

Despite their large number, small and medium enterprises and micro enterprises account for only a fraction of production in the Tunisian economy. Market concentration – as measured by the shares of the four largest firms in total value added in a given sector – is very high due to the small size of the domestic market and to the legacy of investment licensing, which was not discontinued until 1987. The most concentrated industries are Agro-industry, Chemicals, and the Mechanical and Electrical industries. The least concentrated and most export-oriented are Textiles, Clothing, and Leather Goods. Concentration in the Construction Materials industry varies, with Tile Making being the least and Cement Manufacturing the most concentrated activity (87% of production is by the four largest firms which were, until recently, all state-owned).

International trade is vital to the Tunisian economy. In 1999, export and import transactions, together, account for about 61% of the gross national product. Moreover, a high degree of diversification took place, enabling Tunisia to boost its export items from a few numbers of commodities in the early 1960s to a wide range of products in 1999. Indeed, the share of the first three commodities in the total exports of goods and services decreased significantly from 37% in the early 1980s to 20.7% in 1999. However, the market for the product, which is also important to evaluate the degree of diversification, remains dominated by three EU countries: France, Italy and Germany. These countries monopolize more than 70% of the Tunisian trading in 1999. Consequently, Tunisia's business cycle has shown a weak link with business cycles in these EU trading partners. In the near future, this link is likely to be stronger because of the expected increase in trade and investment with the progressive implementation of the 1995 Association Agreement.

In Tunisia, until the mid-1980s, a price regulation system was used. Investment licensing which restricted entry was the rule until the late 1980s. Domestic price controls were liberalized in 1986. Tunisia is a member of the World Trade Organization and is publicly committed to a free trade regime and export-led growth. Since the late 1980s, most goods may be imported without prior licensing.

To meet the terms of the EU Association Agreement, the government has continued the structural economic reforms initiated in 1987. As customs duties are eliminated over a 12-year period for a wide range of imports, Tunisian producers must become more competitive. In conjunction with the Agreement, the government has vowed to accelerate its privatization

⁽⁵⁾ In the industrial sector, firms with fewer than 20 employees account for almost 60% of all active private companies, and companies with fewer than 250 employees account for more than 94% of all companies. In addition, about 45% of manufacturing enterprises have a sales volume below 0.5 million Tunisian Dinars, and 77% below 2 million (*Agence de Promotion de l'Industrie, Tissu industriel tunisien*).

program, which has covered nearly 140 companies since it was launched in 1987, and brought in \$950 million by the end of 2000. Nearly \$660 million was in the form of Foreign Direct Investment. "Privatization" of a considerable number of state-owned companies has, in fact, only been a partial sale of state-owned shares. With the full privatization of two cement plants in 1998 and two more in 2000, the government has turned its attention to a variety of public assets, and about 40 companies have been selected for privatization in 2001 (US Department of State, 2002).

Competition is regulated in Tunisia by a law enacted in 1991 which was amended in 1993, 1995 and more recently in 1999 and 2003. The Tunisian Competition Law, which is very much influenced by the French Competition Ordinance of 1986, states that prices shall generally be freely determined by market forces, with some exceptions concerning basic commodities or services, activities where competition is lacking because of a monopoly position, of supply difficulties or because of the effect of legal or regulatory provisions.

The Tunisian Competition Law prohibits all concerted actions and agreements aimed at impeding, or restricting competition, in particular those that impede market price formation, restrict market access for other firms, restrict or control production, market outlets, investment or technical progress, share markets or sources of supplies. The abuse of a dominant position is likewise prohibited if it involves the domestic market. Abuse consists of the refusal to sell, tie-in clauses, the imposition of minimal prices or discriminatory sale conditions. The abuse of a dominant position on foreign markets is not prohibited by the Tunisian law, a feature shared with almost all anti-trust laws.

The amendment of 1995 brought an outright prohibition of selective and exclusive agreements. It runs against the dominant arrangements between foreign suppliers and local distributors. The new amendment brought by Law 99-41 of 1999 allows exceptions to this prohibition after consultation with the Competition Board by the Minister of Commerce and authorization of the latter.

Empirical Implementation Econometric Methodology

Utilizing Equations 7, 9 and 10 which belong to the following more general class of models that may be estimated using pool procedures:

$$y_{it} = \alpha_{it} + x'_{it}\beta + \varepsilon_{it},$$

where y_{it} is the dependent variable, and x_{it} and β are vectors of non-constant regressors and parameters for $i = 1, \dots, N$ cross-sectional units (six manufacturing sectors). Each cross-section unit is observed for dated periods $t = 1, \dots, T$ (sample from 1973 to 1999).

These data may be viewed as a set of cross-section specific regressions with N cross-sectional equations:

$$y_i = \alpha_i + x'_i\beta + \varepsilon_i,$$

each with T observations, stacked on top of one another. For purposes of discussion, stacked representation is as follows:

$$Y = \alpha + X\beta + \varepsilon ,$$

where α , β and X are set up to include any restrictions on the parameters between cross-sectional units.

The residual covariance matrix for this set of equations is given by:

$$\Omega = E(\varepsilon\varepsilon') = E \begin{pmatrix} \varepsilon_1\varepsilon_1' & \varepsilon_2\varepsilon_1' & \cdots & \varepsilon_N\varepsilon_1' \\ \varepsilon_2\varepsilon_1' & \varepsilon_2\varepsilon_2' & \cdots & \varepsilon_N\varepsilon_2' \\ \vdots & \vdots & \ddots & \vdots \\ \varepsilon_N\varepsilon_1' & \varepsilon_N\varepsilon_2' & \cdots & \varepsilon_N\varepsilon_N' \end{pmatrix}$$

The basic specification treats the pool specification as a system of equations and estimates the model using system Ordinary Least Squares (OLS). This specification is appropriate when the residuals are contemporaneously uncorrelated, and time-period and cross-section homoskedastic:

$$\Omega = \sigma^2 I_N \otimes I_T .$$

The **fixed effects** estimator allows α_i differing across cross-section units by estimating different constants for each cross-section (industry). The fixed effects are generally computed by subtracting the "within" mean from each variable and estimating OLS using the transformed data. The coefficient covariance matrix estimates are given by the usual OLS covariance formula applied to the mean differenced model.

The **random effects** model assumes that the term α_{it} is the sum of a common constant α and a time-invariant cross-section specific random variable that is uncorrelated with the residual ε_{it} . The random effects model may be estimated using the Generalized Least Squares (GLS) procedure.

Cross-section weighted regression is appropriate when the residuals are cross-section heteroskedastic and contemporaneously uncorrelated:

$$\Omega = E(\varepsilon\varepsilon') = E \begin{pmatrix} \sigma_1^2 I_T & 0 & \cdots & 0 \\ 0 & \sigma_2^2 I_T & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \sigma_N^2 I_T \end{pmatrix}$$

It may be estimated by performing feasible GLS where σ_i^2 is estimated from a first-stage pooled OLS regression.

Seemingly Unrelated Regression (SUR) weighted least squares, or Parks estimator, is the feasible GLS estimator when the residuals are both cross-section heteroskedastic and contemporaneously correlated:

$$\Omega = E(\varepsilon\varepsilon') = E \begin{pmatrix} \sigma_{11}I_T & \sigma_{12}I_T & \cdots & \sigma_{1N}I_T \\ \sigma_{21}I_T & \sigma_{22}I_T & \cdots & \sigma_{2N}I_T \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_{N1}I_T & \sigma_{N2}I_T & \cdots & \sigma_{NN}I_T \end{pmatrix} = \Sigma \otimes I_T,$$

where Σ is the symmetric matrix of contemporaneous correlations.

The parameter estimates and the covariance matrix of the parameters of the model are computed using the standard GLS formulae.

Data Sources

A panel data set is employed for purposes of estimation, with observations from 1973 through 1999. The panel employs data for six manufacturing sectors in Tunisian economy. These sectors are: Food Processing (FPI), Construction Materials and Glass (CMGI), Mechanical and Electrical Goods (MEGI), Chemical and Rubber (CRI), Textiles, Clothing and Leather Goods (TCLGI) and Woodwork, Paper and Diverse (WPDI). This provides a 27x6 panel with a total of 162 observations.

The series for gross output, employment, wage compensation, intermediate inputs and gross capital stock by industry were provided by the *Institut d'Economie Quantitative* (IEQ, 2000).

Following Martins *et al.* (1996), a simplified rental price of capital (r_t) was defined as follows:

$$r_t = ((\tau_t - \pi_t^e) + \delta)p_t^I$$

where τ is the nominal market interest rate and π^e is the expected inflation rate which is generated using the low-frequency component of the annual percentage change in the GDP deflator using the Hodrick-Prescott filter. The difference between these two terms represents the expected real cost of funds for the firm. The parameter δ corresponds to the economic rate of depreciation. It is set at 7% across all sectors which is equivalent to an average service life of 14 years and p^I represents the economy-wide deflator for the gross fixed investment by industry, and also obtained from the IEQ database.

The observed labor share and intermediate inputs share in total revenue are used in the definition of the dependent and explanatory variables.

Data on import (export) by type of manufacturing industry were provided by the *Institut National de la Statistique*. Import penetration or import intensity is defined as the share of domestic consumption accounted for by imports, where domestic consumption is calculated as “sectoral output – exports + imports”; all the variables expressed at a constant price.

Estimation Results

Roeger's Approach with Intermediate Inputs. In Tables 1 and 2, the estimation results for the manufacturing sectors given by Equation 11 are reported:

$$NSRGO_{it} = \gamma_{0i} + \gamma_i ROEGER_{it} + \varepsilon_{it} \quad (\text{Equation 11})$$

for $i = \text{FPI, CMGI, MEGI, CRI, TCLGI, WPDI}$; $t = 1973, \dots, 1999$

where:

$$ROEGER_{it} = \tilde{\alpha}\Delta(l_{it} + w_{it}) + \tilde{\beta}\Delta(m_{it} + p_{it}^m) - (\tilde{\alpha} + \tilde{\beta})\Delta(k_{it} + r_{it}).$$

γ_i now measures $(\mu_i - 1)$, where μ_i is the markup for the sector i . Information about the structure of the pooled data in estimating Equation 11 may be used in a number of ways. A model with selected variables may be estimated that have common or different coefficients across cross-sections. Three estimations procedure will be employed: (a) pooled least squares; (b) weighted least squares with estimated cross-section weights; and (c) seemingly unrelated regressions (SUR).

**Table 1. Markup Estimates, Tunisian Manufacturing Industries
Roeger Specification with Common Cross Section Coefficients**

	Markup	Std, Error**	Log-Likelihood
Pooled Least Squares with Common Intercept*	1.221	0.022	416.505
GLS with Cross Section Weights*	1.211	0.010	449.078
Seemingly Unrelated Regression	1.193	0.015	463.566

* White Heteroskedasticity-Consistent Standard Errors and Covariance

** Standard Errors reported concern the estimated margin (Markup-1), 1.221 corresponds to an estimated markup rate of 0.221 or 22.1%

**Table 2. Markup Estimates, Tunisian Manufacturing Industries
Roeger Specification with Specific Cross Section Coefficients**

	Markup	Std, Error	Log-Likelihood
Pooled Least Squares with Common Intercept*			422.273
Food Processing	1.218	0.022	
Construction Materials and Glass	1.306	0.056	
Mechanical and Electrical Goods	1.117	0.044	
Chemical and Rubber	1.280	0.058	
Textiles, Clothing and Leather Goods	1.160	0.034	
Woodwork, Paper and Diverse	1.235	0.017	
GLS with Cross Section Weights*			455.312
Food Processing	1.217	0.011	
Construction Materials and Glass	1.305	0.075	
Mechanical and Electrical Goods	1.116	0.032	
Chemical and Rubber	1.279	0.093	
Textiles, Clothing and Leather Goods	1.159	0.029	
Woodwork, Paper and Diverse	1.233	0.008	
Seemingly Unrelated Regression			470.928
Food Processing	1.223	0.019	
Construction Materials and Glass	1.243	0.055	

Mechanical and Electrical Goods	1.084	0.030	
Chemical and Rubber	1.258	0.051	
Textiles, Clothing and Leather Goods	1.079	0.032	
Woodwork, Paper and Diverse	1.203	0.023	

* White Heteroskedasticity-Consistent Standard Errors and Covariance

* Standard Errors reported concern the estimated margin (Markup-1),

** 1.218 corresponds to an estimated markup rate of 0.218 or 21.8%

Results indicate the presence of an aggregate plausible and moderate markup for the manufacturing sector over the sample period. The distinction between the estimation methods appears to make relatively little difference to the implied markup in Tunisian manufacturing. The aggregate markup defined over gross output is in the range of 19-22% and the sectoral markups are in the range of 8-31%. According to the SUR estimates, 8% in Textiles, Clothing and Leather Goods sector, 8.4% in Mechanical and Electrical Goods sector, 20% in Woodwork, Paper and Diverse sector, 22% in Food Processing sector, 24% in Construction Materials and Glass sector and 26% in Chemical and Rubber sector (cf. Table 2)

Hakura's Approach with Intermediate Inputs. Tables 3 and 4 present the estimation results for the manufacturing sectors of the specification given by:

$$NSRGO_{it} = \theta_{0i} + \theta_{1i}ROEGER_{it} + \theta_{2i}(IPR_{it} - \overline{IPR}_i)ROEGER_{it} + \theta_{3i}(IPR_{it} - \overline{IPR})ROEGER_{it} + u_{it} \quad (\text{Equation 12})$$

**Table 3. Markup Estimates, Tunisian Manufacturing Industries
Hakura Specification with Common Cross Section Coefficients**

	Markup**	θ_2	θ_3	Log-Likelihood
Pooled Least Squares with Common Intercept*	1.219***	0.687	-0.157	419.729
<i>Std,Error</i>	0.021	0.413	0.090	
GLS with Cross Section Weights*	1.197	0.536	-0.138	452.397
<i>Std,Error</i>	0.011	0.258	0.046	
Seemingly Unrelated Regression	1.165	0.402	-0.263	473.883
<i>Std, Error</i>	0.015	0.251	0.043	

* White Heteroskedasticity-Consistent Standard Errors and Covariance

* Standard Errors reported concern the estimated margin (Markup-1), *** 1.219 corresponds to an estimated markup rate of 0.219 or 21.9%

**Table 4. Markup Estimates, Tunisian Manufacturing Industries
Hakura Specification with Specific Cross Section Coefficients**

	Markup ^{**}	θ_2	θ_3	Log-Likelihood
Pooled Least Squares with Common Intercept*	1.166	-		424.731
<i>Std, Error</i>	0.055	-		
Food Processing			-0.193	
<i>Std, Error</i>			0.148	
Construction Materials and Glass			-0.600	
<i>Std, Error</i>			0.240	
Mechanical and Electrical Goods			-0.121	
<i>Std, Error</i>			0.157	
Chemical and Rubber			1.113	
<i>Std, Error</i>			0.613	
Textiles, Clothing and Leather Goods			0.109	
<i>Std, Error</i>			0.342	
Woodwork, Paper and Diverse			-0.710	
<i>Std, Error</i>			0.559	
GLS with Cross Section Weights*	1.209 ^{***}	-		454.851
<i>Std, Error</i>	0.015	-		
Food Processing			-0.029	
<i>Std, Error</i>			0.067	
Construction Materials and Glass			-0.434	
<i>Std, Error</i>			0.269	
Mechanical and Electrical Goods			-0.248	
<i>Std, Error</i>			0.104	
Chemical and Rubber			0.814	
<i>Std, Error</i>			0.825	
Textiles, Clothing and Leather Goods			-0.250	
<i>Std, Error</i>			0.257	
Woodwork, Paper and Diverse			-0.252	
<i>Std, Error</i>			0.251	
Seemingly Unrelated Regression	1.156	-		477.919
<i>Std, Error</i>	0.023	-		
Food Processing			-0.269	
<i>Std, Error</i>			0.100	
Construction Materials and Glass			-0.296	
<i>Std, Error</i>			0.253	
Mechanical and Electrical Goods			-0.241	
<i>Std, Error</i>			0.092	
Chemical and Rubber			0.734	
<i>Std, Error</i>			0.527	
Textiles, Clothing and Leather Goods			-0.994	
<i>Std, Error</i>			0.256	
Woodwork, Paper and Diverse			-0.688	
<i>Std, Error</i>			0.587	

* White Heteroskedasticity-Consistent Standard Errors and Covariance

** Standard Errors reported concern the estimated margin (Markup-1),

*** 1.209 corresponds to an estimated markup rate of 0.209 or 20.9%

The magnitude of the markup parameter is consistent with that already estimated under the preceding section with the estimate ranging from 17 to 22% for the specification controlling for import penetration.

Observations reveal that only increased import penetration ratios across the manufacturing sector serve to decrease industry markups, since θ_2 is not statistically significant and θ_3 is significantly negative.

Between variation refers to variation of industry import penetration ratios from the all sector mean import penetration ratio. The implication of import penetration impacts is that an opening of the economy to competition from imports would serve to reduce the magnitude of markups over marginal cost.

More significantly, increasing the between-industry import penetration ratio from its mean value of 10% will lead to an estimated implied markup of 1,165 to drop to 1,139 ($1,165 - 0,263 \cdot 10\%$) in the SUR regression. Therefore, the estimated impact of changes in import penetration ratios on the margins is somewhat larger in the markup analysis. Thus, while small variation about an industry mean value of import penetration does not serve to lower markups, increasing import penetration relative to the manufacturing sector average does serve to exercise a few price discipline on industries. The no-effect of the within-industry variation is further corroborated by the statistical insignificance of the coefficient.

The panel estimation methodology allows the testing of heterogeneous impact of between-industry variation in import penetration on markup. According to SUR regression, import penetration ratios relative to the manufacturing sector average has a negative and significant influence in Textiles, Clothing and Leather Goods sectors (estimated coefficient θ_3 of -0,994), in Woodwork, Paper and Diverse sectors (estimated coefficient θ_3 of -0,688) and in Food Processing sectors (estimated coefficient θ_3 of -0,269). However, increasing import penetration relative to the manufacturing sector average in Chemical and Rubber sectors seems to have a significant positive impact on markup (estimated coefficient θ_3 of 0,734).

The Impact of Competition Law. An examination of the impact of competition law on the markup by introducing a dummy variable *CLAW* in the Roeger's specification is in order. Tables 5 and 6 present the estimation results of the specification given by:

$$NSRGO_{it} = \lambda_{0i} + \lambda_{1i}ROEGER_{it} + \lambda_{2i}CLAW_iROEGER_{it} + v_{it} \quad (\text{Equation 13})$$

**Table 5. Markup Estimates, Tunisian Manufacturing Industries
Impact of Competition Law with Common Cross Section Coefficients**

	Markup**	λ_2	Log-Likelihood
Pooled Least Squares with Common Intercept*	1.220***	0.018	416.527
<i>Std, Error</i>	0.025	0.057	
GLS with Cross Section Weights*	1.205	0.081	449.910
<i>Std, Error</i>	0.011	0.029	
Seemingly Unrelated Regression	1.191	0.075	464.129
<i>Std, Error</i>	0.015	0.065	

* White Heteroskedasticity-Consistent Standard Errors and Covariance

** Standard Errors reported concern the estimated margin (Markup-1),

*** 1.22 corresponds to an estimated markup rate of 0.22 or 22%

**Table 6. Markup Estimates, Tunisian Manufacturing Industries
Impact of Competition Law with Specific Cross Section Coefficients**

	Markup**	Λ_2	Log-Likelihood
Pooled Least Squares with Common Intercept*			422.908
Food Processing	1.216	0.031	
<i>Std,Error</i>	0.024	0.040	
Construction Materials and Glass	1.311	-0.078	
<i>Std,Error</i>	0.060	0.178	
Mechanical and Electrical Goods	1.115	0.040	
<i>Std,Error</i>	0.048	0.139	
Chemical and Rubber	1.286	-0.072	
<i>Std,Error</i>	0.065	0.079	
Textiles, Clothing and Leather Goods	1.154	0.089	
<i>Std,Error</i>	0.037	0.038	
Woodwork, Paper and Diverse	1.227	0.222	
<i>Std,Error</i>	0.020	0.129	
GLS with Cross Section Weights*			457.524
Food Processing	1.211	0.044	
<i>Std,Error</i>	0.012	0.019	
Construction Materials and Glass	1.304	-0.048	
<i>Std,Error</i>	0.080	0.226	
Mechanical and Electrical Goods	1.111	0.065	
<i>Std,Error</i>	0.034	0.099	
Chemical and Rubber	1.282	-0.056	
<i>Std,Error</i>	0.105	0.119	
Textiles, Clothing and Leather Goods	1.150	0.107	
<i>Std,Error</i>	0.031	0.043	
Woodwork, Paper and Diverse	1.223	0.257	
<i>Std,Error</i>	0.009	0.036	
Seemingly Unrelated Regression			
<i>Std,Error</i>			
Food Processing	1.214	0.080	
<i>Std,Error</i>	0.020	0.076	
Construction Materials and Glass	1.244	-0.239	
<i>Std,Error</i>	0.056	0.223	
Mechanical and Electrical Goods	1.075	0.075	
<i>Std,Error</i>	0.030	0.132	
Chemical and Rubber	1.246	-0.024	
<i>Std,Error</i>	0.052	0.201	
Textiles, Clothing and Leather Goods	1.065	-0.011	
<i>Std,Error</i>	0.034	0.125	
Woodwork, Paper and Diverse	1.189	0.212	
<i>Std,Error</i>	0.022	0.139	

* White Heteroskedasticity-Consistent Standard Errors & Covariance

* Standard Errors reported concern the estimated margin (Markup-1),

*** 1.216 corresponds to an estimated markup rate of 0.216 or 21.6%

The impact of changes in the Competition Law and policy that took place in Tunisia in 1991-1995 on the level of price markups is also investigated by estimating Roeger's specification during the first period (from 1973 to 1994) and the same specification for the second period (from 1995 to 1999). The results are presented in Table 7.

**Table 7. Markup Estimates, Tunisian Manufacturing Industries
Impact of Competition Law with Specific Cross Section Coefficients**

	Markup**	
	1973-94	1995-99
Pooled Least Squares with Common Intercept*		
Food Processing	1.217***	1.266

<i>Std,Error</i>	0.023	0.037
Construction Materials and Glass	1.319	1.032
<i>Std,Error</i>	0.058	0.152
Mechanical and Electrical Goods	1.119	1.053
<i>Std,Error</i>	0.047	0.107
Chemical and Rubber	1.286	1.140
<i>Std,Error</i>	0.061	0.026
Textiles, Clothing and Leather Goods	1.157	1.271
<i>Std,Error</i>	0.035	0.029
Woodwork, Paper and Diverse	1.232	1.295
<i>Std,Error</i>	0.020	0.091
GLS with Cross Section Weights*		
Food Processing	1.213	1.265
<i>Std,Error</i>	0.011	0.020
Construction Materials and Glass	1.313	1.026
<i>Std,Error</i>	0.076	0.262
Mechanical and Electrical Goods	1.115	1.048
<i>Std,Error</i>	0.033	0.116
Chemical and Rubber	1.283	1.137
<i>Std,Error</i>	0.100	0.013
Textiles, Clothing and Leather Goods	1.154	1.266
<i>Std,Error</i>	0.029	0.009
Woodwork, Paper and Diverse	1.228	1.288
<i>Std,Error</i>	0.009	0.087

* White Heteroskedasticity-Consistent Standard Errors and Covariance

* Standard Errors reported concern the estimated margin (Markup-1),

*** 1.217 corresponds to an estimated markup rate of 0.217 or 21.7%

The effect of the *CLAW* dummy variable, used to capture the impact of the introduction of a competition law, does not seem to matter in the full sample. The effect of this variable on industry markups is generally not significant. Even after controlling for the effects of foreign competition, the direct effect of competition law is not statistically significant⁽⁶⁾.

The first possible explanation is that competition policy is not effective. Alternatively, Tunisian firms behave competitively and the old price regulatory system together with import competition has been sufficient to discipline firm behavior. A third possible and most plausible explanation is related to the nature of the data used. Indeed, the econometric methodology adopted uses time series to estimate markups, which is assumed to be constant over time. Thus, it is assumed that competition that firms face is rather static in nature. However, the effect of competition policy on firm behavior should be approached from a dynamic perspective, rather than a static one, because the competitive process is itself dynamic⁽⁷⁾.

⁽⁶⁾ Estimation results are probably affected by the endogeneity of competition law. Specifically, it may be assumed that for any period, a country's decision to adopt or abandon a competition law depends on the perceived level of industry markups, which are affected by the current level of imports, total domestic output, and total number of firms in the industry.

⁽⁷⁾ Focusing on the evolution and the level of price markups of firms as suggested by Sutton (1991), equilibrium prices (P) or markups are a declining function of the number of firms (N) in the market. However, the slope may differ depending on the degree of competition in the market. In one extreme case, tacit collusion, the function P(N) is a flat line, i.e. when a new firm enters the market equilibrium prices are not affected. This is a situation in which firms face very weak price competition. The other extreme case is the one of Bertrand competition where prices fall to marginal costs once a second firm enters the market. This is referred to as the extreme case of very tough price competition. All other oligopoly models will have associated P(N) functions that lie between these two extreme cases. While the strategic interactions between firms may affect the position and the slope of the P(N) function, a number of exogenous parameters, such as the competition law can have an effect on the position of the P(N) function. In this sense, competition policy could lead to tougher price competition, which may in fact lead to less entry in the market because unit margins are reduced in case the competition policy focuses on the level of the margins.

Panel data at a firm level, are more appropriate than sectoral ones to look at the dynamic pricing behavior after a change in competition policy took place and to gain insights into the effectiveness and role of competition policy. With a rich firm level panel data, it is also possible to compare the level of markups across different sectors and to test whether there are other mechanisms that may discipline firms, controlling for common aggregate shocks and for common sectoral shocks.

At the sectoral level, it appears that the incidence of high markup has gone down in Construction Materials and Glass sectors (31.3% on the average in 1973-1994 and not significant markup in 1995-1999); Chemicals with 28.3% on the average in 1973-1994 vs 13.7% on the average in 1995-1999. However, markup increases instead of decreases over time, in Food Processing and Textile sectors with 15.4% on the average in 1973-1994 vs 26.6% on the average in 1995-1999 and in Woodwork, Paper and Diverse with 22.8% on the average in 1973-1994 vs 28.8% on the average in 1995-1999 (cf. Table 7).

Conclusion

This paper investigates the strength of trade discipline on the manufacturing sectors in Tunisia over the period 1973-1999. This period is particularly interesting because it captures the effects of many actions in favor of international trade liberalization on competition.

To estimate the markups, an extension of the approach put forward by Roeger (1995) where price margins are defined over gross output instead of value added is utilized. The main conclusions are summarized below.

The results are statistically robust and the markups estimated are in the range of 8-31% for the Tunisian manufacturing in the period 1973-99. These results are plausible and more in line with micro-economic evidence suggesting low profit margins in most manufacturing industries.

It is observed that increased import penetration ratios across the manufacturing sector serve to decrease industry markups. The implication is that integrating Tunisian manufacturing sectors into world markets has the effect of increasing price competition, and hence, lowering the size of the markup.

The regression results obtained here suggest that the direct effect of the Tunisian Competition Law on industry markup is not significant. Import liberalization not only has a more powerful and direct effect on competition, it also is a lower cost policy alternative, especially in the long run, given no recurrent administrative enforcement and compliance costs. However, further empirical research seems to be required to better understand the relationship between industry price behavior and market characteristics in Tunisian manufacturing industries.

Although the paper does not explore either the issues of heterogeneity within domestic industry or the productivity effect of trade liberalization in the Tunisian manufacturing sectors, this result opens a new scope for research in these matters. Some important aspects have to be investigated by adopting a structural model to evaluate the impact of trade liberalization on firm markups pricing in the context of uncertainty in the policy regime and the macro environment.

Along this line, since industry import-share can fluctuate greatly, focusing on "actual" foreign competition may paint a misleading picture of total foreign competition. To get the full picture, one must quantify "potential" foreign competition. Actual foreign competition could be proxied by the level of import-share as it is the case in the paper. However, assessing potential

competition requires estimating the intertemporal response of imports to changes in market conditions. Indeed, the degree of potential foreign competition will vary across industries depending on structural factors and economic conditions. Import-share and profit-margins are likely to be jointly-determined in industry equilibrium. Thus, a more structural estimation approach must control for reverse causality and purges both industry import penetration or import share and profit-margins of industry-specific constant and trend, and aggregate effects to obtain estimates of the industry specific response of import penetration to changes in profit-margins and to evaluate the dampening effect of import competition on industry profit-margins

The evidence supporting the “import-discipline” hypothesis is based on an econometric methodology which directly estimates markups of price over marginal cost and is more adapted than the traditional one based on the measure of the profit margins from the accounting data. In this context, the estimates of markups (only one point estimation by sector) are related to import penetration ratio. Although useful, clearly, the framework adopted has a number of important limitations to be borne in mind when interpreting the results.

Indeed, as noted by Roberts and Tybout (1996), a finding that higher import penetration subsequent to trade liberalization reduces profitability or markups does not necessarily imply that domestic producers were, prior to trade liberalization, engaging in anticompetitive practices. In a Heckscher-Ohlin world, if import-competing industries are relatively capital-intensive, trade liberalization will put downward pressure on the remuneration of capital; but this will reflect factor-price equalization rather than the elimination of anti-competitive practices. Indeed, the type of trade that can bring competitive discipline on domestic producers is intra-industry trade rather than Heckscher-Ohlin trade. Thus, the mechanism implicit in the estimated equation should be expected to work primarily in industries where intra-industry trade is substantial.

In transition economies, relatively low wage costs compared to those in the OECD have induced some degree of specialization in labor-intensive industries and consequent Heckscher-Ohlin trade in which capital-intensive industries in these countries are downsized as a result of trade liberalization (in transition economies especially, these industries were also characterized by large-scale managerial inefficiencies). This process by itself would have tended to reduce the remuneration of capital irrespective of any anti-competitive behavior prior to the trade liberalization.

Although import-penetration ratios are treated as exogenous in the estimated equation, they are likely to be endogenous. Variations in import penetration are affected not only by (presumably exogenous) changes in trade policy, but also by the ability of domestic producers to fend off foreign competition, which may be correlated with industry characteristics such as profitability. Thus, short of a full simultaneous-equation approach, import-penetration ratios should be instrumented by other exogenous or predetermined variables. However, relatively few studies do so. A notable exception is Grether (1996) who uses measures of trade incentives at the sector level (tariffs and their equivalents of Quantity Ratios) in a study of the effects of the Mexican trade liberalization of the middle 1980s.

Moreover, the endogeneity problem among the variables is likely to be more insidious. After all, the degree of competition is also potentially endogenous as well as the extent of collusive activity. This is why, theoretically at least, it has been recognized that a thorough testing of the import-discipline hypothesis should model as well the degree of competition and the extent of collusive behavior.

In summary, the results show that import penetration has a disciplinary effect on price-cost margins. In spite of the caution that must be taken in interpreting the results of the “import-discipline” hypothesis, it is well-established that trade liberalization achieves at least some of the result that competition policy seeks to achieve – namely putting a check on the ability of domestic producers to exploit consumers. Indeed, in an economic and political environment in which harmonized and/or delegated trade policies are less subject to capture by domestic lobbies (rent seeking and/or corruption), competition policies might be affected by increased lobby pressure. This means that the policy objective involves more than the maximization of a suitably defined domestic welfare function, and one should take into account the political pressures that are likely to shape the formulation of trade and competition policies.

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