THE UNIVERSITY OF TEXAS AT SAN ANTONIO, COLLEGE OF BUSINESS

Working Paper SERIES

March 04, 2009

Wp# 0060ECO-102-2008

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Keywords: Italy, Textile Industry

JEL Classifications: D2, F14, L

*Not for circulation. Not to be quoted without permission. This paper was partially supported by a College of Business Summer Research Grant.

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Abstract

Despite increasing competition from newly industrializing countries, Italy's textile industry has continued to be an important contributor to the domestic economy. Many observers attribute this resilience to the industry's focus on quality. Here, we take note of that view but also examine production and cost relationships to explore the existence of returns to scale and the interrelationships among inputs to gain additional insights about the future prospects for this industry.

The findings are consistent with constant returns to scale and a substitute relationship between all input pairs except for domestic capital and foreign intermediate goods. While the estimated cross elasticity values for the latter input pair suggested complementarity, they were not statistically significant. The results also suggested some increasing flexibility in the labor market, perhaps including informal sector arrangements, greater responsiveness of labor demand to the price of capital, and more international production sharing arrangements. An increasing elasticity over time of the demands for domestic capital and domestic intermediate goods with respect to the price of foreign substitutes was also observed. Maintaining the Italian textile industry's reputation for outstanding quality may be an important survival strategy for some products; international production sharing may be necessary to maintain competitiveness for others.

I. Introduction

The Italian textile and apparel industry is internationally renowned for the style and high quality of its production. This high regard is particularly important given that the Agreement on Textiles and Clothing (ATC) provided for the (almost) full integration of the textile and apparel industries into GATT rules as of January 1, 2005.[1] While the textile industries in much of Western Europe have experienced significant declines in employment and demand in recent years, the Italian textile industry has so far been extraordinarily resilient to these challenges (Bolisani and Scarso, 1996; Keenan, *et. al.*, 2004, pp. 313-314; Owen, 2003; and Stengg, 2001). Although employment in this industry in Italy has recently declined somewhat, the negative effects of global competition have been less severe than in some other developed countries. Still, the Italian textile and apparel industry is likely to face formidable challenges in the near future. In the remainder of this paper, we shall use the term "textile industry" to refer to the aggregate textile and apparel industry, since most of the available Italian data pertain to the combined "tessili e dell'abbigliamento" industry.

The textile industry clearly continues to be an important contributor to the Italian economy. In 2005, about 8.8% of Italy's exports and 5.0% of its imports were textile industry related, resulting in a positive trade balance for the industry of 10,802 million euros, compared with an aggregate trade balance for all commercial activities of -9,947 million euros.[2] In 2003, employees in the Italian textile industry accounted for 4.9% of aggregate employment, but

[1]The ATC was negotiated during the Uruguay Round of the GATT. While the liberalization was scheduled in stages, much of it was delayed until 2005, so the January 1, 2005 date was particularly significant (Liu and Sun, 2004, pp. 53-54). However, the ATC also included some provisions that enabled countries to at least temporarily continue to place restrictions on textile and apparel imports. One example of those clauses is the arrangement that admitted China to the WTO, which included a provision that allowed the other members to place restrictions on all imports subject to the ATC until 2008,. In addition,there was a China-specific measure that is effective until 2013 (Liu and Sun, 2004, p. 54). The United States did determine that resulting increases in imports in early 2005 were disrupting domestic markets and reimposed limits on imports of some Chinese textiles in April of that year (Federal Reserve Bank of Atlanta, 2005, p. 13).

[2]Istituto Nazionale di Statistica, *Annuario statistico italiano: 2006*, pp. 422-423.

officially only a little over 2% of labor compensation. Textile industry sales accounted for 4.9% of Italian GDP, while industry value added was about 1.3% of GDP.[3]

Since the textile industry is an important contributor to the Italian economy, it is not surprising that much survey and case study research has been done regarding the Italian textile industry in recent years.[4] However, we are unaware of any similar econometric work involving the estimation of production or cost relationships for the industry. The purpose of this study is to examine whether economies of scale are still present in the industry and to determine the nature of the relationships among the productive inputs of domestic capital, labor, and intermediate goods and foreign intermediate goods. The outcomes of this research allow us to make some inferences regarding the future challenges and opportunities facing the industry in the international trade arena.

II. Textile Industry Production and Cost Relationships

A transcendental logarithmic (translog) cost function was used to investigate the relationships among the output and inputs of the Italian textile industry. The production technology of the industry is assumed to be representable by an implicit transformation function:

$$\tau(Y, K, L, D, F, T) = 0, \tag{1}$$

where Y is real output, K is capital, L is labor, D is domestically produced intermediate goods, F is imported intermediate goods, and T represents time-related components, including technological change.[5] If the transformation function in (1) has a strictly convex input structure, there exists a

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[3]See (Istituto Nazionale di Statistica, *Annuario statistico italiano: 2006*, 2006; and Istituto Nazionale di Statistica, *Contabilità nazionale*, Tomo I, 2005.) The official statistics likely do not reflect the total economic impact of this industry as a result of the existence of an active informal or "underground" economy in this industry (Aniello, 2001).

[4]Some of these studies include (Aniello, 2001; Antonelli and Marchionatti, 1998; Berra, Piatti, and Vitali, 1995; Bolisani and Scarso, 1996; Camagni and Rabellotti, 1992; De Robertis, 2001; De Toni and Meneghetti, 2000; Guercini, 2004; Guercini and Runfola, 2004; and Owen, 2003).

[5]See Jorgenson (2000, Chapter 4), Greene (2000, pp. 640-644), Berndt and Christensen (1973); Christensen, Jorgenson, and Lau (1973); and Guilkey, Lovell, and Sickles (1983, p. 615)

unique cost function

$$TC = f(Y, P_K, P_L, P_D, P_F, T), \tag{2}$$

where P_K is the price of capital, P_L is the price of labor, P_D is the price of domestically produced intermediate goods, and P_F is the price of imported intermediate goods.

The exact cost function specified in (2) can be approximated with the translog cost function

$$\ln(TC) = \alpha_0 + \alpha_T T + \alpha_Y \ln Y + (1/2)\delta_{YY} (\ln Y)^2 + \sum_i \beta_i \ln P_i \tag{3}$$

$$+ 1/2 \sum_i \sum_j \gamma_{ij} \ln P_i \ln P_j + \sum_i \rho_{Yi} \ln Y \ln P_i$$

$$+ \sum_i \gamma_{iT} T \ln P_i + 1/2\, \gamma_{TT} T^2,$$

where *i, j* = *K*, *L*, *D*, and *F*.[6]

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for more detailed discussions of translog functions. Also see Binswanger (1974, p. 380); and Kohli (1991, pp. 103-106) for a discussion of the technological change variable.

[6]Technically, the estimation of this cost function requires that input markets be perfectly competitive. Although many of the input markets relevant to this study are not perfectly competitive, administered or negotiated prices (such as union wage rates) that do not change frequently in response to volume changes can perform a similar role for estimation purposes.

The minimum requirements for the cost function to describe a "well-behaved" technology are that it be (1) linearly homogeneous in input prices, (2) positive and monotonically increasing in input prices and output, and (3) concave in input prices. These regularity conditions for the cost function require the following restrictions on its parameters:

(1) linearly homogeneous in input prices:

$$\sum_i \beta_i = 1, \quad \sum_i \rho_{iY} = 0, \sum_i \gamma_{iT} = 0, \text{ and } \sum_i \gamma_{ij} = 0 \text{ for all } j,$$

where *i, j* = *K, L, D, F*;

(2) monotonically increasing in input prices and output:

$$\frac{\partial \ln TC}{\partial \ln P_i} \text{ and } \frac{\partial \ln TC}{\partial \ln Y} > 0, \text{ and}$$

(3) concavity in input prices.

The parameters of the translog cost function (3) can be estimated indirectly by estimating the coefficients of the cost share equations, S_i, where

$$S_i = \beta_i + \rho_{Yi} \ln Y + \sum_j \gamma_{ij} \ln P_j + \gamma_{iT} T,$$

and *I, j = K, L, D,* and *F*.[7]

The restrictions imposed on the parameters by the regularity requirement that the cost function be linearly homogeneous in factor prices allow the translog cost function to be written so that only twenty parameters must be estimated.[8] The additional assumption of homotheticity would require

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A sufficient condition for concavity of the cost function is that the Hessian matrix of second partial derivatives with respect to factor prices is negative semidefinite.

Also, γ_{ij} must equal γ_{ji}.

[7]The principal advantages of using a translog cost function rather than a translog production function are found in the following features of the cost function: (1) the partial derivatives of a cost function with respect to input prices yield the corresponding input demand functions (Shephard's Lemma), (2) it follows from (1) that the partial derivative of the cost function in logarithmic form with respect to factor prices yields the cost shares, and (3) the partial derivative of the cost function in logarithmic form with respect to output yields the cost elasticity with respect to output level (Binswanger 1974, p. 377; and (Jorgenson 2000, Chapter 1).

[8]As a result of the linearly homogeneous in prices assumption,

$$\beta_F = (1 - \beta_K - \beta_L - \beta_D),$$

$$\gamma_{FF} = [(1/2)\gamma_{KK} + (1/2)\gamma_{LL} + (1/2)\gamma_{DD} + \gamma_{KL} + \gamma_{KD} + \gamma_{LD}],$$

$$\gamma_{KF} = - (\gamma_{KK} + \gamma_{KL} + \gamma_{KD}),$$

$$\gamma_{LF} = - (\gamma_{KL} + \gamma_{LL} + \gamma_{LD}),$$

$$\gamma_{DF} = - (\gamma_{KD} + \gamma_{LD} + \gamma_{DD}),$$

$$\rho_{YF} = - (\rho_{YK} + \rho_{YL} + \rho_{YD}), \text{ and}$$

that the ρ_{Yi} terms equal zero, and the more restrictive assumption of homogeneity would require that δ_{YY} also equal zero.[9] The number of parameters to be estimated in the cost share equations can be similarly reduced. Only three of the factor share equations are linearly independent, since their sum must be equal to unity. Thus, for example, $S_F = 1 - S_L - S_K - S_D$, and the share equation for imported intermediate inputs was eliminated in the estimation procedure.

While we estimated less restrictive versions of the cost function, the homogeneous function was accepted as the final model. The less restrictive cost functions resulted in violations of the regularity conditions and were therefore rejected.[10] Separate stochastic error terms, assumed to reflect errors in optimizing behavior, were implicitly added to the cost and share equations. The cost function and share equations were estimated by using the Zellner-efficient method (ZEF) and iterating on the estimated covariance matrix until convergence was achieved.[11] The study included data from 1970-

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$\gamma_{FT} = -(\gamma_{KT} + \gamma_{LT} + \gamma_{DT})$.

[9]See Christensen and Greene (1976, p. 661). A cost function corresponds to a homothetic production function if and only if the former function is separable with respect to output and the input prices. A homogeneous production function also requires that the elasticity of cost with respect to output be constant.

[10]If the data are normalized so that total cost, the output quantities, and the input prices are equal to one in the base period and *if the translog cost function is exact*, the logarithm of α_0 is equal to zero. In this case, the addition of the translog cost function to the set of equations to be estimated increases the number of observations and adds only four parameters to be estimated. Although this normalization procedure was followed in the present study, the estimated translog cost function was not assumed to be exact. Thus, α_0 is not necessarily equal to zero.

[11]Barten (1969, pp. 24-25) has shown that maximum-likelihood estimates of a set of share equations less one are invariant to which equation is omitted. Kmenta and Gilbert (1968) and Ruble (1968, pp. 279-286) have shown that iteration of the Zellner (1962 and 1963) procedure (IZEF) until convergence yields maximum-likelihood estimates.

One could argue that industry output is an endogenous variable and that an instrumental variable procedure should be used, since the regressor and the error terms may be correlated. Similar problems may arise with measurement errors; as a result, coefficient estimates may be inconsistent (Westbrook and Tybout, 1993). However, using aggregated data for the United States, Applebaum (1978, p. 94) compared the I3SLS results of Berndt and Christensen (1974) with those of his model using the maximum likelihood method and found they were similar. Also, a potential problem with the instrumental variables methodology is that the results may be sensitive to the set of instrumental variables utilized.

2001, the earliest and latest years for which comparable data were available.[12]

III. Empirical Results

The estimated coefficients of the translog cost function are shown in Table 1 and are generally significantly different from zero.[13] The coefficient of α_Y is of particular interest since it is an

[12]The data sources are Istituto Nazionale di Statistica, *Annuario statistico italiano* and *Contabilità nazionale*, as listed in the bibliography. The data used in the study were for the *industrie tessili e dell'abbigliamento* (textile and apparel industries). Gross output was equal to *produzione ai prezzi di mercato--valori a prezzi 1995* (market value of output in 1995 prices). Total factor cost was given by *produzione ai costo dei fattori--valori a prezzi correnti* (factor cost of production at current prices). The factor cost share of labor was given by *redditi da lavoro dipendente* (income of workers), and the share of capital was given by *valore aggiunto ai costo dei fattori* (value added at factor cost) minus the share of labor. The total share of intermediate goods was given by *produzione ai costo dei fattori--valori a prezzi correnti* (the current value of output at factor cost) less the value added at factor cost. The cost share of imported inputs was given by *importazioni per ramo e classe di attività economica: industrie tessili* and *industrie del vestiario, dell'abbigliamento, dell'arredamento e affini*, and the share of domestic intermediate goods by the difference between the cost share of intermediate goods as a whole and imported intermediate goods. All of the total cost and share data were in millions of euros. The price of domestic intermediate goods was given by *prezzi alla produzione beni intermedi*. The price of imported intermediate goods was given by the import price index, *numeri indici dei prezzi per destinazione economica - importazioni: beni destinati alla trasformazione* from 1970 to 1979, and *numeri indici dei prezzi - importazioni, secondo la classificazione NACE/CLIO: prodotti tessili, cuoio e abbigliamento* from 1980 to 2001. The price of labor was given by *retribuzioni lorde per dipendente: numeri indici (media annue) della retribuzioni contrattuali per dipendente - tessile, operai e impiegati* (index of annual average cost of blue and white collar employees in the textile industry). Where the overall index for both types of workers was not available, the index for blue collar workers only was used. The data series utilized for the price of capital was *rendimento medio percentuale per gruppi di valori mobiliari: obbligazioni - imprese* (average annual percent return on business debt) through 1989 and *totale obbligazioni* (average annual percent yield on all debt) from 1990 onward. All price indices were based on the year 2000 = 100.

[13]The regularity conditions were satisfied at all of the data points.

The conventional single-equation Durbin-Watson statistic for the total cost function was 2.31, in the inconclusive range at the five percent level of significance. See Durbin (1957), Malinvaud (1970, p. 509), and Berndt and Christensen (1973, p. 95) for a discussion of the Durbin-Watson statistic as a criterion for autocorrelation in the case of simultaneous equations.

A Lagrange multiplier test for serial correlation was also done on the total cost equation using lagged values of the error term ranging from one to nine periods (see Godfrey, 1988, pp. 112-117; and Greene, 2000, pp. 540-541). The null hypothesis of $\rho = 0$ could not be rejected at the 5 percent level of significance for any of the lag specifications.

In addition, the Regression Specification Error Test (RESET) was performed on the total cost equation using terms involving the dependent variable estimates up to the fourth power (Maddala, p. 478). This procedure did not suggest any model specification errors at the five estimate of the cost elasticity ($E_C = \partial \ln TC/\partial \ln Y$), for a cost function corresponding to a homogeneous production function. An estimate of returns to scale can be calculated as the reciprocal of the cost elasticity. Here, the estimated coefficient of α_Y is 1.06, which would suggest slightly decreasing returns to scale. However, this estimated value is not significantly different from one, so we cannot reject the hypothesis of constant returns to scale. These results suggest that the Italian textile industry has sufficient output given its production technology to have reached at least the minimum efficient scale of plant.[14]

The direct price elasticity estimates are shown in Table A1.[15] All of these estimates are negative, as would be expected. Using a bootstrap procedure (Eakin, *et. al.*, 1990; and Kerkvliet and McMullen, 1997), we found that the mean estimates of these elasticities were also significantly less than zero at the 2.5% level of significance. The relatively high direct price elasticity estimates for labor are interesting in that European labor market rigidities are frequently considered to be a

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percent level of significance.

[14]Owen (2003, pp. 5, 20-23, 29) suggests that some firms in the Italian apparel industry are able to achieve more unit cost reductions through economies of scale because of higher production volume than comparable British apparel firms. However, these production volumes may be sufficient to exhaust the possibilities for further average cost reductions from scale economies. For example, Owen states, based on his own estimate and that of an interviewed firm, that the minimum efficient scale for woolen weaving is between 3.5 and 5.0 million meters annually, a figure that is small relative to the size of the market. However, at outputs below this level, size does matter (Owen, 2003, p. 20). Aniello (2001) also discusses how interrelationships between small and medium-sized firms allow them to achieve the cost efficiencies of larger firms. In earlier studies Tybout and Westbrook (1995, pp. 70-71) and Westbrook and Tybout (1993) generally did not find statistically significant economies of scale in the Chilean and Mexican textile and apparel industries. Ramcharran (2001a, p. 521) found that returns to scale in the U.S. textile industry ranged from a low of 0.094 in 1975 to a high of 1.668 in 1989, and they varied considerably throughout the study period of 1975-1993. However, he (Ramcharran, 2001b, p. 289) found decreasing returns to scale in the U.S. apparel industry.

[15]The direct price elasticity of demand for input *i* is

$$E_i = \frac{\gamma_{ii} + S_i^2 - S_i}{S_i}.$$

problem. However, given that a substantial portion of the labor used in the Italian textile industry is obtained through informal arrangements, greater flexibility in labor usage may be possible.[16] Also using the bootstrap procedure, we achieved results that suggested that the direct price elasticity of demand for labor became significantly greater in absolute value over the study period.

The estimated cross price elasticities of demand are presented in Table A2.[17] These values indicate that all of the inputs are substitutes except for domestic capital and foreign intermediate goods, which appear to be complements. Again, using the bootstrap procedure, we found that the mean estimates of all of the cross price elasticities were significantly different from zero except for those involving domestic capital and foreign intermediate goods and E_{LF} (the proportional change in the quantity demanded of labor with respect to the percentage change in the price of foreign intermediate goods). Although the estimated values for E_{LF} and E_{FL} appear to be similar in size, only the mean estimate of the later was significantly greater than zero. This result suggests that the quantity demanded of domestic labor was not significantly affected by the price of foreign intermediate goods. However, the demand for foreign intermediate goods apparently was somewhat affected by the domestic price of labor.[18] While domestic capital and foreign intermediate goods appear to be complementary, the bootstrap results suggest that these cross price elasticity relationships were not significantly different from zero.

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[16]See Aniello (2001) for a discussion of how small and medium-sized firms in the industry achieve labor market flexibility by utilizing the informal sector. Owen (2003, p. 28) also relates how the Prato firms increase labor flexibility by establishing companies with fewer than 15 employees.

[17]The cross price elasticities of demand ($E_{ij} = \partial \ln X_i / \partial \ln W_j$) can be calculated using the cost shares and the estimated parameters of the model as:

$$E_{ij} = S_j + \frac{\gamma_{ij}}{S_i} .$$

[18]See Berra, Piatti, and Vitali (1995) and Bolisani and Scarso (1996) for a discussion of foreign substitutes for domestic labor in the Italian apparel industry.

We again used the bootstrap procedure to investigate the behavior of the cross price elasticity estimates over time. The results were consistent with the hypothesis that the value of E_{KL} became significantly *smaller* while E_{LK} became significantly *larger* over the study period (both at the 0.5% significance level). Bolisani and Scarso (1996) state that the Italian clothing manufacturers are becoming more capital intensive in areas where that is feasible without sacrificing quality. Once a particular production technique has become more capital intensive, it is reasonable to expect that E_{KL} might fall in value, as the *percent change* in the quantity demanded of capital might no longer be as sensitive to a given percent change in the wage rate as it was initially. A similar line of reasoning would apply to E_{LK}: as the labor intensity of production fell, the quantity demanded of labor would likely become more sensitive to changes in the price of capital in percentage terms.

The cross price elasticity relationships between capital and *domestic* intermediate goods as well as the responsiveness of the quantity demanded of imported intermediate goods to the price of capital, $E_{FK,}$ did not change significantly over the period of study. However, the responsiveness of the demand for domestic capital to the price of foreign intermediate goods, E_{KF} , did increase significantly at the 0.5 percent level, indicating a decrease in the complementarity of the two inputs by 2001.[19] This result may reflect greater availability of foreign substitutes for domestic capital, perhaps from Eastern Europe, China, and other areas. In addition, Bolisani and Scarso relate a number of examples of production-sharing arrangements between Italian and international firms. Though many of these may have the primary goal of reducing labor costs, they also likely have the effect of reducing the demand for domestic capital as well. Technological advances also enhance the linkages between foreign and domestic firms.

The relationships among labor and domestic and foreign intermediate goods also generally did not change in a statistically significant way over the period of study. The values of E_{LD} and E_{LF} appeared to increase over time, indicating an increase in the responsiveness of the quantity demanded

[19]While E_{FK} also appeared to increase over time, this change was not statistically significant.

of labor to the prices of both domestic and foreign intermediate goods. These results suggest that there may have been some decrease in Italian labor market rigidities over the study period. However, these increases were significant at only the 13 percent level in each case. On the other hand, the value of E_{DL} appeared to *decrease* over time, and it did so at the 6% significance level. This finding would suggest that the demand for domestic intermediate goods was becoming *less responsive* to a change in the price of labor, perhaps reflecting a decreasing substitutability of domestic intermediate goods for labor. This result may be reflected in the fact that the share of labor in total factor cost decreased from about 26% in 1970 to less than 17% in 2001. Clearly, labor had become a less important input in terms of relative input shares. The value of E_{FL} did not change significantly.

Turning to the relationship between domestic and foreign intermediate goods, we found that the value of E_{FD} did not change significantly over the study period.[20] However, the estimated values of E_{DF} did increase at the 0.5% level of significance. This finding suggests a greater sensitivity of the demand for domestic intermediate goods to the price of foreign intermediate goods, again possibly reflecting the internationalization of the production processes in the industry, as discussed in the articles by Berra, Piatti, and Vitali (1995) and Bolisani and Scarso (1996). The fact that the factor share of foreign intermediate goods increased from a little over 7% in 1970 to over 18% in 2001 would support this conclusion.

IV. Conclusions

The results of this study suggest that the potential economies of scale have been exhausted at the levels of output achieved by the Italian textile industry during the period from 1970-2001. Thus, it does not appear that this industry can become more internationally competitive simply by increasing its output. However, numerous case studies have cited the Italian textile industry's reputation for very high quality work in certain products, a factor that can offset the cheaper costs achieved by

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[20] Again, although both E_{FL} and E_{FD} appeared to decrease over time, these changes were not statistically significant.

international competitors. Nevertheless, for certain goods where outstanding quality is not such an important factor in the marketplace, Italian firms have become actively involved in a number of production sharing arrangements.

The findings of the study are consistent with a statistically significant negative direct price elasticity of demand for each of the four inputs: domestic capital, labor and intermediate goods; and foreign intermediate goods. They also suggested that the quantity demanded of labor is becoming more sensitive to changes in its own price over time. This latter result may reflect increasing use of labor from the informal sector by small and medium-sized firms, the substitution of domestic capital for labor in some cases where output quality was not affected, and greater possibilities for international production sharing.

The findings suggested that all of the inputs were substitutes except for domestic capital and foreign intermediate goods. However, the estimated mean value of E_{LF} was not significantly greater than zero. The values of E_{KF} and E_{FK} were not significantly less than zero, so the complementary relationship between domestic capital and foreign intermediate goods was not statistically meaningful.

The results indicated that the value of E_{KL} became significantly *smaller* over time while E_{LK} became significantly *larger*, perhaps reflecting an increase in the capital intensity of the industry. The value of E_{KF} also increased significantly over the period of study, lessening the complementarity relationship between capital and foreign intermediate goods. This finding perhaps reflects the greater availability of foreign substitutes for domestic capital, including those obtained through international production sharing arrangements. The only other cross price elasticity whose estimated value changed significantly over the study period was that of E_{DF}. Those values increased, indicating a greater sensitivity of the quantity demanded of domestic intermediate goods to the price of foreign intermediate goods. These results are consistent with increasing responsiveness of the demand for domestic capital and materials to foreign intermediate goods prices. However, these findings were not as significant as one might expect, given the greater integration of the European Union and generally greater internationalization of markets during the study period.

The values of E_{LD} and E_{LF} appeared to increase over time, but at a relatively low level of statistical significance. These findings suggest there may be greater flexibility in the Italian textile industry labor market developing over time, but the evidence is weak. On the other hand, the estimates of E_{DL} apparently decreased over time, although again at a relatively low level of significance. Such a result would indicate that a change in the price of labor had a smaller impact on the demand for domestic intermediate goods in 2001 than in 1970, perhaps because labor and domestic intermediate inputs were becoming less substitutable.

To some extent, as discussed above, the impact of internationalization has been smaller with respect to the Italian textile industry because of its longstanding reputation for excellent quality. However, if trade barriers specific to the textile industry, especially with respect to Chinese products, continue to fall as currently scheduled, the Italian textile industry may face greater difficulties in the relatively near future. The challenges are likely to be greater for products that are easily duplicated and where high quality is relatively less important. Clearly, the Italian textile industry has so far achieved a substantial measure of success in the international marketplace with its reputation for outstanding quality in those products where quality is a critical factor in consumer demand. Maintaining and even enhancing that reputation in those areas is certainly an important strategy for the industry. Nevertheless, it may find itself increasingly forced to examine more possibilities for international production sharing in other types of textiles where high quality is of less value to the consumer.

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Table A1 Direct Price Elasticities

Year	E_{KK}	E_{LL}	E_{DD}	E_{FF}
1970	-0.842	-0.986	-0.693	-1.302
1971	-0.841	-1.001	-0.691	-1.271
1972	-0.839	-1.020	-0.686	-1.253
1973	-0.842	-1.030	-0.676	-1.249
1974	-0.851	-0.975	-0.721	-1.187
1975	-0.846	-0.997	-0.714	-1.180
1976	-0.848	-0.991	-0.715	-1.183
1977	-0.846	-1.008	-0.708	-1.176
1978	-0.843	-1.027	-0.708	-1.154
1979	-0.844	-1.047	-0.708	-1.120
1980	-0.846	-1.037	-0.701	-1.143
1981	-0.847	-1.041	-0.692	-1.158
1982	-0.846	-1.054	-0.691	-1.144
1983	-0.844	-1.078	-0.689	-1.120
1984	-0.845	-1.095	-0.689	-1.097
1985	-0.846	-1.110	-0.687	-1.083
1986	-0.843	-1.141	-0.682	-1.067
1987	-0.840	-1.158	-0.684	-1.055
1988	-0.841	-1.166	-0.681	-1.051
1989	-0.841	-1.153	-0.682	-1.061
1990	-0.838	-1.150	-0.691	-1.055
1991	-0.835	-1.166	-0.694	-1.045
1992	-0.832	-1.174	-0.695	-1.044
1993	-0.833	-1.185	-0.694	-1.034
1994	-0.833	-1.194	-0.696	-1.026
1995	-0.835	-1.176	-0.698	-1.030
1996	-0.834	-1.195	-0.701	-1.013
1997	-0.835	-1.218	-0.700	-0.999
1998	-0.834	-1.243	-0.698	-0.988
1999	-0.832	-1.254	-0.699	-0.984
2000	-0.833	-1.229	-0.706	-0.988
2001	-0.833	-1.242	-0.704	-0.983

Table A2 Italian Textile Industry Cross Price Elasticities

Year	E_{KL}	E_{LK}	E_{KD}	E_{DK}	E_{KF}	E_{FK}
1970	0.432	0.239	0.526	0.162	-0.116	-0.249
1971	0.423	0.243	0.527	0.164	-0.109	-0.220
1972	0.412	0.248	0.530	0.166	-0.103	-0.201
1973	0.410	0.247	0.538	0.162	-0.106	-0.201
1974	0.447	0.229	0.507	0.154	-0.104	-0.159
1975	0.430	0.237	0.512	0.159	-0.096	-0.148
1976	0.435	0.235	0.511	0.157	-0.098	-0.152
1977	0.425	0.239	0.515	0.159	-0.094	-0.144
1978	0.412	0.245	0.516	0.162	-0.085	-0.125
1979	0.404	0.248	0.515	0.161	-0.075	-0.100
1980	0.411	0.244	0.521	0.158	-0.085	-0.119
1981	0.410	0.244	0.527	0.158	-0.091	-0.131
1982	0.403	0.247	0.528	0.158	-0.086	-0.120
1983	0.390	0.253	0.529	0.161	-0.075	-0.100
1984	0.384	0.256	0.529	0.160	-0.068	-0.085
1985	0.379	0.258	0.531	0.159	-0.064	-0.076
1986	0.364	0.267	0.534	0.162	-0.054	-0.062
1987	0.355	0.273	0.532	0.164	-0.047	-0.053
1988	0.353	0.274	0.534	0.163	-0.046	-0.051
1989	0.358	0.271	0.534	0.163	-0.050	-0.057
1990	0.356	0.273	0.526	0.166	-0.044	-0.050
1991	0.347	0.280	0.524	0.170	-0.036	-0.040
1992	0.341	0.285	0.523	0.173	-0.032	-0.037
1993	0.338	0.287	0.523	0.172	-0.029	-0.032
1994	0.335	0.289	0.522	0.172	-0.025	-0.027
1995	0.343	0.282	0.521	0.170	-0.029	-0.032
1996	0.336	0.287	0.518	0.171	-0.021	-0.021
1997	0.329	0.292	0.519	0.170	-0.014	-0.014
1998	0.321	0.298	0.521	0.171	-0.008	-0.007
1999	0.317	0.302	0.520	0.172	-0.004	-0.004
2000	0.324	0.296	0.515	0.172	-0.006	-0.006
2001	0.320	0.299	0.517	0.172	-0.004	-0.004

Table A2 Con't. Cross Price Elasticities

Year	E_{LD}	E_{DL}	E_{LF}	E_{FL}	E_{DF}	E_{FD}
1970	0.649	0.362	0.097	0.376	0.169	1.174
1971	0.655	0.354	0.103	0.362	0.174	1.129
1972	0.664	0.344	0.107	0.349	0.176	1.106
1973	0.675	0.338	0.109	0.343	0.176	1.107
1974	0.626	0.371	0.120	0.358	0.196	0.988
1975	0.637	0.359	0.123	0.345	0.197	0.984
1976	0.635	0.362	0.122	0.349	0.196	0.986
1977	0.644	0.352	0.124	0.339	0.197	0.982
1978	0.651	0.343	0.131	0.325	0.203	0.953
1979	0.657	0.334	0.143	0.309	0.214	0.910
1980	0.658	0.338	0.135	0.318	0.205	0.944
1981	0.666	0.335	0.131	0.319	0.200	0.969
1982	0.671	0.329	0.136	0.311	0.203	0.953
1983	0.680	0.318	0.144	0.296	0.211	0.924
1984	0.686	0.311	0.153	0.285	0.219	0.896
1985	0.693	0.304	0.159	0.276	0.223	0.883
1986	0.707	0.292	0.167	0.262	0.229	0.868
1987	0.712	0.286	0.173	0.254	0.234	0.854
1988	0.717	0.283	0.175	0.250	0.236	0.852
1989	0.711	0.287	0.170	0.256	0.231	0.862
1990	0.704	0.290	0.173	0.257	0.235	0.849
1991	0.708	0.284	0.178	0.249	0.240	0.836
1992	0.710	0.281	0.179	0.246	0.240	0.835
1993	0.714	0.278	0.184	0.241	0.245	0.825
1994	0.717	0.275	0.188	0.237	0.249	0.816
1995	0.709	0.281	0.185	0.243	0.247	0.818
1996	0.713	0.275	0.194	0.235	0.255	0.800
1997	0.723	0.268	0.203	0.225	0.262	0.787
1998	0.735	0.260	0.210	0.216	0.268	0.779
1999	0.739	0.257	0.213	0.213	0.270	0.775
2000	0.724	0.265	0.209	0.220	0.269	0.773
2001	0.730	0.261	0.212	0.216	0.271	0.771

Table 1 Estimates of Textile Industry Model Parameters
(t values)

	Homogeneous Production Function
α_0	0.070 (1.249)
α_T	-0.042 (- 2.735)
α_{TT}	0.003 (6.275)
α_Y	1.060 (3.437)
β_K	0.154 (25.604)
β_L	0.277 (44.454)
β_D	0.498 (63.932)
γ_{KK}	0.001 (0.232)
γ_{LL}	-0.073 (-7.509)
γ_{DD}	-0.948 (-3.022)
γ_{KL}	0.238 (7.810)
γ_{KD}	0.004 (1.088)
γ_{LD}	0.042 (3.060)
Log Likelihood	328.167